



**US Army Corps
of Engineers®**

Buffalo District

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

**2014
ENVIRONMENTAL SURVEILLANCE
TECHNICAL MEMORANDUM**

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Acronyms and Abbreviations

AEC	Atomic Energy Commission
ASTM	American Society for Testing and Materials
CAP88-PC	Clean Air Act Assessment Package – 1988 (U.S. EPA)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOD	Department of Defense
DOE	United States Department of Energy
DOH	Department of Health
EPA	United States Environmental Protection Agency
ESP	environmental surveillance program
FUSRAP	Formerly Utilized Sites Remedial Action Program
IWCS	interim waste containment structure
KAPL	Knolls Atomic Power Laboratory
LOOW	Lake Ontario Ordnance Works
MCL	maximum contaminant level
MDA	minimum detectable activity
MED	Manhattan Engineer District
MEI	maximally exposed off-site individual
m	meters
m ³	cubic meter(s)
µg/g	micrograms per gram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NCRP	National Council on Radiation Protection and Measurements
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NFSS	Niagara Falls Storage Site
NTUs	nephelometric turbidity units
NRC	Nuclear Regulatory Commission
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OSL	optically stimulated luminescence
OSLD	optically stimulated luminescence dosimeter
PAH	polycyclic aromatic hydrocarbon
pCi/g	picocuries per gram
pCi/L	picocuries per liter
Ra	radium
RCRA	Resource Conservation and Recovery Act
RSL	regional screening level
SCO	soil cleanup objective
SDWA	Safe Drinking Water Act
TDS	total dissolved solids
TED	total effective dose
U	lab qualifier–nondetect
U 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 (USACE) 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 USACE website in the "Environmental Monitoring" section:
<http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>.

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

In October 1997, Congress transferred management of FUSRAP (which had been initiated in 1974) from the DOE to the USACE. In addition to investigating and remediating site contaminants at the NFSS, the USACE is responsible for maintaining the site and conducting the ESP. The environmental surveillance activities the DOE initiated in 1979 have since evolved; today the Corps of Engineers 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 USACE Buffalo District completed the *Remedial Investigation Report for the NFSS* and *NFSS Remedial Investigation Report Addendum*, respectively. These 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 USACE further enhanced the ESP; the USACE now monitors the IWCS protective engineered controls to ensure they function properly.

Between 2012 and 2014, the Corps investigated further to describe the soil contamination in detail and locate the source of elevated uranium in groundwater south and east of the IWCS. As part of these investigations, the Corps 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 presented results of these investigations in reports issued in August 2013 (USACE, 2013a) and February 2015 (USACE, 2015a).

In 2013, the USACE Buffalo District 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 added well MW943 to the ESP, increasing the total number of wells monitored semiannually to 55. Well MW943 monitors the upper water-bearing zone south of the IWCS.

The Corps made no changes to air monitoring: it collects radon-222 flux measurements on the IWCS cap annually; it measures radon-222 concentrations and gamma emissions semiannually at the IWCS perimeter and NFSS property boundary semiannually.

To evaluate environmental surveillance data, the USACE 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 USACE Buffalo District website: <http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>.

Key Findings: The 2014 environmental surveillance analytical results confirm that site controls continue to perform as designed; they are fully protective of human health and the environment.

Results of the 2014 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); radon-222 flux measurements taken on the IWCS are less than the DOE flux standard of 20 pCi/m²/s.
- The calculated dose to a receptor due to airborne particulates is below the EPA guideline of 10 millirem/year (excluding radon); the cumulative dose, which is calculated by adding the maximum external gamma dose to the maximum airborne particulate dose, is significantly less than the DOE limit of 100 millirem/year.
- Several metals in all sediment samples and several polycyclic aromatic hydrocarbons, predominantly in upstream sediment samples, exceed criteria.
- Trace levels of chlorinated solvents were in several groundwater monitoring wells in the former acidification area, and chloroform was above criteria in one groundwater monitoring well, also located in the former acidification area.
- Total uranium concentrations in all groundwater monitoring wells were consistent with historical data.

Total uranium in surface water was detected at concentrations slightly greater than the state drinking water limit of 30 µg/L at two locations: SWSD010 (43.2 µg/L) and SWSD021 (31.1 µg/L). Both samples were collected in April 2014. However, the October 2014 data for these locations were below the drinking water standard. Furthermore, a review of historical data shows that these sampling locations have exhibited similar total uranium concentrations in the past. Samples collected in 2014 from location SWSD011 where surface water leaves the site were below the state drinking water limit.

The 2014 groundwater analytical data show that total uranium concentrations in 24 groundwater monitoring wells exceed the drinking water criterion for uranium (30 µg/L). The most elevated total uranium concentrations were detected in wells installed east and south of the IWCS in late 2012 as part of the Balance of Plant field investigation: MW953 (3,351 µg/L), located east and across the Central Drainage Ditch from the IWCS and immediately east of well OW11B; and MW951 (3,601 µg/L), located south of the IWCS and east of former Building 409.

The USACE believes the former storage piles and residual contamination in and around former Building

409 are the source of uranium in wells south of the IWCS. The Corps believes the source of uranium in wells east of the IWCS is the residual soil contamination from former operations in this area; they include a railroad bed, storage piles, and a decontamination pad used during construction of the IWCS. In addition, residual contamination in the sanitary sewer near manhole 6, which was removed in 2013 as part of field investigative activities, may have contributed to groundwater contamination in this area (USACE 2015a).

A trend analysis of total uranium in groundwater shows:

- No increasing or decreasing trends in total uranium concentrations in 44 wells
- A decreasing trend in total uranium concentrations in seven wells, including A42, A45, OW06B, OW13B, OW18B, 302A, and MW952
- A possible increasing trend in wells OW12B and MW960 (the number of available wells is less than 10, which is too small a sample size to definitively determine a trend)

It's important to note that ESP groundwater sampling results are compared to federal and state drinking water standards as a conservative basis for evaluation. Groundwater resources underlying the NFSS reflect the EPA Class IIIB criteria for nonpotable and limited beneficial use water (EPA 1986). To be a potable water source, groundwater at the NFSS would require expensive and energy intensive treatment by reverse osmosis (desalination). Since there's a replaceable surface water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it's reasonable to assume that no municipality or service would find NFSS groundwater economically viable.

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) 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 USACE Buffalo District conducts the 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 the interim waste containment structure (IWCS). The IWCS contains radiologically contaminated materials from cleanup actions the U.S. Department of Energy (DOE) conducted more than 20 years ago. The ESP is the focus of this report.

1.1 Brief History of the Niagara Falls Storage Site

The NFSS represents a portion of the former Lake Ontario Ordnance Works (LOOW). The LOOW was used by the USACE Manhattan Engineer District (MED) and U.S. Atomic Energy Commission (AEC) to store radioactive residues and other materials beginning in 1944. Nearly all the radioactive residues in the IWCS at NFSS originated from uranium (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.



Figure 1: Location of Niagara Falls Storage Site

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 sites, 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 dike and wall were built while DOE was conducting interim remedial actions at the site, and the wall was tied into the underlying clay formation. A multi-layered cap was placed over the contents after the cleanup actions were completed. These DOE actions are described in further detail in the Remedial Investigation Report (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 at the NFSS. That Record of Decision identified the IWCS as an acceptable interim storage solution with a projected service life of 25 to 50 years. During this time frame, the IWCS was considered safe for containing the radioactive residues and other wastes until a decision on their final disposition could be made. The service life of 25 to 50 years identified in the Record of Decision specifically applies to the IWCS cap; Bechtel National, Inc. (BNI) determined the design service life of the clay dike and cutoff walls surrounding the IWCS and the natural glaciolacustrine clay beneath the IWCS was 200 to 1,000 years. (BNI 1986).

1.2 Overview of Environmental Surveillance Program

The DOE initiated the ESP at the NFSS in 1979 before the construction of the IWCS. It monitored air, water, and external gamma radiation (and later streambed sediments) to ensure human health and environmental protection from radioactive residues and wastes buried in the IWCS and other on-site soil and groundwater contamination. In 1997, when responsibility for FUSRAP transferred to the USACE, the USACE Buffalo District continued to follow the DOE ESP, with some revisions over the years. The USACE reports its findings annually in the form of this technical memorandum, which is posted to the NFSS website at

<http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>.

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 USACE monitors environmental media and regularly reassesses the adequacy of the program. If warranted, the Corps 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, implemented in 2013. Sample locations and analytical parameters and methods are detailed in Section 2.0.

In addition to the collecting and analyzing environmental samples, the ESP calculates the dose to off-site receptors from airborne emissions of site soils. To do this, the USACE 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

Within 50 feet of the ground surface, the NFSS and surrounding vicinity are underlain by two water-bearing zones; 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 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 (Alluvial Sand and Gravel that overlie the upper, fractured portion of the Queenston Formation (Figure 3). It extends from the bottom of the Gray Clay Unit to the bottom of the weathered zone of the Queenston Formation. A regional groundwater divide (the Lockport Escarpment) is approximately two miles south of the NFSS. Regional groundwater flow north of the divide is toward the northwest, whereas groundwater flow south of the divide is toward the southwest.

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

1.3.2 Surface Water Drainage

Before site development, surface drainage from the NFSS entered Four Mile, Six Mile, and Twelve Mile Creeks. All of these flow northward to Lake Ontario. During the 1940s, drainage modifications routed surface water to a series of linear ditches that eventually coalesce into the Central Drainage Ditch north of the site.

The Central Drainage Ditch enters into Four Mile Creek approximately 3 miles northwest of the NFSS. The vegetation that grows in the on-site ditches during the summer months deters 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 doesn't 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 USACE collects:

- Annual radon-222 flux data via 180 radon flux canisters placed on the IWCS protective cap at discrete grid intersections and at three off-site (background) locations, as shown on Figure 4
- Semiannual groundwater samples from 44 monitoring wells, 13 wells screened in the lower water-bearing zone and 31 wells screened in the upper water-bearing zone, near the IWCS (two wells are sampled on a quarterly basis), as shown on Figure 5
- Semiannual radon and external gamma radiation samples by placing Radtrak® detectors and optically stimulated luminescence dosimeters (OSLDs), respectively, at seven locations around the perimeter of the IWCS, as shown on Figure 6

In addition, USACE collects:

- Semiannual groundwater samples from 11 monitoring wells, one well screened in the lower water-bearing zone and ten wells screened in the upper water-bearing zone, as shown on Figure 5 (note that well MW922 is sampled only if well MW921 is dry)
- Semiannual radon and external gamma radiation samples by placing Radtrak® detectors and OSLDs, respectively, at 16 locations within and around the perimeter of the site and at three off-site (background) locations, as shown on Figure 6
- 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 on to NFSS from off site.
 - SWSD010, SWSD011, SWSD022, and SWSD025 are situated along the Central Drainage Ditch.
 - WDD2 and WDD3 are located along the West Drainage Ditch.
- Quarterly water level measurements in over 100 monitoring wells throughout the site to monitor the groundwater flow directions in the upper and lower water-bearing zones

2.2 Sampling Parameters and Laboratory Analytical Methods

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

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

(limited to five wells), anions, and water quality parameters; field measurements are recorded for dissolved oxygen, turbidity, pH, temperature, specific conductivity, and oxidation-reduction potential.

The Corps 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 6020, 7470	SW 846 6020, 7470
Total Uranium	ASTM D5174.97, Trace Uranium by Pulsed Laser Phosphorimetry	ASTM D5174.97 Trace Uranium by Pulsed Laser Phosphorimetry	HASL-300m, Iso-uranium
Radium-226	EPA 903.1	EPA 903.1	EPA 901.1m
Anions •Chloride •Fluoride •Nitrate/Nitrite •Ortho-phosphate •Sulfate	EPA 300.0	EPA 300.0	---
Water Quality •Alkalinity •Total Dissolved Solids	SM-2320B SM-2540C	SM-2320B SM- 2540C	---

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

2.3 Sample Collection Techniques

All environmental surveillance activities at the NFSS are conducted in accordance with DOD Environmental Field Sampling Handbook (2013) and the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP). The UFP-QAPP provides procedures and guidance 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 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). New polyethylene tubing is used for each well during each sampling event. The Corps also measures groundwater levels and uses sample collection techniques in accordance with USACE's Engineer Manual 1110-2-1421, *Groundwater Hydrology*.

The Corps 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 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.

2.3.2 Sediment

The Corps 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 (2 to 4 inches [5 to 10 centimeters] 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 measures radon flux at the NFSS once a year toward the end of 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 monitors radon gas concentrations using Landauer Radtrak® detectors placed around the IWCS and the NFSS. The Radtrak® detectors are placed on the fence at breathing height (1.7 meters [5.6 feet] above the ground) and replaced every six months.

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

2.3.5 Gamma Emissions

External gamma radiation is monitored at the NFSS by Landauer optically stimulated luminescent detectors (OSLDs) placed around the IWCS and the NFSS at the same locations as the Radtrak® detectors, at breathing height (1.7 meters [5.6 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 (OSL) 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 the NFSS site are compared to ESP analytical data. However, the standards and criteria provided herein are for comparative purposes only; applicable or relevant and appropriate requirements and media-specific cleanup goals will be evaluated independently and presented in future CERCLA decision documents that will be available for public comment. Details are provided in the following sections.

3.1 Dose to the Public

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

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

3.2 Radioactive Constituents in Air

3.2.1 U.S. Department of Energy Order 458.1

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

3.2.2 U.S. Environmental Protection Agency Clean Air Act

The EPA guidance action level for radon concentrations in indoor air (homes and buildings) is 4.0 pCi/L. Although this limit is specific to indoor air, it is a conservative basis for comparing the outdoor air results of the environmental surveillance. To compare further, the average radon level in U.S. homes is about 1.25 pCi/L, and the average outdoor value is 0.4 pCi/L (National Council on Radiation Protection and Measurements [NCRP] 2009).

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

- 40 CFR 61.92, Subpart H, National Emission Standards for Emissions of Radionuclides Other Than Radon from DOE Facilities: emissions of radionuclides to the ambient air from DOE facilities shall not exceed amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem.
- 40 CFR 61.192, Subpart Q, National Emission Standards for Radon Emissions from DOE

Facilities: no source at a DOE facility shall emit into the air more than 20 picocuries per square meter per second ($\text{pCi}/(\text{meter}^2\text{-sec})$) ($1.9 \text{ pCi}/(\text{feet}^2\text{-sec})$) of radon-222 as an average for the entire source.

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

3.3 Radioactive and Chemical Constituents in Groundwater

3.3.1 General Groundwater Quality

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

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

In 2007, the Niagara County Department of Health (DOH) updated its well inventory to include nine potable wells (two were a sole source for drinking water), eight nonpotable wells, 20 abandoned wells, and 77 idle wells within the survey area. Based on the DOE report and the recent Niagara County DOH inventory, groundwater isn't the main source of drinking water; however, the New York State Department of Environmental Conservation (NYSDEC) Class GA groundwater standards are conservatively used to compare to ESP groundwater analytical results. Groundwater at the NFSS in both the upper and lower water-bearing zones consistently exceeds sodium and sulfate Class GA standards; it exhibits over 1,000 milligrams/Liter (mg/L) total dissolved solids and commonly exhibits over 250 mg/L chloride. By definition, these levels indicate saline groundwater or a groundwater classification GSA (Title 6 New York Codes, Rules and Regulations (6 NYCRR) Part 701.16).

3.3.2 Federal Safe Drinking Water Act for Chemicals and Radionuclides

The Safe Drinking Water Act (SDWA) is the primary federal law 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 developed its own standards; they are presented in 6 NYCRR Parts 700–705, "Water Quality Regulations for Surface and Groundwater" (NYSDEC 1996). The New York State (NYS) limit for radium-226 in groundwater is 3 pCi/L.

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

3.4 Radioactive and Chemical Constituents in Sediment

Results of the ESP sediment analyses are compared to federal and state guidelines and standards and site-specific background screening levels. Details are provided in the following sections.

3.4.1 Nuclear Regulatory Commission Dose-Based Screening Levels for Radionuclides

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

Sediment analytical results for radium-226 are compared to 5 pCi/g above background. The 5 pCi/g above background value is presented in 10 Code of Federal Regulations (CFR) Part 40, Appendix A, Criterion 6(6), which stipulates that:

“The design requirements in this criterion for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters (100 meters squared is equivalent to 1,076 feet squared), which, as a result of byproduct material, does not exceed the background level by more than: (i) 5 picocuries per gram (pCi/g) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface...”

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

New York State regulatory criteria found in 6 NYCRR Part 375, Unrestricted Use Soil Cleanup Objectives (SCOs), are compared to sediment analytical data for PAHs. When appropriate, Restricted Use (Residential or Industrial) SCOS are also cited for comparison to results. Unrestricted Use SCOs from 6NYCRR 375 for certain PAH constituents are based on a survey of soil background concentrations performed in New York State. It should be noted that sediment background concentrations would differ from soil background in many instances.

3.4.3 US Environmental Protection Agency Regional Screening Levels and Niagara Falls Storage Site Background Criteria for Metals

For some of the more common metals, such as aluminum, calcium, and sodium, among others, there are no NYSDEC SCOs. Therefore, the analytical data for these metals are compared to EPA Regional Screening Levels (RSLs) for soil (June 2015) (residential receptor). In the event that an NFSS background screening level found in Table 13-1 of the *NFSS Remedial Investigation Report Addendum* (USACE 2011) is greater than its corresponding RSL, the background screening level is selected for comparison. As noted in Section 3.4.2, sediment background concentrations presented in the *NFSS Remedial Investigation Report* (USACE 2007) would differ from soil background in many instances.

3.5 Radioactive and Chemical Constituents in Surface Water

The results from surface water samples collected from site drainage ditches are compared to NYSDEC standards presented in 6 NYCRR Part 703, Surface Water and Groundwater Quality Standards for Class B water aquatic life. The NYSDEC Class B water classification is conservatively used because the on-site Central Drainage and West Drainage Ditches discharge into Four Mile Creek, which New York State classifies as a Class B or C water source, depending on its location. If a standard for Class B water isn't available in 6 NYCRR Part 703 for a specific parameter, the corresponding standard for groundwater or Class A water is used, as appropriate.

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

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

4.0 ANALYTICAL DATA AND INTERPRETATION OF RESULTS

This section presents the 2014 ESP analytical results for groundwater, surface water, sediment, airborne particulate, radon, and gamma radiation. It's important to note that results for radioactive constituents may be expressed as negative numbers. Negative numbers can occur when the average background activity of the laboratory counting instrument exceeds the measured sample activity; background activity is subtracted from the measured sample activity to calculate the result. Also, when results fall below the laboratory's minimum detectable activity (MDA), they are interpreted as having unknown values between zero and the MDA; these are referred to herein as nondetects.

4.1 Air

To establish the annual dose to the public from radiological sources in air, the Corps 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 annual average wind speed.

4.1.1 External Gamma Radiation

In 2014, external gamma radiation dose rates were measured continuously for the year using OSLDs. The 2014 results, including both raw data and data corrected for background, are presented in Table 4.

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

Based on the 2014 OSLD results, the dose rates to the receptors are consistent with results from previous years, as follows:

- 0.020 mrem/year to a resident located 152.4 meters (500 feet) from the western perimeter fence, southwest of the site
- 0.0029 mrem/year to an off-site worker located 310.9 meters (1,020 feet) east of the site

Receptor dose rate calculations are presented in Sections 4.1 and 4.2 of Appendix A. Trend graphs depicting external gamma dose rates at the NFSS and IWCS perimeters from 1998 thru 2014 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 2014, the Corps 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 2014.

Contributions from radon gas, which isn't a particulate, aren't considered in this calculation. The total airborne particulate release rate is input into the EPA's CAP88-PC (Version 4.0) computer model to calculate:

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

The first calculation indicates that the annual airborne particulate dose to the MEI, a resident, 914 meters (2,999 feet) south-southwest of the site, in 2014, was 0.00013 mrem. Consistent with results from previous years, this value is well below the 10 mrem per year standard, individual dose, specified in 40 CFR, Part 61.92, Subpart H.

The second calculation indicates that the annual airborne particulate collective dose to the population within 80 km (50 miles) of the site in 2014 was 0.00272 person-rem. This compares to an annual background dose to the same population of 5,425,000 person-rem. Details of the calculations, including methodology, are presented in USACE's "FUSRAP CY2014 NESHAP Annual Report for Niagara Falls Storage Site (NFSS), Lewiston, New York" (USACE 2015b) included in Appendix B.

4.1.3 Calculated Cumulative Dose

As a conservative measure, the cumulative dose to the MEI, which is calculated by adding the maximum airborne particulate dose to the maximum external gamma dose, is compared to the 100 mrem per year dose limit (excluding radon). Based on 2014 data, the cumulative dose is 0.02013 mrem (0.00013 mrem + 0.020 mrem), which is significantly less than the DOE limit of 100 mrem per year (excluding radon) and the U.S. average per capita background dose of approximately 620 mrem per year (NCRP 2009). (Please note that 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.)

4.1.4 Radon Gas

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

Based on the radioactive constituents in the wastes contained in the IWCS, it's unlikely that the IWCS would emit radon-220; however, it's possible that it would emit radon-222. The Corps uses Radtrak® detectors to conduct air surveillance to determine the concentration of radon gas at NFSS. These Radtrak® detectors measure alpha particle emissions from both isotopes of radon (radon-220 and radon-222) and collect passive, integrated data throughout the period of exposure. Because radon-220 isn't a contaminant of concern at NFSS (due to the relatively low concentrations of radium-228 and the short half-life of radon-220), all concentrations are conservatively assumed to be radon-222. Results of semiannual monitoring for 2014 are presented in Table 5. The corresponding surveillance locations are shown on Figure 6.

Consistent with results from previous years, all site radon-222 results from the 2014 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 0.2 pCi/L. The results from the background locations also ranged from nondetect (less than 0.2 pCi/L) to 0.2 pCi/L. The site average of 0.20 pCi/L (nondetects included in average) is equal to that of the background average of 0.20 pCi/L; both are 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.

Measured results in 2014 for radon flux, presented on Table 6, ranged from nondetect to 0.4636 pCi/m²/s, with an average result (of detects and nondetects) of 0.0642 pCi/m²/s. Average background flux rate was 0.0575 pCi/m²/s. As in previous years, these results are well below the 20 pCi/m²/s standard specified in 40 CFR Part 61, Subpart Q, comparable to background, and demonstrate the effectiveness of the IWCS containment to mitigate the release of radon-222.

4.2 Surface Water

In 2014, all surface water samples were collected semiannually (2nd and 4th quarters) from nine designated locations. Location SWSD025 also is sampled during 1st and 3rd quarters and during significant rain events. Sample locations are presented in Figure 7.

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

- 2nd quarter samples were collected on April 14 and April 16, 2014
- 4th quarter samples were collected on October 20, October 22, and October 23, 2014
- 1st and 3rd quarter samples were also collected from SWSD025 on February 11 and August 21, 2014, respectively; eight additional sampling events occurred at SWSD025 between May and July 2014 during significant rain events
- Analytical parameters included radium-226, total uranium, PAHs, and metals (samples collected during significant rain events were analyzed for radium-226 and total uranium only)

All surface water samples are measured for turbidity prior to submission to the laboratory for analysis. If turbidity measurements are greater than 50 nephelometric turbidity units (NTUs), the sample is filtered, and both the filtered and unfiltered samples are submitted to the laboratory for analysis (applies to radionuclides and metals only). Otherwise, only 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 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 2014 analytical results for radionuclides in surface water, which are presented on Table 8, were:

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

Details are presented in the following sections.

Radium-226

Radium-226 was not detected in 33 of 38 surface water samples collected in 2014. Among the five detections, the concentrations were well below the state drinking water limit of 3 pCi/L, with concentrations ranging from 0.241 pCi/L to 0.542 pCi/L, collected at SWSD009 and SWSD025, respectively.

Total Uranium

Uranium was detected in all 38 surface water samples collected in 2014. Concentrations ranged from 0.534 µg/L at SWSD025 to 43.2 µg/L at SWSD010. Among the 38 samples collected, only two samples exhibited concentrations greater than the state drinking water limit of 30 µg/L, including 43.2 µg/L at SWSD010 and 31.1 µg/L at SWSD021 (both samples were collected in April 2014). The October 2014 data for these locations were below the drinking water standard. Furthermore, a review of historical data shows that these sampling locations have exhibited similar total U concentrations in the past. Samples collected in 2014 from location SWSD011 where surface water leaves the site were below the state drinking water limit.

4.2.3 Surface Water Chemical Findings

The 2014 analytical results for chemicals in surface water are presented on Tables 9 and 10 and are summarized below.

PAHs

No PAHs were detected in the surface water samples collected in 2014.

Metals

Several metals exceeded NYSDEC surface water criteria for aluminum, antimony, iron, magnesium, manganese, selenium, and sodium; however, the data was comparable to past results.

4.3 Sediment

In accordance with the 2014 analytical schedule, the Corps 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 2014 is as follows:

- 2nd quarter samples were collected on April 14, April 15, and April 16, 2014
- 4th quarter samples were collected on October 21, October 22, and October 23, 2014
- Location SWSD025 was also sampled on February 11 and August 21, 2014 (1st and 3rd quarters)
- Analytical parameters include radionuclides (radium-226, uranium-234, uranium-235, and uranium-238), metals, and PAHs (1st and 3rd quarter samples from SWSD025 are analyzed for radionuclides only)

Details of the findings are presented in the following sections.

4.3.1 Sediment Radiological Findings

The 2014 analytical results for radionuclides in sediment are presented on Table 11. In general, the results were:

- Below criteria
- Comparable to past results

Radium-226

The 2014 analytical results for the 20 sediment samples collected and analyzed for radium-226 were below 5 pCi/g. They exhibited activity levels ranging from 0.73 pCi/g (SWSD023) to 2.67 pCi/g (SWSD011). These results are fairly consistent with historical data, as shown on the graph on Figure 11, which presents radium-226 concentrations in sediment between 1997 and 2014; however, concentrations of radium-226 at sample locations SWSD011, SWSD025, and SWSD010 were slightly elevated compared to recent historical data.

Uranium

The 2014 analytical results for uranium isotopes, uranium-234, uranium-235 and uranium-238, in sediment showed detections in the majority of samples collected. Among the detections, the isotopic activity levels ranged from 0.08 pCi/g to 2.89 pCi/g. All of the isotopic uranium data are well below their respective criteria and most are consistent with historical data. A graphical representation of the analytical data is shown on Figure 12.

4.3.2 Sediment Chemical Findings

The 2014 analytical results for chemicals in sediment are presented on Tables 12 and 13 and are summarized below.

Metals

Several metals, including arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, and zinc, were detected in sediment at concentrations that exceed their respective NYS Unrestricted Use SCOs; however, all but cadmium and manganese were below their respective NYS Residential Restricted Use SCOs. In addition, calcium, total chromium, magnesium, potassium, sodium, and thallium exceeded the greater value between the EPA RSL or NFSS Remedial Investigation background screening level. These values are used for comparison in the absence of NYS SCOs. The analytical data are shown on Table 12.

PAHs

Several PAHs were detected in the sediment samples collected in 2014; the highest concentrations were

found at sampling point SWSD023, along the southern property boundary near a parking area owned by Modern Landfill, Inc. The analytical results for most of the detected PAHs are below their respective NYS Unrestricted Use SCOs, except for those in samples collected at SWSD023. The analytical findings for PAHs in sediment are shown on Table 13.

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 wells are sampled if a well that is typically dry is found to have water. Sampling locations are presented on Figure 5. Water levels are measured on a quarterly basis in over 100 wells.

Highlights of the groundwater sample collection effort in 2014 are as follows:

- The semiannual sampling took place between April 14 and 18 (2nd quarter) and October 21 and 27 (4th quarter); wells OW04A and OW04B were also sampled on February 11 and August 21, 2014
- Groundwater samples were collected from 56 monitoring wells in the 2nd quarter event; well MW921 replaced MW922, which was dry; well MW423, which isn't part of the ESP, was also sampled
- Groundwater samples were collected from 54 monitoring wells in the 4th quarter event; wells MW946 and MW947 were dry and replaced by wells 808A and MW423, respectively, and well MW943 was inadvertently missed
- Water level measurements were recorded from over 100 wells
- Groundwater samples were analyzed for radium-226, total uranium, VOCs (four wells only), and water quality parameters (such as alkalinity and total dissolved solids).

For comparative purposes, the NYSDEC Class GA (groundwater, which is considered potable) water quality standards (hereafter referred to as NYSDEC drinking water standards) were used. It's noted that groundwater at the NFSS isn't 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 2014, the Corps measured groundwater levels in 118 wells using an electronic depth-to-water meter. Potentiometric data were recorded from 75 wells in the upper water-bearing zone and 43 wells in the lower water-bearing zone (including six bedrock wells). Water level measurements are presented on Table 14. Figures 13 through 16 show the piezometric surfaces and groundwater flow directions in the upper and lower units during seasonally high and low groundwater conditions.

The UWBZ exists in a fine-grained glacial till that was derived from ice advancement through a proglacial 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 UWBZ during seasonal periods. This variability (texture and saturation) can produce groundwater levels that are significantly different in proximal wells. Consequently, the UWBZ potentiometric surface maps represent generalized trends in groundwater elevations, especially in areas where well levels show local variability. The potentiometric contours heavily weigh elevation data that are hydraulically similar to proximal wells, whereas localized anomalous data are ignored in the contouring. For example, water levels in MW947 can be nearly 15 feet lower than nine nearby wells, so

MW947 levels are ignored in the contouring. These omissions are not seasonally consistent and thus professional judgment, coupled with site knowledge, is used in the water-level contouring of the UWBZ. Site knowledge (or soft data) includes trends in ponded water, the presence of burial areas and utilities, vegetation coverage, and drainage characteristics that can affect the UWBZ hydrology.

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 -0.3 to 6.2 meters (-0.87 to 20.44 feet) below ground surface during 2014; the negative value reflects a minor artesian condition at well MW946 in April due to the presence of a sand lens that is under positive pressure along the well screen.

The quarterly water level fluctuations in the upper water-bearing zone averaged 0.6 meters (1.95 feet) and showed high and low elevations on April 11, 2014, and October 20, 2014, respectively.

In the lower groundwater system, the depth to water ranged from 0.09 to 3.1 meters (0.30 to 10.27 feet) below ground surface during 2014. Quarterly water level fluctuations in the lower groundwater system averaged 0.3 meters (0.87 feet) and showed high and low elevations also on April 11, 2014, and October 20, 2014, respectively. The lower groundwater system exhibits artesian conditions due to the overlying clay aquitard that confines the lower groundwater zone.

The high-water elevations in the upper system ranged from 95.3 to 97.3 meters (312.55 to 319.20 feet) above mean sea level, whereas the low-water condition ranged from 90.5 to 97.0 meters (297.00 to 318.27 feet). The high-water elevation in the lower system ranged from 94.4 to 97.0 meters (309.67 to 318.16 feet) above mean sea level, whereas the low-water condition ranged from 93.4 to 96.1 meters (306.23 to 315.32 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 significantly 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. Vertical gradients calculated using water levels obtained from monitoring well pairs indicate vertical groundwater flow normally occurs from the upper zone to the lower zone (or downward) in the midwinter through early summer period, when evapotranspiration is less robust. From midsummer to late fall, when evapotranspiration is more robust, vertical gradients in 35 percent of the well pairs become upward due to water level declines in the upper water-bearing zone. This is most pronounced near the Central Drainage Ditch east of the IWCS; in other areas of the site, the downward gradient becomes weaker for that period. This seasonal 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 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 15.

4.4.3 Groundwater Quality Parameters

At the NFSS, water quality in the upper water-bearing zone is indicative of low recharge to a hydraulically slow flow system; this produces poor-quality (near-saline) groundwater with high total dissolved solids and calcium/magnesium sulfates. Water quality in the lower water-bearing zone is poor due to high total dissolved solids. It's likely that the lower groundwater system receives recharge along the base of the Niagara Escarpment, situated approximately 3.2 kilometers (2 miles) south of the site (DOE 1994) and, to a lesser extent, via downward flow from the upper unit during spring recharge. Table 16 presents water quality parameter data for 2014.

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

Sampling of wells during the 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 isn't used as a public drinking water supply; it's 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 2014 analytical results for radionuclides in groundwater are presented on Table 16 and depicted, along with historical data, on Figures 17, 18, and 19. These figures show that the 2014 data are predominantly consistent with historical results, suggesting that groundwater is contaminated from legacy residue/waste handling and/or surface-storage practices.

Radium

Radium-226 was not detected in 90 of the 116 samples collected in 2014. Among the 26 detections, radium-226 concentrations were below the NYS drinking water standard of 3 pCi/L; they ranged from 0.231 pCi/L to 1.73 pCi/L. The highest activity level was detected in well OW05A, which was screened in the lower 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
2013 and 2014**

Groundwater Zone Monitored	Concentration Range	
	2013	2014
Upper water-bearing zone	Nondetect—0.956 pCi/L	Nondetect—1.07 pCi/L
Lower water-bearing zone	Nondetect—0.821 pCi/L	Nondetect—1.73 pCi/L

Total Uranium

The 2014 groundwater analytical data showed that total uranium concentrations in 24 groundwater

monitoring wells exceeded the uranium drinking water criterion (30 µg/L). The most elevated total uranium concentrations were detected in wells installed east and south of the IWCS in late 2012 as part of the Balance of Plant field investigation. The two wells with the highest total uranium concentrations are MW953 (3,351 µg/L), located east and across the Central Drainage Ditch from the IWCS and immediately east of well OW11B, and MW951 (3,601 µg/L), located south of the IWCS and east of former Building 409. As shown in the table below, analytical data from 2013 and 2014 are comparable.

Total Uranium Findings 2013 and 2014

Groundwater Zone Monitored	Concentration Range	
	2013	2014
Upper water-bearing zone	5.25—4,843 µg/L	5.57—3,601 µg/L
Lower water-bearing zone	0.093—18.4 µg/L	0.076—9.58 µg/L

The Corps 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 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.

As previously reported, declining to dynamic steady-state (i.e., annually fluctuating about a mean) uranium trends in 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 4.6.6.

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; they're monitored by wells 411A, MW934, MW947, MW948, and MW949. These wells were selected to monitor potential migration of the chlorinated solvent (i.e., tetrachloroethylene (PCE) and its degradation products) plume. Although not part of the ESP, well MW423 was sampled in the 4th quarter of 2014 as a substitute for well MW947, which had an insufficient volume of water to sample. Among the wells sampled, only MW949 monitors the lower water-bearing zone; all of the other wells monitor the upper water-bearing zone.

Results from the 2014 analysis were similar to previous years and showed trace levels of PCE, trans-1,2-dichloroethene, and cis-1,2-dichloroethene in wells 411A and MW948. Additionally, several VOCs, primarily laboratory contaminants (e.g., acetone and chloroform), were detected in several wells at concentrations below state drinking water standards, with two exceptions: chloroform was found in well MW934 at a concentration of 20 µg/L, which exceeds the NYS drinking water standard of 7 µg/L; and hexachlorobutadiene was found in well MW948 at a concentration of 2.2 µg/L, which exceeds the NYS drinking water standard of 0.5 µg/L. The analytical results are presented in Table 18.

Chloroform concentrations in well MW934 have fluctuated over the years (i.e., since 2009 when the well was installed), ranging from 3.61 µg/L (2009) to 1,400 µg/L (2012). Although chloroform can be a laboratory contaminant, laboratory contamination isn't likely the source of chloroform detected in well

MW934 due to its persistence and sometimes elevated level. Chloroform can be a degradation product of carbon tetrachloride, a highly volatile solvent that doesn't easily bind to soil and may leach into groundwater; there it can hydrolyze into chloroform. However, carbon tetrachloride has not been detected in any soil or water samples collected at the site. Therefore, the source of chloroform in well MW934 remains unknown.

4.6.6 Groundwater Trend Analysis

Total uranium groundwater concentrations over the course of the USACE ESP (1997 through 2014) were subjected to the Mann-Kendall test to determine if any surveillance well showed a statistically significant upward trend in concentration. Before long-term trends can be evaluated, seasonal or repetitive cyclical trends should be identified since they can account for changes in concentration over time. Temporal data plots were inspected to identify seasonality, or predictable increases or decreases in concentration within a time cycle. The data, collected primarily in the spring and fall, do not indicate a consistent repeating pattern and as such did not support the use of the seasonal Kendall test.

The Mann-Kendall test, described in the EPA's document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance* (EPA 2009) and USACE's Engineer Manual *Environmental Quality-Environmental Statistics* (USACE 2013b), is an accepted method for identifying the presence of a significant upward trend at surveillance wells. This method assumes that no discernible linear trend exists in concentration data over time (null hypothesis).

To test this hypothesis, the Mann-Kendall "test statistic" is determined. The test statistic is a function of the sample data which quantifies the probability associated with the relative magnitudes of the sample data for a given sample size (n). The significance of this probability is determined by comparison to the critical value, a threshold value of statistical significance. The critical value is determined based on a 95 percent level of confidence associated with the standard normal distribution. If the test statistic exceeds the critical value, the null hypothesis is rejected, and the alternative hypothesis that concentrations are trending is accepted. For small sample sizes less than or equal to 10, a slightly different procedure is used in which the probability is calculated directly and compared to the selected level of significance (0.05 for a 95 percent level of confidence); in this case, the null hypothesis is rejected if the probability is less than the level of significance. Rejection of the null hypothesis is considered to be strong evidence of an upward trend; if the null hypothesis isn't rejected, there's insufficient evidence for identifying a significant, nonzero trend.

The results of the total uranium groundwater concentration trend evaluation (spring and fall data from 1997 to 2014) are presented in the following two tables: the first table presents wells with sample sizes greater than 10, and the second table presents wells with sample sizes less than or equal to 10.

As shown by the results in the tables, no increasing or decreasing trends in total uranium concentrations were identified in 44 of 53 wells analyzed for trending. A decreasing trend in total uranium concentrations was identified at wells A42, A45, OW06B, OW13B, OW18B, 302A, and MW952; a possible increasing trend was identified at wells OW12B and MW960. The available sample size for wells OW12B and MW960 is considered small ($n < 10$) for definitively determining a trend. The test's statistical power (ability to accurately reject the null hypothesis) is limited by the sample size of data collected from the wells. As additional data is collected through the surveillance program the statistical power of the test will increase.

WELLS WITH SAMPLE SIZES GREATER THAN 10

Well	Sample Size (n)	Test Statistic	Critical Value	Resulting Trend
A42	25	-1.68	-1.64	Decreasing
A45	26	-2.75	-1.64	Decreasing
A50	26	-0.15	-1.64	No trend
OW04B	37	-1.53	-1.64	No trend
OW06B	27	-3.96	-1.64	Decreasing
OW07B	16	-0.77	-1.64	No trend
OW11B	23	0.21	1.64	No trend
OW13B	19	-2.10	-1.64	Decreasing
OW15B	26	-0.55	-1.64	No trend
OW17B	25	-1.21	-1.64	No trend
OW18B	15	-2.73	-1.64	Decreasing
302A	24	-1.69	-1.64	Decreasing
411A	11	-0.78	-1.64	No trend
BH49A	15	-0.30	-1.64	No trend
505	14	1.20	1.64	No trend
OW04A	24	0.60	1.64	No trend
OW05A	11	0.93	1.64	No trend
OW06A	11	0.08	1.64	No trend
OW07A	11	1.09	1.64	No trend
OW13A	11	0.47	1.64	No trend
MW862	11	0.63	1.64	No trend
MW863	11	-0.86	-1.64	No trend

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

WELLS WITH SAMPLE SIZES LESS THAN OR EQUAL TO 10

Well	Sample Size (n)	Test Probability	Level of Significance	Resulting Trend
OW03B	10	0.431	0.05	No trend
OW05B	10	0.332	0.05	No trend
OW12B	9	0.022	0.05	Possibly increasing
808A	4	0.375	0.05	No trend
BH49	10	0.397	0.05	No trend
A43	6	0.360	0.05	No trend
A55	10	0.500	0.05	No trend
OW03A	10	0.190	0.05	No trend
OW11A	10	0.216	0.05	No trend
OW12A	9	0.540	0.05	No trend
OW15A	10	0.500	0.05	No trend
OW17A	10	0.190	0.05	No trend
MW921	6	0.360	0.05	No trend
MW922	5	0.242	0.05	No trend
MW934	10	0.146	0.05	No trend
MW935	10	0.054	0.05	No trend
MW938	5	0.242	0.05	No trend
MW945	4	0.167	0.05	No trend
MW948	4	0.375	0.05	No trend

MW949	5	0.408	0.05	No trend
MW950	6	0.360	0.05	No trend
MW951	6	0.500	0.05	No trend
MW952	5	0.042	0.05	Decreasing
MW953	5	0.408	0.05	No trend
MW954	5	0.408	0.05	No trend
MW955	5	0.408	0.05	No trend
MW956	5	0.408	0.05	No trend
MW957	5	0.242	0.05	No trend
MW958	5	0.592	0.05	No trend
MW959	5	0.242	0.05	No trend
MW960	5	0.042	0.05	Possibly increasing

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

Radium-226 concentrations (pCi/L) in groundwater aren't evaluated for trending in this memorandum. Radium-226 groundwater concentrations over the course of the USACE ESP (1997 through 2014) 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 USACE:

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

The results of the 2014 ESP show that the IWCS is continuing to perform as designed and is fully protective of human health and the environment. The data indicate that most contaminant concentrations are below regulatory standards and criteria. Based on 2014 data, contaminants that exceed criteria (used for comparison purposes only) include:

- Total uranium at two locations in surface water
- Metals at multiple locations and PAHs at two locations in sediment
- Total uranium at multiple locations in groundwater
- A couple of VOCs at two locations in groundwater

The 2014 groundwater analytical data show that total uranium concentrations in 24 groundwater monitoring wells exceed the drinking water standard. All 24 wells screened in the upper water-bearing zone. Some of these wells are located along the northeastern, northern, and eastern boundaries of the NFSS, but the majority of the wells are located east and south of the IWCS. The two wells with the highest total uranium concentrations are MW953 (3,351 µg/L), located east and across the Central Drainage Ditch from the IWCS and immediately east of well OW11B, and MW951 (3,601 µg/L), located south of the IWCS and east of former Building 409.

The Corps 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 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 Corps analyzed the trend of total uranium in groundwater for 53 monitoring wells. The results showed no increasing or decreasing trends in total uranium concentrations in 44 of the 53 wells. A decreasing trend in total uranium concentrations was identified at wells A42, A45, OW06B, OW13B, OW18B, 302A, and MW952; a possible increasing trend was identified at wells OW12B and MW960. The available sample size for wells OW12B and MW960 is considered too small (less than 10) to definitively determine a trend. The test's statistical power is limited by the sample size of data collected from the well. As additional data are collected through the surveillance program, the statistical power of the test will increase.

6.0 REFERENCES

- Acres American, Inc., 1981. *Hydrologic and Geologic Characterization of the U.S. DOE-Niagara Falls Storage Site*, Buffalo, New York (September).
- Argonne National Laboratory, 2012. *Preliminary Evaluation of Health Effects for Hypothetical Exposures to Contaminants from the Interim Waste Containment Structure Technical Memorandum*, (February).
- EA (EA Engineering, Science, Technology) 1998. History Search Report, Lake Ontario Ordnance Works (LOOW), Niagara County New York, August.
- La Sala, A.M. Jr., 1968. *Ground-Water Resources of the Erie-Niagara Basin, New York, State of New York Conservation Department, Water Resources Commission, Basin Planning Report ENB-3*.
- National Council on Radiation Protection and Measurements (NCRP), 2009. *NCRP REPORT No. 160, Ionizing Radiation Exposure of the Population of the United States*.
- New York State Department of Environmental Conservation (NYSDEC), 1994. Memorandum from Michael J. O'Toole to the Regional Hazardous Waste Remediation Engineers, Bureau Directors and Section Chiefs, Division of Technical and Administrative Guidance, Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels (January 24).
- NYSDEC, 1999. *Codes of Rules and Regulations of the State of New York (NYCRR); Title 6, Department of Environmental Conservation; Chapter X, Division of Water Resources; Subchapter A, General; Part 703, Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards*. NYSDEC Water-Quality Regulations (August).
- USACE, 2007. *Groundwater Flow and Contaminant Transport Modeling, Niagara Falls Storage Site, Lewiston, New York*. (December).
<http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>
- USACE, 2007, (Science Applications International Corporation (SAIC) and Tetra Tech). *NFSS Remedial Investigation Report*, (December).
<http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>
- USACE, 2008. *Environmental Quality: Environmental Statistics, App. Q: Trend Analysis*, USACE EM 1110-1-4014. (January). <http://140.194.76.129/publications/eng-manuals/em1110-1-4014/>.
- USACE, 2011, SAIC, *NFSS Remedial Investigation Report Addendum* (April).
<http://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/NiagaraFallsStorageSite.aspx>
- USACE 2013a. *Balance of Plant Operable Unit Field Investigation, Niagara Falls Storage Site, Lewiston, New York*, Prepared by URS Group, Inc., August.
- USACE, 2013b, Engineer Manual: *Environmental Quality – Environmental Statistics* (May),
- USACE, 2015a, (URS Group, Inc.). *Field Investigation Report Balance of Plant Operable Unit, Investigation to Refine the Extent of Soil Contamination*. (February).
- USACE, 2015b, *FUSRAP CY2014 NESHAP Annual Report for Niagara Falls Storage Site (NFSS)*, Lewiston, New York, (June).

- U.S. DOE, 1994. *Niagara Falls Storage Site Failure Analysis Report* (unnumbered), Oak Ridge, Tenn. (December).
- U.S. DOE, 1996a. *Standards/Requirements Identification Document, Formerly Utilized Sites Remedial Action Program*, (April).
- U.S. DOE, 1996b. Letter from L. K. Price (Director, FSRD) to P. A. Giardina (Radiation Branch, U.S. EPA Region II), Status of Radon Flux Monitoring (NESHAPs Subpart Q) at Three Department of Energy Sites in U.S. EPA Region II, CCN 143772 (July 1).
- U.S. DOE, 2011. Change 2: 6-06-11, DOE Order 458.1, Radiation Protection of the Public and the Environment.
- U.S. DOE 2012. Assessment of Historical Knolls Atomic Power Laboratory Waste Storage Locations, Niagara Falls Storage Site, FUSRAP Site, Lewiston, New York, LMS/NFS/S06763, Office of Legacy Management, February.
- U.S. EPA 1986. *Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy*, U.S. EPA/440/6-86-007. December 1986.
- U.S. EPA, 1987. *A Compendium of Superfund Field Operations Methods*, U.S. EPA/540/P-87/001 (August). U.S. EPA, 2007. *Users Guide for Version 3.0, CAP88-PC*, (March).
- U.S. EPA, 1992. *RCRA Groundwater Monitoring: Draft Technical Guidance*, U.S. EPA/530/R-93/001, Office of Solid Waste (November).
- U.S. EPA, Revision 1, 1996. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846 (September).
- U.S. EPA, 1993. *Radon - A Physician's Guide: The Health Threat With A Simple Solution*, 402-K-93-008 (September).
- U.S. EPA, 1995. Letter from Tara O'Toole (Assistant Secretary, Environment, Safety and Health) to Distribution, Memorandum of Understanding with the Environmental Protection Agency Concerning the Radionuclide National Emission Standards for Hazardous Air Pollutants, CCN 130813 (April 5).
- U.S. EPA, 1996. *Drinking Water Regulations and Health Advisories*, U.S. EPA-822-R-96-001, Office of Water (February).
- U.S. EPA, 2000. *National Primary Drinking Water Regulations; Radionuclides; Final Rule*, Federal Register Vol.65, No. 236 (December).
- U.S. EPA, 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*, EPA 530/R-09-007.
<http://www.epa.gov/osw/hazard/correctiveaction/resources/guidance/sitechar/gwstats/index.htm>
- Wehran Engineering Corporation, 1977. *Hydrogeologic Investigation: Chem-trol Pollution Services, Inc., Townships of Porter and Lewiston, Niagara County, New York*.

TABLES

Acronyms and Abbreviations (in Tables)

BKGD	background
CY	calendar year
DO	dissolved oxygen
DOE	Department of Energy
°F	degrees Fahrenheit.
IWCS	Interim Waste Containment Structure
J	data estimated
LWBZ	lower water bearing zone
MDA	method detection activity
MDL	method detection limit
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mrem	millirem
mrem/yr	millirem per year
mS/cm	millSiemens 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/m ² /s	picocuries per meters-squared per second
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
R	data rejected
RI	remedial investigation
RSL	regional screening level
SDWA	Safe Drinking Water Act
Spec. Cond.	Specific conductance
TDS	total dissolved solids
TLD	thermo luminescent dosimeter
U	not detected
µg/kg	microgram per kilogram
UWBZ	upper water bearing zone
VOC	volatile organic compound
µg/L	micrograms per liter

Table 1: Evolution of NFSS Environmental Surveillance Plan

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

Parameter	1997	2000	2003	2008	2009	2010 (fall) (spring 2010 same as 2009)	2013 (fall) (spring same as 2010)
Radon Flux (Radon-222 emissions)	-----	180 monitoring locations	183 monitoring locations	183 monitoring locations	183 monitoring locations	183 monitoring locations	183 monitoring locations
OSLs (external gamma dose)	18 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location
Radon-222, -220	18 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	20 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location	26 locations 1 duplicate location
Groundwater level measurements	66 wells	66 wells	91 wells	91 wells	91 wells	101 wells	101 wells
Groundwater Sampling	8 wells: BO2W20S, A45, A50, OW04B, OW06B, OW07B, OW15B, OW17B	8 wells (same)	8 wells (same)	18 wells: The 10 groundwater wells added to the ESP include: OW18B, 313, 505, 302A, A42, BH49A, OW04A, OW11B, 415A, and 201A NOTE: OW13B replaced OW07B in 2004	18 wells (same)	Spring 2010 - Same as 2009 Fall 2010 - 39 wells (wells OW04A/4B are sampled quarterly; all others are sampled semi- annually)	54 wells: (wells listed on Table 2)
	<u>Field Parameters:</u> Dissolved oxygen, redox potential, turbidity, temperature, specific conductivity, pH <u>Water quality</u> <u>analytes:</u> calcium, magnesium, potassium, sodium alkalinity, bicarbonate, carbonate, chloride, nitrate-nitrogen, nitrite-nitrogen, phosphate, sulfate, Total Dissolved Solids, sulfate	<u>Field Parameters:</u> Same	<u>Field Parameters:</u> Same	<u>Field Parameters:</u> Same	<u>Field Parameters:</u> Same	<u>Field Parameters:</u> Same	<u>Field Parameters:</u> Same
	<u>Water quality</u> <u>analytes:</u> Same	<u>Water quality</u> <u>analytes:</u> Same	<u>Water quality</u> <u>analytes:</u> Same	<u>Water quality</u> <u>analytes:</u> alkalinity(calcium carbonate) and total dissolved solids	<u>Anions:</u> chloride, fluoride, nitrate, nitrite, ortho- phosphate, sulfate	<u>Water quality</u> <u>analytes:</u> Same	<u>Water quality</u> <u>analytes:</u> Same
	<u>Radionuclides:</u> Total uranium, radium, thorium	<u>Radionuclides:</u> Same	<u>Radionuclides:</u> Same	<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>Radionuclides:</u> Same	<u>Radionuclides:</u> Iso-uranium, Iso-thorium, Thorium-226, -228 Strontium-90, Technetium-99, Cesium-137, Iso-plutonium, Trifluoride	<u>Radionuclides:</u> Total Uranium Radium-226
	<u>Metals:</u> Copper, lead, vanadium	<u>Metals:</u> Same	<u>Metals:</u> Same	<u>Metals:</u> Target analyte list, boron, and lithium	<u>Metals:</u> Same	<u>Metals:</u> Same	<u>Metals:</u> Same
				<u>Volatile Organic Compounds (VOCs):</u> Only wells 415A and 201A	<u>VOCs:</u> same	<u>VOCs:</u> Only wells 415A, 411A, 201A, MW934, MW948, MW949, MW950	<u>VOCs:</u> Same

Table 1 Continued: Evolution of NFSS Environmental Surveillance Plan

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

**Table 2
2014 ESP
Groundwater Sampling
Niagara Falls Storage Site**

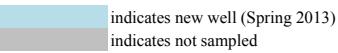
Well Location	UWBZ or LWBZ	Well	Purpose	*Laboratory Analytical Parameters						**Field Parameters
				Total Uranium	Radium -226	VOCs	Alkalinity	TDS	Anions	
A45	UWBZ	N (IWCS)	X	X			X	X	X	X
OW04A ¹	LWBZ	N (IWCS)	X	X			X	X	X	X
OW04B ¹	UWBZ	N (IWCS)	X	X			X	X	X	X
BH49A	UWBZ	N (IWCS)	X	X			X	X	X	X
BH49	LWBZ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

***Laboratory Analytical Parameters**

		**Field Parameters:
VOC	- Volatile Organic Compounds	pH
TDS	- Total Dissolved Solids	Temperature
Anions:	Chloride	Specific conductivity
	Fluoride	Oxidation-Reduction Potential
	Nitrate	Dissolved oxygen
	Nitrite	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.)
	Phosphate	
	Sulfate	

UWBZ - upper water bearing zone

LWBZ - lower water-bearing zone

 indicates new well (Spring 2013)
 indicates not sampled

¹ These wells are sampled quarterly

² MW921 or MW922 is sampled based on availability of water within these wells

Table 3
2014 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
2014 External Gamma Radiation Dose Rates
Niagara Falls Storage Site

Monitoring Location	Monitoring Station	Gross OSL ^a Data ^b (mrem) (12/23/2013 - 07/09/14) ^c	Gross OSL ^a Data ^b (mrem) (07/09/2014 - 12/23/14) ^c	Normalized Gross TLD Data ^d (mrem/yr)	CY2014 Net OSL ^e Data (mrem/yr)
NFSS Perimeter	1	15.0	16.0	31.0	8.8
	1	15.0	16.0	31.0	8.8
	7	10.0	13.0	23.0	0.8
	7	10.0	14.0	24.0	1.8
	11	10.0	12.0	22.0	-0.2
	11	8.0	11.0	19.0	-3.2
	12	12.0	13.0	25.0	2.8
	12	14.0	11.0	25.0	2.8
	13	11.0	15.0	26.0	3.8
	13	11.0	13.0	24.0	1.8
	15	15.0	16.0	31.0	8.8
	15	14.0	15.0	29.0	6.8
	28	18.0	16.0	34.0	11.8
	28	15.0	16.0	31.0	8.8
	29	12.0	18.0	30.0	7.8
	29	14.0	18.0	32.0	9.8
	32	10.0	11.0	21.0	-1.2
	32	11.0	11.0	22.0	-0.2
	36	13.0	16.0	29.0	6.8
	36	13.0	16.0	29.0	6.8
	45	12.0	12.0	24.0	1.8
	45	12.0	11.0	23.0	0.8
	50	17.0	16.0	33.0	10.8
	50	16.0	17.0	33.0	10.8
	55	13.0	18.0	31.0	8.8
	55*	-	17.0	17.0	-5.2
	60*	-	15.0	15.0	-7.2
	60*	-	14.0	14.0	-8.2
	65	18.0	17.0	35.0	12.8
	65	16.0	14.0	30.0	7.8
	122	14.0	15.0	29.0	6.8
	122	14.0	15.0	29.0	6.8
	123	12.0	13.0	25.0	2.8
	123	10.0	15.0	25.0	2.8
IWCS Perimeter	8	9.0	11.0	20.0	-2.2
	8	11.0	11.0	22.0	-0.2
	10	14.0	14.0	28.0	5.8
	10	14.0	16.0	30.0	7.8
	18	12.0	13.0	25.0	2.8
	18	11.0	12.0	23.0	0.8
	21	12.0	14.0	26.0	3.8
	21	12.0	13.0	25.0	2.8
	23	14.0	14.0	28.0	5.8
	23	13.0	14.0	27.0	4.8
	24	12.0	14.0	26.0	3.8
	24	11.0	14.0	25.0	2.8
	40	11.0	11.0	22.0	-0.2
	40	11.0	14.0	25.0	2.8
Background ^f	105	9.0	11.0	20.0	
	105	9.0	12.0	21.0	
	116	9.0	10.0	19.0	
	116	8.0	13.0	21.0	
	120	11.0	16.0	27.0	
	120	11.0	14.0	25.0	
Average Background		9.5	12.7	22.2	

a OSL - Optically Stimulated Luminescence dosimeters

b All data reported from the vendor are gross results in mrem per monitoring period.

c Exposure period date format mm/dd/yy.

d Gross data for each period are normalized to a daily dose rate, averaged, and then normalized for the length of the year (365 days).

e Net data are corrected by subtracting the average normalized background value.

f Background Locations: 105-Lewiston-Porter School, 116-Balmer Road and 120-Lewiston Water Pollution Control Center

* Dosimeter damaged during first half of 2014 monitoring period.

Table 5
2014 Radon Gas Concentrations^a

Monitoring Location ^b	Station	Average Daily Concentration (pCi/L)			Average Daily Concentration (pCi/L)		
		12/23/13-7/09/14 ^c			7/09/14-12/23/14 ^c		
NFSS Perimeter	1	< 0.2	±	0.02	< 0.2	±	0.02
	7	< 0.2	±	0.02	< 0.2	±	0.02
	11	< 0.2	±	0.02	< 0.2	±	0.02
	12	< 0.2	±	0.02	< 0.2	±	0.02
	12 (dup ^d)	< 0.2	±	0.02	< 0.2	±	0.02
	13	< 0.2	±	0.02	< 0.2	±	0.02
	15	< 0.2	±	0.02	< 0.2	±	0.02
	28	< 0.2	±	0.02	0.2	±	0.02
	29	< 0.2	±	0.02	0.2	±	0.02
	36	< 0.2	±	0.02	0.2	±	0.02
	45	< 0.2	±	0.02	< 0.2	±	0.02
	50	< 0.2	±	0.02	< 0.2	±	0.02
	55	< 0.2	±	0.02	< 0.2	±	0.02
	60	< 0.2	±	0.02	< 0.2	±	0.02
	65	< 0.2	±	0.02	< 0.2	±	0.02
IWCS Perimeter	122	< 0.2	±	0.02	0.2	±	0.02
	123	< 0.2	±	0.02	< 0.2	±	0.02
	8	< 0.2	±	0.02	< 0.2	±	0.02
	10	< 0.2	±	0.02	< 0.2	±	0.02
	18	< 0.2	±	0.02	0.2	±	0.02
	21	< 0.2	±	0.02	< 0.2	±	0.02
	23	< 0.2	±	0.02	< 0.3	±	0.02
Background	24	< 0.2	±	0.02	0.2	±	0.02
	40	< 0.2	±	0.02	0.2	±	0.02
	105	< 0.2	±	0.02	< 0.2	±	0.02
	116	< 0.2	±	0.02	0.2	±	0.02
	120	< 0.2	±	0.02	< 0.2	±	0.02

- a. Radon gas concentrations were measured with RadTrak® detectors.
These detectors measure the combined concentration of radon-220 and radon-222 in air.
- b. Monitoring locations are shown on 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.

(<0.2) Indicates detection limit is reported. Actual result is less than this value.

1 pCi = 0.037 becquerel

Table 6
2014 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	U	0.0295	± 0.0147	0.0515	51		0.1002	± 0.0251	0.0236
2	U	0.0066	± 0.0174	0.0579	52		0.0490	± 0.0100	0.0237
3	U	0.0000	± 0.0241	0.0865	53		0.1058	± 0.0153	0.0347
4	U	0.0193	± 0.0104	0.0441	54		0.1045	± 0.0194	0.0236
5		0.0327	± 0.0083	0.0311	55		0.0524	± 0.0096	0.0179
6		0.0472	± 0.0103	0.0276	56		0.1129	± 0.0146	0.0359
7		0.0608	± 0.0193	0.0533	57		0.0685	± 0.0119	0.0203
8		0.0636	± 0.0105	0.0217	58		0.0530	± 0.0156	0.0236
9		0.1502	± 0.0184	0.0216	59		0.0584	± 0.0112	0.0433
10		0.0330	± 0.0096	0.0201	60		0.0895	± 0.0130	0.0168
10-DUP ^b		0.0444	± 0.0094	0.0201	60-DUP ^b		0.0943	± 0.0138	0.0220
11		0.1188	± 0.0242	0.0751	61		0.0977	± 0.0139	0.0181
12		0.0387	± 0.0085	0.0317	62		0.4636	± 0.0456	0.0610
13	U	0.0753	± 0.0186	0.0529	63	U	0.0239	± 0.0325	0.1325
14	U	0.0454	± 0.0285	0.1297	64		0.4134	± 0.0409	0.0578
15		0.0874	± 0.0128	0.0248	65		0.0763	± 0.0128	0.0221
16	U	0.0242	± 0.0099	0.0398	66		0.1005	± 0.0147	0.0308
17		0.0430	± 0.0108	0.0402	67	U	0.0582	± 0.0196	0.0648
18	U	0.0435	± 0.0311	0.1382	68		0.0380	± 0.0086	0.0100
19		0.0636	± 0.0104	0.0238	69		0.0700	± 0.0116	0.0167
20		0.0587	± 0.0111	0.0341	70		0.0484	± 0.0093	0.0107
20-DUP ^b		0.0516	± 0.0102	0.0419	70-DUP ^b		0.0413	± 0.0089	0.0204
21	U	0.0034	± 0.0166	0.0487	71	U	0.0565	± 0.0291	0.1135
22		0.0565	± 0.0110	0.0202	72		0.0920	± 0.0130	0.0180
23	U	0.0346	± 0.0176	0.1040	73		0.1364	± 0.0185	0.0538
24		0.0618	± 0.0115	0.0179	74	U	0.0650	± 0.0391	0.1179
25		0.0825	± 0.0121	0.0166	75		0.0492	± 0.0103	0.0181
26	U	0.0828	± 0.0257	0.0715	76	U	0.0424	± 0.0144	0.0522
27	U	0.0554	± 0.0291	0.1050	77		0.0654	± 0.0124	0.0435
28		0.0447	± 0.0087	0.0179	78		0.1002	± 0.0238	0.0238
29	U	0.0452	± 0.0107	0.0483	79		0.0628	± 0.0120	0.0238
30		0.0621	± 0.0110	0.0255	80	J	0.0521	± 0.0097	0.0221
30-DUP ^b		0.0703	± 0.0127	0.0282	80-DUP ^b	J	0.0238	± 0.0128	0.0572
31	U	0.0402	± 0.0255	0.0922	81		0.0364	± 0.0105	0.0324
32		0.0387	± 0.0100	0.0332	82	U	0.0516	± 0.0195	0.0707
33	U	0.0338	± 0.0111	0.0573	83		0.1940	± 0.0325	0.0692
34		0.0443	± 0.0151	0.0236	84		0.0665	± 0.0105	0.0112
35	U	0.0221	± 0.0139	0.0445	85		0.0592	± 0.0107	0.0220
36		0.0561	± 0.0103	0.0219	86		0.0338	± 0.0074	0.0107
37	U	0.0282	± 0.0085	0.0293	87		0.0721	± 0.0221	0.0239
38	U	0.0279	± 0.0256	0.1096	88		0.0737	± 0.0114	0.0332
39	U	0.0351	± 0.0096	0.0360	89		0.0468	± 0.0098	0.0259
40		0.0760	± 0.0126	0.0218	90	U	0.0234	± 0.0159	0.0573
40-DUP ^b		0.0687	± 0.0111	0.0219	90-DUP ^b	J	0.0407	± 0.0133	0.0427
41		0.1306	± 0.0171	0.0403	91		0.0771	± 0.0214	0.0645
42		0.0505	± 0.0105	0.0197	92		0.0783	± 0.0136	0.0467
43	U	0.0423	± 0.0249	0.1097	93		0.0541	± 0.0113	0.0317
44		0.0591	± 0.0107	0.0180	94	U	0.0294	± 0.0253	0.1146
45		0.0581	± 0.0096	0.0218	95		0.0505	± 0.0113	0.0328
46		0.0601	± 0.0111	0.0107	96		0.0345	± 0.0078	0.0222
47		0.0821	± 0.0204	0.0780	97		0.0381	± 0.0091	0.0206
48		0.0381	± 0.0092	0.0181	98		0.0836	± 0.0216	0.0239
49		0.0534	± 0.0097	0.0220	99		0.0309	± 0.0090	0.0246
50	U	0.0042	± 0.0191	0.0669	100	U	0.0412	± 0.0125	0.0332
50-DUP ^b	J	0.0427	± 0.0084	0.0107	100-DUP ^b	J	0.0248	± 0.0124	0.0403

Table 6 (cont.)
2014 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
101		0.1455	± 0.0182	0.0347	151	U	0.0231	± 0.0335	0.1346
102		0.0700	± 0.0114	0.0108	152		0.0629	± 0.0105	0.0115
103	U	0.0529	± 0.0222	0.1065	153	U	0.0205	± 0.0096	0.0371
104		0.0565	± 0.0102	0.0247	154	U	0.0900	± 0.0298	0.1207
105		0.0627	± 0.0119	0.0221	155	U	0.0087	± 0.0122	0.0492
106		0.0818	± 0.0141	0.0437	156		0.0479	± 0.0104	0.0224
107	U	0.0711	± 0.0261	0.1114	157	U	0.0096	± 0.0172	0.0598
108		0.0556	± 0.0101	0.0114	158		0.1228	± 0.0234	0.0241
109		0.0604	± 0.0116	0.0350	159		0.0692	± 0.0122	0.0114
110	J	0.0448	± 0.0095	0.0202	160		0.0613	± 0.0105	0.0223
110-DUP ^b	J	0.0115	± 0.0161	0.0608	160-DUP ^b		0.0752	± 0.0123	0.0223
111	U	0.0231	± 0.0410	0.1156	161		0.0939	± 0.0138	0.0183
112		0.0747	± 0.0111	0.0114	162		0.0644	± 0.0120	0.0109
113		0.0588	± 0.0110	0.0374	163		0.1359	± 0.0286	0.0258
114	U	0.0653	± 0.0316	0.1230	164		0.0816	± 0.0132	0.0182
115	U	0.0354	± 0.0095	0.0400	165		0.1295	± 0.0176	0.0442
116		0.0489	± 0.0100	0.0296	166		0.0868	± 0.0144	0.0206
117	U	0.0107	± 0.0150	0.0539	167		0.1428	± 0.0273	0.0658
118	U	0.0203	± 0.0341	0.0985	168		0.1192	± 0.0161	0.0184
119		0.0810	± 0.0122	0.0183	169		0.0474	± 0.0097	0.0353
120		0.0438	± 0.0086	0.0222	170		0.1596	± 0.0210	0.0331
120-DUP ^b		0.0346	± 0.0085	0.0170	170-DUP ^b		0.1469	± 0.0199	0.0208
121		0.0347	± 0.0076	0.0102	171	U	0.0832	± 0.0375	0.1041
122	U	0.0086	± 0.0061	0.0399	172		0.1194	± 0.0156	0.0103
123		0.1128	± 0.0254	0.0242	173		0.0557	± 0.0106	0.0223
124		0.0851	± 0.0128	0.0102	174	U	0.0673	± 0.0208	0.0679
125		0.1178	± 0.0165	0.0351	175		0.0749	± 0.0117	0.0184
126		0.0526	± 0.0111	0.0410	176		0.0315	± 0.0080	0.0282
127	U	0.0457	± 0.0293	0.0939	177		0.0597	± 0.0139	0.0438
128		0.1364	± 0.0180	0.0350	178	U	0.0443	± 0.0246	0.1254
129		0.0812	± 0.0137	0.0381	179		0.0417	± 0.0082	0.0184
130	U	-0.0013	± 0.0166	0.0455	180	J	0.0589	± 0.0121	0.0406
130-DUP ^b	J	0.0370	± 0.0107	0.0445	180-DUP ^b	J	0.0206	± 0.0157	0.0632
131	U	0.0622	± 0.0243	0.0889	181 ^c		0.0344	± 0.0078	0.0117
132		0.0249	± 0.0076	0.0230	182 ^c		0.0834	± 0.0144	0.0372
133		0.0384	± 0.0079	0.0224	183 ^c	U	0.0546	± 0.0339	0.1057
134	U	0.0289	± 0.0307	0.1165	Average background		0.05746	(pCi/m ² /s)	
135	U	0.0104	± 0.0127	0.0407					
136	U	0.0220	± 0.0150	0.0429			IWCS	Value	Units
137		0.0570	± 0.0127	0.0209			Average ^e	0.0642	(pCi/m ² /s)
138	U	0.0404	± 0.0360	0.1123			High ^f	0.4636	(pCi/m ² /s)
139		0.0535	± 0.0103	0.0184			Low	-0.0013	(pCi/m ² /s)
140	J	0.0464	± 0.0097	0.0223					
140-DUP ^b	U	0.0693	± 0.0168	0.0405					
141		0.0555	± 0.0108	0.0184					
142	U	0.0495	± 0.0204	0.0579					
143	U	0.0488	± 0.0281	0.0892					
144		0.0506	± 0.0112	0.0337					
145		0.0926	± 0.0143	0.0223					
146		0.1459	± 0.0194	0.0442					
147	U	0.0356	± 0.0182	0.1070					
148		0.1039	± 0.0147	0.0184					
149		0.0445	± 0.0090	0.0244					
150		0.0702	± 0.0135	0.0313					
150-DUP ^b		0.0504	± 0.0113	0.0208					

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

a. Radon-222 flux was performed on August 18-19, 2014

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

c. Background:

181-Lewiston-Porter Central School

182-Lewiston Water Pollution Control Center

183-Balmer Rd. (CWM Secondary Gate)

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

J - indicates a estimated value due to the relative percent difference between the primary finding and duplicate (-DUP) exceeds 30%.

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

f. Highest detectable finding.

Table 7
2014 Surfacewater Field Parameter Measurements
Niagara Falls Storage Site

Page 1 of 1

SURFACE WATER

Surace 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 ⁴	2/11/2014	36.0	7.11	53	2.08	39.9	11.59
SWSD009	4/16/2014	53.6	8.21	166	2.50	82.0	10.11
SWSD010	4/16/2014	37.2	6.55	159	1.01	33.2	8.79
SWSD011	4/14/2014	36.4	5.56	196	0.59	140.0	8.38
SWSD021	4/16/2014	36.3	6.90	158	1.06	33.0	10.63
SWSD022	4/16/2014	37.8	6.19	174	1.48	28.6	7.85
SWSD023	4/14/2014	54.4	7.18	11	1.55	0.0	8.24
SWSD025 ⁴	4/16/2014	35.8	5.90	182	0.66	16.0	8.27
WDD2	4/16/2014	46.3	6.33	190	0.75	119.0	9.40
WDD3	4/14/2014	63.8	7.63	174	0.98	59.9	13.34
SWSD009	5/12/2014	70.8	7.57	170	2.24	24.6	8.35
SWSD010	5/12/2014	71.6	6.81	159	1.75	34.2	5.27
SWSD011	5/12/2014	61.7	7.47	-11	1.16	71.0	10.15
SWSD021	5/12/2014	61.8	7.07	98	0.85	58.0	1.74
SWSD022	5/12/2014	67.0	6.81	48	1.55	31.6	7.19
SWSD023	5/12/2014	58.5	7.03	95	1.83	10.5	6.20
SWSD025 ⁴	5/12/2014	64.2	7.33	107	1.94	13.2	5.86
WDD2	5/12/2014	69.3	7.61	220	1.69	6.5	8.48
WDD3	5/12/2014	69.3	7.66	198	1.57	3.5	8.34
SWSD025 ²	5/14/2014	68.0	6.65	145.0	0.76	>800	6.61
SWSD025 ²	6/3/2014	69.7	6.70	159.0	1.04	150.0	6.91
SWSD025 ²	6/8/2014	65.7	6.84	176.0	1.62	15.4	8.95
SWSD025 ²	6/11/2014	73.8	7.26	175.0	1.21	119.0	7.35
SWSD025 ²	6/17/2014	64.4	6.71	159.0	0.45	112.0	6.56
SWSD025 ²	6/24/2014	68.7	7.40	168.0	1.37	17.1	8.53
SWSD025 ²	7/15/2014	76.7	6.94	140.0	1.40	530.0	5.35
SWSD025 ²	6/27/2014	75.5	6.84	180.0	0.57	264.0	6.25
SWSD025 ¹	8/21/14	69.7	7.40	80.0	1.60	177.0	4.07
SWSD009	10/23/2014	60.9	6.99	21.0	1.50	29.8	44.00
SWSD010	10/20/2014	50.5	1.56	74.0	1.56	48.3	4.55
SWSD011	10/20/2014	55.9	7.32	182.0	1.59	8.8	7.30
SWSD021	10/20/2014	54.0	7.64	238.0	0.86	18.6	4.74
SWSD022	10/20/2014	51.2	7.56	76.0	1.50	15.3	7.80
SWSD023	10/23/2014	60.9	6.99	21.0	1.50	29.8	4.78
SWSD025 ⁴	10/20/2014	49.0	7.67	49.0	1.69	8.5	8.50
WDD2	10/22/2014	51.7	7.30	201.0	1.68	19.0	5.56
WDD3	10/22/2014	50.5	7.31	21.0	1.50	29.8	4.78

a. °F - Degrees Fahrenheit.

NA - Not Applicable

b. Spec. Cond. - Specific conductance.

*Parameter not taken/meter malfunction

c. uS/cm - microSiemens/centimeter.

¹ NYSDOH requested sampling location for quarterly sampling.

d. DO - Dissolved oxygen.

² Rain Event -sample taken by autosampler

e. mg/L - milligrams per liter.

f. ORP - Oxidation-Reduction potential.

g. mV - milliVolts.

h. NTU - Nephelometric turbidity units.

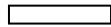
i. 1-Liter = 0.26 gallons

j. Milliter PM = milliter per minute

(1000ml = 1.0 liter) -averaged rate

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

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/23/14	04/16/14	10/20/14	04/16/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.241 J	0.256 J	0.214 U	0.393 U	0.081 U
TOTAL URANIUM	UG/L	30	8.49	4.25	43.2	4.44	12.6
RADIUM-226	PCi/L	3	0.251 U	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	UG/L	30	7.78	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed



Concentration Exceeds Criteria

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

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

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

NOTE: The detection limits shown are MDL.

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

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/14	04/16/14	10/20/14	04/16/14	10/20/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.25 U	0 U	0.225 U	0.131 U	0.264 J
TOTAL URANIUM	UG/L	30	19.6	31.1	8.21	18	7.69
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				

Concentration Exceeds Criteria

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

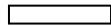
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

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

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025-R
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/23/14	02/11/14	04/16/14	05/14/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.0827 U	0.257 J	0.202 U	0.16 U	0.542
TOTAL URANIUM	UG/L	30	4.3	5.83	15.1	16.6	6.74
RADIUM-226	PCi/L	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0 U
TOTAL URANIUM	UG/L	30	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	6.7



Concentration Exceeds Criteria

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

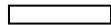
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

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

Location Identifier :			SWSD025	SWSD025	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD025-R	SWSD025-R	SWSD025-R	SWSD025-R	SWSD025-R
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			06/03/14	06/08/14	06/11/14	06/17/14	06/24/14
Parameter	Units	Criteria ¹					(2-2)
RADIOMNUCLIDES							
RADIUM-226	PCi/L	3	0.0979 U	0.064 U	0 U	-0.076 U	0.609 U
TOTAL URANIUM	UG/L	30	3.63	4.54	2.51	0.881	5.22
RADIOMNUCLIDES (FILTERED)							
RADIUM-226	PCi/L	3	0.519 U	0.231 U	Not Anaylzed	-0.257 U	Not Anaylzed
TOTAL URANIUM	UG/L	30	3.5	2.46	Not Anaylzed	0.534	Not Anaylzed



Concentration Exceeds Criteria

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

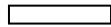
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

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

Location Identifier :			SWSD025	SWSD025	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD025-R	SWSD025-R	SWSD025	SWSD025	WDD2
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			07/15/14	07/27/14	08/21/14	10/20/14	04/16/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.0821 U	0.276 U	0.208 U	-0.063 U	-0.064 U
TOTAL URANIUM	UG/L	30	3.94	1.93	4.9	10.6	2.01
RADIUM-226	PCi/L	3	0.322 U	0.248 U	0.304 U	Not Anaylzed	0 U
TOTAL URANIUM	UG/L	30	3.99	1.52	5.4	Not Anaylzed	2.11



Concentration Exceeds Criteria

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

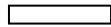
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

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

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹			
RADIUM-226	PCi/L	3	0.0868 U	0.321 U	0.0933 U
TOTAL URANIUM	UG/L	30	1.28	2.66	0.7
RADIUM-226	PCi/L	3	Not Anaylzed	-0.139 U	Not Anaylzed
TOTAL URANIUM	UG/L	30	Not Anaylzed	2.7	Not Anaylzed



Concentration Exceeds Criteria

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

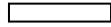
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 9
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
POLYCYCLIC AROMATIC HYDROCARBON							
2-METHYLNAPHTHALENE	UG/L	4.7	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
ACENAPHTHENE	UG/L	5.3	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
ACENAPHTHYLENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
ANTHRACENE	UG/L	3.8	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(A)ANTHRACENE	UG/L	0.03	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(A)PYRENE	UG/L	0.0012	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(B)FLUORANTHENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(G,H,I)PERYLENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(K)FLUORANTHENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
CHRYSENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
DIBENZ(A,H)ANTHRACENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
FLUORANTHENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
FLUORENE	UG/L	0.54	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
NAPHTHALENE	UG/L	13	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
PHENANTHRENE	UG/L	5	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
PYRENE	UG/L	4.6	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U



Concentration Exceeds Criteria

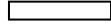
(1) - TOGS 1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 9
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/14	05/12/14	10/20/14	05/12/14	10/20/14
Parameter	Units	Criteria ¹					
POLYCYCLIC AROMATIC HYDROCARBON							
2-METHYLNAPHTHALENE	UG/L	4.7	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
ACENAPHTHENE	UG/L	5.3	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
ACENAPHTHYLENE	UG/L	50	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
ANTHRACENE	UG/L	3.8	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
BENZO(A)ANTHRACENE	UG/L	0.03	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
BENZO(A)PYRENE	UG/L	0.0012	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
BENZO(B)FLUORANTHENE	UG/L	0.002	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
BENZO(G,H,I)PERYLENE	UG/L	50	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
BENZO(K)FLUORANTHENE	UG/L	0.002	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
CHRYSENE	UG/L	0.002	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
DIBENZ(A,H)ANTHRACENE	UG/L	50	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
FLUORANTHENE	UG/L	50	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
FLUORENE	UG/L	0.54	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.002	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
NAPHTHALENE	UG/L	13	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
PHENANTHRENE	UG/L	5	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U
PYRENE	UG/L	4.6	0.52 U	0.5 U	0.53 U	0.5 U	0.51 U



Concentration Exceeds Criteria

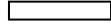
(1) - TOGS 1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 9
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
POLYCYCLIC AROMATIC HYDROCARBON							
2-METHYLNAPHTHALENE	UG/L	4.7	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
ACENAPHTHENE	UG/L	5.3	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
ACENAPHTHYLENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
ANTHRACENE	UG/L	3.8	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(A)ANTHRACENE	UG/L	0.03	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(A)PYRENE	UG/L	0.0012	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(B)FLUORANTHENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(G,H,I)PERYLENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
BENZO(K)FLUORANTHENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
CHRYSENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
DIBENZ(A,H)ANTHRACENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
FLUORANTHENE	UG/L	50	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
FLUORENE	UG/L	0.54	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.002	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
NAPHTHALENE	UG/L	13	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
PHENANTHRENE	UG/L	5	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U
PYRENE	UG/L	4.6	0.5 U	0.5 U	0.5 U	0.52 U	0.5 U



Concentration Exceeds Criteria

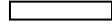
(1) - TOGS 1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 9
SURFACE WATER ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	05/12/14	10/22/14
Parameter	Units	Criteria ¹			
POLYCYCLIC AROMATIC HYDROCARBON					
2-METHYLNAPHTHALENE	UG/L	4.7	0.5 U	0.5 U	0.5 U
ACENAPHTHENE	UG/L	5.3	0.5 U	0.5 U	0.5 U
ACENAPHTHYLENE	UG/L	50	0.5 U	0.5 U	0.5 U
ANTHRACENE	UG/L	3.8	0.5 U	0.5 U	0.5 U
BENZO(A)ANTHRACENE	UG/L	0.03	0.5 U	0.5 U	0.5 U
BENZO(A)PYRENE	UG/L	0.0012	0.5 U	0.5 U	0.5 U
BENZO(B)FLUORANTHENE	UG/L	0.002	0.5 U	0.5 U	0.5 U
BENZO(G,H,I)PERYLENE	UG/L	50	0.5 U	0.5 U	0.5 U
BENZO(K)FLUORANTHENE	UG/L	0.002	0.5 U	0.5 U	0.5 U
CHRYSENE	UG/L	0.002	0.5 U	0.5 U	0.5 U
DIBENZ(A,H)ANTHRACENE	UG/L	50	0.5 U	0.5 U	0.5 U
FLUORANTHENE	UG/L	50	0.5 U	0.5 U	0.5 U
FLUORENE	UG/L	0.54	0.5 U	0.5 U	0.5 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.002	0.5 U	0.5 U	0.5 U
NAPHTHALENE	UG/L	13	0.5 U	0.5 U	0.5 U
PHENANTHRENE	UG/L	5	0.5 U	0.5 U	0.5 U
PYRENE	UG/L	4.6	0.5 U	0.5 U	0.5 U



Concentration Exceeds Criteria

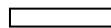
(1) - TOGS 1.1 (June 1998) Class B surface water criteria (default to Groundwater or Class A standard if Class B is not provided). Sum of Radium-226 and Radium-228 (sum total of 5 pCi/l); Thorium (15 pCi/l for alpha emitters) . 10 NYCRR Part 5, Subpart 5-1 (NYSDOH); Total Uranium (30 ug/L or 27 pCi/L) total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, and H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
METALS							
ALUMINUM	UG/L	100	120	380	160	580	180
ANTIMONY	UG/L	3	9.4	6.2	2.2 J	2.8	1.4 J
ARSENIC	UG/L	150	5.4	3.6	2.5	3.1	1.8
BARIUM	UG/L	1000	83	170	72	160	75
BERYLLIUM	UG/L	1100	0.5 U	0.45 J	R	0.5 U	0.5 U
BORON	UG/L	10000	440 J	Not Anaylzed	590	Not Anaylzed	450 J
CADMIUM	UG/L	5	0.5 U	0.76 J	0.5 U	0.75 J	0.5 U
CALCIUM	UG/L	-	170,000	120,000	150,000	140,000	140,000
CHROMIUM, TOTAL	UG/L	50	1.8 J	2.8 J	2.4 J	5 J	3.5 J
COBALT	UG/L	5	0.88 J	1.4 J	0.71 J	1.9 J	0.6 J
COPPER	UG/L	200	6.4	8.4	4.9 J	7.9	4 J
IRON	UG/L	300	410	730	500	1,200	820
LEAD	UG/L	25	2.1	11	1.2	5.8	0.7 J
LITHIUM	UG/L	-	75	45 J	51	47 J	26 J
MAGNESIUM	UG/L	35000	60,000	37,000	49,000	43,000	43,000
MANGANESE	UG/L	300	180	250	400	410	370
MERCURY	UG/L	0.7	0.1 U				
MOLYBDENUM	UG/L	-	Not Anaylzed	17	Not Anaylzed	11	Not Anaylzed
NICKEL	UG/L	100	8.9 J	11	7.2 J	25	5.5 J



Concentration Exceeds Criteria

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

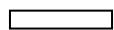
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
METALS							
POTASSIUM	UG/L	-	16,000	17,000	11,000	17,000	6,500
SELENIUM	UG/L	10	12	3.6 J	7.4	2.5 U	2.4 J
SILVER	UG/L	50	0.5 U	R	0.46 J	0.48 J	0.5 U
SODIUM	UG/L	20000	220,000	120,000	160,000	140,000	65,000
THALLIUM	UG/L	8	0.5 U	0.48 J	0.5 U	0.5 U	0.5 U
VANADIUM	UG/L	14	2 J	2.8 J	1 J	2.7 J	0.88 J
ZINC	UG/L	2000	24 J	41 J	23 J	26 J	14 J
METALS (FILTERED)							
ALUMINUM	UG/L	100	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	3.5 J
ANTIMONY	UG/L	3	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	2 J
ARSENIC	UG/L	150	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	1.2 J
BARIUM	UG/L	1000	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	68
BERYLLIUM	UG/L	1100	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.5 U
BORON	UG/L	10000	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	410 J
CADMIUM	UG/L	5	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.5 U
CALCIUM	UG/L	-	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	130,000
CHROMIUM, TOTAL	UG/L	50	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	3.9 J
COBALT	UG/L	5	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	1.5 J
COPPER	UG/L	200	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	2.3 J



Concentration Exceeds Criteria

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

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

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

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
METALS (FILTERED)							
IRON	UG/L	300	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	150 J
LEAD	UG/L	25	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.5 U
LITHIUM	UG/L	-	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	24 J
MAGNESIUM	UG/L	35000	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	41,000
MANGANESE	UG/L	300	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	330
MERCURY	UG/L	7.00E-04	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.1 U
NICKEL	UG/L	100	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	5.4 J
POTASSIUM	UG/L	-	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	5,600
SELENIUM	UG/L	4.6	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	2.5 U
SILVER	UG/L	50	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.5 U
SODIUM	UG/L	20000	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	62,000
THALLIUM	UG/L	8	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	0.5 U
VANADIUM	UG/L	14	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	1 J
ZINC	UG/L	2000	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed	6.4 J

■ Concentration Exceeds Criteria

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

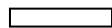
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/14	05/12/14	10/20/14	05/12/14	10/20/14
Parameter	Units	Criteria ¹					
METALS							
ALUMINUM	UG/L	100	130	230	270	100	120
ANTIMONY	UG/L	3	1.2 J	1 U	0.89 J	1.6 J	1.8 J
ARSENIC	UG/L	150	1.6	2.1	1 J	1.5	1.3 J
BARIUM	UG/L	1000	78	65	75	64	100
BERYLLIUM	UG/L	1100	0.5 U				
BORON	UG/L	10000	Not Anaylzed	71 J	Not Anaylzed	620	Not Anaylzed
CADMIUM	UG/L	5	0.5 U				
CALCIUM	UG/L	-	160,000	130,000	120,000	150,000	140,000
CHROMIUM, TOTAL	UG/L	50	2.9 J	3.9 J	15	1.9 J	R
COBALT	UG/L	5	0.6 J	0.66 J	0.39 J	0.6 J	0.49 J
COPPER	UG/L	200	3.8 J	3.5 J	5.7	4.8 J	2.8 J
IRON	UG/L	300	810	950	330	330	680
LEAD	UG/L	25	1.4	0.24 J	0.26 J	0.38 J	0.98 J
LITHIUM	UG/L	-	42 J	11 J	14 J	36 J	39 J
MAGNESIUM	UG/L	35000	45,000	46,000	32,000	46,000	40,000
MANGANESE	UG/L	300	470	250	48	160	420
MERCURY	UG/L	0.7	0.1 U	0.1 U	0.066 J	0.1 U	0.1 U
MOLYBDENUM	UG/L	-	11	Not Anaylzed	4.2 J	Not Anaylzed	9.6
NICKEL	UG/L	100	9.2 J	4.7 J	4.6 J	7 J	7.9 J



Concentration Exceeds Criteria

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

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

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

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/14	05/12/14	10/20/14	05/12/14	10/20/14
Parameter	Units	Criteria ¹					
METALS							
POTASSIUM	UG/L	-	11,000	2,400	5,600	9,200	13,000
SELENIUM	UG/L	10	2.3 J	2 J	2.5 U	6.5	1.5 J
SILVER	UG/L	50	R	0.5 U	0.7 J	0.5 U	0.5 U
SODIUM	UG/L	20000	140,000	28,000	18,000	120,000	130,000
THALLIUM	UG/L	8	0.5 U				
VANADIUM	UG/L	14	0.56 J	0.74 J	0.96 J	0.78 J	0.49 J
ZINC	UG/L	2000	17 J	5.5 J	4.8 J	11 J	16 J
METALS (FILTERED)							
ALUMINUM	UG/L	100	Not Anaylzed	3 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
ANTIMONY	UG/L	3	Not Anaylzed	2.6	Not Anaylzed	Not Anaylzed	Not Anaylzed
ARSENIC	UG/L	150	Not Anaylzed	1.3 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
BARIUM	UG/L	1000	Not Anaylzed	56	Not Anaylzed	Not Anaylzed	Not Anaylzed
BERYLLIUM	UG/L	1100	Not Anaylzed	0.5 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
BORON	UG/L	10000	Not Anaylzed	110 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
CADMIUM	UG/L	5	Not Anaylzed	0.5 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
CALCIUM	UG/L	-	Not Anaylzed	110,000	Not Anaylzed	Not Anaylzed	Not Anaylzed
CHROMIUM, TOTAL	UG/L	50	Not Anaylzed	5 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
COBALT	UG/L	5	Not Anaylzed	2.1	Not Anaylzed	Not Anaylzed	Not Anaylzed
COPPER	UG/L	200	Not Anaylzed	2.1 J	Not Anaylzed	Not Anaylzed	Not Anaylzed

Concentration Exceeds Criteria

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

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

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

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/20/14	05/12/14	10/20/14	05/12/14	10/20/14
Parameter	Units	Criteria ¹					
METALS (FILTERED)							
IRON	UG/L	300	Not Anaylzed	120 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
LEAD	UG/L	25	Not Anaylzed	0.5 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
LITHIUM	UG/L	-	Not Anaylzed	11 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
MAGNESIUM	UG/L	35000	Not Anaylzed	41,000	Not Anaylzed	Not Anaylzed	Not Anaylzed
MANGANESE	UG/L	300	Not Anaylzed	210	Not Anaylzed	Not Anaylzed	Not Anaylzed
MERCURY	UG/L	7.00E-04	Not Anaylzed	0.1 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
NICKEL	UG/L	100	Not Anaylzed	4.4 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
POTASSIUM	UG/L	-	Not Anaylzed	2,200	Not Anaylzed	Not Anaylzed	Not Anaylzed
SELENIUM	UG/L	4.6	Not Anaylzed	2.5 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
SILVER	UG/L	50	Not Anaylzed	0.5 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
SODIUM	UG/L	20000	Not Anaylzed	24,000	Not Anaylzed	Not Anaylzed	Not Anaylzed
THALLIUM	UG/L	8	Not Anaylzed	0.5 U	Not Anaylzed	Not Anaylzed	Not Anaylzed
VANADIUM	UG/L	14	Not Anaylzed	1.4 J	Not Anaylzed	Not Anaylzed	Not Anaylzed
ZINC	UG/L	2000	Not Anaylzed	2.1 J	Not Anaylzed	Not Anaylzed	Not Anaylzed

 Concentration Exceeds Criteria

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

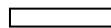
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U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
METALS							
ALUMINUM	UG/L	100	66 J	350	69	120	130
ANTIMONY	UG/L	3	1.2 J	3.1	1 U	1.5 J	0.57 J
ARSENIC	UG/L	150	1.2 J	1.9	2.1	2	2.7
BARIUM	UG/L	1000	69	90	68	95	56
BERYLLIUM	UG/L	1100	0.5 U	0.5 U	0.43 J	0.5 U	0.5 U
BORON	UG/L	10000	170 J	Not Anaylzed	570	Not Anaylzed	300 J
CADMIUM	UG/L	5	0.5 U	0.37 J	0.5 U	0.5 U	0.5 U
CALCIUM	UG/L	-	140,000	200,000	150,000	170,000	150,000
CHROMIUM, TOTAL	UG/L	50	1.3 J	2.4 J	1.1 J	1.9 J	1.6 J
COBALT	UG/L	5	0.63 J	1.7 J	0.58 J	0.68 J	1.9 J
COPPER	UG/L	200	7.3	16	4.5 J	3.4 J	23
IRON	UG/L	300	770	1,600	370	1,000	360
LEAD	UG/L	25	1.2	9.9	0.33 J	0.7 J	0.86 J
LITHIUM	UG/L	-	29 J	25 J	36 J	44 J	39 J
MAGNESIUM	UG/L	35000	40,000	46,000	44,000	50,000	49,000
MANGANESE	UG/L	300	240	350	200	560	140
MERCURY	UG/L	0.7	0.1 U	R	0.1 U	0.1 U	0.1 U
MOLYBDENUM	UG/L	-	Not Anaylzed	8.6	Not Anaylzed	12	Not Anaylzed
NICKEL	UG/L	100	6.2 J	10	6 J	9.2 J	8.9 J



Concentration Exceeds Criteria

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

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

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

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
METALS							
POTASSIUM	UG/L	-	8,000	7,100	8,100	14,000	110,000
SELENIUM	UG/L	10	3.8 J	2.5 J	2.9 J	3 J	4 J
SILVER	UG/L	50	0.5 U				
SODIUM	UG/L	20000	180,000	88,000	110,000	160,000	64,000
THALLIUM	UG/L	8	0.5 U				
VANADIUM	UG/L	14	0.68 J	1.4 J	0.5 U	0.66 J	1.9 J
ZINC	UG/L	2000	16 J	110	10 J	9.3 J	140
METALS (FILTERED)							
ALUMINUM	UG/L	100	Not Anaylzed				
ANTIMONY	UG/L	3	Not Anaylzed				
ARSENIC	UG/L	150	Not Anaylzed				
BARIUM	UG/L	1000	Not Anaylzed				
BERYLLIUM	UG/L	1100	Not Anaylzed				
BORON	UG/L	10000	Not Anaylzed				
CADMIUM	UG/L	5	Not Anaylzed				
CALCIUM	UG/L	-	Not Anaylzed				
CHROMIUM, TOTAL	UG/L	50	Not Anaylzed				
COBALT	UG/L	5	Not Anaylzed				
COPPER	UG/L	200	Not Anaylzed				

Concentration Exceeds Criteria

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

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NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Surface Water				
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			05/12/14	10/23/14	05/12/14	10/20/14	05/12/14
Parameter	Units	Criteria ¹					
METALS (FILTERED)							
IRON	UG/L	300	Not Anaylzed				
LEAD	UG/L	25	Not Anaylzed				
LITHIUM	UG/L	-	Not Anaylzed				
MAGNESIUM	UG/L	35000	Not Anaylzed				
MANGANESE	UG/L	300	Not Anaylzed				
MERCURY	UG/L	7.00E-04	Not Anaylzed				
NICKEL	UG/L	100	Not Anaylzed				
POTASSIUM	UG/L	-	Not Anaylzed				
SELENIUM	UG/L	4.6	Not Anaylzed				
SILVER	UG/L	50	Not Anaylzed				
SODIUM	UG/L	20000	Not Anaylzed				
THALLIUM	UG/L	8	Not Anaylzed				
VANADIUM	UG/L	14	Not Anaylzed				
ZINC	UG/L	2000	Not Anaylzed				

■ Concentration Exceeds Criteria

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

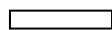
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NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	05/12/14	10/22/14
Parameter	Units	Criteria ¹			
METALS					
ALUMINUM	UG/L	100	330	170	480
ANTIMONY	UG/L	3	0.68 J	0.71 J	0.6 J
ARSENIC	UG/L	150	3.9	2.7	4
BARIUM	UG/L	1000	33	55	30
BERYLLIUM	UG/L	1100	0.5 U	0.28 J	0.5 U
BORON	UG/L	10000	Not Anaylzed	270 J	Not Anaylzed
CADMIUM	UG/L	5	0.33 J	0.28 J	0.5 U
CALCIUM	UG/L	-	160,000	140,000	160,000
CHROMIUM, TOTAL	UG/L	50	R	1.5 J	R
COBALT	UG/L	5	1.9 J	1.8 J	1.9 J
COPPER	UG/L	200	9.7	19	14
IRON	UG/L	300	580	320	650
LEAD	UG/L	25	1.4	0.72 J	2.6
LITHIUM	UG/L	-	36 J	35 J	36 J
MAGNESIUM	UG/L	35000	36,000	47,000	39,000
MANGANESE	UG/L	300	92	100	73
MERCURY	UG/L	0.7	0.1 U	0.1 U	0.1 U
MOLYBDENUM	UG/L	-	7.4	Not Anaylzed	7.3
NICKEL	UG/L	100	10	8.5 J	11



Concentration Exceeds Criteria

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

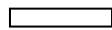
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U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	05/12/14	10/22/14
Parameter	Units	Criteria ¹			
METALS					
POTASSIUM	UG/L	-	130,000	93,000	140,000
SELENIUM	UG/L	10	1.8 J	5.3	2.5 U
SILVER	UG/L	50	R	0.5 U	0.9 J
SODIUM	UG/L	20000	39,000	65,000	32,000
THALLIUM	UG/L	8	0.5 U	0.5 U	0.5 U
VANADIUM	UG/L	14	1.2 J	2 J	1.6 J
ZINC	UG/L	2000	120	120	140
METALS (FILTERED)					
ALUMINUM	UG/L	100	Not Anaylzed	Not Anaylzed	Not Anaylzed
ANTIMONY	UG/L	3	Not Anaylzed	Not Anaylzed	Not Anaylzed
ARSENIC	UG/L	150	Not Anaylzed	Not Anaylzed	Not Anaylzed
BARIUM	UG/L	1000	Not Anaylzed	Not Anaylzed	Not Anaylzed
BERYLLIUM	UG/L	1100	Not Anaylzed	Not Anaylzed	Not Anaylzed
BORON	UG/L	10000	Not Anaylzed	Not Anaylzed	Not Anaylzed
CADMIUM	UG/L	5	Not Anaylzed	Not Anaylzed	Not Anaylzed
CALCIUM	UG/L	-	Not Anaylzed	Not Anaylzed	Not Anaylzed
CHROMIUM, TOTAL	UG/L	50	Not Anaylzed	Not Anaylzed	Not Anaylzed
COBALT	UG/L	5	Not Anaylzed	Not Anaylzed	Not Anaylzed
COPPER	UG/L	200	Not Anaylzed	Not Anaylzed	Not Anaylzed



Concentration Exceeds Criteria

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

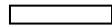
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NOTE: The detection limits shown are MDL.

TABLE 10
SURFACE WATER ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Surface Water	Surface Water	Surface Water
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	05/12/14	10/22/14
Parameter	Units	Criteria ¹			
METALS (FILTERED)					
IRON	UG/L	300	Not Anaylzed	Not Anaylzed	Not Anaylzed
LEAD	UG/L	25	Not Anaylzed	Not Anaylzed	Not Anaylzed
LITHIUM	UG/L	-	Not Anaylzed	Not Anaylzed	Not Anaylzed
MAGNESIUM	UG/L	35000	Not Anaylzed	Not Anaylzed	Not Anaylzed
MANGANESE	UG/L	300	Not Anaylzed	Not Anaylzed	Not Anaylzed
MERCURY	UG/L	7.00E-04	Not Anaylzed	Not Anaylzed	Not Anaylzed
NICKEL	UG/L	100	Not Anaylzed	Not Anaylzed	Not Anaylzed
POTASSIUM	UG/L	-	Not Anaylzed	Not Anaylzed	Not Anaylzed
SELENIUM	UG/L	4.6	Not Anaylzed	Not Anaylzed	Not Anaylzed
SILVER	UG/L	50	Not Anaylzed	Not Anaylzed	Not Anaylzed
SODIUM	UG/L	20000	Not Anaylzed	Not Anaylzed	Not Anaylzed
THALLIUM	UG/L	8	Not Anaylzed	Not Anaylzed	Not Anaylzed
VANADIUM	UG/L	14	Not Anaylzed	Not Anaylzed	Not Anaylzed
ZINC	UG/L	2000	Not Anaylzed	Not Anaylzed	Not Anaylzed



Concentration Exceeds Criteria

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

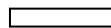
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U - Not detected above the reported quantitation limit.; R - The data is rejected.; J - The reported concentration is an estimated value.

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/23/14	04/15/14	10/21/14	04/15/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCI/G	5	0.958	1.073	1.436	2.552	1.561
URANIUM-234	PCI/G	13	0.85	0.753	1.86	1.63	1.34
URANIUM-235	PCI/G	8	0.091 U	0.126	0.178 J	0.084 J	0.128 J
URANIUM-238	PCI/G	14	0.815	0.88	1.75	1.44	1.26
TOTAL URANIUM	PCI/G	-	1.665	1.759	3.788	3.154	2.728



Concentration Exceeds Criteria

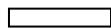
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/15/14	10/22/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCI/G	5	2.669	1.293	1.33	1.754	2
URANIUM-234	PCI/G	13	2.05	1.1	1.02	1.91	2.79
URANIUM-235	PCI/G	8	0.091	0.097 U	0.168	0.048 U	0.171
URANIUM-238	PCI/G	14	1.39	0.895	0.884	1.94	2.56
TOTAL URANIUM	PCI/G	-	3.531	1.995	2.072	3.85	5.521



Concentration Exceeds Criteria

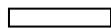
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	SWSD025
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/23/14	02/11/14	04/15/14	08/21/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCI/G	5	0.961	0.731	1.435	1.897	1.468
URANIUM-234	PCI/G	13	1.16	1.09	1.99	2.28	2.13
URANIUM-235	PCI/G	8	0.062 U	0.065 U	0.15	0.081 U	0.08 J
URANIUM-238	PCI/G	14	0.965	0.767	1.97	2.37	1.75
TOTAL URANIUM	PCI/G	-	2.125	1.857	4.11	4.65	3.96



Concentration Exceeds Criteria

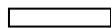
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 11
SEDIMENT ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD025	WDD2	WDD2	WDD3	WDD3
Field Sample Identifier :			SWSD025	WDD2	WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/16/14	10/22/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCI/G	5	2.488	1.077	1.343	1.801	1.382
URANIUM-234	PCI/G	13	2.67	1.02	1.22	0.858	0.921
URANIUM-235	PCI/G	8	0.114	0.082 J	0.1 J	0.108 J	0.098
URANIUM-238	PCI/G	14	2.89	0.811	1.03	1.01	0.664
TOTAL URANIUM	PCI/G	-	5.674	1.913	2.35	1.976	1.683



Concentration Exceeds Criteria

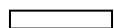
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/23/14	04/15/14	10/21/14	04/15/14
Parameter	Units	Criteria ¹					
METALS							
ALUMINUM	MG/KG	77000	16,000	21,000	27,300	28,000	21,200
ANTIMONY	MG/KG	NS	4.84	3.5	8.2	6	3.12
ARSENIC	MG/KG	13	5.98	3.4	14.5	8.8	7.48
BARIUM	MG/KG	350	88.9	98	156	150	136
BERYLLIUM	MG/KG	7.2	1.14	0.16 J	1.95	1.3	1.59
BORON	MG/KG	16000	17.2	21	39.3 J	41	26.4
CADMIUM	MG/KG	2.5	3.65	3.4	7.36	6.6	4.84
CALCIUM	MG/KG	58900	93,800	66,000	66,500	51,000	49,000
CHROMIUM, TOTAL	MG/KG	25.8	75.2	43	98.2	98	55
COBALT	MG/KG	36.7	7.62	6.9	18.3	15	12.9
COPPER	MG/KG	50	60.5	57	145	120	65.2
IRON	MG/KG	55000	28,000	36,000	51,400	43,000	37,000
LEAD	MG/KG	63	40.2	35 J	101	69	36
LITHIUM	MG/KG	160	22.5	22	47.8	43	37.1
MAGNESIUM	MG/KG	14800	20,500	17,000	23,400	20,000	14,200
MANGANESE	MG/KG	1600	1,740	850	1,440	950	1,020
MERCURY	MG/KG	0.18	0.164	0.22 J	0.349	0.27 J	0.126
MOLYBDENUM	MG/KG	390	Not Anaylzed	1.4 J	Not Anaylzed	3.4	Not Anaylzed
NICKEL	MG/KG	30	29.9	24	54.9	48	39.5



Concentration Exceeds Criteria

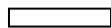
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/23/14	04/15/14	10/21/14	04/15/14
Parameter	Units	Criteria ¹					
METALS							
POTASSIUM	MG/KG	2860	1,920	2,100	4,750	6,500	3,630
SELENIUM	MG/KG	3.9	1.08 U	2 U	3.25 U	3.6 U	1.77 U
SILVER	MG/KG	2	0.271 U	0.34 U	0.814 U	0.59 U	0.443 U
SODIUM	MG/KG	331	414	330	770	720	348
THALLIUM	MG/KG	0.78	1.17 J	0.75 J	1.48 J	2.4 U	1.18 J
VANADIUM	MG/KG	390	25.2	24	54.5	51	36.3
ZINC	MG/KG	109	198	180	500	400	226



Concentration Exceeds Criteria

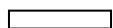
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/15/14	10/22/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
METALS							
ALUMINUM	MG/KG	77000	31,000	24,300	27,000	24,400	23,000
ANTIMONY	MG/KG	NS	3.8	2.3	1.4	7.81	3
ARSENIC	MG/KG	13	7.9	6.05	5.3	10.7	5.1
BARIUM	MG/KG	350	150 J	119	110	163	140
BERYLLIUM	MG/KG	7.2	1.2	2.57	0.13 J	2.27	1.2
BORON	MG/KG	16000	39	16.9 J	17	28.5	30
CADMIUM	MG/KG	2.5	5.3	4.9	4.8	5.76	4.1
CALCIUM	MG/KG	58900	57,000	55,300	58,000	40,400	33,000
CHROMIUM, TOTAL	MG/KG	25.8	68	67.3	49	77.7	48
COBALT	MG/KG	36.7	14	14.6	12	15.5	13
COPPER	MG/KG	50	65	38.9	37	85.1	54
IRON	MG/KG	55000	45,000	41,900	46,000	40,200	31,000
LEAD	MG/KG	63	35	13.1	8.5 J	50.6	28
LITHIUM	MG/KG	160	39	42.2	42	42.7	34
MAGNESIUM	MG/KG	14800	17,000	16,300	18,000	17,200	13,000
MANGANESE	MG/KG	1600	1,300	978	1,000	995	500
MERCURY	MG/KG	0.18	0.18 J	0.0295	0.034	0.123	0.12 J
MOLYBDENUM	MG/KG	390	1.1 J	Not Analyzed	0.48 J	Not Analyzed	3.7
NICKEL	MG/KG	30	41 J	41.3	37	45	38



Concentration Exceeds Criteria

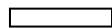
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/15/14	10/22/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
METALS							
POTASSIUM	MG/KG	2860	7,500	3,720	5,500	4,190	5,000
SELENIUM	MG/KG	3.9	3.4 U	2.11 U	1.7 U	1.93 U	3.4 U
SILVER	MG/KG	2	0.57 U	0.529 U	0.28 U	0.482 U	0.57 U
SODIUM	MG/KG	331	590	249	230	503	590
THALLIUM	MG/KG	0.78	2.3 U	2.48 J	0.49 J	0.931 J	2.3 U
VANADIUM	MG/KG	390	43	37.7	36	45.9	39
ZINC	MG/KG	109	300	73	65	285	220



Concentration Exceeds Criteria

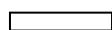
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/23/14	04/15/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
METALS							
ALUMINUM	MG/KG	77000	9,380	10,000	21,400	27,000	20,500
ANTIMONY	MG/KG	NS	3.75	2.9	4.29	8.3	1.5 J
ARSENIC	MG/KG	13	8.54	7.5	7.88	12	4.56
BARIUM	MG/KG	350	86	81	144	200 J	120
BERYLLIUM	MG/KG	7.2	0.933	0.07 U	1.86	1.1	1.61
BORON	MG/KG	16000	15.6 J	14 J	21.8 J	43	16.8 J
CADMIUM	MG/KG	2.5	3.94	3.5	4.75	7.7	3.69
CALCIUM	MG/KG	58900	145,000	120,000	39,300	45,000	33,300
CHROMIUM, TOTAL	MG/KG	25.8	30	23	57.3	66	31.4
COBALT	MG/KG	36.7	10	14	13.9	20	9.53
COPPER	MG/KG	50	119	90	67.1	81	39.4
IRON	MG/KG	55000	23,700	25,000	38,000	57,000	34,700
LEAD	MG/KG	63	115	75	44.1	45	14.3
LITHIUM	MG/KG	160	17	15	38.3	44	31.7
MAGNESIUM	MG/KG	14800	62,100	53,000	15,700	17,000	14,300
MANGANESE	MG/KG	1600	876	780	1,300	2,400	1,270
MERCURY	MG/KG	0.18	0.332	0.25	0.136	0.16 J	0.0363
MOLYBDENUM	MG/KG	390	Not Anaylzed	3.6	Not Anaylzed	6.8	Not Anaylzed
NICKEL	MG/KG	30	28.3	23	39.9	51 J	27.1



Concentration Exceeds Criteria

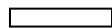
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/23/14	04/15/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
METALS							
POTASSIUM	MG/KG	2860	1,720	1,800	3,590	5,900	2,940
SELENIUM	MG/KG	3.9	1.44 U	2.1 U	2.04 U	4.6 U	1.57 U
SILVER	MG/KG	2	0.661 J	0.61 J	0.51 U	0.77 U	0.391 U
SODIUM	MG/KG	331	395	380	292	760	216
THALLIUM	MG/KG	0.78	0.549 J	1.4 U	0.842 J	3.4 J	0.783 U
VANADIUM	MG/KG	390	21.5	18	38.2	51	26.9
ZINC	MG/KG	109	714	910	249	330	152



Concentration Exceeds Criteria

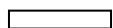
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹			
METALS					
ALUMINUM	MG/KG	77000	32,000	15,400 J	19,000
ANTIMONY	MG/KG	NS	3.7	1.7	1.3 J
ARSENIC	MG/KG	13	6.3	2.39 J	10
BARIUM	MG/KG	350	190	127 J	130
BERYLLIUM	MG/KG	7.2	0.26 J	1.31 J	0.085 U
BORON	MG/KG	16000	37	13.1 J	16 J
CADMIUM	MG/KG	2.5	6.6	2.99	6.2
CALCIUM	MG/KG	58900	62,000	50,800	64,000
CHROMIUM, TOTAL	MG/KG	25.8	59	21.2 J	22
COBALT	MG/KG	36.7	17	7.03 J	10
COPPER	MG/KG	50	69	24.4 J	30
IRON	MG/KG	55000	54,000	28,400	60,000
LEAD	MG/KG	63	35 J	67.6 J	8.8 J
LITHIUM	MG/KG	160	50	24.8 J	30
MAGNESIUM	MG/KG	14800	20,000	7,640 J	14,000
MANGANESE	MG/KG	1600	1,900	1,500 J	2,100
MERCURY	MG/KG	0.18	0.064	0.0611	0.036
MOLYBDENUM	MG/KG	390	1.2 J	Not Analyzed	1.6 J
NICKEL	MG/KG	30	50	19.7 J	25



Concentration Exceeds Criteria

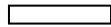
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 12
SEDIMENT ANALYTICAL RESULTS - METALS
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹			
METALS					
POTASSIUM	MG/KG	2860	5,300	2,440 J	3,500
SELENIUM	MG/KG	3.9	3.5 U	1.62 U	2.6 U
SILVER	MG/KG	2	0.58 U	0.405 U	0.43 U
SODIUM	MG/KG	331	610	284	270
THALLIUM	MG/KG	0.78	2.3 U	0.809 U	1.7 U
VANADIUM	MG/KG	390	51	18.6 J	41
ZINC	MG/KG	109	260	119 J	100



Concentration Exceeds Criteria

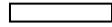
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives, Resident Soil RSL (06/2015) and RI Background Screening Levels (12/2007).

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

NOTE: The detection limits shown are MDL.

TABLE 13
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Field Sample Identifier :			SWSD009	SWSD009	SWSD010	SWSD010	SWSD011
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/23/14	04/15/14	10/21/14	04/15/14
Parameter	Units	Criteria ¹					
POLYCYCLIC AROMATIC HYDROCARBON							
2-METHYLNAPHTHALENE	UG/KG	-	150 U	140 U	75 U	51 U	48 U
ACENAPHTHENE	UG/KG	20000	150 U	140 U	75 U	51 U	48 U
ACENAPHTHYLENE	UG/KG	100000	150 U	140 U	75 U	39 J	48 U
ANTHRACENE	UG/KG	100000	150 J	96 J	75 U	54 J	48 U
BENZO(A)ANTHRACENE	UG/KG	1000	600 J	400 J	160 J	230 J	54 J
BENZO(A)PYRENE	UG/KG	1000	640 J	390 J	190 J	310 J	47 J
BENZO(B)FLUORANTHENE	UG/KG	1000	1,200 J	600 J	350 J	640	69 J
BENZO(G,H,I)PERYLENE	UG/KG	100000	260 J	190 J	110 J	160 J	41 J
BENZO(K)FLUORANTHENE	UG/KG	800	430 J	270 J	150 J	240 J	95 U
CHRYSENE	UG/KG	1000	640 J	500 J	200 J	280 J	74 J
DIBENZ(A,H)ANTHRACENE	UG/KG	330	300 U	280 U	150 U	100 U	95 U
FLUORANTHENE	UG/KG	100000	1,200 J	820 J	300 J	420 J	95 J
FLUORENE	UG/KG	30000	150 U	140 U	75 U	51 U	48 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	500	300 J	210 J	100 J	110 J	25 J
NAPHTHALENE	UG/KG	12000	150 U	140 U	75 U	51 U	48 U
PHENANTHRENE	UG/KG	100000	520 J	310 J	94 J	130 J	51 J
PYRENE	UG/KG	100000	1,300 J	660 J	340 J	640	75 J



Concentration Exceeds Criteria

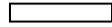
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 13
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Field Sample Identifier :			SWSD011	SWSD021	SWSD021	SWSD022	SWSD022
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/15/14	10/22/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
POLYCYCLIC AROMATIC HYDROCARBON							
2-METHYLNAPHTHALENE	UG/KG	-	43 U	38 U	150 U	260 U	43 U
ACENAPHTHENE	UG/KG	20000	43 U	38 U	150 U	260 U	43 U
ACENAPHTHYLENE	UG/KG	100000	21 J	38 U	150 U	260 U	19 J
ANTHRACENE	UG/KG	100000	23 J	38 U	150 U	260 U	43 U
BENZO(A)ANTHRACENE	UG/KG	1000	98 J	34 J	150 U	210 J	91 J
BENZO(A)PYRENE	UG/KG	1000	120 J	23 J	150 U	220 J	110 J
BENZO(B)FLUORANTHENE	UG/KG	1000	310 J	45 J	150 U	490 J	240 J
BENZO(G,H,I)PERYLENE	UG/KG	100000	67 J	38 U	150 U	260 U	53 J
BENZO(K)FLUORANTHENE	UG/KG	800	110 J	76 U	300 U	530 U	88 J
CHRYSENE	UG/KG	1000	130 J	31 J	150 U	230 J	130 J
DIBENZ(A,H)ANTHRACENE	UG/KG	330	87 U	76 U	300 U	530 U	86 U
FLUORANTHENE	UG/KG	100000	160 J	42 J	150 U	330 J	160 J
FLUORENE	UG/KG	30000	43 U	38 U	150 U	260 U	43 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	500	53 J	76 U	300 U	180 J	46 J
NAPHTHALENE	UG/KG	12000	43 U	38 U	150 U	260 U	43 U
PHENANTHRENE	UG/KG	100000	63 J	38 U	150 U	260 U	65 J
PYRENE	UG/KG	100000	190 J	39 J	150 U	430 J	190 J



Concentration Exceeds Criteria

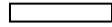
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 13
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Field Sample Identifier :			SWSD023	SWSD023	SWSD025	SWSD025	WDD2
Sample Type :			Sediment	Sediment	Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/23/14	04/15/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
POLYCYCLIC AROMATIC HYDROCARBON							
2-METHYLNAPHTHALENE	UG/KG	-	1,800 U	910 U	48 U	60 U	46 U
ACENAPHTHENE	UG/KG	20000	1,800 U	910 U	48 U	60 U	46 U
ACENAPHTHYLENE	UG/KG	100000	1,800 U	910 U	48 U	60 U	46 U
ANTHRACENE	UG/KG	100000	1,800 U	910 U	48 U	60 U	46 U
BENZO(A)ANTHRACENE	UG/KG	1000	1,900 J	1,300 J	54 J	100 J	39 J
BENZO(A)PYRENE	UG/KG	1000	1,800 J	1,000 J	37 J	130 J	46 U
BENZO(B)FLUORANTHENE	UG/KG	1000	2,600 J	1,800 J	72 J	300 J	40 J
BENZO(G,H,I)PERYLENE	UG/KG	100000	1,800 U	910 U	37 J	60 J	46 U
BENZO(K)FLUORANTHENE	UG/KG	800	3,700 U	1,800 U	96 U	76 J	92 U
CHRYSENE	UG/KG	1000	2,200 J	1,600 J	56 J	140 J	43 J
DIBENZ(A,H)ANTHRACENE	UG/KG	330	3,700 U	1,800 U	96 U	120 U	92 U
FLUORANTHENE	UG/KG	100000	3,400 J	2,500 J	87 J	180 J	54 J
FLUORENE	UG/KG	30000	1,800 U	910 U	48 U	60 U	46 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	500	1,100 J	1,800 U	30 J	54 J	92 U
NAPHTHALENE	UG/KG	12000	1,800 U	910 U	48 U	60 U	46 U
PHENANTHRENE	UG/KG	100000	1,300 J	750 J	32 J	65 J	46 U
PYRENE	UG/KG	100000	4,300 J	2,800 J	70 J	210 J	49 J



Concentration Exceeds Criteria

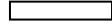
(1) - 6 NYCRR Part 375, NYS Unrestricted Use Soil Cleanup Objectives for VOCs, Pesticides, PCBs, PAHs and Metals. USDOE Order 458.1 (June 2011) - Ra-226 and Ra-228 (sum total of 5 pCi/g), Thorium isotopes (sum total of 5 pCi/g) total dose not to exceed 25 mrem/yr for remaining radionuclides (Sr-90, Tc-99,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

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

NOTE: The detection limits shown are MDL.

TABLE 13
SEDIMENT ANALYTICAL RESULTS - PAHs
NIAGARA FALLS STORAGE SITE

Location Identifier :			WDD2	WDD3	WDD3
Field Sample Identifier :			WDD2	WDD3	WDD3
Sample Type :			Sediment	Sediment	Sediment
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹			
POLYCYCLIC AROMATIC HYDROCARBON					
2-METHYLNAPHTHALENE	UG/KG	-	270 U	36 U	210 U
ACENAPHTHENE	UG/KG	20000	270 U	36 U	210 U
ACENAPHTHYLENE	UG/KG	100000	270 U	36 U	210 U
ANTHRACENE	UG/KG	100000	270 U	36 U	210 U
BENZO(A)ANTHRACENE	UG/KG	1000	270 U	36 U	210 U
BENZO(A)PYRENE	UG/KG	1000	270 U	36 U	210 U
BENZO(B)FLUORANTHENE	UG/KG	1000	270 U	36 U	210 U
BENZO(G,H,I)PERYLENE	UG/KG	100000	270 U	36 U	210 U
BENZO(K)FLUORANTHENE	UG/KG	800	540 U	72 U	420 U
CHRYSENE	UG/KG	1000	270 U	36 U	210 U
DIBENZ(A,H)ANTHRACENE	UG/KG	330	540 U	72 U	420 U
FLUORANTHENE	UG/KG	100000	270 U	36 U	210 U
FLUORENE	UG/KG	30000	270 U	36 U	210 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	500	540 U	72 U	420 U
NAPHTHALENE	UG/KG	12000	270 U	36 U	210 U
PHENANTHRENE	UG/KG	100000	270 U	36 U	210 U
PYRENE	UG/KG	100000	270 U	36 U	210 U



Concentration Exceeds Criteria

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

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

NOTE: The detection limits shown are MDL.

TABLE 14
2014 GROUNDWATER LEVELS

Summary of Water Level Measurements First Quarter 2014 (February 11, 2014)				Summary of Water Level Measurements Second Quarter 2014 (April 11, 2014)				Summary of Water Level Measurements Third Quarter 2014 (August 21, 2014)				Summary of Water Level Measurements Fourth Quarter 2014 (October 20, 2014)			
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
A23A	321.90	8.41	313.49	A23A	321.90	8.22	313.68	A23A	321.90	8.04	313.86	A23A	321.90	9.50	312.40
A42	319.70	5.40	314.30	A42	319.70	5.12	314.58	A42	319.70	7.07	312.63	A42	319.70	7.38	312.32
A43	320.50	5.88	314.62	A43	320.50	5.01	315.49	A43	320.50	5.63	314.87	A43	320.50	7.05	313.45
A45	321.70	Not Taken***		A45	321.70	8.66	313.04	A45	321.70	9.75	311.95	A45	321.70	10.45	311.25
A50	321.30	9.80	311.50	A50	321.30	8.75	312.55	A50	321.30	11.04	310.26	A50	321.30	11.48	309.82
A51	321.20	8.32	312.88	A51	321.20	6.35	314.85	A51	321.20	10.20	311.00	A51	321.20	10.05	311.15
A52	321.10	6.75	314.35	A52	321.10	5.88	315.22	A52	321.10	7.26	313.84	A52	321.10	7.90	313.20
A54	320.70	7.21	313.49	A54	320.70	6.69	314.01	A54	320.70	7.55	313.15	A54	320.70	7.91	312.79
A55	320.60	6.95	313.65	A55	320.60	6.40	314.20	A55	320.60	7.65	312.95	A55	320.60	7.63	312.97
A56	322.30	10.26	312.04	A56	322.30	9.74	312.56	A56	322.30	9.58	312.72	A56	322.30	11.50	310.80
A57	321.40	10.74	310.66	A57	321.40	9.95	311.45	A57	321.40	10.03	311.37	A57	321.40	11.48	309.92
BH5	321.32	9.00	312.32	BH5	321.32	8.25	313.07	BH5	321.32	8.48	312.84	BH5	321.32	10.22	311.10
BH12	320.85	6.55	314.30	BH12	320.85	5.99	314.86	BH12	320.85	5.78	315.07	BH12	320.85	7.12	313.73
BH15	320.16	5.95	314.21	BH15	320.16	2.00	318.16	BH15	320.16	5.36	314.80	BH15	320.16	6.99	313.17
BH48	322.04	7.35	314.69	BH48	322.04	6.67	315.37	BH48	322.04	7.68	314.36	BH48	322.04	8.20	313.84
BH49	320.23	8.50	311.73	BH49	320.23	7.85	312.38	BH49	320.23	8.09	312.14	BH49	320.23	9.71	310.52
BH49A	320.65	3.25	317.40	BH49A	320.65	2.17	318.48	BH49A	320.65	5.09	315.56	BH49A	320.65	7.82	312.83
BH50	319.25	7.51	311.74	BH50	319.25	6.81	312.44	BH50	319.25	8.13	311.12	BH50	319.25	10.90	308.35
BH51	321.24	6.75	314.49	BH51	321.24	6.00	315.24	BH51	321.24	7.08	314.16	BH51	321.24	8.92	312.32
BH57	322.84	7.25	315.59	BH57	322.84	6.63	316.21	BH57	322.84	6.77	316.07	BH57	322.84	8.61	314.23
BH59	321.45	7.30	314.15	BH59	321.45	6.92	314.53	BH59	321.45	7.99	313.46	BH59	321.45	8.23	313.22
BH60	322.32	5.60	316.72	BH60	322.32	5.50	316.82	BH60	322.32	5.38	316.94	BH60	322.32	7.09	315.23
BH61	318.50	10.10	308.40	BH61	318.50	8.83	309.67	BH61	318.50	9.75	308.75	BH61	318.50	12.27	306.23
BH62	318.60	9.40	309.20	BH62	318.60	8.28	310.32	BH62	318.60	8.62	309.98	BH62	318.60	10.72	307.88
BH63	323.01	6.95	316.06	BH63	323.01	6.40	316.61	BH63	323.01	6.65	316.36	BH63	323.01	8.27	314.74
BH64	319.32	4.60	314.72	BH64	319.32	2.82	316.50	BH64	319.32	5.94	313.38	BH64	319.32	8.30	311.02
BH70	321.29	7.50	313.79	BH70	321.29	7.40	313.89	BH70	321.29	7.25	314.04	BH70	321.29	9.72	311.57
B02W19D	319.90	3.90	316.00	B02W19D	319.90	3.53	316.37	B02W19D	319.90	3.71	316.19	B02W19D	319.90	5.29	314.61
B02W20D	322.00	5.56	316.44	B02W20D	322.00	5.05	316.95	B02W20D	322.00	5.39	316.61	B02W20D	322.00	7.11	314.89
B02W20S	322.00	2.90	319.10	B02W20S	322.00	2.80	319.20	B02W20S	322.00	4.86	317.14	B02W20S	322.00	7.54	314.46
OW01B	321.49	3.41	318.08	OW01B	321.49	3.83	317.66	OW01B	321.49	5.08	316.41	OW01B	321.49	6.82	314.67
OW02A	321.50	6.20	315.30	OW02A	321.50	8.50	313.00	OW02A	321.50	8.50	313.00	OW02A	321.50	10.20	311.30
OW02B	321.55	3.38	318.17	OW02B	321.55	3.10	318.45	OW02B	321.55	4.84	316.71	OW02B	321.55	6.42	315.13
OW03A	321.67	8.62	313.05	OW03A	321.67	8.26	313.41	OW03A	321.67	8.50	313.17	OW03A	321.67	10.01	311.66
OW03B	321.38	4.52	316.86	OW03B	321.38	3.91	317.47	OW03B	321.38	5.40	315.98	OW03B	321.38	6.95	314.43
OW04A	320.52	8.00	312.52	OW04A	320.52	7.35	313.17	OW04A	320.52	7.34	313.18	OW04A	320.52	8.95	311.57
OW04B	320.17	2.80	317.37	OW04B	320.17	3.38	316.79	OW04B	320.17	5.45	314.72	OW04B	320.17	4.45	315.72
OW05A	319.59	6.65	312.94	OW05A	319.59	6.32	313.27	OW05A	319.59	6.45	313.14	OW05A	319.59	8.30	311.29
OW05B	319.68	4.70	314.98	OW05B	319.68	3.09	316.59	OW05B	319.68	6.20	313.48	OW05B	319.68	8.72	310.96
OW06A	322.34	8.23	314.11	OW06A	322.34	7.85	314.49	OW06A	322.34	7.72	314.62	OW06A	322.34	9.22	313.12
OW06B	322.28	5.38	316.90	OW06B	322.28	4.22	318.06	OW06B	322.28	7.14	315.14	OW06B	322.28	8.60	313.68
OW07A	319.77	5.81	313.96	OW07A	319.77	5.36	314.41	OW07A	319.77	5.19	314.58	OW07A	319.77	6.67	313.10
OW07B	319.69	5.95	313.74	OW07B	319.69	3.60	316.09	OW07B	319.69	6.98	312.71	OW07B	319.69	9.35	310.34
OW08A	318.91	5.70	313.21	OW08A	318.91	5.18	313.73	OW08A	318.91	5.15	313.76	OW08A	318.91	6.80	312.11
OW08B	318.97	6.67	312.30	OW08B	318.97	2.50	316.47	OW08B	318.97	6.58	312.39	OW08B	318.97	9.60	309.37
OW09A	318.66	4.90	313.76	OW09A	318.66	4.44	314.22	OW09A	318.66	4.35	314.31	OW09A	318.66	5.85	312.81
OW09B	318.82	4.38	314.44	OW09B	318.82	2.40	316.42	OW09B	318.82	6.48	312.34	OW09B	318.82	10.30	308.52
OW10A	320.01	6.51	313.50	OW10A	320.01	5.62	314.39	OW10A	320.01	6.50	313.51	OW10A	320.01	7.00	313.01
OW10B	320.13	4.50	315.63	OW10B	320.13	2.15	317.98	OW10B	320.13	5.81	314.32	OW10B	320.13	8.20	311.93
OW11A	319.05	4.80	314.25	OW11A	319.05	4.26	314.79	OW11A	319.05	4.19	314.86	OW11A	319.05	5.48	313.57
OW11B	319.09	5.20	313.89	OW11B	319.09	2.30	316.79	OW11B	319.09	5.11	313.98	OW11B	319.09	6.60	312.49
OW12A	320.42	6.15	314.27	OW12A	320.42	2.60	317.82	OW12A	320.42	5.46	314.96	OW12A	320.42	6.90	313.52
OW12B	319.09	6.55	312.54	OW12B	319.09	3.50	315.59	OW12B	319.09	8.46	310.63	OW12B	319.09	11.45	307.64
OW13A	321.54	7.62	313.92	OW13A	321.54	7.10	314.44	OW13A	321.54	6.95	314.59	OW13A	321.54	8.51	313.03
OW13B	321.09	4.66	316.43	OW13B	321.09	2.20	318.89	OW13B	321.09	5.36	315.73	OW13B	321.09	8.10	312.99
OW14A	320.52	8.44	312.08	OW14A	320.52	7.75	312.77	OW14A	320.52	7.71	312.81	OW14A	320.52	9.39	311.13
OW14B	320.73	4.08	316.65	OW14B	320.73	2.39	318.34	OW14B	320.73	5.96	314.77	OW14B	320.73	6.90	313.83
OW15A	320.30	8.79	311.51	OW15A	320.30	8.03	312.27	OW15A	320.30	7.91	312.39	OW15A	320.30	9.55	310.75
OW15B	320.12	3.60	316.52	OW15B	320.12	2.35	317.77	OW15B	320.12	6.20	313.92	OW15B	320.12	8.00	312.12
OW16A	320.63	8.21	312.42	OW16A	320.63	7.57	313.06	OW16A	320.63	7.37	313.26	OW16A	320.63	8.87	311.76
OW16B	320.06	4.71	315.35	OW16B	320.06	2.34	317.72	OW16B	320.06	5.46	314.60	OW16B	320.06	6.80	313.26
OW17A	320.31	7.20	313.11	OW17A	320.31	6.60	313.71	OW17A	320.31	6.41	313.90	OW17A	320.31	7.82	312.49
OW17B	320.29	4.22	316.07	OW17B	320.29	1.99	318.30	OW17B	320.29	4.72	315.57	OW17B	320.29	6.20	314.09
OW18A	321.09	7.97	313.12	OW18A	321.09	6.50	314.59	OW18A	321.09	6.31	314.78	OW18A	321.09</		

TABLE 14
2014 GROUNDWATER LEVELS

Summary of Water Level Measurements First Quarter 2014 (February 11, 2014)				Summary of Water Level Measurements Second Quarter 2014 (April 11, 2014)				Summary of Water Level Measurements Third Quarter 2013 (August 13, 2013)				Summary of Water Level Measurements Fourth Quarter 2013 (October 10, 2013)					
NEW WELLS - 2000				NEW WELLS - 2000				NEW WELLS - 2000				NEW WELLS - 2000					
Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)		
201A	321.47	5.05	316.42	201A	321.47	4.85	316.62	201A	321.47	5.41	316.06	201A	321.47	6.35	315.12		
203A	321.87	4.70	317.17	203A	321.87	4.25	317.62	203A	321.87	5.37	316.50	203A	321.87	7.50	314.37		
213A	321.37	6.00	315.37	213A	321.37	4.82	316.55	213A	321.37	8.17	313.20	213A	321.37	11.60	309.77		
215A	320.26	6.05	314.21	215A	320.26	2.90	317.36	215A*	320.26	12.60	307.66	215A	320.26	12.60	307.66		
302A	320.53	4.35	316.18	302A	320.53	4.25	316.28	303A	321.83	3.08	318.75	303A	321.83	9.91	311.92		
303A	321.83	4.15	317.68	404A	323.73	5.20	318.53	404A	323.73	9.40	314.33	404A	323.73	12.25	311.48		
404A	323.73	6.20	317.53	411A	322.05	3.75	318.30	411A	322.05	8.92	313.13	411A	322.05	10.62	311.43		
411A	322.05	4.80	317.25	415A	321.27	2.93	318.34	415A	321.27	8.72	312.55	415A	321.27	11.51	309.76		
415A	321.27	4.36	316.91	505	317.80	3.19	314.61	505	317.80	14.41	303.39	505	317.80	18.78	299.02		
505	317.80	7.15	310.65	603A**	320.57	2.00	318.57	603A	320.57	2.20	318.37	603A	320.57	4.66	315.91		
606A	321.49	3.55	317.94	606A	321.49	3.30	318.19	606A	321.49	5.61	315.88	606A	321.49	8.28	313.21		
808A	319.27	3.30	315.97	808A	319.27	2.06	317.21	810A	318.44	3.12	315.32	810A	318.44	13.72	304.72		
810A	318.44	4.65	313.79	816A	320.62	1.74	318.88	816A	320.62	2.88	317.74	816A	320.62	2.35	318.27		
NEW WELLS - 2003				NEW WELLS - 2003				NEW WELLS - 2003				NEW WELLS - 2003					
Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)
MW228	320.85	5.55	MW228	320.85	4.18	MW228	320.85	5.68	MW228	320.85	7.72	MW228	320.85	12.20	MW228	320.85	313.13
MW229	320.61	6.10	MW229	320.61	5.57	MW229	320.61	5.51	MW229	320.61	6.95	MW229	320.61	13.28	MW229	320.61	313.66
MW313	320.88	4.24	MW313	320.88	3.60	MW313	320.88	7.55	MW313	320.88	12.94	MW313	320.88	21.94	MW313	320.88	307.94
MW314*	318.94	10.35	MW314*	318.94	3.80	MW314	318.94	15.35	MW314	318.94	21.94	MW314	318.94	22.20	MW314	318.94	297.00
MW422*	321.36	21.35	MW422*	321.36	16.91	MW422	321.36	17.87	MW422	321.36	22.20	MW422*	321.36	299.16	MW422*	321.36	309.11
MW423	322.39	5.40	MW423	322.39	3.81	MW423	322.39	11.80	MW423	322.39	30.99	MW423	322.39	8.46	MW423	322.39	309.96
MW424	320.93	3.45	MW424	320.93	2.77	MW424	320.93	8.46	MW424	320.93	10.97	MW424	320.93	12.23	MW424	320.93	312.14
MW860	320.06	7.00	MW860	320.06	5.45	MW860	320.06	8.58	MW860	320.06	7.92	MW860	320.06	8.55	MW860	320.06	311.37
MW861	319.92	7.60	MW861	319.92	7.00	MW861	319.92	6.98	MW861	319.92	8.61	MW861	319.92	7.92	MW861	319.92	311.70
MW862	319.62	4.62	MW862	319.62	3.80	MW862	319.62	7.06	MW862	319.62	8.89	MW862	319.62	7.00	MW862	319.62	310.72
MW863	319.61	6.15	MW863	319.61	5.70	MW863	319.61	5.51	MW863	319.61	6.56	MW863	319.61	7.00	MW863	319.61	314.60
NEW WELLS - 2009				NEW WELLS - 2009				NEW WELLS - 2009				NEW WELLS - 2009					
Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)
MW921	319.88	8.14	MW921	319.88	4.51	MW921	319.88	11.12	MW921	319.88	18.29	MW921	319.88	21.20	MW921	319.88	301.59
MW922	318.56	3.07	MW922	318.56	2.49	MW922	318.56	7.96	MW922	318.56	11.27	MW922	318.56	12.20	MW922	318.56	307.29
MW923	319.53	7.80	MW923	319.53	3.50	MW923	319.53	13.53	MW923	319.53	19.63	MW923	319.53	21.22	MW923	319.53	299.90
MW930	323.16	5.85	MW930	323.16	4.28	MW930	323.16	10.80	MW930	323.16	12.23	MW930	323.16	14.27	MW930	323.16	310.93
MW934	322.20	4.30	MW934	322.20	3.40	MW934	322.20	9.94	MW934	322.20	14.27	MW934	322.20	14.27	MW934	322.20	307.93
MW935	319.33	4.80	MW935	319.33	4.00	MW935	319.33	6.51	MW935	319.33	7.93	MW935	319.33	8.22	MW935	319.33	311.40
MW936	320.64	3.45	MW936	320.64	2.31	MW936	320.64	5.13	MW936	320.64	6.56	MW936	320.64	7.90	MW936	320.64	314.08
MW938	319.54	4.26	MW938	319.54	3.75	MW938	319.54	7.50	MW938	319.54	8.61	MW938	319.54	9.21	MW938	319.54	310.93
MW941	318.98	3.50	MW941	318.98	2.65	MW941	318.98	5.01	MW941	318.98	5.90	MW941	318.98	6.22	MW941	318.98	313.08
MW943	321.60	3.52	MW943	321.60	2.64	MW943	321.60	5.39	MW943	321.60	7.00	MW943	321.60	7.90	MW943	321.60	314.60
NEW WELLS - 2012				NEW WELLS - 2012				NEW WELLS - 2012				NEW WELLS - 2012					
Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)	Well No.	Reference Elevation (ft)	Groundwater Elevation (ft)
MW944			MW944		3.84	MW944		9.81	MW944		12.63	MW944		14.27	MW944		15.36
MW945			MW945		5.20	MW945		8.78	MW945		10.70	MW945		11.01	MW945		17.00
MW946			MW946		2.06	MW946		18.55	MW946		21.22	MW946		21.22	MW946		14.27
MW947			MW947		19.05	MW947		8.23	MW947		11.01	MW947		11.01	MW947		10.95
MW948			MW948		2.75	MW948		7.68	MW948		9.75	MW948		9.75	MW948		8.10
MW949			MW949		7.00	MW949		6.30	MW949		7.94	MW949		7.94	MW949		8.10
MW950			MW950		3.40	MW950		7.07	MW950		9.21	MW950		9.21	MW950		8.22
MW951			MW951		4.90	MW951		6.20	MW951		7.44	MW951		7.44	MW951		8.65
MW952			MW952		3.62	MW952		8.11	MW952		9.50	MW952		9.50	MW952		8.71
MW953			MW953		3.65	MW953		6.21	MW953		7.90	MW953		7.90	MW953		8.50
MW954			MW954		3.52	MW954		6.35	MW954		8.25	MW954		8.25	MW954		8.50
MW955			MW955		3.66	MW955		7.32	MW955		9.11	MW955		9.11	MW955		8.65
MW956			MW956		9.43	MW956		10.06	MW956		11.32	MW956		11.32	MW956		9.25
MW957			MW957		6.76	MW957		6.93	MW957		8.71	MW957		8.71	MW957		8.65
MW958			MW958		3.51	MW958		6.94	MW958		8.50	MW958		8.50	MW958		8.50
MW959			MW959		3.90	MW959		7.43	MW959			MW959			MW959		
MW960			MW960		4.09	MW960			MW960			MW960			MW960		

*MW422 - Dry bottom of well recorded.
 **MW314 - Dry bottom of well recorded.
 ***MW947 - Dry bottom of well recorded.
 **603 - Water in casing frozen.
 ***A45 - Un-locatable in snow drift.

*215A - Dry bottom of well recorded.

*215A - Dry bottom of well recorded.
 **MW422 - Dry bottom of well recorded.

Table 15
2014 Groundwater Field Parameter Measurements
Niagara Falls Storage Site

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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 ^j)	Discharge milliter PM ⁱ
OW04A ^{1,3}	2/11/2014	52.5	8.46	127	1.22	18.7	6.31	-	-
OW04B ^{1,4}	<i>-Water in well casing frozen at time of sampling.</i>								
505	4/14/14	54.7	6.91	-41	5.72	9.9	1.26	4.9	90
302A	4/14/14	54.4	6.90	-38	6.69	3.9	0.83	4.3	110
411A	4/17/14	48.4	7.20	-33	2.90	8.0	0.71	3.3	100
A42	4/17/14	53.9	7.04	72	1.43	0.0	0.48	6.4	180
A43	4/18/14	52.2	7.12	303	2.30	14.5	1.58	6.3	210
A45	4/17/14	49.7	6.96	-24	2.41	5.9	0.72	8.5	225
A50	4/14/14	57.7	7.32	58	1.76	0.0	1.78	3.6	120
A55	4/17/14	53.2	13.23	-242	3.62	81.5	0.78	4.9	140
BH49	4/17/14	47.2	8.16	-187	0.41	0.0	0.82	4.5	100
BH49A	4/17/14	52.1	7.15	107	1.66	0.0	2.21	3.0	100
MW862	4/14/2014	65.8	7.09	113	1.80	0.0	0.90	3.4	120
MW863	4/14/2014	60.4	8.35	127	1.96	0.0	1.01	3.1	100
MW921	4/14/2014	65.5	6.95	129	4.37	0.0	3.50	2.8	90
MW934	4/15/2014	42.2	6.92	137	4.20	1.8	1.90	2.7	90
MW935	4/15/2014	40.8	7.05	21	2.74	6.6	3.79	3.6	100
MW938	4/16/2014	49.4	7.25	-12	3.75	0.0	0.98	2.6	80
MW944	4/15/2014	42.8	6.90	192	1.57	7.4	1.48	2.7	90
MW945	4/15/2014	43.2	6.73	-21	3.22	9.7	0.50	3.1	90
MW946	4/16/2014	44.2	6.86	170	7.71	2.9	3.00	5.2	100
MW947	4/14/2014	57.8	6.83	203	2.58	23.9	1.25	2.2	85
MW948	4/16/2014	40.2	7.05	178	4.96	3.3	1.01	2.9	90
MW949	4/16/2014	43.6	8.60	-175	3.50	1.7	0.51	2.8	90
MW950	4/17/2014	53.1	7.23	111	3.69	0.0	1.16	3.2	100
MW951	4/18/2014	55.1	6.60	-26	1.86	20.3	0.31	3.0	100
MW952	4/16/2014	40.8	7.78	197	2.24	0.0	3.53	2.5	90
MW953	4/16/2014	39.8	7.64	182	2.02	0.0	1.32	2.3	90
MW954	4/16/2014	40.4	7.84	178	2.75	0.0	1.66	2.2	90
MW955	4/16/2014	43.7	7.36	191	2.13	0.0	1.71	4.1	100
MW956	4/18/2014	49.1	7.13	195	2.45	8.1	1.76	3.2	100
MW957	4/17/2014	47.7	7.10	104	2.74	7.7	2.15	3.3	100
MW958	4/17/2014	45.4	7.32	98	1.35	0.0	2.31	2.6	75
MW959	4/17/2014	55.7	6.85	142	2.11	0.0	0.87	3.0	100
MW960	4/18/2014	47.2	6.54	-24	1.76	0.0	0.74	3.0	100
OW03A	4/18/14	52.2	8.63	167	2.06	0.0	2.35	3.4	110
OW03B	4/18/14	47.5	8.14	208	1.99	0.0	2.97	3.2	100
OW04A	4/17/14	60.8	8.69	121	1.31	0.0	3.26	2.8	90
OW04B	4/14/14	51.5	7.18	159	1.93	0.0	0.89	13.9	450
OW05A	4/17/14	50.0	7.76	-63	1.60	14.7	0.75	2.9	100
OW05B	4/17/14	44.9	7.32	-15	1.94	0.0	0.98	2.8	90
OW06A	4/18/14	51.8	7.90	-107	2.21	0.2	2.23	5.9	140
OW06B	4/18/14	51.0	7.58	214	1.88	4.0	0.74	4.8	115
OW07A	4/17/14	56.5	7.72	65	2.13	0.0	2.15	4.5	120
OW07B	4/17/14	58.9	7.51	128	1.87	0.0	1.71	2.9	60
OW11A	4/16/14	44.1	8.37	143	1.87	0.0	8.08	3.0	100
OW11B	4/16/14	43.0	7.60	158	1.89	0.0	2.12	2.9	100
OW12A	4/15/14	41.4	7.22	99	2.02	3.0	0.80	3.0	100
OW12B	4/15/14	39.6	7.25	87	1.24	3.4	1.93	2.9	90
OW13A	4/18/14	55.0	7.38	-93	2.14	0.0	0.51	8.5	350
OW13B	4/18/14	50.8	7.19	15	2.66	0.0	0.75	2.9	90
OW15A	4/15/14	44.8	6.95	-97	2.32	35.4	0.43	3.5	100
OW15B	4/15/14	40.7	7.10	66	1.08	9.7	1.81	5.0	150
OW17A	4/16/14	48.0	8.39	-56	2.62	0.0	0.44	4.0	90
OW17B	4/16/14	47.9	7.80	119	1.79	0.0	1.70	4.5	100
OW18B	4/17/14	46.9	8.55	-139	2.20	0.0	0.73	4.5	140
OW04A	8/21/2014	*	8.46	127	1.22	18.7	6.31	8.0	185
OW04B	8/21/2014	67.2	6.95	125	1.71	14.2	0.95	10.4	325
505 ³	10/21/2014	54.6	6.65	-63	7.88	178.0	6.24	-	-
302A	10/22/2014	56.4	6.87	71	6.33	3.3	0.46	4.6	100
411A	10/21/2014	56.2	6.93	-96	2.35	1.8	2.04	4.5	150
A42	10/24/2014	56.1	6.96	65	1.44	0.6	1.73	4.5	150

Table 15
2014 Groundwater Field Parameter Measurements
Niagara Falls Storage Site

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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 ^j)	Discharge milliter PM ⁱ
A43	10/24/2014	57.0	6.83	18	2.25	0.0	1.81	5.3	160
A45	10/24/2014	59.5	7.01	-60	1.26	13.0	1.57	4.7	150
A50	10/22/2014	55.1	7.19	29	1.87	2.3	0.78	4.2	120
A55	10/22/2014	57.0	11.80	-217	3.59	248.0	6.28	2.7	100
BH49	10/23/2014	62.8	8.82	-258	0.74	8.9	1.17	6.6	155
BH49A	10/23/2014	57.0	7.26	-269	1.70	0.8	1.53	4.5	150
MW862	10/27/2014	59.7	6.95	-46	2.01	0.0	1.69	4.4	145
MW863	10/27/2014	55.7	7.55	-176	2.08	0.0	1.65	6.5	140
MW921 ²	-Insufficient volume see substitute well MW922								
MW922	10/21/2014	57.6	6.93	59	4.67	25.1	6.12	5.1	135
MW934	10/21/2014	56.5	6.93	87	3.79	17.0	4.41	4.5	150
MW935	10/22/2014	57.2	7.02	-31	2.80	1.3	1.43	5.4	165
MW938	10/23/2014	53.6	6.93	-267	3.85	1.1	1.95	4.5	145
MW944 ²	-Insufficient well volume and/or dry, no sample taken.								
MW945 ^{2,3}	-Insufficient well volume, grab sample taken.								
MW946 ^{2,3}	-Insufficient well volume, grab sample taken (additional sample taken at substitute well 808A)								
808A	10/22/2014	53.0	6.82	5	5.79	0.0	2.00	4.1	137
MW947 ²	--Insufficient well volume and/or dry, no sample taken. See substitute well MW423								
MW423	10/24/1014	55.5	7.06	-243	1.58	4.6	1.76	5.0	160
MW948	10/24/1014	56.0	6.93	-61	4.49	2.1	2.00	4.8	158
MW949	10/21/2014	54.3	8.08	-223	3.19	0.6	2.39	3.9	129
MW950	10/27/2014	55.2	7.60	-26	3.22	1.6	0.73	4.5	100
MW951	10/23/2014	59.9	6.99	-94	2.04	16.2	1.08	3.8	115
MW952	10/22/2014	56.6	6.97	58	2.32	31.9	2.32	3.5	100
MW953	10/22/2014	53.3	6.95	30	2.06	17.4	2.38	5.4	153
MW954	10/22/2014	57.5	6.92	1	2.75	32.0	1.02	3.5	115
MW955	10/22/2014	55.7	7.15	-43	1.83	5.7	0.63	3.3	108
MW956	10/21/2014	54.3	6.91	-69	2.38	6.1	0.92	3.6	101
MW957	10/21/2014	55.3	6.77	77	2.64	5.8	2.28	3.5	117
MW958	10/24/1014	57.1	6.86	64	1.30	0.0	1.13	3.0	100
MW959	10/23/1014	61.4	7.09	-14	2.02	1.6	0.72	3.4	102
MW960	10/27/1014	59.5	7.44	-79	1.53	0.0	0.72	3.9	100
OW03A	10/24/1014	56.1	7.22	-78	2.15	0.0	1.69	4.8	160
OW03B	10/24/1014	56.2	7.37	-40	1.96	1.8	2.30	4.7	155
OW04A	10/22/2014	53.5	7.85	-70	1.52	3.1	0.38	3.5	115
OW04B	10/22/2014	56.5	7.05	163	2.02	4.0	0.36	10.9	363
OW05A	10/23/1014	60.6	7.78	-113	0.695	14.9	1.42	5.4	160
OW05B	10/23/1014	54.7	7.20	-62	1.13	2.0	1.51	4.6	153
OW06A	10/23/1014	55.4	7.56	-139	2.03	31.0	1.50	3.3	100
OW06B	10/23/1014	59.9	7.09	-190	1.85	3.3	1.53	4.8	115
OW07A	10/24/1014	52.5	7.25	-86	2.10	4.0	0.98	5.8	120
OW07B	10/24/1014	54.7	6.95	24	1.95	16.9	0.80	3.4	106
OW11A	10/22/2014	55.2	7.53	-107	1.67	0.9	0.63	3.0	100
OW11B	10/22/2014	59.1	7.14	34	1.66	9.5	0.74	3.0	100
OW12A	10/22/2014	51.7	7.01	-126	1.78	20.5	0.83	4.5	150
OW12B	10/22/2014	53.5	6.99	51	1.05	6.9	1.14	4.8	158
OW13A	10/21/2014	54.1	7.34	-84	2.12	6.9	2.05	5.7	189
OW13B	10/21/2014	55.8	7.06	44	2.39	1.2	2.26	4.6	152
OW15A	10/22/2014	52.1	7.33	-109	2.31	2.1	1.14	3.5	115
OW15B	10/22/2014	55.5	6.99	38	1.47	16.9	1.28	6.0	200
OW17A	10/22/2014	54.4	7.77	-79	2.33	1.1	2.14	7.4	163
OW17B	10/22/2014	54.8	7.27	9	1.51	2.7	1.69	5.1	150
OW18B	10/22/2014	55.5	7.27	204	1.60	2.3	8.39	4.3	142

a. °F - Degrees Fahrenheit.

b. Spec. Cond. - Specific conductance.

c. uS/cm - microSiemens/centimeter.

d. DO - Dissolved oxygen.

e. mg/L - milligrams per liter.

f. ORP - Oxidation-Reduction potential.

g. mV - milliVolts.

h. NTU - Nephelometric turbidity units.

i. 1-Liter = 0.26 gallons

j. Milliter PM = milliter per minute
(1000ml = 1.0 liter) -averaged rate

NA - Not Applicable

*Parameter not taken/meter malfunction

¹ Quarterly sampling

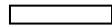
² Insufficient well volume and/or dry

³ Grab sample

⁴ Water frozen in well casing at time of sampling

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			302A	302A	411A	411A	505
Field Sample Identifier :			302A	302A	411A	411A	505
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/22/14	04/17/14	10/21/14	04/14/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	560	570	780	830	850
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	560	570	780	830	850
BROMIDE	MG/L	2	1.4	0.8	0.27	0.23 J	2.9
CHLORIDE (AS CL)	MG/L	250	440	340	28	14	210
DISSOLVED SOLIDS, TOTAL	MG/L	1000	7,200	5,900	2,000	1,700	5,200
FLUORIDE	MG/L	1.5	0.04 U	0.4 U	0.45	0.75 J	0.04 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.072	0.25 U	0.075 J	0.25 U	0.085
NITROGEN, NITRITE (AS N)	MG/L	1	0.04 U	0.4 U	0.043 J	0.4 U	0.04 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	40 U	0.4 U	8 U	0.4 U	4 U
SULFATE	MG/L	250	4,000	3,300	870	710	2,600



Concentration Exceeds Criteria

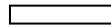
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			505	808A	A42	A42	A43
Field Sample Identifier :			505	808A	A42	A42	A43
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	10/22/14	04/17/14	10/24/14	04/18/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	1,200	650	430	420	590
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	1,200	650	430	420	590
BROMIDE	MG/L	2	4	2.3	0.36	0.21 J	0.57
CHLORIDE (AS CL)	MG/L	250	320	250	20	26	27
DISSOLVED SOLIDS, TOTAL	MG/L	1000	8,000	5,400	950	990	1,600
FLUORIDE	MG/L	1.5	0.4 U	0.64 J	0.12	0.4 U	0.14
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.25 U	0.044 J	0.25 U	0.044 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.24 J	0.4 U	0.05	0.4 U	0.045 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	4 U	0.4 U	0.4 U
SULFATE	MG/L	250	4,400	2,900	300	340	660



Concentration Exceeds Criteria

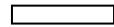
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			A43	A45	A45	A50	A50
Field Sample Identifier :			A43	A45	A45	A50	A50
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/24/14	04/17/14	10/24/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	600	460	480	440	440
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	600	460	480	440	440
BROMIDE	MG/L	2	0.39 J	0.29	0.4 U	0.38	0.4 U
CHLORIDE (AS CL)	MG/L	250	25	57	58	20	17
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,700	1,700	1,700	1,300	1,300
FLUORIDE	MG/L	1.5	0.4 J	0.054 J	0.4 U	0.26	0.4 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.11	0.25 U	0.081	0.42 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.044 J	0.4 U	0.051	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	4 U	0.4 U	0.4 U	0.4 U
SULFATE	MG/L	250	740	730	730	580	570



Concentration Exceeds Criteria

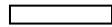
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55	A55	BH49	BH49	BH49A
Field Sample Identifier :			A55	A55	BH49	BH49	BH49A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/22/14	04/17/14	10/23/14	04/17/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	4.534 U	4.534 U	71	120	400
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	24	39	4.534 U	4.534 U	4.534 U
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U	47	4.534 U	4.534 U	4.534 U
ALKALINITY, TOTAL	MG/L	500	42	86	71	120	400
BROMIDE	MG/L	2	0.6	0.47 J	0.13	0.4 U	0.27
CHLORIDE (AS CL)	MG/L	250	66	56	12	23	36
DISSOLVED SOLIDS, TOTAL	MG/L	1000	2,300	2,200	300	550	1,200
FLUORIDE	MG/L	1.5	0.072 J	0.57 J	0.055 J	0.4 U	0.23
NITROGEN, NITRATE (AS N)	MG/L	10	0.079	0.25 U	0.26	0.25 U	0.13
NITROGEN, NITRITE (AS N)	MG/L	1	0.089	0.4 U	0.043 J	0.4 U	0.044 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	8 U	0.4 U	0.8 U	0.4 U	4 U
SULFATE	MG/L	250	1,500	1,300	130	240	480



Concentration Exceeds Criteria

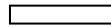
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			BH49A	MW423	MW423	MW862	MW862
Field Sample Identifier :			BH49A	MW423	MW423	MW862	MW862
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/14	04/14/14	10/24/14	04/14/14	10/27/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	430	650	720	580	600
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	430	650	720	580	600
BROMIDE	MG/L	2	0.4 U	0.27	0.4 U	0.49	0.6
CHLORIDE (AS CL)	MG/L	250	38	10	10	83	85
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,200	940	940	1,400	1,400
FLUORIDE	MG/L	1.5	0.4 U	0.35	0.48 J	0.16	0.4 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.7	0.062	0.25 U	0.058	0.25 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.049 J	0.4 U	0.045 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	0.4 U	4 U	0.4 U
SULFATE	MG/L	250	460	220	190	440	430



Concentration Exceeds Criteria

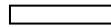
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW863	MW863	MW921	MW922	MW934
Field Sample Identifier :			MW863	MW863	MW921	MW922	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/27/14	04/14/14	10/21/14	04/15/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	220	240	750	420	700
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	220	240	750	420	700
BROMIDE	MG/L	2	0.48	0.46 J	2.7	0.49 J	0.6
CHLORIDE (AS CL)	MG/L	250	29	28	200	30	47
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,600	1,700	4,300	4,600	3,400
FLUORIDE	MG/L	1.5	0.16	0.4 U	0.059 J	0.4 U	0.17
NITROGEN, NITRATE (AS N)	MG/L	10	0.42	0.25 U	0.22	0.25 U	0.11
NITROGEN, NITRITE (AS N)	MG/L	1	0.062	0.4 U	0.04 U	0.4 U	0.046 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	4 U	0.4 U	40 U
SULFATE	MG/L	250	910	840	2,100	3,000	1,700



Concentration Exceeds Criteria

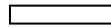
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW934	MW935	MW935	MW938	MW938
Field Sample Identifier :			MW934	MW935	MW935	MW938	MW938
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/15/14	10/22/14	04/16/14	10/23/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	740	610	560	740	730
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	740	610	560	740	730
BROMIDE	MG/L	2	0.57	0.22	0.4 U	0.41	0.4 U
CHLORIDE (AS CL)	MG/L	250	49	13	23	32	29
DISSOLVED SOLIDS, TOTAL	MG/L	1000	3,400	1,900	2,200	3,200	2,900
FLUORIDE	MG/L	1.5	0.4 U	0.3	0.61 J	0.095 J	0.4 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.25	0.73	0.11	0.33 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.053	0.4 U	0.051	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	95 J	0.4 U	0.4 U	0.4 U
SULFATE	MG/L	250	1,700	910	1,200	1,700	1,400



Concentration Exceeds Criteria

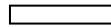
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW943	MW944	MW945	MW945	MW946
Field Sample Identifier :			MW943	MW944	MW945	MW945	MW946
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/18/14	04/15/14	04/15/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	430	520	670	800	550
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	430	520	670	800	550
BROMIDE	MG/L	2	0.29	0.26	1.2	2.1	2.5
CHLORIDE (AS CL)	MG/L	250	75	16	83	170	290
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,400	1,000	1,800	3,000	7,100
FLUORIDE	MG/L	1.5	0.37	0.13	0.21	0.4 U	0.04 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.12 J	0.094	0.42	0.34 J	0.12
NITROGEN, NITRITE (AS N)	MG/L	1	0.043 J	0.047 J	0.045 J	0.4 U	0.046 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	4 U	4 U	4 U	0.4 U	4 U
SULFATE	MG/L	250	560	320	630	1,400	3,900



Concentration Exceeds Criteria

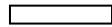
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW946	MW947	MW948	MW948	MW949
Field Sample Identifier :			MW946	MW947	MW948	MW948	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/24/14	04/14/14	04/16/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	560	740	550	600	78
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	560	740	550	600	78
BROMIDE	MG/L	2	2.4	0.32	0.76	0.57	0.84
CHLORIDE (AS CL)	MG/L	250	290	27	89	98	86
DISSOLVED SOLIDS, TOTAL	MG/L	1000	7,300	1,800	4,200	4,300	2,800
FLUORIDE	MG/L	1.5	0.4 U	0.25	0.13	0.4 U	0.1
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.084	0.082	0.25 U	0.039 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.049 J	0.05 J	0.4 U	0.057
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	4 U	0.4 U	4 U
SULFATE	MG/L	250	4,100	710	2,200	2,700	1,600



Concentration Exceeds Criteria

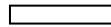
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW950	MW950	MW951	MW951
Field Sample Identifier :			MW949	MW950	MW950	MW951	MW951
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/17/14	10/27/14	04/18/14	10/23/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	79	520	500	560	540
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	79	520	500	560	540
BROMIDE	MG/L	2	20 U	0.56	0.82	0.27	0.4 U
CHLORIDE (AS CL)	MG/L	250	95	59	66	85	75
DISSOLVED SOLIDS, TOTAL	MG/L	1000	2,800	3,000	4,300	1,400	1,400
FLUORIDE	MG/L	1.5	20 U	0.17	0.64 J	0.2	0.45 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.12	0.25 U	0.11 J	0.31 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.043 J	0.4 U	0.043 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	20 U	8 U	0.4 U	4 U	0.4 U
SULFATE	MG/L	250	1,700	1,700	2,500	520	520



Concentration Exceeds Criteria

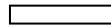
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW952	MW952	MW953	MW953	MW954
Field Sample Identifier :			MW952	MW952	MW953	MW953	MW954
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/22/14	04/16/14	10/22/14	04/16/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	360	400	380	430	450
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	360	400	380	430	450
BROMIDE	MG/L	2	0.29	0.4 U	0.11	0.4 U	0.19
CHLORIDE (AS CL)	MG/L	250	51	41	22	21	38 J
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,800	1,800	1,500	1,500	2,200
FLUORIDE	MG/L	1.5	0.17	0.48 J	0.22	0.4 U	0.31
NITROGEN, NITRATE (AS N)	MG/L	10	0.24	0.25 U	0.069	0.25 U	0.18
NITROGEN, NITRITE (AS N)	MG/L	1	0.05	0.4 U	0.051	0.4 U	0.056
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U				
SULFATE	MG/L	250	840	860	690	760	1,100



Concentration Exceeds Criteria

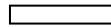
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
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 :			10/22/14	04/16/14	10/22/14	04/18/14	10/21/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	490	410	430	520	560
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	490	410	430	520	560
BROMIDE	MG/L	2	0.4 U	0.21	0.4 U	0.44	0.52
CHLORIDE (AS CL)	MG/L	250	32	20	18	39	36
DISSOLVED SOLIDS, TOTAL	MG/L	1000	2,300	1,300	1,300	1,800	1,700
FLUORIDE	MG/L	1.5	0.82 J	0.28	0.4 U	0.29	0.47 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.32 J	0.067	0.24 J	0.067 J	0.25 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.059	0.4 U	0.044 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	0.4 U	40 U	0.4 U
SULFATE	MG/L	250	1,300	560	550	790	810



Concentration Exceeds Criteria

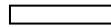
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW957	MW957	MW958	MW958	MW959
Field Sample Identifier :			MW957	MW957	MW958	MW958	MW959
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	04/17/14	10/24/14	04/17/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	560	600	450	470	510
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	560	600	450	470	510
BROMIDE	MG/L	2	0.42	0.62	0.15	0.4 U	0.34
CHLORIDE (AS CL)	MG/L	250	19	27	34	33	62
DISSOLVED SOLIDS, TOTAL	MG/L	1000	2,000	2,100	790	830	1,600
FLUORIDE	MG/L	1.5	0.45	0.7 J	0.33	0.56 J	0.3
NITROGEN, NITRATE (AS N)	MG/L	10	0.11	0.25 U	0.066	0.25 U	0.23
NITROGEN, NITRITE (AS N)	MG/L	1	0.044 J	0.4 U	0.043 J	0.4 U	0.04 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	4 U	0.82 J	4 U
SULFATE	MG/L	250	910	1,100	200	230	700



Concentration Exceeds Criteria

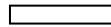
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW959	MW960	MW960	OW03A	OW03A
Field Sample Identifier :			MW959	MW960	MW960	OW03A	OW03A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/14	04/18/14	10/27/14	04/18/14	10/24/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	500	520	520	470	480
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	500	520	520	470	480
BROMIDE	MG/L	2	0.4 U	0.11	0.4 U	0.39	0.5 J
CHLORIDE (AS CL)	MG/L	250	40	72	56	29	29
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,500	1,200	1,100	1,600	1,600
FLUORIDE	MG/L	1.5	0.4 U	0.22	0.4 U	0.15	0.4 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.096 J	0.22 J	0.22 J	0.3 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.04 U	0.4 U	0.044 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	4 U	0.4 U	0.4 U	0.4 U
SULFATE	MG/L	250	640	380	350	720	690



Concentration Exceeds Criteria

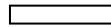
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW03B	OW03B	OW04A	OW04A	OW04A
Field Sample Identifier :			OW03B	OW03B	OW04A	OW04A	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/18/14	10/24/14	02/11/14	04/17/14	08/21/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	490	510	20 U	110	160
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U	4.534 U	20 U	39	0.534 U
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U	4.534 U	20 U	4.534 U	0.534 U
ALKALINITY, TOTAL	MG/L	500	490	510	150	150	160
BROMIDE	MG/L	2	0.29	0.4 U	0.54	0.44	Not Anaylzed
CHLORIDE (AS CL)	MG/L	250	260	29	30	31	Not Anaylzed
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,400	1,400	940	930	1,000
FLUORIDE	MG/L	1.5	0.23	0.4 U	0.21 U	0.24	Not Anaylzed
NITROGEN, NITRATE (AS N)	MG/L	10	0.13 J	0.25 U	0.42 J	0.22	Not Anaylzed
NITROGEN, NITRITE (AS N)	MG/L	1	0.044 J	0.4 U	0.1 U	0.044 J	Not Anaylzed
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	4 U	0.4 U	0.17 U	4 U	Not Anaylzed
SULFATE	MG/L	250	610	570	470	470	Not Anaylzed



Concentration Exceeds Criteria

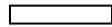
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04A	OW04B	OW04B	OW04B	OW05A
Field Sample Identifier :			OW04A	OW04B	OW04B	OW04B	OW05A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/22/14	04/14/14	08/21/14	10/22/14	04/17/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	160	320	340	340	270
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U	4.534 U	0.534 U	4.534 U	4.534 U
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U	4.534 U	0.534 U	4.534 U	4.534 U
ALKALINITY, TOTAL	MG/L	500	160	320	340	340	270
BROMIDE	MG/L	2	0.4 U	0.076 J	Not Anaylzed	0.4 U	0.5
CHLORIDE (AS CL)	MG/L	250	27	120	Not Anaylzed	97	37
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,000	1,400	1,500	1,300	960
FLUORIDE	MG/L	1.5	0.4 U	0.36	Not Anaylzed	0.79 J	0.31
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.17 J	Not Anaylzed	0.25 U	0.13
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.045 J	Not Anaylzed	0.4 U	0.043 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	4 U	Not Anaylzed	0.4 U	4 U
SULFATE	MG/L	250	510	580	Not Anaylzed	560	420



Concentration Exceeds Criteria

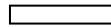
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW05A	OW05B	OW05B	OW06A	OW06A
Field Sample Identifier :			OW05A	OW05B	OW05B	OW06A	OW06A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/14	04/17/14	10/23/14	04/18/14	10/23/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	260	390	390	230	220
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	260	390	390	230	220
BROMIDE	MG/L	2	0.4 U	0.15	0.4 U	0.45	0.35 J
CHLORIDE (AS CL)	MG/L	250	38	14	14	32	31
DISSOLVED SOLIDS, TOTAL	MG/L	1000	940	1,200	1,200	1,600	1,600
FLUORIDE	MG/L	1.5	0.4 U	0.25	0.4 U	0.28	0.4 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.095	0.25 U	0.069 J	0.35 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.046 J	0.4 U	0.046 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	0.4 U	0.4 U	40 U	0.4 U
SULFATE	MG/L	250	400	540	490	800	820



Concentration Exceeds Criteria

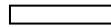
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
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 :			04/18/14	10/23/14	04/17/14	10/24/14	04/17/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	530	500	150	190	410
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	530	500	150	190	410
BROMIDE	MG/L	2	0.34	0.4 U	0.66	0.4 U	0.27
CHLORIDE (AS CL)	MG/L	250	72	59	45	38	20
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,200	1,300	1,600	1,700	1,500
FLUORIDE	MG/L	1.5	0.28	0.4 U	0.21	0.4 U	0.22
NITROGEN, NITRATE (AS N)	MG/L	10	0.094 J	0.36 J	0.14	0.25 U	0.057
NITROGEN, NITRITE (AS N)	MG/L	1	0.044 J	0.4 U	0.04 U	0.4 U	0.045 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	4 U	0.4 U	8 U	0.4 U	4 U
SULFATE	MG/L	250	440	430	950	1,000	740



Concentration Exceeds Criteria

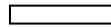
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
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 :			10/24/14	04/16/14	10/22/14	04/16/14	10/22/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	430	230	250	350	370
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	430	230	250	350	370
BROMIDE	MG/L	2	0.4 U	0.38	0.4 U	0.1	0.4 U
CHLORIDE (AS CL)	MG/L	250	15	24	22	17	17
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,500	1,100	1,200	1,200	1,200
FLUORIDE	MG/L	1.5	0.4 U	0.18	0.4 U	0.23	0.52 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.32 J	0.21	0.25 U	0.29	0.25 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.054	0.4 U	0.069	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U				
SULFATE	MG/L	250	720	530	620	540	520



Concentration Exceeds Criteria

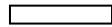
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
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 :			04/15/14	10/22/14	04/15/14	10/22/14	04/18/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	220	220	260	390	200
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	220	220	260	390	200
BROMIDE	MG/L	2	0.38	0.54	0.04 U	0.4 U	0.53
CHLORIDE (AS CL)	MG/L	250	23	19	11	3.5	39
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,400	1,400	400	720	1,700
FLUORIDE	MG/L	1.5	0.26	0.4 U	0.5	0.57 J	0.27
NITROGEN, NITRATE (AS N)	MG/L	10	0.066	0.22 J	3.5	0.25 U	0.11 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.06	0.4 U	0.047 J	0.4 U	0.054 J
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	40 U	0.4 U	0.4 U	0.4 U	0.4 U
SULFATE	MG/L	250	700	820	55	250	880



Concentration Exceeds Criteria

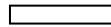
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13A	OW13B	OW13B	OW15A	OW15A
Field Sample Identifier :			OW13A	OW13B	OW13B	OW15A	OW15A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/18/14	10/21/14	04/15/14	10/22/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	210	490	420	94	97
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	210	490	420	94	97
BROMIDE	MG/L	2	0.64	0.36	0.42 J	0.8	0.71
CHLORIDE (AS CL)	MG/L	250	36	43	35	64	63
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,600	2,200	2,000	1,800	1,900
FLUORIDE	MG/L	1.5	0.42 J	0.29	0.4 U	0.2	0.4 U
NITROGEN, NITRATE (AS N)	MG/L	10	0.25 U	0.08 J	0.25 U	0.14 J	0.25 U
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.044 J	0.4 U	0.064 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.4 U	40 U	0.4 U	4 U	0.4 U
SULFATE	MG/L	250	990	1,000	1,100	1,100	7,000



Concentration Exceeds Criteria

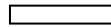
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW15B	OW15B	OW17A	OW17A	OW17B
Field Sample Identifier :			OW15B	OW15B	OW17A	OW17A	OW17B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/15/14	10/22/14	04/16/14	10/22/14	04/16/14
Parameter	Units	Criteria ¹					
MISCELLANEOUS							
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	340	440	130	100	420
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U				
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U				
ALKALINITY, TOTAL	MG/L	500	340	440	130	100	420
BROMIDE	MG/L	2	0.066	0.4 U	0.42	0.4 U	0.14
CHLORIDE (AS CL)	MG/L	250	4.6	4.6	33	28	18
DISSOLVED SOLIDS, TOTAL	MG/L	1000	680	1,000	2,000	1,900	980
FLUORIDE	MG/L	1.5	0.39	0.71 J	0.17	0.4 U	0.24
NITROGEN, NITRATE (AS N)	MG/L	10	0.28	0.25 U	0.1	0.25 U	0.3
NITROGEN, NITRITE (AS N)	MG/L	1	0.053	0.4 U	0.057	0.4 U	0.053
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	4 U	0.4 U	0.4 U	0.4 U	4 U
SULFATE	MG/L	250	230	430	1,100	1,000	510



Concentration Exceeds Criteria

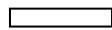
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 16
GROUNDWATER ANALYTICAL RESULTS - WATER QUALITY PARAMETERS
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW17B	OW18B	OW18B
Field Sample Identifier :			OW17B	OW18B	OW18B
Sample Type :			Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	04/17/14	10/22/14
Parameter	Units	Criteria ¹			
MISCELLANEOUS					
ALKALINITY, BICARBONATE (As CaCO ₃)	MG/L	-	430	530	550
ALKALINITY, CARBONATE (As CaCO ₃)	MG/L	-	4.534 U	4.534 U	4.534 U
ALKALINITY, HYDROXIDE (AS CACO ₃)	MG/L	-	4.534 U	4.534 U	4.534 U
ALKALINITY, TOTAL	MG/L	500	430	530	550
BROMIDE	MG/L	2	0.4 U	0.23	0.4 U
CHLORIDE (AS CL)	MG/L	250	7.4	19	11
DISSOLVED SOLIDS, TOTAL	MG/L	1000	1,000	1,400	1,400
FLUORIDE	MG/L	1.5	0.057 J	0.25	0.6 J
NITROGEN, NITRATE (AS N)	MG/L	10	0.47 J	0.09	0.36 J
NITROGEN, NITRITE (AS N)	MG/L	1	0.4 U	0.045 J	0.4 U
PHOSPHORUS, TOTAL ORTHOPHOSPHATE (AS PO ₄)	MG/L	-	0.04 U	4 U	0.4 U
SULFATE	MG/L	250	370	660	620



Concentration Exceeds Criteria

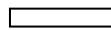
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			302A	302A	411A	411A	505
Field Sample Identifier :			302A	302A	411A	411A	505
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/22/14	04/17/14	10/21/14	04/14/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.227 U	0.0793 U	1.07 J	0.0697 U	0.289 U
TOTAL URANIUM	UG/L	30	104	84.6	11.1	13.9	37.8
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

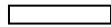
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			505	808A	A42	A42	A43
Field Sample Identifier :			505	808A	A42	A42	A43
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	10/22/14	04/17/14	10/24/14	04/18/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.388 U	0 U	0.725	-0.066 U	0.646 J
TOTAL URANIUM	UG/L	30	27.4	43.1	41.8	62.3	36
RADIUM-226	PCi/L	3	0 U	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	UG/L	30	24.9	Not Anaylzed	Not Anaylzed	Not Anaylzed	Not Anaylzed



Concentration Exceeds Criteria

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

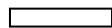
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A43	A45	A45	A50	A50
Field Sample Identifier :			A43	A45	A45	A50	A50
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/24/14	04/17/14	10/24/14	04/14/14	10/22/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.185 U	0.0881 U	0.651	0.131 U	0.0455 U
TOTAL URANIUM	UG/L	30	40.5	32.6	29.2	16.2	17.8
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

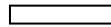
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			A55	A55	BH49	BH49	BH49A
Field Sample Identifier :			A55	A55	BH49	BH49	BH49A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/22/14	04/17/14	10/23/14	04/17/14
Parameter	Units	Criteria ¹					
RADIOMNUCLIDES							
RADIUM-226	PCi/L	3	0 U	0.171 U	0.497 U	0.235 U	0.114 U
TOTAL URANIUM	UG/L	30	0.076 J	0.103 J	0.723	1.98	22.7
RADIOMNUCLIDES (FILTERED)							
RADIUM-226	PCi/L	3	0.147 U	0.79	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	UG/L	30	0.079 J	0.107 J	Not Anaylzed	Not Anaylzed	Not Anaylzed



Concentration Exceeds Criteria

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

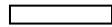
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			BH49A	MW423	MW423	MW862	MW862
Field Sample Identifier :			BH49A	MW423	MW423	MW862	MW862
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/14	04/14/14	10/24/14	04/14/14	10/27/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCi/L	3	0.207 U	0.115 U	0.231 J	0 U	0.561 U
TOTAL URANIUM	UG/L	30	14.3	10.2	11.9	24.5 J	24.1
RADIATION (FILTERED)							
RADIUM-226	PCi/L	3	Not Analyzed				
TOTAL URANIUM	UG/L	30	Not Analyzed				



Concentration Exceeds Criteria

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

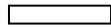
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW863	MW863	MW921	MW922	MW934
Field Sample Identifier :			MW863	MW863	MW921	MW922	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	10/27/14	04/14/14	10/21/14	04/15/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.392 U	0.708 J	0 U	0 U	0.323 J
TOTAL URANIUM	UG/L	30	3.93	3.04	36.2	33.2	35
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

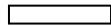
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW934	MW935	MW935	MW938	MW938
Field Sample Identifier :			MW934	MW935	MW935	MW938	MW938
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/15/14	10/22/14	04/16/14	10/23/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.0688 U	0.292 J	0.126 U	0.281 U	0.341 U
TOTAL URANIUM	UG/L	30	34.1	28.8	25.8	29.2	28.3
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

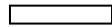
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW943	MW944	MW945	MW945	MW946
Field Sample Identifier :			MW943	MW944	MW945	MW945	MW946
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/18/14	04/15/14	04/15/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCi/L	3	0.228 U	0.473	-0.108 U	0.44 U	0 U
TOTAL URANIUM	UG/L	30	22.3	9.32	10.7	25.2	17.6
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

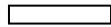
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW946	MW947	MW948	MW948	MW949
Field Sample Identifier :			MW946	MW947	MW948	MW948	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/24/14	04/14/14	04/16/14	10/21/14	04/16/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.194 U	0.212 U	0 U	0.564 J	0.591 J
TOTAL URANIUM	UG/L	30	33.7	21.2	32.4	33.9	0.289 J
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

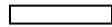
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW949	MW950	MW950	MW951	MW951
Field Sample Identifier :			MW949	MW950	MW950	MW951	MW951
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/17/14	10/27/14	04/18/14	10/23/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0 U	0.451 U	0.396 U	0.11 U	0.27 U
TOTAL URANIUM	UG/L	30	1.12	33.1	30.1	3,601	3,231
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

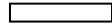
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW952	MW952	MW953	MW953	MW954
Field Sample Identifier :			MW952	MW952	MW953	MW953	MW954
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/16/14	10/22/14	04/16/14	10/22/14	04/16/14
Parameter	Units	Criteria ¹					
RADIONUCLIDES							
RADIUM-226	PCi/L	3	0.178 U	0.256 U	-0.065 U	0.354 U	0 U
TOTAL URANIUM	UG/L	30	200	165	3,351	3,221	620
RADIONUCLIDES (FILTERED)							
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

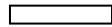
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
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 :			10/22/14	04/16/14	10/22/14	04/18/14	10/21/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.0906 U	-0.061 U	0.345 U	0.155 U	0.128 U
TOTAL URANIUM	UG/L	30	523	22.5	23.7	64.3	49.1
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

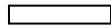
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW957	MW957	MW958	MW958	MW959
Field Sample Identifier :			MW957	MW957	MW958	MW958	MW959
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	04/17/14	10/24/14	04/17/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0 U	0.492	0.0865 U	0.365 U	-0.152 U
TOTAL URANIUM	UG/L	30	2,310	1,600	210	84.8	160
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

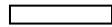
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW959	MW960	MW960	OW03A	OW03A
Field Sample Identifier :			MW959	MW960	MW960	OW03A	OW03A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/23/14	04/18/14	10/27/14	04/18/14	10/24/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCi/L	3	0.285	0.0802 U	0.717	0.407 U	0.481
TOTAL URANIUM	UG/L	30	78.6	1,109	1,201	8.61	9.58
RADIATION (FILTERED)							
RADIUM-226	PCi/L	3	Not Analyzed				
TOTAL URANIUM	UG/L	30	Not Analyzed				



Concentration Exceeds Criteria

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

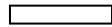
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW03B	OW03B	OW04A	OW04A	OW04A
Field Sample Identifier :			OW03B	OW03B	OW04A	OW04A	OW04A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/18/14	10/24/14	02/11/14	04/17/14	08/21/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.437	0.198 U	0.121 U	0.256 U	0.289 U
TOTAL URANIUM	UG/L	30	17.6	18.5	2.41	2.03	2.05
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

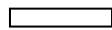
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW04A	OW04B	OW04B	OW04B	OW05A
Field Sample Identifier :			OW04A	OW04B	OW04B	OW04B	OW05A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/22/14	04/14/14	08/21/14	10/22/14	04/17/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.271 U	0.332 U	0.131 U	-0.081 U	1.73
TOTAL URANIUM	UG/L	30	1.92	47.5	46.8	49.7	2.31
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

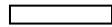
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
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 :			10/23/14	04/17/14	10/23/14	04/18/14	10/23/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.32 U	-0.202 U	0.882	0.156 U	0 U
TOTAL URANIUM	UG/L	30	1.96	15.1	13.2	1.99	1.78
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

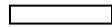
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
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 :			04/18/14	10/23/14	04/17/14	10/24/14	04/17/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCi/L	3	0.164 U	0.273 U	0.157 U	0.0598 U	0.422 U
TOTAL URANIUM	UG/L	30	17.2	15.8	1.68	1.94	17.6
RADIATION (FILTERED)							
RADIUM-226	PCi/L	3	Not Analyzed				
TOTAL URANIUM	UG/L	30	Not Analyzed				



Concentration Exceeds Criteria

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

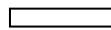
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
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 :			10/24/14	04/16/14	10/22/14	04/16/14	10/22/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.277 U	0.29 U	0.594 U	-0.051 U	0.967
TOTAL URANIUM	UG/L	30	20.9	1.55	1.96	385	221
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

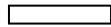
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
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 :			04/15/14	10/22/14	04/15/14	10/22/14	04/18/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.458	0.187 U	-0.283 U	0.398	0.356 U
TOTAL URANIUM	UG/L	30	4.36	4.4	34.3	34.8	2.47
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

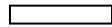
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW13A	OW13B	OW13B	OW15A	OW15A
Field Sample Identifier :			OW13A	OW13B	OW13B	OW15A	OW15A
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			10/21/14	04/18/14	10/21/14	04/15/14	10/22/14
Parameter	Units	Criteria ¹					
RADIUM-226	PCi/L	3	0.612	0.134 U	0.198 U	0.261	0.516 U
TOTAL URANIUM	UG/L	30	2.47	12.7	24.3	0.497 J	0.535
RADIUM-226	PCi/L	3	Not Anaylzed				
TOTAL URANIUM	UG/L	30	Not Anaylzed				



Concentration Exceeds Criteria

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

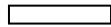
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW15B	OW15B	OW17A	OW17A	OW17B
Field Sample Identifier :			OW15B	OW15B	OW17A	OW17A	OW17B
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/15/14	10/22/14	04/16/14	10/22/14	04/16/14
Parameter	Units	Criteria ¹					
RADIATION							
RADIUM-226	PCi/L	3	0 U	0.345 J	0.225 U	-0.087 U	0.528
TOTAL URANIUM	UG/L	30	10.4	11.6	1.36	4.12	5.57
RADIATION (FILTERED)							
RADIUM-226	PCi/L	3	Not Analyzed				
TOTAL URANIUM	UG/L	30	Not Analyzed				



Concentration Exceeds Criteria

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

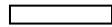
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 17
GROUNDWATER ANALYTICAL RESULTS - RADIONUCLIDES
NIAGARA FALLS STORAGE SITE

Location Identifier :			OW17B	OW18B	OW18B
Field Sample Identifier :			OW17B	OW18B	OW18B
Sample Type :			Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-
Date of Sample :			10/22/14	04/17/14	10/22/14
Parameter	Units	Criteria ¹			
RADIUM-226	PCi/L	3	0.167 U	-0.107 U	0 U
TOTAL URANIUM	UG/L	30	6.64	10.4	12.7
RADIUM-226	PCi/L	3	Not Anaylzed	Not Anaylzed	Not Anaylzed
TOTAL URANIUM	UG/L	30	Not Anaylzed	Not Anaylzed	Not Anaylzed



Concentration Exceeds Criteria

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

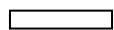
If turbidity measurements exceed 50 nephelometric turbidity units (NTUs) for any groundwater or surface water sample, the sample is field filtered via a disposable 0.45 micron in-line filter to remove solids and reduce the turbidity readings to below the 50 NTU threshold and then the filtered and unfiltered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

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	10/24/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROPROPENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	1 U	1 U	1 U	1 U	1 U
1,2,3-TRIMETHYLBENZENE	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
1,2,4-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	1 U	1 U	1 U	1 U	1 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROETHANE	UG/L	0.6	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROPROPANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U



Concentration Exceeds Criteria

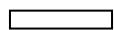
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	10/24/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
1,3-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,4-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2,2-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-CHLOROETHYL VINYL ETHER	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
2-CHLOROTOLUENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-HEXANONE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-METHYLNAPHTHALENE	UG/L	-	1 U	Not Anaylzed	Not Anaylzed	1 U	Not Anaylzed
4-CHLOROTOLUENE	UG/L	-	1 U	1 U	1 U	1 U	1 U
ACETONE	UG/L	50	2.1 J	4 U	4 J	R	3.1 J
ACRYLONITRILE	UG/L	5	1 U	Not Anaylzed	Not Anaylzed	1 U	Not Anaylzed
BENZENE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOBENZENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOCHLOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMODICHLOROMETHANE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOFORM	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOMETHANE	UG/L	5	4 U	4 U	4 U	4 U	4 U
CARBON DISULFIDE	UG/L	60	0.6 U	0.6 U	0.27 J	0.6 U	0.6 U
CARBON TETRACHLORIDE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U



Concentration Exceeds Criteria

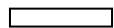
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	10/24/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
CHLOROETHANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	7	0.6 U	0.6 U	0.6 U	20	1.4
CHLOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CYCLOHEXANE	UG/L	-	1 U	Not Anaylzed	Not Anaylzed	1 U	Not Anaylzed
DIBROMOCHLOROMETHANE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIBROMOMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIETHYL ETHER (ETHYL ETHER)	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
ETHYL METHACRYLATE	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
ETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
HEXAChLOROBUTADIENE	UG/L	0.5	1 U	1 U	1 U	1 U	1 U
HEXAChLOROETHANE	UG/L	5	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
IODOMETHANE (METHYL IODIDE)	UG/L	5	1 U	Not Anaylzed	Not Anaylzed	1 U	Not Anaylzed
ISOPROPYL ETHER	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
M+P-XYLENE	UG/L	5	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
METHYL ACETATE	UG/L	-	1 U	Not Anaylzed	Not Anaylzed	1 U	Not Anaylzed



Concentration Exceeds Criteria

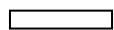
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	10/24/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	5 U	5 U	5 U	5 U	5 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
METHYLCYCLOHEXANE	UG/L	-	1 U	Not Anaylzed	Not Anaylzed	1 U	Not Anaylzed
METHYLENE CHLORIDE	UG/L	5	0.6 U	R	0.6 U	R	R
NAPHTHALENE	UG/L	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
N-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
N-PROPYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
P-CYMENE (P-ISOPROPYLtolUENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
SEC-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
STYRENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
T-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TERT-AMYL METHYL ETHER	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
TERT-BUTYL ALCOHOL	UG/L	-	50 U	Not Anaylzed	Not Anaylzed	50 U	Not Anaylzed
TERT-BUTYL ETHYL ETHER	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
TERT-BUTYL METHYL ETHER	UG/L	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TETRAHYDROFURAN	UG/L	-	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
TOLUENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U



Concentration Exceeds Criteria

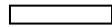
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			411A	411A	MW423	MW934	MW934
Field Sample Identifier :			411A	411A	MW423	MW934	MW934
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/17/14	10/21/14	10/24/14	04/15/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
TOTAL 1,2-DICHLOROETHENE	UG/L	5	Not Anaylzed	1.2 U	1.2 U	Not Anaylzed	1.2 U
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.6 U				
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.6 U				
TRANS-1,4-DICHLORO-2-BUTENE	UG/L	5	0.6 U	Not Anaylzed	Not Anaylzed	0.6 U	Not Anaylzed
TRICHLOROETHANE	UG/L	5	0.6 U				
TRICHLOROETHYLENE (TCE)	UG/L	5	0.6 U	0.33 J	0.6 U	0.6 U	0.6 U
TRICHLOROFLUOROMETHANE	UG/L	5	0.6 U				
VINYL CHLORIDE	UG/L	2	0.6 U				
XYLENES, TOTAL	UG/L	-	1.8 U				



Concentration Exceeds Criteria

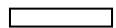
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW949	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	04/16/14	10/21/14	04/16/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
1,1,1,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2,2-TETRACHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1,2-TRICHLOROETHANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,1-DICHLOROPROPENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2,3-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	1.3	0.6 U	0.6 U
1,2,3-TRICHLOROPROPANE	UG/L	0.04	1 U	1 U	1 U	1 U	1 U
1,2,3-TRIMETHYLBENZENE	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
1,2,4-TRICHLOROBENZENE	UG/L	5	0.6 U	0.6 U	1	0.6 U	0.6 U
1,2,4-TRIMETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.21 J	0.6 U	0.6 U
1,2-DIBROMO-3-CHLOROPROPANE	UG/L	0.04	1 U	1 U	1 U	1 U	1 U
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	UG/L	0.006	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.35 J	0.6 U	0.6 U
1,2-DICHLOROETHANE	UG/L	0.6	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,2-DICHLOROPROPANE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3,5-TRIMETHYLBENZENE (MESITYLENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,3-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.39 J	0.4 J	0.6 U



Concentration Exceeds Criteria

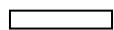
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW949	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	04/16/14	10/21/14	04/16/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
1,3-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
1,4-DICHLOROBENZENE	UG/L	3	0.6 U	0.6 U	0.52 J	0.6 U	0.6 U
2,2-DICHLOROPROPANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-CHLOROETHYL VINYL ETHER	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
2-CHLOROTOLUENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-HEXANONE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
2-METHYLNAPHTHALENE	UG/L	-	1 U	1 U	Not Anaylzed	1 U	Not Anaylzed
4-CHLOROTOLUENE	UG/L	-	1 U	1 U	1 U	1 U	1 U
ACETONE	UG/L	50	12	2.7 J	3.6 J	3.8 J	4.2 J
ACRYLONITRILE	UG/L	5	1 U	1 U	Not Anaylzed	1 U	Not Anaylzed
BENZENE	UG/L	1	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOBENZENE	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOCHLOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMODICHLOROMETHANE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOFORM	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
BROMOMETHANE	UG/L	5	4 U	4 U	4 U	4 U	4 U
CARBON DISULFIDE	UG/L	60	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CARBON TETRACHLORIDE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U



Concentration Exceeds Criteria

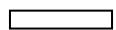
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW949	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	04/16/14	10/21/14	04/16/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
CHLOROETHANE	UG/L	5	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	7	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CHLOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,2-DICHLOROETHYLENE	UG/L	5	0.6 U	0.6 U	0.17 J	0.6 U	0.6 U
CIS-1,3-DICHLOROPROPENE	UG/L	0.4	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CYCLOHEXANE	UG/L	-	1 U	1 U	Not Anaylzed	1 U	Not Anaylzed
DIBROMOCHLOROMETHANE	UG/L	50	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIBROMOMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DICHLORODIFLUOROMETHANE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
DIETHYL ETHER (ETHYL ETHER)	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
ETHYL METHACRYLATE	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
ETHYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
HEXAChLOROBUTADIENE	UG/L	0.5	1 U	1 U	2.2 J	1 U	1 U
HEXAChLOROETHANE	UG/L	5	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
IODOMETHANE (METHYL IODIDE)	UG/L	5	1 U	1 U	Not Anaylzed	1 U	Not Anaylzed
ISOPROPYL ETHER	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
ISOPROPYLBENZENE (CUMENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
M+P-XYLENE	UG/L	5	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
METHYL ACETATE	UG/L	-	1 U	1 U	Not Anaylzed	1 U	Not Anaylzed



Concentration Exceeds Criteria

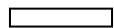
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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

NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW949	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	04/16/14	10/21/14	04/16/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
METHYL ETHYL KETONE (2-BUTANONE)	UG/L	50	5 U	5 U	5 U	5 U	5 U
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	UG/L	-	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
METHYLCYCLOHEXANE	UG/L	-	1 U	1 U	Not Anaylzed	1 U	Not Anaylzed
METHYLENE CHLORIDE	UG/L	5	0.6 U	R	R	0.6 U	R
NAPHTHALENE	UG/L	10	0.6 U	0.6 U	1	0.6 U	0.6 U
N-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.42 J	0.6 U	0.6 U
N-PROPYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
O-XYLENE (1,2-DIMETHYLBENZENE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
P-CYMENE (P-ISOPROPYLtolUENE)	UG/L	5	0.6 U	0.6 U	0.27 J	0.6 U	0.6 U
SEC-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.24 J	0.6 U	0.6 U
STYRENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
T-BUTYLBENZENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TERT-AMYL METHYL ETHER	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
TERT-BUTYL ALCOHOL	UG/L	-	50 U	50 U	Not Anaylzed	50 U	Not Anaylzed
TERT-BUTYL ETHYL ETHER	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
TERT-BUTYL METHYL ETHER	UG/L	10	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TETRACHLOROETHYLENE(PCE)	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
TETRAHYDROFURAN	UG/L	-	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
TOLUENE	UG/L	5	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U



Concentration Exceeds Criteria

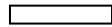
(1) - TOGS 1.1.1 (June 1998) for chemicals (VOCs, metals), Ra-226 and Ra-228 (5 pCi/l), Thorium (sum total of 15 pCi/l). 10 NYCRR Part 5, Subpart 5-1 (NYSDOH) for Arsenic, Total Uranium (30 ug/L or 27 pCi/L) beta emitters total dose not to exceed 4 mrem/yr (Sr-90, Tc-99, Cs-137, Pu-238, Pu-239/240, H-3).

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NOTE: The detection limits shown are MDL.

TABLE 18
GROUNDWATER ANALYTICAL RESULTS - VOLATILES
NIAGARA FALLS STORAGE SITE

Location Identifier :			MW947	MW948	MW948	MW949	MW949
Field Sample Identifier :			MW947	MW948	MW948	MW949	MW949
Sample Type :			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Depth Interval (ft) :			-	-	-	-	-
Date of Sample :			04/14/14	04/16/14	10/21/14	04/16/14	10/21/14
Parameter	Units	Criteria ¹					
VOLATILE ORGANIC ANALYSES							
TOTAL 1,2-DICHLOROETHENE	UG/L	5	Not Anaylzed	Not Anaylzed	0.38 J	Not Anaylzed	1.2 U
TRANS-1,2-DICHLOROETHENE	UG/L	5	0.6 U	0.6 U	0.21 J	0.6 U	0.6 U
TRANS-1,3-DICHLOROPROPENE	UG/L	0.4	0.6 U	0.6 U	0.31 J	0.6 U	0.6 U
TRANS-1,4-DICHLORO-2-BUTENE	UG/L	5	0.6 U	0.6 U	Not Anaylzed	0.6 U	Not Anaylzed
TRICHLOROETHANE	UG/L	5	0.6 U				
TRICHLOROETHYLENE (TCE)	UG/L	5	0.6 U				
TRICHLOROFLUOROMETHANE	UG/L	5	0.6 U				
VINYL CHLORIDE	UG/L	2	0.6 U				
XYLENES, TOTAL	UG/L	-	1.8 U				



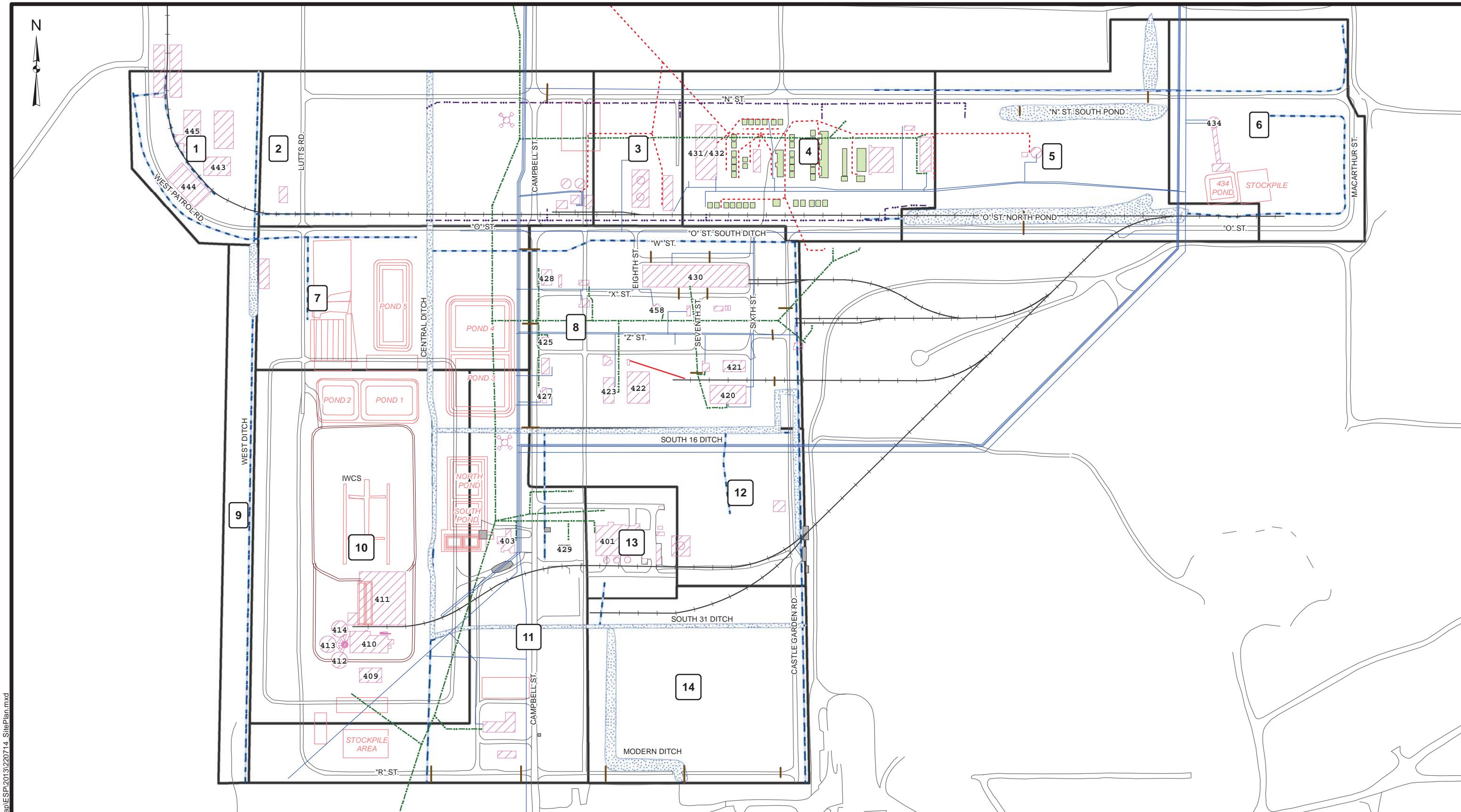
Concentration Exceeds Criteria

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

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

NOTE: The detection limits shown are MDL.

FIGURES

**Legend**

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

0 175 350 700
Feet



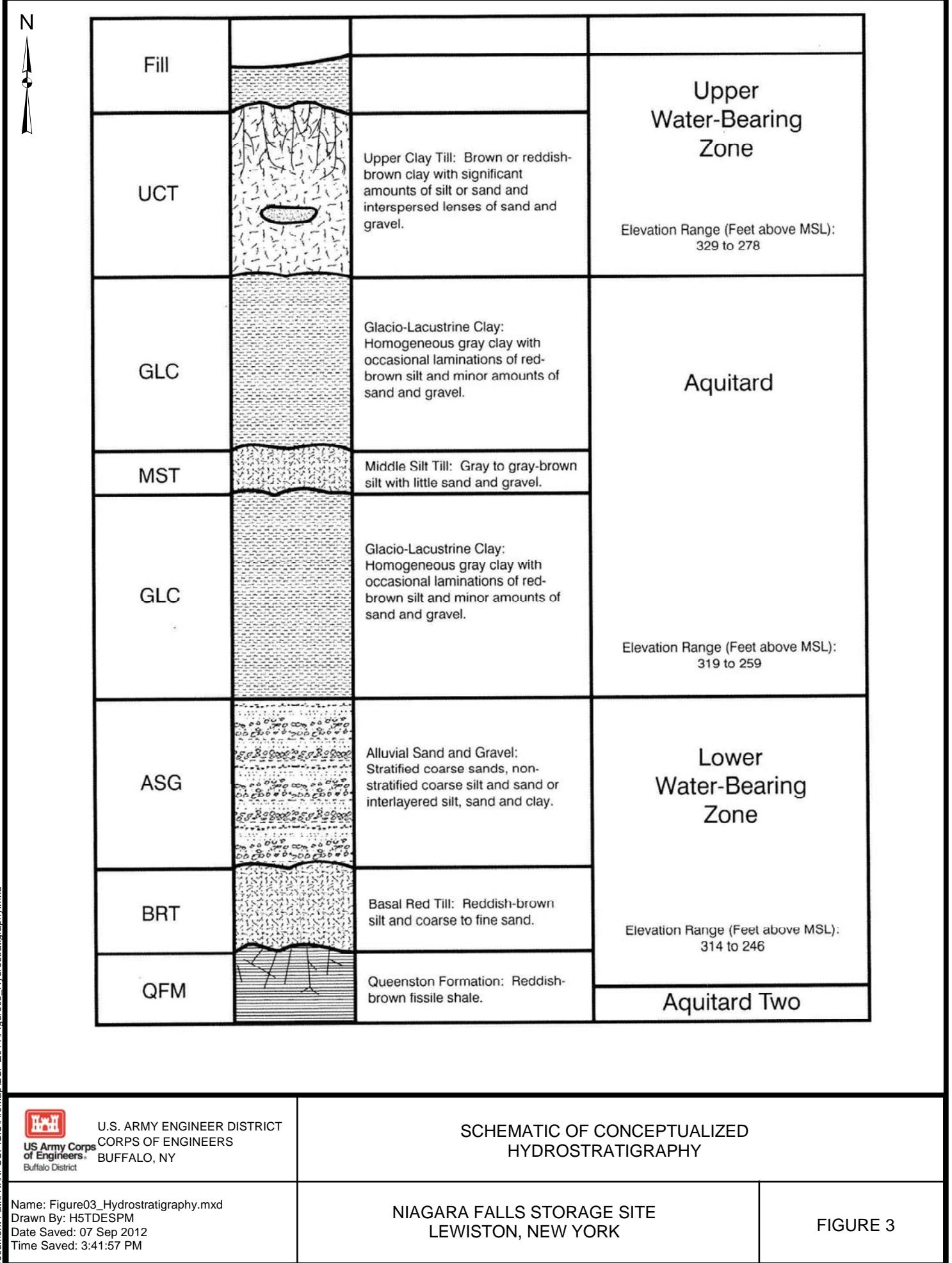
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
Buffalo District

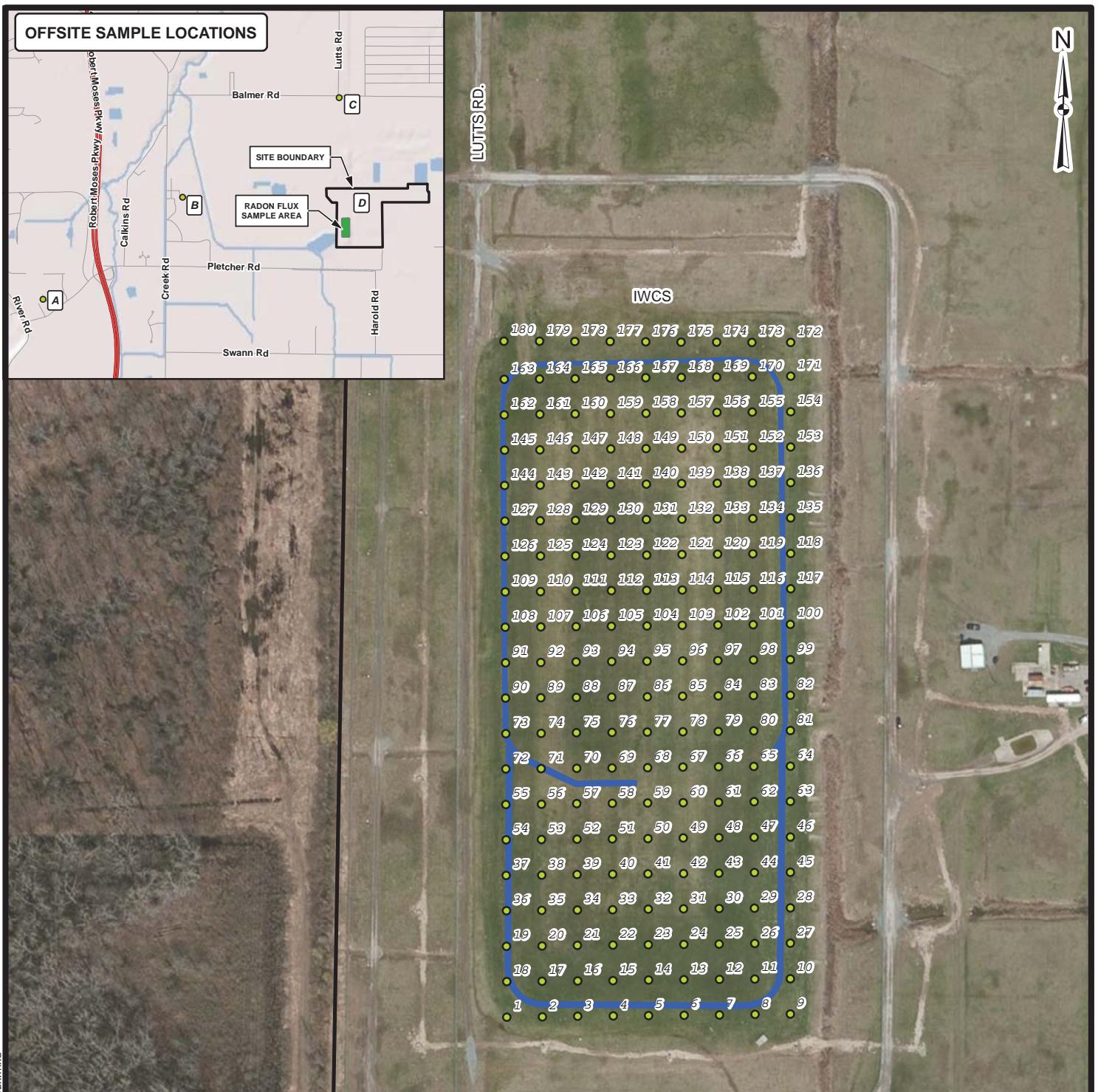
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Time Saved: 1:14:51 PM

SITE PLAN

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 2





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

LOCATIONS OF RADON FLUX MEASUREMENTS ON THE IWCS

Name: 220714_ESPRadonFlux.mxd
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Time Saved: 9:52:36 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 4



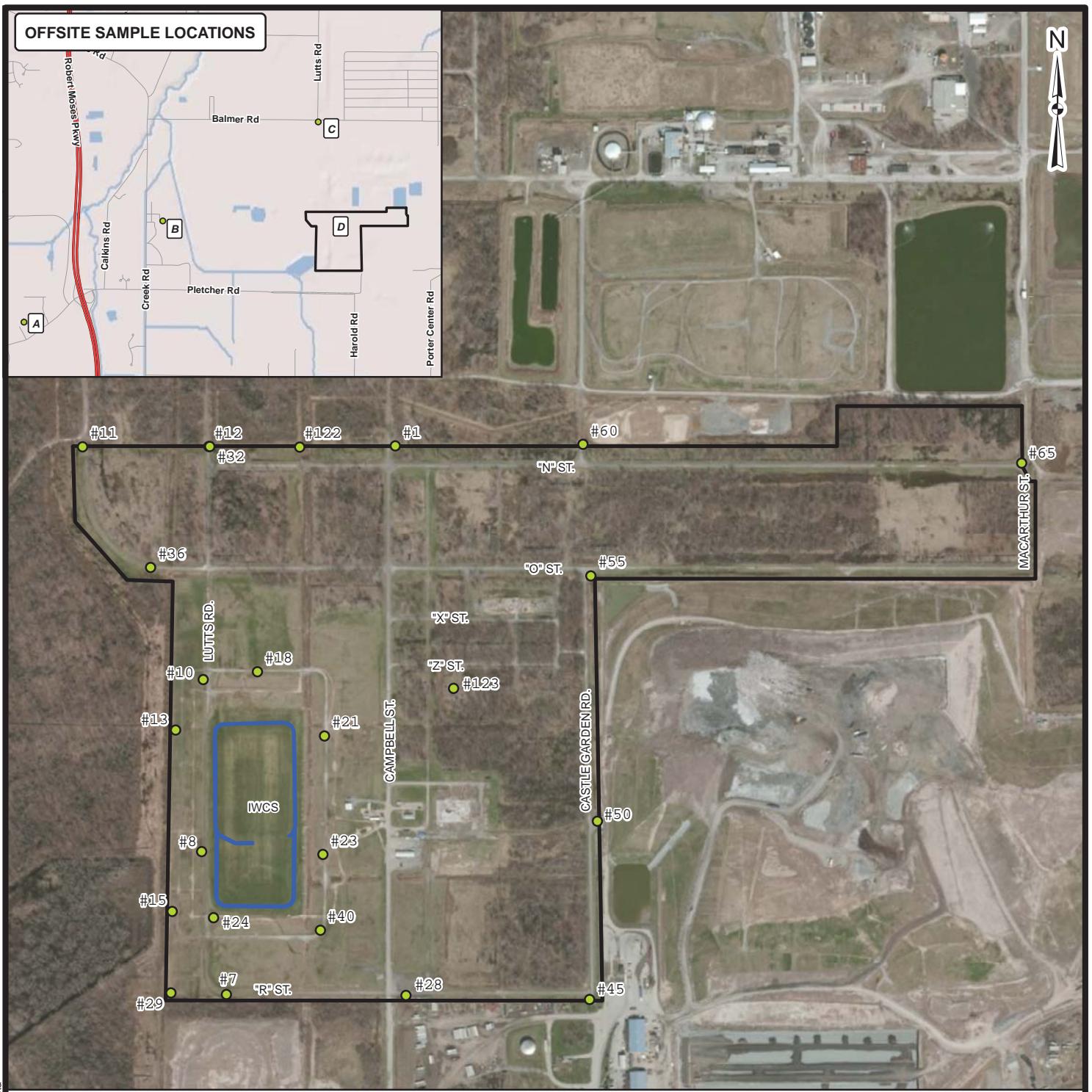
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CORPS OF ENGINEERS
Buffalo District

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Time Saved: 3:01:21 PM

MONITORING WELL LOCATION MAP

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 5



Legend

● OSL's / RadTrack Detectors

A - Lewiston Water Pollution Control Center

B - Lewiston Porter School Campus

C - Balmer Road Location

D - Niagara Falls Storage Site

— IWCS Cutoff Wall

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

○ NFSS Site Boundary

0 350 700 1,400
Feet



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

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

**LOCATION OF RADTRACK DETECTORS
AND OSL'S**

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Date Saved: 23 Jul 2014
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NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 6



Document Path: K:\NFSS\GIS\MapSampling_Locations\130321_SWaterSed_Aerial.mxd

Legend

▲ Surface Water/Sediment Sample Location

O NFSS Site Boundary

0 175 350 700
Feet



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
US Army Corps of Engineers
BUFFALO, NY
Buffalo District

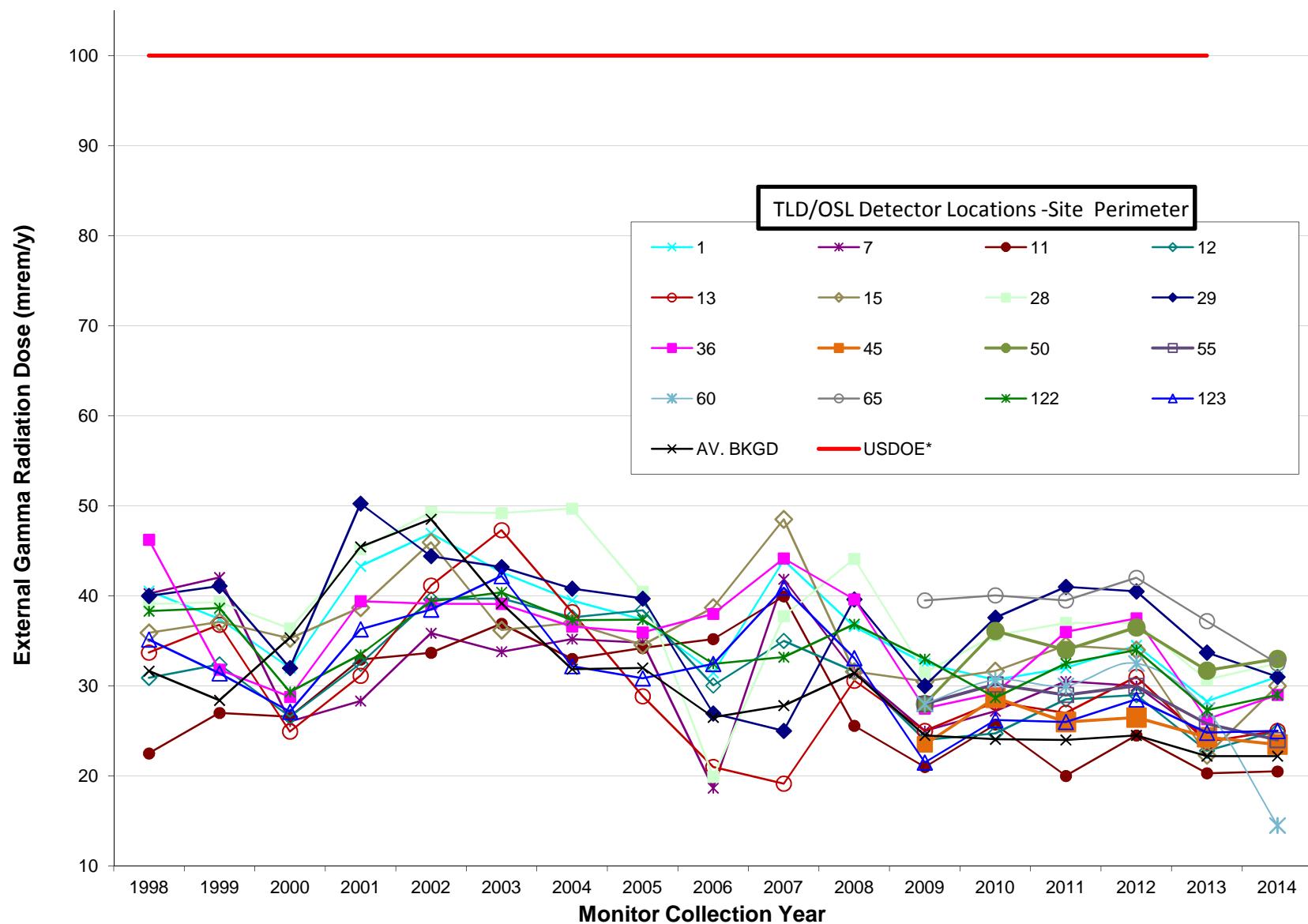
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SURFACE WATER/SEDIMENT SAMPLING LOCATION MAP

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

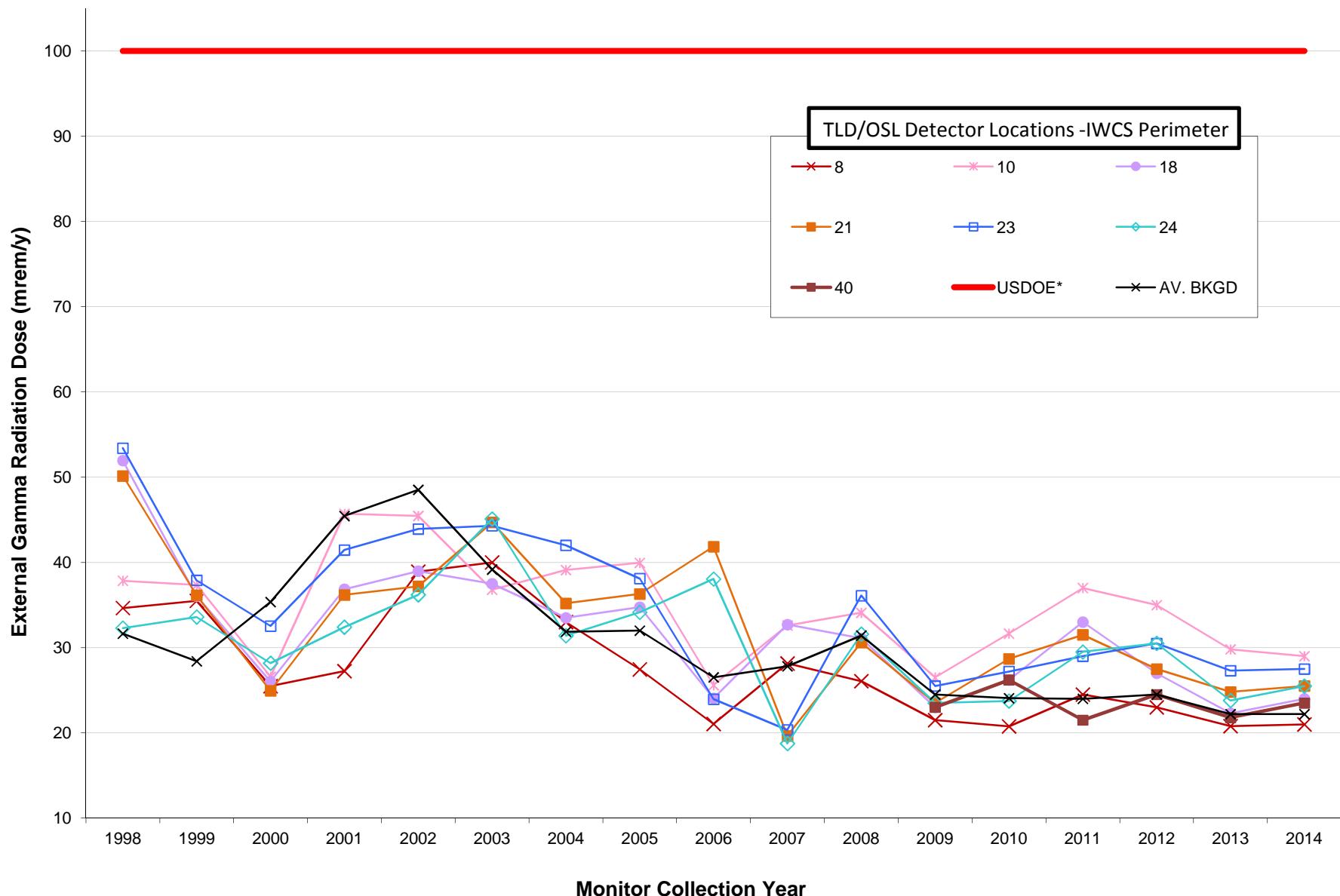
FIGURE 7

FIGURE 8
EXTERNAL GAMMA RADIATION DOSE RATES AT NFSS PERIMETER

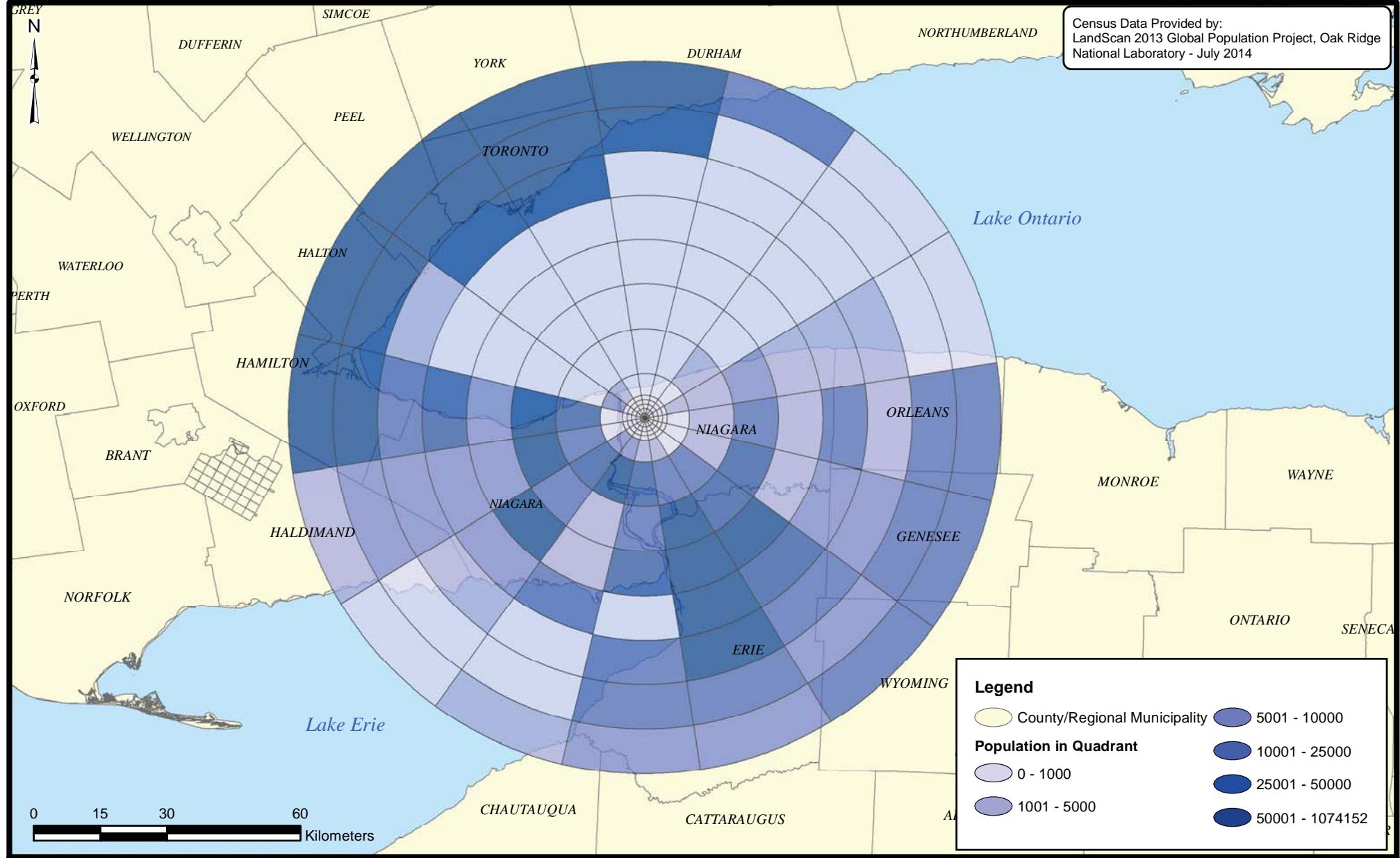


*The United States Department of Energy (USDOE) limit for external gamma radiation is 100 mrem/year above background but the value for each detector location includes background.

FIGURE 9
EXTERNAL GAMMA RADIATION DOSE RATES AT IWCS PERIMETER



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



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CENSUS DATA

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NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 10

FIGURE 11
RADIUM-226 CONCENTRATIONS IN SEDIMENT
1997 - 2014

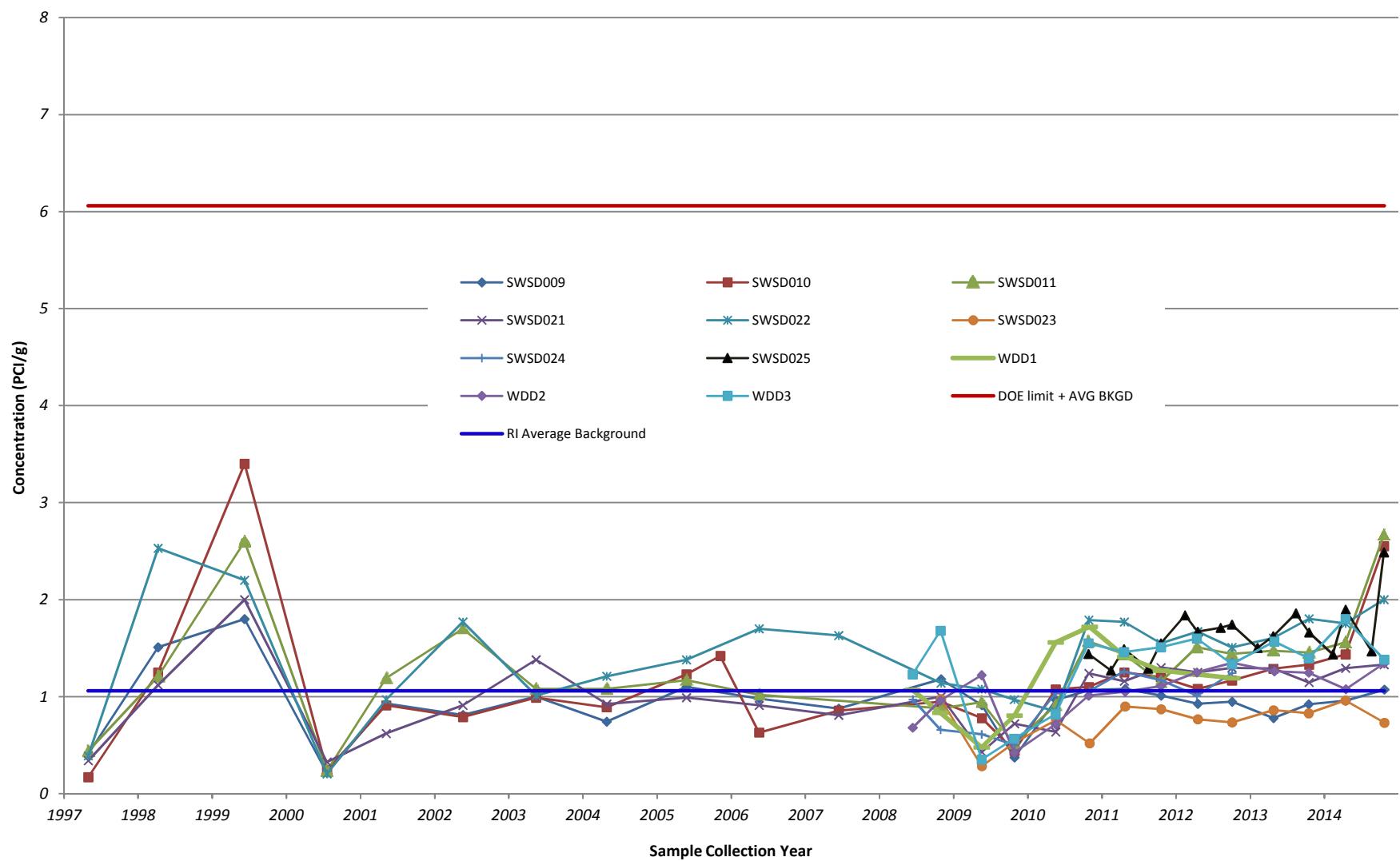
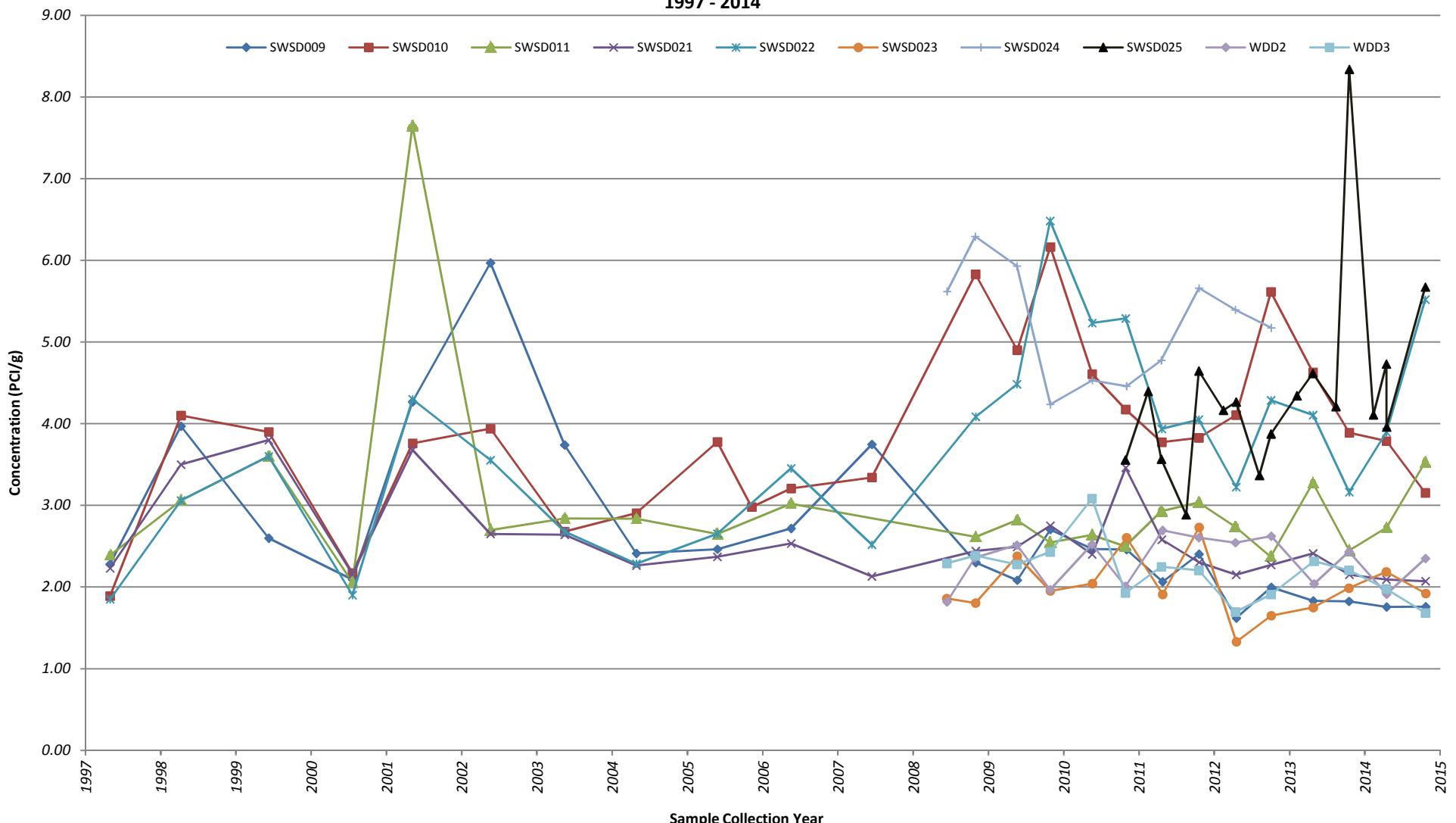
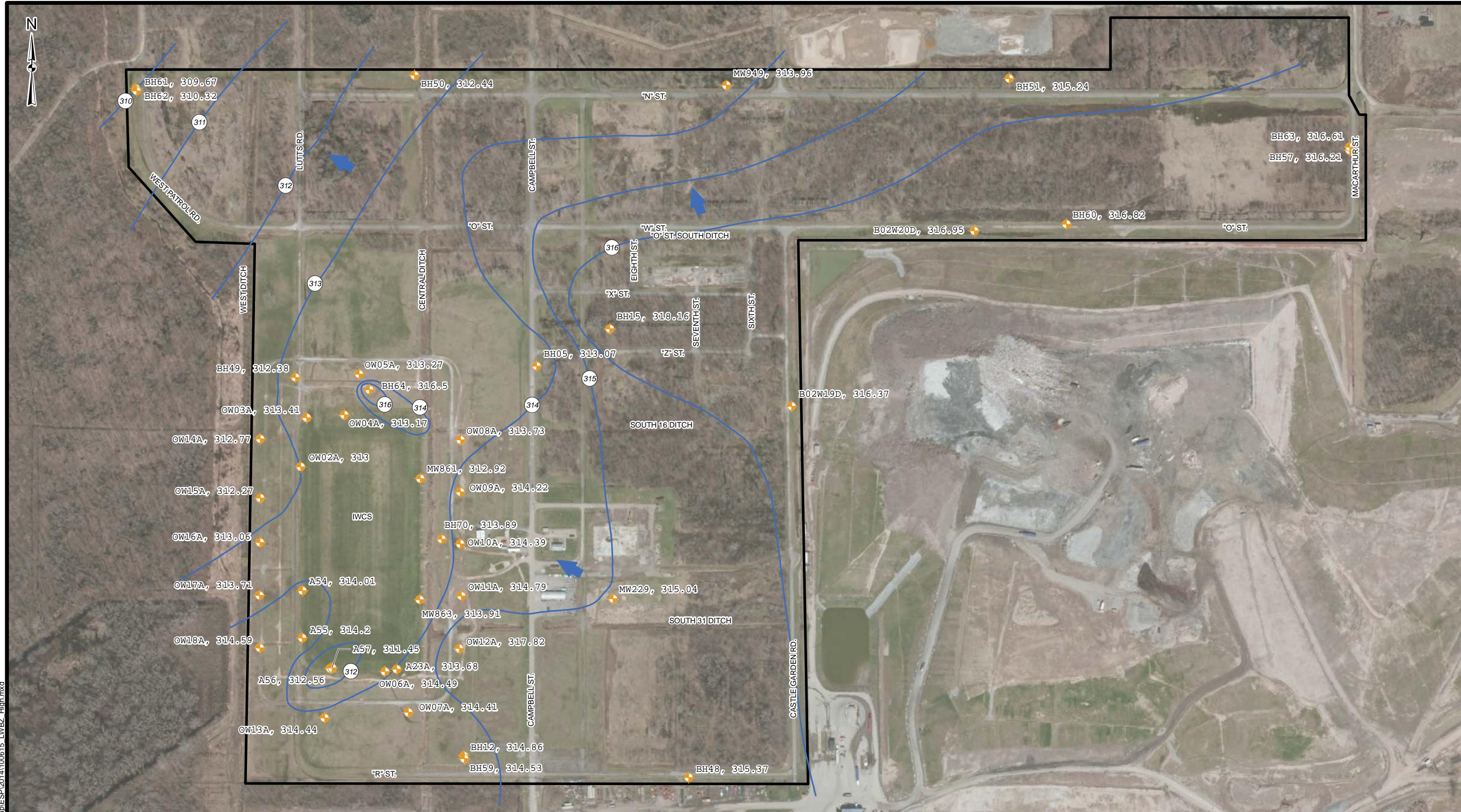


FIGURE 12
TOTAL URANIUM CONCENTRATIONS IN SEDIMENT
1997 - 2014



DOE DOSE-BASED LIMIT + Avg. BKGD = 37.76 pCi/g



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Legend

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

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



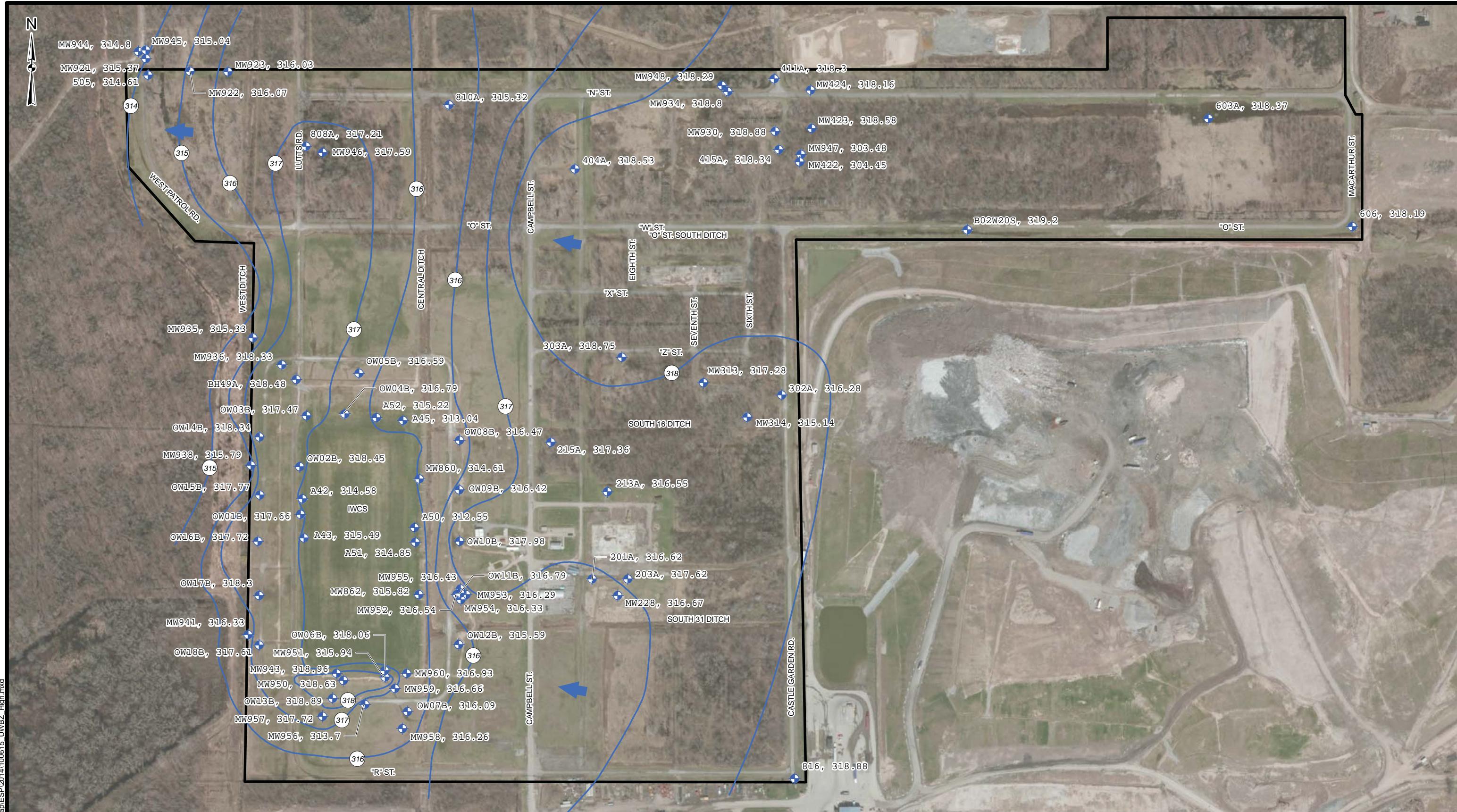
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Buffalo District
BUFFALO, NY

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Time Saved: 8:40:12 AM

GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR
THE LOWER WATER BEARING ZONE
(APRIL 11, 2014 - SEASONAL HIGH)

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 13





Legend

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

NOTES:

- All elevations are represented in NGVD 88.



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GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR
THE LOWER WATER BEARING ZONE
(OCTOBER 20, 2014 - SEASONAL LOW)

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 15



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Legend

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

NOTES:

- All elevations are represented in NGVD 88.



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Buffalo District
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GROUNDWATER POTENTIOMETRIC SURFACE MAP FOR
THE UPPER WATER BEARING ZONE
(OCTOBER 20, 2014 - SEASONAL LOW)

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Drawn By: H5TDESPM
Date Saved: 11 Jun 2015
Time Saved: 8:54:28 AM

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 16

FIGURE 17
TOTAL URANIUM CONCENTRATIONS IN UPPER WATER BEARING ZONE WELLS IN THE VICINITY OF THE IWCS
(1997 - 2014)

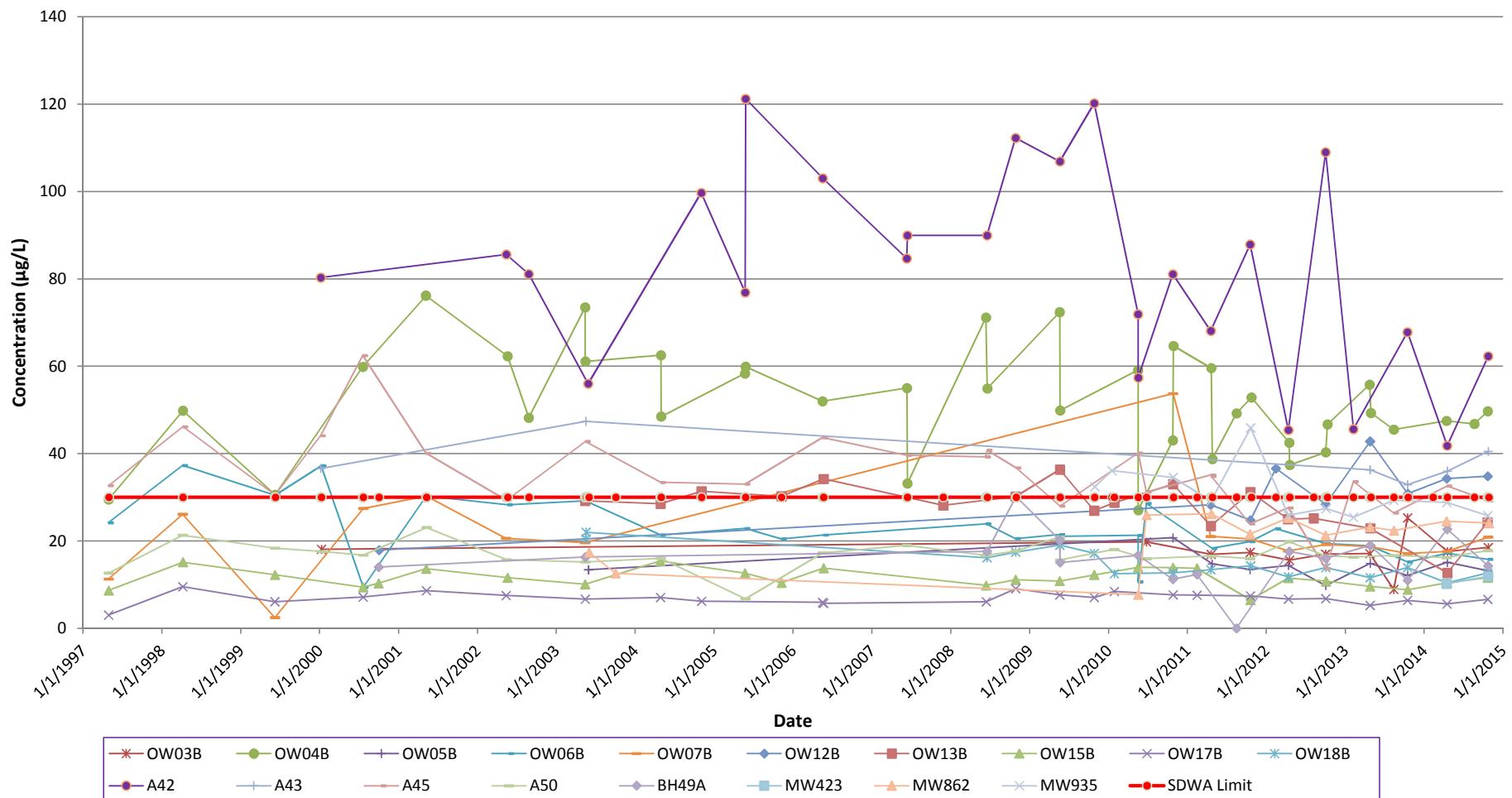


FIGURE 18
**TOTAL URANIUM CONCENTRATIONS IN UPPER WATER BEARING ZONE WELL OW11B AND NEWLY INSTALLED BALANCE OF PLANT WELLS
(2007 - 2014)**

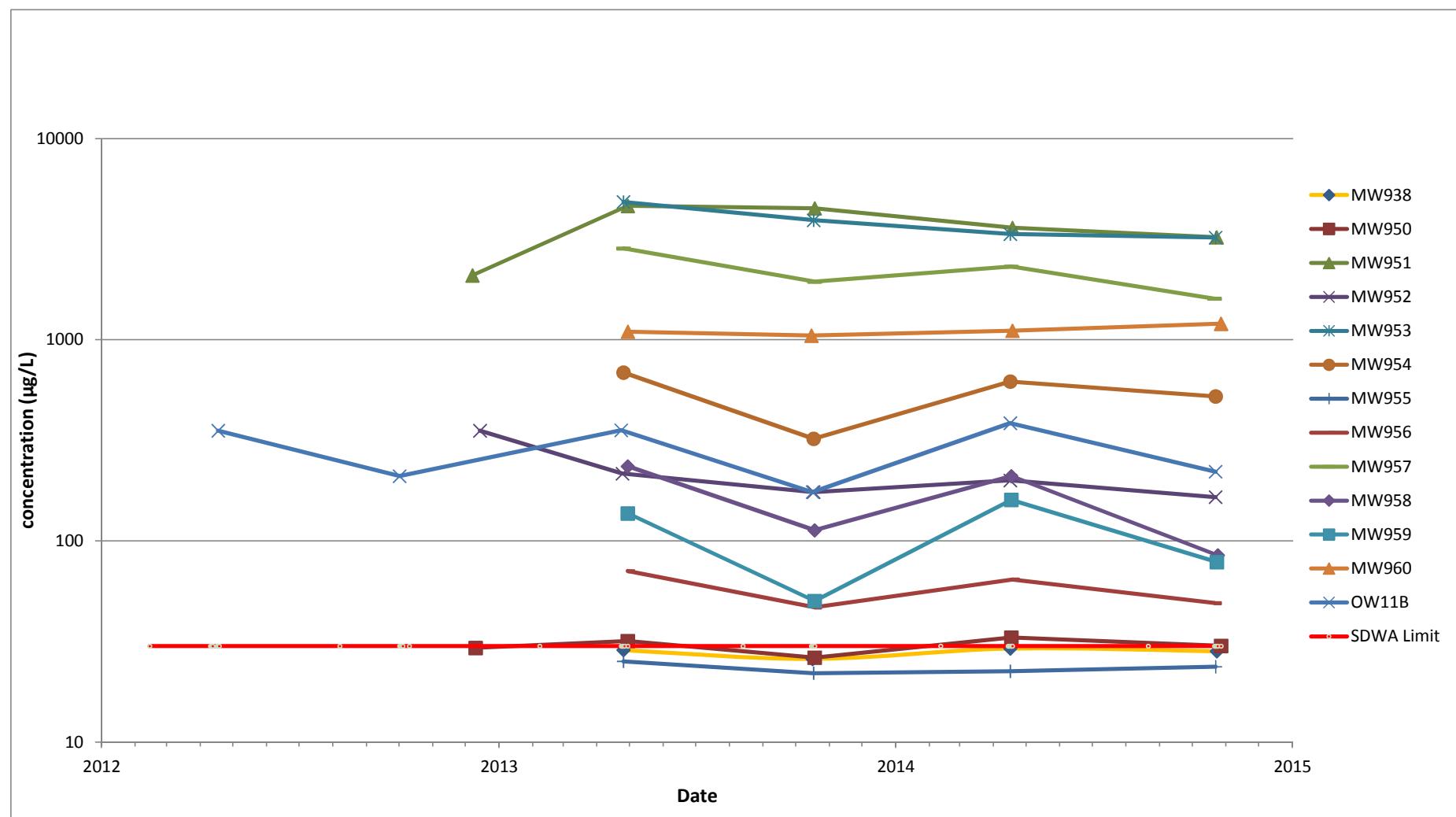
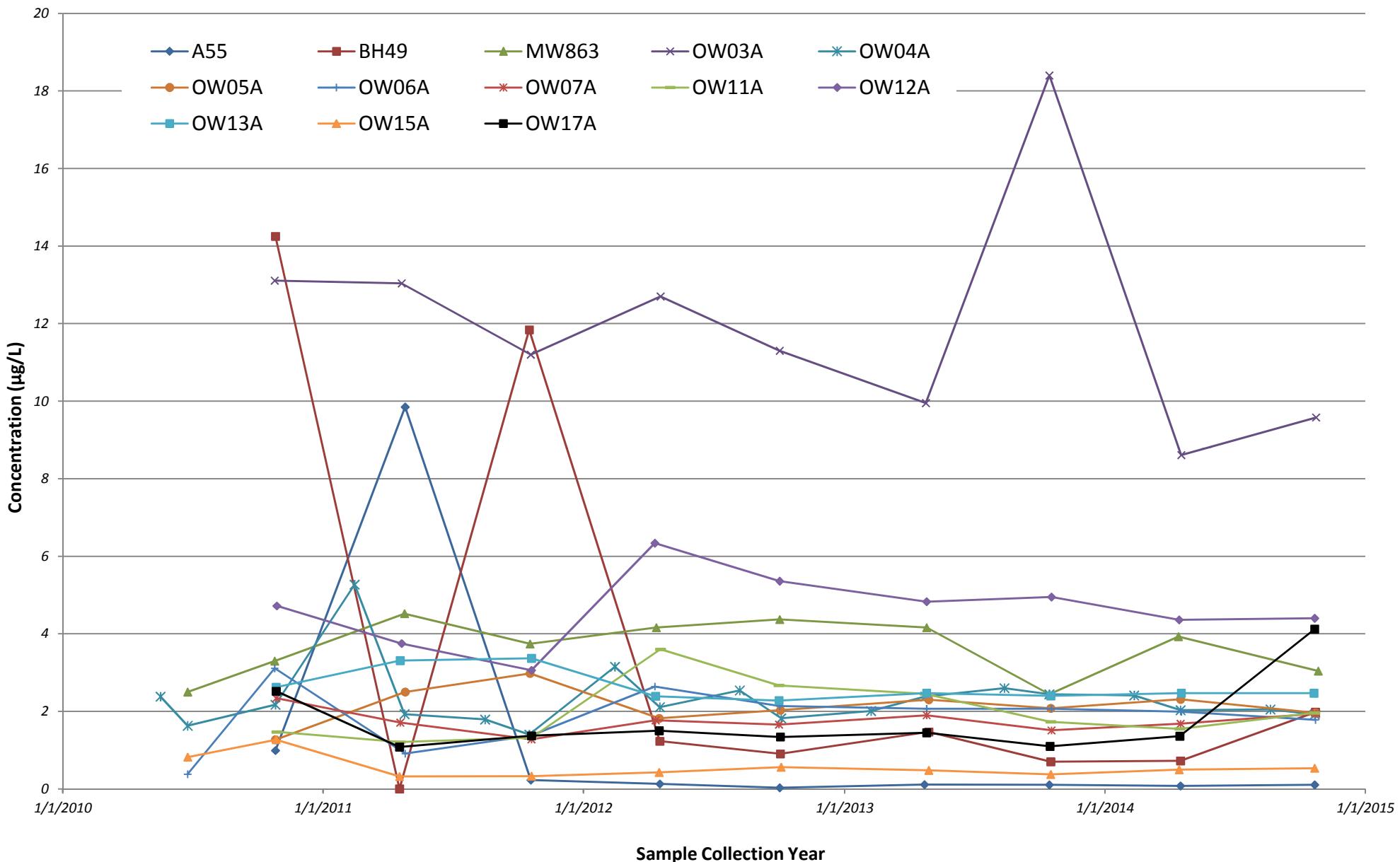


FIGURE 19
**TOTAL URANIUM CONCENTRATIONS IN LOWER WATER BEARING
ZONE MONITORING WELLS (1997 - 2013)**



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

APPENDIX A

2014 Calculation of External Gamma Radiation Dose Rates for Niagara Falls Storage Site

APPENDIX A: NFSS CY 2014 ENVIRONMENTAL SURVEILLANCE TECHNICAL MEMORANDUM

CY 2014 CALCULATION OF EXTERNAL GAMMA RADIATION DOSE RATES FOR NIAGARA FALLS STORAGE SITE (NFSS)

LEWISTON, NEW YORK

2015



**US Army Corps
of Engineers®**

Buffalo District

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4.0 ASSESSMENT METHODOLOGY AND RESULTS.....	2
4.1 NEAREST RESIDENT	2
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1.0 PURPOSE

This calculation estimates the external gamma radiation dose from the Niagara Falls Storage Site (NFSS), Lewiston, New York (see Figure 1, Appendix B), during calendar year (CY) 2014. Hypothetical doses from external gamma radiation to members of the public are calculated from dose measurements using Landauer “Luxel” Optically Stimulated Luminescence dosimeters (OSLs) located at the perimeters of the NFSS and the Interim Waste Containment Structure (IWCS). Figure 6 in the main text shows the locations of the dosimeters. The OSLs replaced thermoluminescent dosimeters (TLDs) in the environmental program in 2008.

2.0 ASSUMPTIONS

The locations of off-site receptors used for the dose calculation were based on a canvas of receptors conducted by USACE in CY 2006. The hypothetical doses for the nearest resident and off-site worker are reported. The modeling approach described below is considered to be protective of human health (conservative) in calculating hypothetical dose to receptors. The shielding effect of the air has not been included in the calculations. Calculations for the hypothetical annual external gamma radiation doses to these receptors used the following assumptions:

- Distance from each OSL above the source (the ground) is 0.91 meters (m) (3 feet [ft])
- Distance from the OSLs to the nearest resident is 152.4 m (500 ft) perpendicular to the western OSL line
- Distance from the OSLs to the nearest off-site worker is 310.9 m (1,020 ft) perpendicular to the eastern OSL line
- Length of the western OSL monitoring line (western perimeter fence) is 843 m (2,766 ft)
- Length of the eastern OSL monitoring line (east of Campbell Street) is 823 m (2,700 ft)

3.0 OSL DATA

At NFSS, OSLs are used to measure gamma radiation from the site and from sources of background radiation. Natural sources of background radiation include cosmic radiation and terrestrial radiation sources. While background radiation from all sources is 620 millirem per year (mrem/yr) in the United States, the annual average (per capita) cosmic and terrestrial radiation doses are 34 mrem and 22 mrem/yr, respectively (NCRP Report 160). Annual doses due to background at NFSS are measured at background locations using OSLs at the Lewiston Porter High School, Balmer Road, and the Lewiston Water Pollution Control Center. Background dose for the same period of exposure is subtracted from site dose values to estimate the net dose from NFSS. The OSLs are located at the site perimeter and at the perimeter of the IWCS. The OSLs are placed at 1.6 meters (m) (3 feet [ft]) above the ground surface. The OSLs measure exposure to external radiation during their time of deployment (approximately six-month intervals) and then are analyzed at an off-site laboratory.

Seventeen locations around the perimeter of the site and seven locations around the IWCS were monitored in CY 2014. In addition to these locations, there were three background locations. Two environmental OSLs were placed at each monitoring location for redundancy purposes for quality control. If an OSL is lost or damaged during a monitoring period or at the laboratory then the duplicate reading is assumed for that location. During the first half of 2014, one badge from location 55 and both badges from location 60 were damaged during fence maintenance activities at the site. For all other monitoring locations, the OSL co-located badge results were used for each location.

The OSL monitoring data for CY 2014 are presented in Table 4. A time-weighted or normalized annual dose is calculated that accounts for exposure periods having different integration times (a different number of measurement days). Negative net values, when they occur, are retained for calculation purposes.

4.0 ASSESSMENT METHODOLOGY AND RESULTS

Gamma radiation measured at the perimeter fence line represents the dose for full-time occupancy: i.e., 24 hours/day and 365 days/year (366 days for a leap year). Dose to an off-site receptor is significantly affected by proximity to the source and the amount of time spent at the receptor location. The estimate of dose to an off-site worker therefore uses a correction factor for occupancy assuming 2,000 hours worked per year. The estimate of dose to an off-site resident assumes a full-time occupancy at home. The average net dose rate for CY 2014 at the site perimeter by direction is calculated to be:

Direction	OSL Locations	Calculated Average Net Dose Rate (mrem/year)
North perimeter	1, 11, 12, 60, 65, 122	3.25
East perimeter	1,28,123	7.33
South perimeter	7, 28, 29, 45	5.46
West perimeter	8, 10, 11,13,15,29,36	4.33

4.1 NEAREST RESIDENT

The dose calculation for the nearest resident uses the line of OSLs along the western perimeter fence. The OSLs along this side of the facility include NFSS perimeter fence monitoring locations 11, 13, 15, 29, and 36, and IWCS perimeter fence monitoring locations 8 and 10. The two IWCS locations are close to the western NFSS perimeter fence. Figure 6 in the main text shows the locations of the dosimeters. Net dose rates (corrected for background) for these OSLs are summed and divided by the total number of observations (14 for CY 2014). This average value represents the annual dose at the site perimeter ($D_1 = 4.33$ mrem for CY 2014). The dose contribution to this resident from the southern exposure is insignificant compared to the exposure from the western line source. The western site perimeter dose is then used in the following equation for a line source:

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

Where:

D_2 = dose calculated at the receptor location from the line source

D_1 = dose at the site perimeter as described above

h_1 = the distance of the OSLs from the source (0.91 m; 3 ft)

h_2 = the distance of the resident from the fence line (152.4 m; 500 ft)

L = half the length of line of OSLs measuring the line source (421.5 m; 1,383 ft)

Nearest Resident Dose Calculation (Resident southwest of NFSS)

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

Where:

h_1 = 0.91 m (3 ft) distance of OSL from the source

h_2 = 152.4 m (500 ft) distance of resident from the western fence line

L = 421.5 m (1,383 ft) half the length of the western line source

D_1 = 7.71 mrem average annual dose at the OSL monitoring locations

D_2 = 0.02 mrem resident annual dose at 500 feet from the western fence line

The hypothetical dose to the nearest resident is 2.0 E-02 (or 0.02) mrem for CY 2014.

4.2 NEAREST OFF-SITE WORKER

The dose to the nearest off-site worker uses the line of OSLs, closest to the eastern perimeter fence (Castle Garden Road). The OSLs used include monitoring locations 1, 28, and 123. These OSLs are located along an interior fence east of Campbell Street. Figure 6 in the main text shows the locations of the dosimeters. There are no IWCS perimeter fence monitoring locations close to those along the fence line east of Campbell Street; therefore, none are included in the dose calculations. Net dose rates (corrected for background) for OSL monitoring locations 1, 28, and 123 are summed and divided by the total number observations (6 for CY 2014). This average represents the annual dose at the site perimeter ($D_1 = 7.33$ mrem for CY 2014).

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

NFSS Perimeter Monitoring Locations 1, 28, 123

$h_1 = 0.91$ m (3 ft) distance of OSL from the source

$h_2 = 365.8$ m (1,020 ft) distance of off-site worker from the OSLs

$L = 411.5$ m (1,350 ft) half the length of the eastern line source

$D_1 = 8.83$ mrem average annual dose at the OSL monitoring locations

$D_2 = 0.003$ mrem off-site worker annual dose at 1,020 feet from the western fence line.

The hypothetical dose to the nearest off-site worker is 2.9 E-03 (or 0.0029) mrem for CY 2014. This was calculated using the equation above and a correction factor for off-site worker occupancy of 2,000/8,760 hours.

5.0 REFERENCES

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

APPENDIX B

FUSRAP CY2014 NESHAP Annual Report

for Niagara Falls Storage Site (NFSS)



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

REPLY TO
ATTENTION OF:

Special Projects Branch

June 16, 2015

SUBJECT:Niagara Falls Storage Site 2014 National Emission Standards for Hazardous Air Pollutants Report

[REDACTED]
Radiation and Indoor Air Branch
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, New York 10007

Dear [REDACTED]:

Enclosed please find the 2014 National Emission Standards for Hazardous Air Pollutants (NESHAPs) report for the Niagara Falls Storage Site (NFSS). This report, as it has in the past, will be included in the U.S. Army Corps of Engineers FUSRAP Niagara Falls Storage Site 2014 Environmental Surveillance Technical Memorandum, which is currently under development. In summary the Corps finds that the NFSS is in compliance with 40 CFR 61, Subpart H and Subpart Q.

Compliance with 40 CFR 61, Subpart H is determined by use of USEPA approved code CAP88-PC Version 4.0. The CAP88-PC hypothetical annual maximum dose to an off-site:

Resident (Infant): 1.3 E-04 mrem
Farmer (Infant): 1.0 E-04 mrem

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

Off-site worker (Adult): 6.6 E-05 mrem
School (Fifteen-year old): 1.0 E-05 mrem

The hypothetical annual dose to the maximally exposed off-site individual is therefore 1.3 E-04 mrem to a resident.

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

Population (Infant): 2.72 E-03 person-rem

Compliance with 40 CFR 61, Subpart Q is demonstrated by the measurement of radon-222 (radon flux). Radon-222 flux at the NFSS was measured using 180 10-inch diameter activated carbon canisters placed at 15-meter intervals across the Interim Waste Containment Structure and sealed to the surface for a 24-hour exposure period (August 18 - 19, 2014). Individual and average (0.0642 pCi/m²/sec) measurements were well below the NESHPAs standard for radon flux of 20 pCi/m²/sec, with results ranging from non-detect to 0.4636 pCi/m²/s. These results are consistent with radon flux measured in previous years. The results do not exceed the established standard specified in 40 CFR 61, Subpart Q.

Mr. [REDACTED] is the technical point of contact for these results. He can be reached at [REDACTED] if you have any questions.

Sincerely,

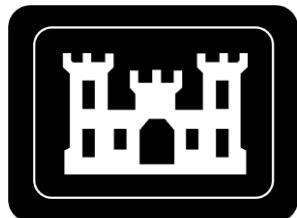
[REDACTED] PMP
Acting Chief, Special Projects Branch

Enclosure

FUSRAP CY2014 NESHAP ANNUAL REPORT FOR NIAGARA FALLS STORAGE SITE (NFSS)

LEWISTON, NEW YORK

JUNE 2015



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

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- Attachment B: Source Term Calculations and Annual Air Releases
- Attachment C: CAP88-PC Reports – Individual
- Attachment D: CAP88-PC Reports – Population
- Attachment E: National Climatic Data Center, Niagara Falls, New York
- Attachment F: 2014 Niagara Falls Storage Site Radon Flux Results and Site Map

ACRONYMS AND ABBREVIATIONS

BNI	Bechtel National, Inc.
CAP88-PC Ver 3	Clean Air Act Assessment Package-1988, Version 3.0 (Revised in 2013)
CAP88-PC Ver 4	Clean Air Act Assessment Package-1988, Version 4.0 (Revised in 2014)
CFR	Code of Federal Regulations
E _w	annual wind erosion emission
FUSRAP	Formerly Utilized Sites Remedial Action Program
ICRP	International Commission on Radiological Protection
IWCS	Interim Waste Containment Structure
m ²	square meter(s)
MEI	maximally exposed individual
ML	Modern Landfill
mph	miles per hour
NOAA	National Oceanic and Atmospheric Administration
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIA	Niagara Falls International Airport
NFSS	Niagara Falls Storage Site
USAEC	United States Atomic Energy Commission
USACE	United States Army Corps of Engineers
UCL	upper confidence limit
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

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

1.1 SITE DESCRIPTION

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

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

1.2 SOURCE DESCRIPTION

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

Table 1. History and Description of Wastes Transferred to NFSS

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

Since 1971, activities at NFSS have been confined to residue and waste storage and remediation. On-site and off-site areas with residual radioactivity exceeding USDOE guidelines were remediated between 1981 and 1992. The materials generated during remedial actions (approximately 195,000 m³) are encapsulated in the IWCS, which is specifically designed to provide interim storage of the materials. Remedial investigation began at the end of 1999 to determine if any areas of the site contained radioactive or chemical contaminants at levels that could pose an unacceptable risk to human health and the environment. The CERCLA remedial investigation of the NFSS was completed in 2007. From 2012-2014 USACE investigated the NFSS Balance of Plant Operable Unit (which includes everything outside the IWCS, excluding groundwater). The Balance of Plant fieldwork delineated areas of groundwater and soil contamination as well as investigated underground utilities. The NFSS is currently in the feasibility study phase of the CERCLA process for the IWCS Operable Unit and the Balance of Plant Operable Unit.

2.0 REGULATORY STANDARDS

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

2.1 40 CFR 61, SUBPART H

40 CFR 61, Subpart H provides standards for reporting emissions of radionuclides (excluding radon-222 and radon-220) into the air from USDOE facilities. Although control and maintenance of the site currently rests with USACE, responsibility for NFSS will return to USDOE following completion of remedial actions. This regulation therefore provides an appropriate standard for NFSS. Compliance with Subpart H is verified by applying the USEPA approved code, CAP88-PC. CAP88-PC Version 4.0 (USEPA 2006, revised 2014) was used for this year's calculation. The applicable regulation, 40 CFR 61.92 limits exposure of the public to an annual effective dose equivalent of 10 mrem from airborne radioactive emissions.

2.2 40 CFR 61, SUBPART Q

40 CFR 61, Subpart Q applies to storage and disposal facilities for radium-containing material that emits radon-222 into air. NFSS is specifically identified as one such facility in this subpart (in 40 CFR 61.190). Compliance with Subpart Q is verified by annual monitoring of the IWCS for radon-222 flux. The Subpart Q radon-222 emission limit is 20 pCi/m²/s.

3.0 AIR EMISSION DATA

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

These calculations use the USEPA air pollution emission factor methodology (AP-42) to estimate the radioactive release from wind erosion, which is then used as the source term in the Clean Air Act Assessment Package (CAP88-PC) model to estimate airborne doses to hypothetically exposed individuals. The annual wind erosion emission estimate uses the most current soil data from the NFSS Remedial Investigations and has been revised for this report to include all subsequent soils data collected during the NFSS Balance of Plant field investigations. For the year 2014 average soil concentrations without the subtraction of background radioactivity were calculated for each soil nuclide of concern and were used as the soil concentration for the source term estimate. The area of the entire NFSS was assumed to be uniformly contaminated and to contribute to the source term.

Table 2. Air Emission Data - NFSS

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

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

4.0 DOSE ASSESSMENTS

4.1 MODEL SOURCE DESCRIPTION

To determine the dose from airborne particulates potentially released from NFSS during CY2014, the annual wind erosion emission, E_w (Attachment A) is calculated using local climatological data (Attachment E) from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center for the Niagara Falls International Airport (NFIA) in Niagara Falls, NY. E_w is calculated using the USEPA AP-42 methodology for “fugitive emissions” from an “area source” that uses the “fastest mile” wind speed data from local climatological data reports for the calendar year. E_w , in grams emitted, is then applied to the soil nuclide concentration to estimate the source term or annual emissions for each radionuclide. The soil concentration was developed from all sample data (new for this year) compiled since Phases I, II, and III of the Remedial Investigation for soil contamination (Attachment B). Contributions from radon gas, in accordance with regulatory guidance, are not considered in this calculation. Annual estimated emissions for each radionuclide were input into the USEPA’s CAP88-PC, Version 4.0 (revised 2014) code to calculate hypothetical receptor doses. The model estimates resultant doses from airborne particulates to hypothetical individuals at the distances to the nearest residence, commercial/industrial facility, school, and farm as measured from a central location on-site. Hypothetical doses are then corrected for occupancy. Commercial/industrial facility and school occupancy is assumed to be 40 hr/week for 50 weeks/yr. Residential and farm occupancy is assumed to be full-time/continuous for 24 hr/day for 365 days/yr. The hypothetical individual receiving the higher of these calculated doses is then identified as the maximally exposed individual (MEI) for airborne particulate dose.

4.2 DESCRIPTION OF DOSE MODEL

4.2.1 CAP88-PC Computer Program

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

CAP88-PC uses a modified Gaussian plume equation to estimate the average dispersion of radionuclides released from a site. Assessments for population exposure are performed for a circular grid of distances and directions for a radius of 80 km (50 miles) around the facility. Agricultural arrays for EPA food source scenarios for vegetation, milk and meat, and for milk cattle and beef cattle density and land fraction cultivated are generated automatically. Dose and risk factors for CAP88-PC, Version 4.0 are from Federal Guidance Report 13 and are based on the methods detailed in International Commission on Radiological Protection (ICRP) 72 (ICRP72). CAP88-PC Version 4.0 includes a significant modification that adopts age-dependent dose and risk factors from FGR 13 for potential receptors including, adults, fifteen-year olds, ten-year olds, five-year olds, one-year olds and infants. This NESHAPS report includes age-dependent doses for these receptors. The dose calculations presented in this document used the default values for nuclide lung clearance type. These defaults correspond to the recommended values from FGR 13. Deposition velocity and scavenging coefficient are calculated by the code in accordance with USEPA policy. In the CAP88 model nuclides are depleted from the plume by precipitation scavenging, dry deposition and radioactive decay. The default scavenging coefficient is calculated as a function of annual precipitation. The program calculates the effective dose equivalents received by receptors by combining the inhalation and ingestion intake rates and the air and ground surface concentrations using the appropriate dose conversion factors. For this year's NESHAPS report the Annual Climatological Summary report for Niagara Falls International Airport from NOAA was unavailable at the time of writing this report and the monthly Quality Controlled Local Climatological Data reports for the airport were used to calculate the 2014 annual mean temperature (7.83 degrees Centigrade) and the total precipitation (77.0 centimeters) for input into CAP88.

4.2.2 CAP88-PC Input

Input parameters for CAP88 include:

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

4.2.3 CAP88-PC Output

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

4.3 COMPLIANCE ASSESSMENT

The released activity data from Attachment B is entered into the CAP88-PC modeling program to derive the hypothetical dose to the defined receptors. To derive the dose to the MEI, the CAP88-PC model must have weather data for the appropriate year, information on the emission source, and the distances and directions to the nearest residence, off-site worker, school, and farm. The following CY2014 meteorological data were entered into CAP88-PC (see Attachment E):

Average temperature	7.83 °C (46.1 °F) NFIA
Precipitation,	77.0 cm (30.3 inches) ML
Mixing height	1,000 m

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

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

The CAP88-PC annual hypothetical dose to the nearest resident, off-site worker, school, and farm at the corresponding directions and distances taken from page six of the “Dose and Risk Equivalent Summaries” document for individual modeling (Attachment C) using age-dependent factors and listed including member of the public receiving the highest dose listed in Table 3 are:

Resident - Infant	1.3 E-04 mrem, SSW @ 914 m
Off-site worker - Adult	2.9 E-04 mrem, SE @ 533 m
School – Age Fifteen	4.6 E-05 mrem, W @ 2499 m
Farm - Infant	1.0 E-04 mrem, S @ 1105 m

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

Off-site worker – Adult	6.6 E-05 mrem, SE @ 533 m
School - Age Fifteen	1.0 E-05 mrem, W @ 2499 m

Table 3 lists the results of the age-dependent individual doses for all CAP88 receptors.

Table 3. Individual Doses to Hypothetical Receptors (mrem/year)

Receptor	Adult	Fifteen	Ten	Five	One	Infant
Worker SE at 533 m	6.6E-05	NA	NA	NA	NA	NA
Resident SSW at 914 m	6.9E-05	1.0E-04	7.5E-05	7.1E-05	7.8E-05	1.3E-04
School W at 2499 m	6.2E-06	1.0E-05	7.1E-06	6.4E-06	NA	NA
Farmer S at 1105 m	5.3E-05	8.0E-05	5.8E-05	5.5E-05	6.1E-05	1.0E-04

Bold font indicates the highest individual (time corrected) used for the NESHAPS reporting.
NA indicates "not applicable."

5.0 SUPPLEMENTAL INFORMATION

5.1 POPULATION DOSE

The CAP88-PC model was also used to estimate the hypothetical airborne particulate dose to the population within 80 km of the site. Population data taken from LandScan 2013 Global Population Data from Oak Ridge National Laboratory, that included data for the United States and Canada, was used to create a population file for CAP88-PC. The effective dose equivalent for the collective population in person-rem/yr is from the CAP88-PC "Dose and Risk Equivalent Summaries" report.

The age-dependent maximum CAP88-PC annual effective dose for the population within 80 km of the facility is 2.72 E-03 person-rem for an infant. The maximum annual effective dose for each population age group is as follows (Attachment D):

Population:	Adult	1.15 E-03 person-rem
	Fifteen-year old	1.66 E-03 person-rem
	Ten-year old	1.33 E-03 person-rem
	Five-year old	1.30 E-03 person-rem
	One-year old	1.43 E-03 person-rem
	Infant	2.72 E-03 person-rem

5.2 RADON-222 FLUX

Measurement of radon-222 flux provides an indication of the rate of radon-222 emission from a surface. Radon-222 flux is measured with activated charcoal canisters placed at 15-m intervals across the surface of the IWCS for a 24-hr exposure period. Measurements for CY2014 are presented in the radon flux results with measurement locations (site map) in Attachment F.

Measured results for 2014 ranged from non-detect to 0.4636 pCi/m²/s, with an average result including detects and non-detects of 0.0642 pCi/m²/s. As in previous years, these results are well below the 20 pCi/m²/s standard specified in 40 CFR Part 61, Subpart Q, and demonstrate the effectiveness of the containment cell design and construction in mitigating radon-222 migration.

5.3 NON-APPLICABILITY

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

6.0 REFERENCES

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

Environmental Protection Agency (EPA), 1995. *Compilation of Air Pollutant Emission Factors, Fifth Edition*, AP-42, Office of Air Quality Planning and Standards, Research Triangle Park, NC (January).

Environmental Protection Agency (EPA), 2006. CAP88-PC Version 4.0 Computer Code, U.S. Environmental Protection Agency.

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

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

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

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

ATTACHMENT A

ANNUAL WIND EROSION EMISSION CALCULATION

A.1 ANNUAL WIND EROSION

In 2014, the potential source of airborne emissions from NFSS is assumed to be from wind erosion of in-situ soil from the entire NFSS. The AP-42 model for industrial wind erosion for limited flat sources is used. In this model the potential airborne emissions are a function of the number of disturbances of contaminated soil. Attachment E contains the 2014 monthly weather summary reports. The following assumptions and calculations are made:

The air release source is wind erosion of in-situ soil from an area (A) of 780,000 m² of vegetation covered soil.

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

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

$$V = 0.90$$

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

$$N = 27$$

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

$$U_t = 1.02 \text{ m/s}$$

Anemometer height adjustment is not necessary.

$$Z_r = \text{reference anemometer height} = 10 \text{ m}$$

$$Z_a = \text{actual anemometer height} = 10 \text{ m}$$

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

$$Z_o = 0.3 \text{ cm}$$

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

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

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

$$U_N = 0.053 U_{rN}$$

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

$U_{a1} = 38$	$U_{a2} = 30$	$U_{a3} = 44$	$U_{a4} = 26$	$U_{a5} = 24$	$U_{a6} = 30$
$U_{a7} = 20$	$U_{a8} = 31$	$U_{a9} = 25$	$U_{a10} = 33$	$U_{a11} = 36$	$U_{a12} = 26$
$U_{a13} = 23$	$U_{a14} = 25$	$U_{a15} = 22$	$U_{a16} = 26$	$U_{a17} = 26$	$U_{a18} = 22$
$U_{a19} = 25$	$U_{a20} = 33$	$U_{a21} = 32$	$U_{a22} = 33$	$U_{a23} = 14$	$U_{a24} = 35$
$U_{a25} = 28$	$U_{a26} = 24$	$U_{a27} = 32$			

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

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

U ₁	1.17E+00	U ₁₁	1.11E+00	U ₂₁	9.86E-01
U ₂	9.24E-01	U ₁₂	8.01E-01	U ₂₂	1.02E+00
U ₃	1.36E+00	U ₁₃	7.08E-01	U ₂₃	4.31E-01
U ₄	8.01E-01	U ₁₄	7.70E-01	U ₂₄	1.08E+00
U ₅	7.39E-01	U ₁₅	6.78E-01	U ₂₅	8.62E-01
U ₆	9.24E-01	U ₁₆	8.01E-01	U ₂₆	7.39E-01
U ₇	6.16E-01	U ₁₇	8.01E-01	U ₂₇	9.86E-01
U ₈	9.55E-01	U ₁₈	6.78E-01		
U ₉	7.70E-01	U ₁₉	7.70E-01		
U ₁₀	1.02E+00	U ₂₀	1.02E+00		

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

$$P_N = 58 (U^* - U_t)^2 + 25(U^* - U_t) = 24.30 \text{ g/m}^2$$

The erosion potentials (P_N) for each period between disturbances are all less than or equal to the threshold friction velocity except for U₁, U₃, U₁₁, and U₂₄.

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

$$k = 0.5$$

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

$$P = k \sum P_N = 12.15 \text{ g/m}^2$$

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

$$PE = 110$$

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

$$PM_{10} = P(1-V) / (PE/50)^2 = 0.25 \text{ g/m}^2/\text{yr}$$

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

$$E = A (PM_{10}) = 195,793 \text{ g soil}$$

A.2 REFERENCES

- EPA 2004. *Methods for Estimating Fugitive Air Emissions of Radionuclides from Diffuse Sources at USDOE Facilities*, Final Report, September 3, 2004.
- EPA 1995. *AP 42 Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, Fifth Edition, 1995.
- M. J. Changery, *National Wind Data Index Final Report*, HCO/T1041-01 UC-60, National Climatic Center, Asheville, NC, December 1978.
- EPA 1985. *Rapid Assessment of Exposure to Particulate Emissions from Surface Contaminated Sites*, EPA/600/8-85/002, Office of Health and Environmental Assessment, Washington, DC (February).
- EPA 1985. *AP 42 Compilation of Air Pollution Emission Factors*, Third Edition (including supplements 1-7), August 1977.

ATTACHMENT B

SOURCE TERM DEVELOPMENT AND ANNUAL AIR EMISSIONS

B.1 SOURCE TERM DEVELOPMENT

The source term for NFSS NESHAPS calculations was developed considering the radionuclides significant to dose, that is uranium, thorium, and actinium decay series as shown in Table B-1. Concentration data for these radioisotopes were taken from all site data collected since and including the Phases I, II, and III of the Remedial Investigation and are listed in Table B-2. The total number of samples has almost doubled (to about 1000) from the previous database. The Phase I sampling was performed from November 1999 through January 2000. The Phase II was performed from August 2000 through October 2000. The Phase III sampling was performed from May 2001 through October 2003. The Balance of Plant investigations at the NFSS occurred between 2012 and 2014. During this field work samples were collected to delineate soil contamination across the NFSS. The soil source term used for the 2014 NESHAPs was generated using surface soil data collected from all USACE investigations on the NFSS. The figure at the end of Attachment B shows the locations of surface soil samples used to generate this source term. The dataset has been verified to ensure data quality and includes the analysis of soils from biased high locations (i.e., locations that had elevated gamma survey readings).

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

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

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

Table B-1. Radionuclides Considered in NESHAPS Evaluation

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

Nuclides with asterisks (*) were excluded from dose calculations because radon isotopes, including thoron and actinon, are specifically excluded per the regulation or they are stable nuclides and do not contribute to radiological dose. Nuclides are presented from top to bottom in order of decay starting from the parent radionuclides. Branching fractions are shown, as appropriate, for consideration in source term development. Fractions taken from Shleien, 1992. Because in the year 2014 EPA revised CAP88 Ver 4.0 the input into the source term was changed to the inclusion of all (maximum) sub-chains for the three series listed above. The subchains used are indicated in alternating highlight. Sub-chains were chosen because the database analyses included the radionuclides and daughter build-up in a 100 year time frame was not significant. Chain length was not limited to 10 daughters as in the previous version of the code.

Table B-2. Summary of Characterization Data Used in NESHPAP Dose Calculations

Nuclide	Units	Results	Minimum Detect	Maximum Detect	Average Result and Input Exposure Concentration
Radium-226 ^a	(pCi/g)	1002	0.1	1140	6.9
Thorium-228	(pCi/g)	1003	0.0	2.4	0.9
Thorium-230	(pCi/g)	1003	0.1	978	5.5
Thorium-232	(pCi/g)	1004	0.0	2.2	0.8
Uranium-234	(pCi/g)	1007	0.0	8340	12.5
Uranium-235	(pCi/g)	1007	-0.1	886	1.1
Uranium-238	(pCi/g)	1007	0.0	8830	13.0

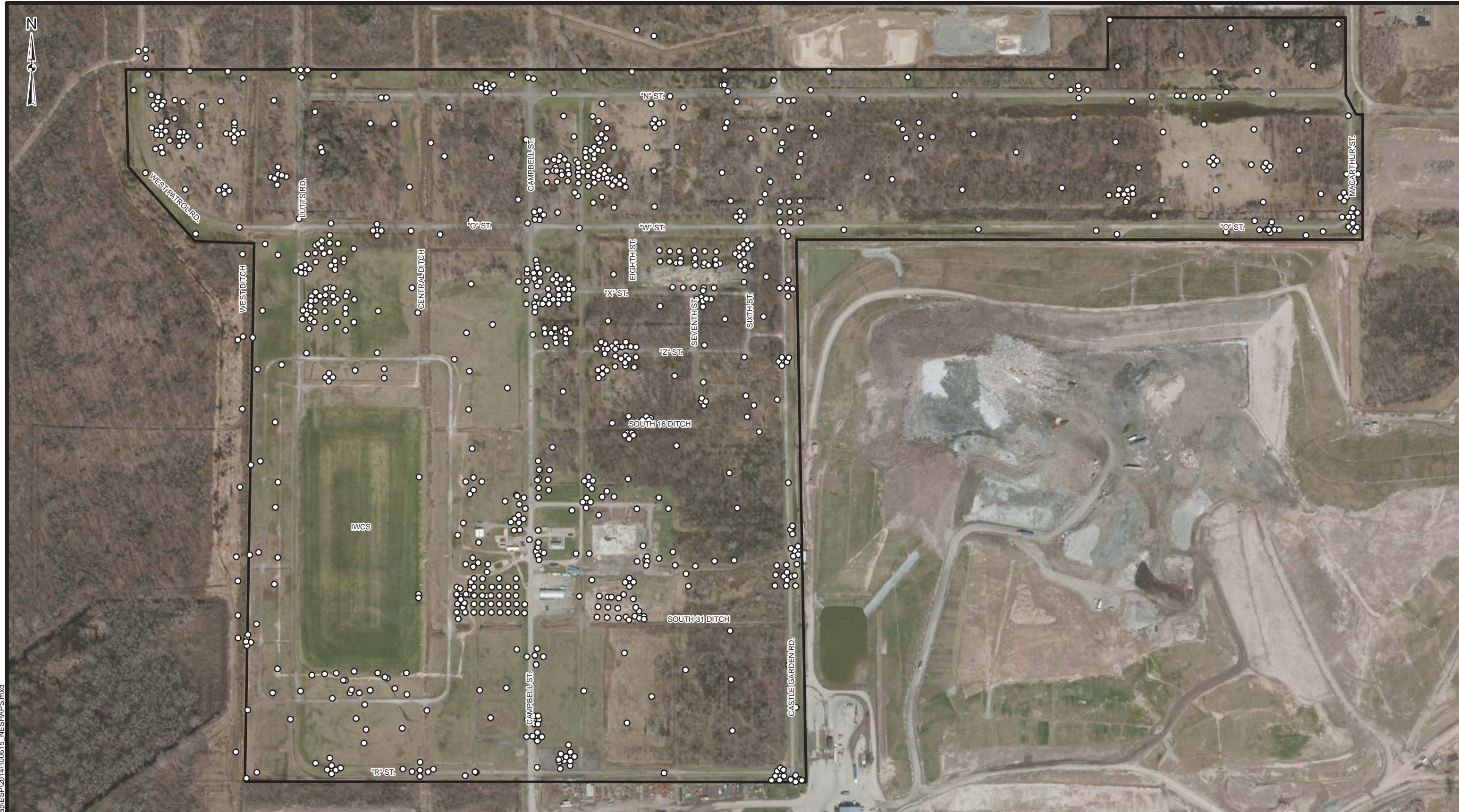
^a Includes previous outlier 1,140 pCi/g

Table B-3. Soil Concentration and Estimated Emission of Radionuclides from NFSS for CY 2014

Soil Concentration and CAPP88 Input Source Term									
Uranium Series			Thorium Series			Actinium Series			
Nuclide	pCi/g	Ci/y	Nuclide	pCi/g	Ci/y	Nuclide	pCi/g	Ci/y	
U-238	13	2.55E-06	Th-232	0.8	1.57E-07	U-235	1.1	2.15E-07	
Th-234			Ra-228			Th-231			
Pa-234m			Ac-228			Pa-231			
Pa-234			Th-228	0.9	1.76E-07	Ac-227			
U-234	12.5	2.45E-06	Ra-224			Th-227			
Th-230	5.5	1.08E-06	Rn-220			Fr-223			
Ra-226	6.9	1.35E-06	Po-216			Ra-223			
Rn-222			Pb-212			Rn-219			
Po-218			Bi-212			Po-215			
Pb-214			Po-212			Pb-211			
At-218			Tl-208			At-215			
Bi-214			Pb-208 (stable)			Bi-211			
Po-214						Po-211			
Tl-210						Tl-207			
Pb-210						Pb-207 (stable)			
Bi-210									
Po-210									
Tl-206									
Pb-206 (stable)									

B.2 REFERENCES

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



Legend

- Surface Soil Sample Location
- NFSS Site Boundary

Document Path: K:\NFSS\GIS\AcmeESP\2014\100615_NESHAPS.mxd

0 175 350 700
Feet



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
US Army Corps of Engineers
BUFFALO, NY
Buffalo District

Name: 100615_NESHAPS.mxd
Drawn By: H5TDESPM
Date Saved: 15 Jun 2015
Time Saved: 9:08:12 AM

SURFACE SOIL SAMPLE LOCATIONS

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE

ATTACHMENT C
CAPP88-PC REPORTS – INDIVIDUAL

NFSS2014 Ind. SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 11 10:23:16 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Infant

Comments: NFSS Technical Memo 2014 Year
Individual Dose

Dataset Name: NFSS2014 Ind.
Dataset Date: Jun 11, 2015 10:23 AM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

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Thu Jun 11 10:23:16 2015

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.32E-04
UB_Wall	1.43E-04
Bone_Sur	8.82E-03
Brain	1.38E-04
Breasts	1.49E-04
St_Wall	1.41E-04
SI_Wall	1.41E-04
ULT_Wall	1.64E-04
LLI_Wall	2.27E-04
Kidneys	3.96E-04
Liver	3.62E-04
Muscle	1.53E-04
Ovaries	1.57E-04
Pancreas	1.33E-04
R_Marrow	1.15E-03
Skin	1.79E-03
Spleen	1.46E-04
Testes	1.77E-04
Thymus	1.38E-04
Thyroid	1.43E-04
GB_Wall	1.34E-04
Ht_Wall	1.38E-04

	NFSS2014 Ind. SUM
Uterus	1.37E-04
ET_Reg	1.10E-03
Lung_66	1.64E-03
Effecti v	5.71E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Sel ected Individ ual (mrem)
INGESTI ON	2.47E-04
INHALATI ON	2.00E-04
AIR IMMERSI ON	6.22E-11
GROUND SURFACE	1.25E-04
INTERNAL	4.47E-04
EXTERNAL	1.25E-04
TOTAL	5.71E-04

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SUMMARY
Page 2

NUCL IDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nucl ide	Sel ected Individ ual (mrem)
U-238	4.50E-05
Th-234	8.91E-07
Pa-234m	1.22E-05
Pa-234	2.40E-07
U-234	5.04E-05
Th-230	8.86E-05
Ra-226	2.04E-04
Rn-222	2.14E-08
Po-218	3.83E-13
Pb-214	1.40E-05
At-218	1.44E-12
Bi -214	8.17E-05
Rn-218	8.33E-15
Po-214	4.53E-09
Tl -210	3.19E-08
Pb-210	6.88E-08
Bi -210	1.11E-06
Hg-206	8.98E-14
Po-210	2.88E-10
Tl -206	2.60E-12
Th-232	1.67E-05
Ra-228	4.20E-09
Ac-228	4.70E-06
Th-228	3.80E-05
Ra-224	5.61E-08
Rn-220	3.43E-09

NFSS2014 Ind. SUM	
Po-216	8. 28E-11
Pb-212	7. 54E-07
Bi -212	8. 80E-07
Po-212	0. 00E+00
Tl -208	6. 08E-06
U-235	5. 40E-06
Th-231	1. 40E-07
Pa-231	2. 32E-10
Ac-227	7. 77E-13
Th-227	3. 71E-10
Fr-223	3. 50E-12
Ra-223	4. 15E-10
Rn-219	1. 80E-10
At-219	0. 00E+00
Bi -215	8. 08E-16
Po-215	5. 49E-13
Pb-211	3. 53E-10
Bi -211	1. 45E-10
Tl -207	1. 83E-10
Po-211	6. 99E-14
TOTAL	5. 71E-04

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk
INGESTION	3. 68E-12		
INHALATION	5. 48E-12		
AIR IMMERSION	3. 30E-17		
GROUND SURFACE	6. 12E-11		
INTERNAL	9. 17E-12		
EXTERNAL	6. 12E-11		
TOTAL	7. 04E-11		

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Thu Jun 11 10:23:16 2015

SUMMARY
Page 4

NUCLIDE RISK SUMMARY

NFSS2014 Ind. SUM
 Selected Individual
 Total Lifetime
 Fatal Cancer Risk

Nuclide	
U-238	1.30E-12
Th-234	4.61E-13
Pa-234m	2.13E-12
Pa-234	1.31E-13
U-234	1.47E-12
Th-230	1.57E-12
Ra-226	3.61E-12
Rn-222	1.17E-14
Po-218	1.71E-19
Pb-214	7.48E-12
At-218	1.77E-19
Bi-214	4.32E-11
Rn-218	4.56E-21
Po-214	2.49E-15
Tl-210	1.70E-14
Pb-210	3.08E-14
Bi-210	1.23E-13
Hg-206	3.98E-20
Po-210	1.58E-16
Tl-206	2.92E-19
Th-232	3.28E-13
Ra-228	1.25E-15
Ac-228	2.50E-12
Th-228	1.04E-12
Ra-224	3.00E-14
Rn-220	1.88E-15
Po-216	4.55E-17
Pb-212	4.10E-13
Bi-212	3.39E-13
Po-212	0.00E+00
Tl-208	3.31E-12
U-235	8.58E-13
Th-231	6.38E-14
Pa-231	1.21E-16
Ac-227	2.90E-19
Th-227	2.01E-16
Fr-223	1.30E-18
Ra-223	2.24E-16
Rn-219	9.83E-17
At-219	0.00E+00
Bi-215	3.61E-22
Po-215	3.01E-19
Pb-211	1.26E-16
Bi-211	7.93E-17
Tl-207	2.35E-17
Po-211	3.83E-20
TOTAL	7.04E-11

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SUMMARY
 Page 5

INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
 (All Radioisotopes and Pathways)

NFSS2014I nd. SUM

Direction	533	783	914	1105	1250	1486	2499
N	4. 2E-04	1. 9E-04	1. 5E-04	1. 2E-04	1. 1E-04	9. 0E-05	6. 0E-05
NNW	3. 4E-04	1. 5E-04	1. 2E-04	9. 0E-05	7. 7E-05	6. 3E-05	4. 2E-05
NW	3. 4E-04	1. 4E-04	1. 1E-04	8. 8E-05	7. 9E-05	6. 8E-05	4. 9E-05
WNW	3. 6E-04	2. 0E-04	1. 5E-04	1. 2E-04	1. 0E-04	8. 2E-05	5. 3E-05
W	3. 9E-04	2. 1E-04	1. 7E-04	1. 3E-04	1. 2E-04	1. 0E-04	6. 7E-05
WSW	3. 9E-04	2. 1E-04	1. 6E-04	1. 2E-04	1. 0E-04	8. 5E-05	5. 3E-05
SW	3. 6E-04	1. 6E-04	1. 3E-04	1. 0E-04	9. 0E-05	7. 7E-05	5. 3E-05
SSW	3. 3E-04	1. 6E-04	1. 3E-04	9. 8E-05	8. 4E-05	7. 0E-05	4. 7E-05
S	3. 5E-04	1. 6E-04	1. 3E-04	1. 0E-04	9. 3E-05	7. 9E-05	5. 5E-05
SSE	3. 9E-04	2. 0E-04	1. 6E-04	1. 2E-04	1. 0E-04	8. 3E-05	5. 3E-05
SSE	4. 4E-04	2. 2E-04	1. 7E-04	1. 3E-04	1. 2E-04	9. 8E-05	6. 4E-05
ESE	4. 9E-04	2. 5E-04	1. 9E-04	1. 5E-04	1. 2E-04	1. 0E-04	6. 1E-05
E	5. 5E-04	2. 5E-04	2. 0E-04	1. 5E-04	1. 3E-04	1. 1E-04	6. 6E-05
ENE	5. 7E-04	2. 9E-04	2. 2E-04	1. 7E-04	1. 4E-04	1. 1E-04	6. 4E-05
NE	5. 7E-04	2. 9E-04	2. 3E-04	1. 8E-04	1. 5E-04	1. 3E-04	7. 9E-05
NNE	5. 1E-04	2. 8E-04	2. 1E-04	1. 6E-04	1. 3E-04	1. 1E-04	6. 3E-05

Distance (m)

Direction 2629

N	5. 8E-05
NNW	4. 1E-05
NW	4. 8E-05
WNW	5. 1E-05
W	6. 4E-05
WSW	5. 2E-05
SW	5. 2E-05
SSW	4. 6E-05
S	5. 3E-05
SSE	5. 1E-05
SSE	6. 1E-05
ESE	5. 9E-05
E	6. 4E-05
ENE	6. 2E-05
NE	7. 5E-05
NNE	6. 1E-05

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Thu Jun 11 10:23:16 2015

SUMMARY
Page 6

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

Distance (m)

Direction 533 783 914 1105 1250 1486 2499

	NFSS2014I Ind. SUM						
N	5. 0E-11	2. 1E-11	1. 6E-11	1. 2E-11	1. 0E-11	8. 0E-12	4. 2E-12
NNW	4. 0E-11	1. 6E-11	1. 2E-11	8. 0E-12	6. 3E-12	4. 4E-12	1. 7E-12
NW	4. 0E-11	1. 4E-11	1. 1E-11	7. 8E-12	6. 5E-12	5. 1E-12	2. 6E-12
WNW	4. 2E-11	2. 2E-11	1. 6E-11	1. 1E-11	9. 3E-12	7. 0E-12	3. 1E-12
W	4. 7E-11	2. 3E-11	1. 8E-11	1. 4E-11	1. 2E-11	9. 4E-12	5. 0E-12
WSW	4. 6E-11	2. 3E-11	1. 7E-11	1. 2E-11	9. 9E-12	7. 4E-12	3. 2E-12
SW	4. 3E-11	1. 7E-11	1. 3E-11	9. 6E-12	8. 0E-12	6. 3E-12	3. 2E-12
SSW	3. 9E-11	1. 7E-11	1. 3E-11	9. 1E-12	7. 3E-12	5. 4E-12	2. 3E-12
S	4. 2E-11	1. 7E-11	1. 3E-11	1. 0E-11	8. 4E-12	6. 6E-12	3. 4E-12
SSE	4. 7E-11	2. 3E-11	1. 7E-11	1. 2E-11	9. 6E-12	7. 2E-12	3. 1E-12
SSE	5. 4E-11	2. 5E-11	1. 9E-11	1. 4E-11	1. 2E-11	9. 2E-12	4. 6E-12
ESE	5. 9E-11	2. 9E-11	2. 1E-11	1. 5E-11	1. 3E-11	9. 5E-12	4. 2E-12
E	6. 7E-11	2. 9E-11	2. 2E-11	1. 6E-11	1. 3E-11	1. 0E-11	5. 0E-12
ENE	7. 0E-11	3. 4E-11	2. 6E-11	1. 8E-11	1. 5E-11	1. 1E-11	4. 7E-12
NE	7. 0E-11	3. 4E-11	2. 6E-11	1. 9E-11	1. 6E-11	1. 3E-11	6. 7E-12
NNE	6. 2E-11	3. 2E-11	2. 4E-11	1. 7E-11	1. 4E-11	1. 0E-11	4. 5E-12

Distance (m)

Direction 2629

N	3. 9E-12
NNW	1. 6E-12
NW	2. 4E-12
WNW	2. 9E-12
W	4. 7E-12
WSW	3. 0E-12
SW	3. 0E-12
SSW	2. 2E-12
S	3. 2E-12
SSE	2. 9E-12
SSE	4. 3E-12
ESE	4. 0E-12
E	4. 6E-12
ENE	4. 4E-12
NE	6. 2E-12
NNE	4. 2E-12

NFSS2014Ind - 1. SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 11 10:21:36 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: One

Comments: NFSS Technical Memo 2014 Year
Individual Dose

Dataset Name: NFSS2014 Ind.
Dataset Date: Jun 11, 2015 10:21 AM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

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Thu Jun 11 10:21:36 2015

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.14E-04
UB_Wall	1.25E-04
Bone_Sur	2.57E-03
Brain	1.20E-04
Breasts	1.31E-04
St_Wall	1.22E-04
SI_Wall	1.23E-04
ULT_Wall	1.42E-04
LLI_Wall	1.95E-04
Kidneys	2.52E-04
Liver	2.26E-04
Muscle	1.35E-04
Ovaries	1.28E-04
Pancreas	1.15E-04
R_Marrow	3.45E-04
Skin	1.77E-03
Spleen	1.23E-04
Testes	1.45E-04
Thymus	1.20E-04
Thyroid	1.25E-04
GB_Wall	1.16E-04
Ht_Wall	1.20E-04

	NFSS2014Ind	- 1. SUM
Uterus	1. 19E-04	
ET_Reg	1. 15E-03	
Lung_66	1. 82E-03	
Effecti v	4. 10E-04	

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Sel ected Individ ual (mrem)
INGESTION	5. 99E-05
INHALATION	2. 25E-04
AIR IMMERSION	6. 22E-11
GROUND SURFACE	1. 25E-04
INTERNAL	2. 85E-04
EXTERNAL	1. 25E-04
TOTAL	4. 10E-04

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SUMMARY
Page 2

NUCL IDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nucl ide	Sel ected Individ ual (mrem)
U-238	4. 13E-05
Th-234	8. 91E-07
Pa-234m	1. 22E-05
Pa-234	2. 40E-07
U-234	4. 69E-05
Th-230	7. 01E-05
Ra-226	6. 91E-05
Rn-222	2. 14E-08
Po-218	3. 83E-13
Pb-214	1. 40E-05
At-218	1. 44E-12
Bi -214	8. 17E-05
Rn-218	8. 33E-15
Po-214	4. 53E-09
Tl -210	3. 19E-08
Pb-210	6. 88E-08
Bi -210	1. 11E-06
Hg-206	8. 98E-14
Po-210	2. 88E-10
Tl -206	2. 60E-12
Th-232	1. 52E-05
Ra-228	4. 14E-09
Ac-228	4. 70E-06
Th-228	3. 93E-05
Ra-224	5. 61E-08
Rn-220	3. 43E-09

	NFSS2014Ind	- 1. SUM
Po-216	8. 28E-11	
Pb-212	7. 54E-07	
Bi -212	8. 80E-07	
Po-212	0. 00E+00	
Tl -208	6. 08E-06	
U-235	5. 08E-06	
Th-231	1. 40E-07	
Pa-231	2. 32E-10	
Ac-227	7. 77E-13	
Th-227	3. 71E-10	
Fr-223	3. 50E-12	
Ra-223	4. 15E-10	
Rn-219	1. 80E-10	
At-219	0. 00E+00	
Bi -215	8. 08E-16	
Po-215	5. 49E-13	
Pb-211	3. 53E-10	
Bi -211	1. 45E-10	
Tl -207	1. 83E-10	
Po-211	6. 99E-14	
TOTAL	4. 10E-04	

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk
INGESTION	5. 99E-12		
INHALATION	7. 25E-12		
AIR IMMERSION	3. 30E-17		
GROUND SURFACE	6. 12E-11		
INTERNAL	1. 32E-11		
EXTERNAL	6. 12E-11		
TOTAL	7. 44E-11		

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SUMMARY
Page 4

NUCLIDE RISK SUMMARY

Nuclide	NFSS2014 Ind - 1. SUM		
	Selected	Individual	Total
	Fatal	Lifetime	Cancer Risk
U-238		1.82E-12	
Th-234		4.61E-13	
Pa-234m		2.13E-12	
Pa-234		1.31E-13	
U-234		2.04E-12	
Th-230		2.10E-12	
Ra-226		5.57E-12	
Rn-222		1.17E-14	
Po-218		1.71E-19	
Pb-214		7.48E-12	
At-218		1.77E-19	
Bi-214		4.32E-11	
Rn-218		4.56E-21	
Po-214		2.49E-15	
Tl-210		1.70E-14	
Pb-210		3.08E-14	
Bi-210		1.23E-13	
Hg-206		3.98E-20	
Po-210		1.58E-16	
Tl-206		2.92E-19	
Th-232		4.39E-13	
Ra-228		1.25E-15	
Ac-228		2.50E-12	
Th-228		1.38E-12	
Ra-224		3.00E-14	
Rn-220		1.88E-15	
Po-216		4.55E-17	
Pb-212		4.10E-13	
Bi-212		3.39E-13	
Po-212		0.00E+00	
Tl-208		3.31E-12	
U-235		9.05E-13	
Th-231		6.38E-14	
Pa-231		1.21E-16	
Ac-227		2.90E-19	
Th-227		2.01E-16	
Fr-223		1.30E-18	
Ra-223		2.24E-16	
Rn-219		9.83E-17	
At-219		0.00E+00	
Bi-215		3.61E-22	
Po-215		3.01E-19	
Pb-211		1.26E-16	
Bi-211		7.93E-17	
Tl-207		2.35E-17	
Po-211		3.83E-20	
TOTAL		7.44E-11	

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SUMMARY
Page 5

INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radioisotopes and Pathways)

NFSS2014Ind - 1. SUM

Direction	533	783	914	1105	1250	1486	2499
N	2. 9E-04	1. 2E-04	9. 6E-05	7. 2E-05	6. 2E-05	5. 0E-05	2. 8E-05
NNW	2. 3E-04	9. 7E-05	7. 1E-05	5. 0E-05	4. 0E-05	3. 0E-05	1. 5E-05
NW	2. 3E-04	8. 4E-05	6. 5E-05	4. 9E-05	4. 1E-05	3. 3E-05	1. 9E-05
WNW	2. 5E-04	1. 3E-04	9. 6E-05	7. 0E-05	5. 7E-05	4. 4E-05	2. 2E-05
W	2. 7E-04	1. 4E-04	1. 1E-04	8. 2E-05	7. 1E-05	5. 8E-05	3. 3E-05
WSW	2. 7E-04	1. 4E-04	1. 0E-04	7. 4E-05	6. 0E-05	4. 6E-05	2. 3E-05
SW	2. 5E-04	1. 0E-04	7. 9E-05	5. 9E-05	5. 0E-05	4. 0E-05	2. 3E-05
SSW	2. 3E-04	1. 0E-04	7. 8E-05	5. 6E-05	4. 6E-05	3. 5E-05	1. 8E-05
S	2. 4E-04	1. 0E-04	8. 0E-05	6. 1E-05	5. 2E-05	4. 2E-05	2. 4E-05
SSE	2. 8E-04	1. 3E-04	9. 9E-05	7. 1E-05	5. 8E-05	4. 5E-05	2. 2E-05
SSE	3. 2E-04	1. 4E-04	1. 1E-04	8. 3E-05	7. 0E-05	5. 6E-05	3. 0E-05
ESE	3. 5E-04	1. 7E-04	1. 3E-04	9. 1E-05	7. 5E-05	5. 7E-05	2. 8E-05
E	3. 9E-04	1. 7E-04	1. 3E-04	9. 5E-05	7. 9E-05	6. 2E-05	3. 2E-05
ENE	4. 1E-04	2. 0E-04	1. 5E-04	1. 1E-04	8. 7E-05	6. 6E-05	3. 1E-05
NE	4. 1E-04	2. 0E-04	1. 5E-04	1. 1E-04	9. 6E-05	7. 7E-05	4. 1E-05
NNE	3. 6E-04	1. 9E-04	1. 4E-04	1. 0E-04	8. 2E-05	6. 3E-05	3. 0E-05

Distance (m)

Direction 2629

N	2. 6E-05
NNW	1. 4E-05
NW	1. 9E-05
WNW	2. 1E-05
W	3. 1E-05
WSW	2. 2E-05
SW	2. 2E-05
SSW	1. 7E-05
S	2. 3E-05
SSE	2. 1E-05
SSE	2. 8E-05
ESE	2. 7E-05
E	3. 0E-05
ENE	2. 9E-05
NE	3. 9E-05
NNE	2. 8E-05

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

Distance (m)

Direction 533 783 914 1105 1250 1486 2499

	NFSS2014							nd	-	1.	SUM
N	5.3E-11	2.2E-11	1.7E-11	1.3E-11	1.1E-11	8.8E-12	4.7E-12				
NNW	4.2E-11	1.7E-11	1.3E-11	8.7E-12	6.9E-12	5.0E-12	2.1E-12				
NW	4.2E-11	1.5E-11	1.1E-11	8.5E-12	7.2E-12	5.7E-12	3.0E-12				
WNW	4.5E-11	2.3E-11	1.7E-11	1.2E-11	1.0E-11	7.7E-12	3.6E-12				
W	5.0E-11	2.5E-11	2.0E-11	1.5E-11	1.3E-11	1.0E-11	5.6E-12				
WSW	4.9E-11	2.5E-11	1.9E-11	1.3E-11	1.1E-11	8.1E-12	3.7E-12				
SW	4.5E-11	1.8E-11	1.4E-11	1.0E-11	8.8E-12	7.0E-12	3.7E-12				
SSW	4.1E-11	1.9E-11	1.4E-11	9.8E-12	8.0E-12	6.0E-12	2.7E-12				
S	4.4E-11	1.9E-11	1.4E-11	1.1E-11	9.1E-12	7.3E-12	3.9E-12				
SSE	5.0E-11	2.4E-11	1.8E-11	1.3E-11	1.0E-11	7.8E-12	3.6E-12				
SSE	5.7E-11	2.6E-11	2.0E-11	1.5E-11	1.3E-11	1.0E-11	5.2E-12				
ESE	6.3E-11	3.1E-11	2.3E-11	1.6E-11	1.3E-11	1.0E-11	4.8E-12				
E	7.1E-11	3.1E-11	2.3E-11	1.7E-11	1.4E-11	1.1E-11	5.5E-12				
ENE	7.4E-11	3.7E-11	2.7E-11	1.9E-11	1.6E-11	1.2E-11	5.3E-12				
NE	7.4E-11	3.6E-11	2.8E-11	2.1E-11	1.8E-11	1.4E-11	7.4E-12				
NNE	6.5E-11	3.4E-11	2.6E-11	1.8E-11	1.5E-11	1.1E-11	5.1E-12				

Distance (m)

Direction 2629

N	4.4E-12
NNW	2.0E-12
NW	2.9E-12
WNW	3.4E-12
W	5.2E-12
WSW	3.4E-12
SW	3.5E-12
SSW	2.6E-12
S	3.7E-12
SSE	3.4E-12
SSE	4.9E-12
ESE	4.5E-12
E	5.2E-12
ENE	5.0E-12
NE	6.9E-12
NNE	4.8E-12

NFSS2014 Ind - 5. SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 11 10:20:11 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Five

Comments: NFSS Technical Memo 2014 Year
Individual Dose

Dataset Name: NFSS2014 Ind.
Dataset Date: Jun 11, 2015 10:20 AM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

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Thu Jun 11 10:20:11 2015

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.11E-04
UB_Wall	1.22E-04
Bone_Sur	2.71E-03
Brain	1.17E-04
Breasts	1.28E-04
St_Wall	1.18E-04
SI_Wall	1.18E-04
ULT_Wall	1.30E-04
LLI_Wall	1.61E-04
Kidneys	2.26E-04
Liver	1.95E-04
Muscle	1.31E-04
Ovaries	1.28E-04
Pancreas	1.12E-04
R_Marrow	2.94E-04
Skin	1.77E-03
Spleen	1.20E-04
Testes	1.45E-04
Thymus	1.17E-04
Thyroid	1.22E-04
GB_Wall	1.12E-04
Ht_Wall	1.17E-04

	NFSS2014Ind	- 5. SUM
Uterus	1. 16E-04	
ET_Reg	7. 18E-04	
Lung_66	1. 69E-03	
Effecti v	3. 84E-04	

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Sel ected Individ ual (mrem)
INGESTION	4. 54E-05
INHALATION	2. 13E-04
AIR IMMERSION	6. 22E-11
GROUND SURFACE	1. 25E-04
INTERNAL	2. 59E-04
EXTERNAL	1. 25E-04
TOTAL	3. 84E-04

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Thu Jun 11 10:20:11 2015

SUMMARY
Page 2

NUCL IDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nucl ide	Sel ected Individ ual (mrem)
U-238	3. 68E-05
Th-234	8. 91E-07
Pa-234m	1. 22E-05
Pa-234	2. 40E-07
U-234	4. 17E-05
Th-230	7. 10E-05
Ra-226	5. 46E-05
Rn-222	2. 14E-08
Po-218	3. 83E-13
Pb-214	1. 40E-05
At-218	1. 44E-12
Bi -214	8. 17E-05
Rn-218	8. 33E-15
Po-214	4. 53E-09
Tl -210	3. 19E-08
Pb-210	6. 88E-08
Bi -210	1. 11E-06
Hg-206	8. 98E-14
Po-210	2. 88E-10
Tl -206	2. 60E-12
Th-232	1. 64E-05
Ra-228	4. 13E-09
Ac-228	4. 70E-06
Th-228	3. 56E-05
Ra-224	5. 59E-08
Rn-220	3. 43E-09

	NFSS2014 Ind	- 5. SUM
Po-216	8. 28E-11	
Pb-212	7. 54E-07	
Bi -212	8. 80E-07	
Po-212	0. 00E+00	
Tl -208	6. 08E-06	
U-235	4. 68E-06	
Th-231	1. 40E-07	
Pa-231	2. 32E-10	
Ac-227	7. 77E-13	
Th-227	3. 71E-10	
Fr-223	3. 50E-12	
Ra-223	4. 15E-10	
Rn-219	1. 80E-10	
At-219	0. 00E+00	
Bi -215	8. 08E-16	
Po-215	5. 49E-13	
Pb-211	3. 53E-10	
Bi -211	1. 45E-10	
Tl -207	1. 83E-10	
Po-211	6. 99E-14	
TOTAL	3. 84E-04	

♀
Thu Jun 11 10:20:11 2015

SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk
INGESTION	6. 17E-13		
INHALATION	2. 34E-11		
AIR IMMERSION	3. 30E-17		
GROUND SURFACE	6. 12E-11		
INTERNAL	2. 40E-11		
EXTERNAL	6. 12E-11		
TOTAL	8. 52E-11		

♀
Thu Jun 11 10:20:11 2015

SUMMARY
Page 4

NUCLIDE RISK SUMMARY

Nuclide	NFSS2014 Ind - 5. SUM			
	Selected	Individual	Total	Lifetime
	Fatal	Cancer	Risk	
U-238		4.09E-12		
Th-234		4.61E-13		
Pa-234m		2.13E-12		
Pa-234		1.31E-13		
U-234		5.23E-12		
Th-230		5.95E-12		
Ra-226		2.84E-12		
Rn-222		1.17E-14		
Po-218		1.71E-19		
Pb-214		7.48E-12		
At-218		1.77E-19		
Bi-214		4.32E-11		
Rn-218		4.56E-21		
Po-214		2.49E-15		
Tl-210		1.70E-14		
Pb-210		3.08E-14		
Bi-210		1.23E-13		
Hg-206		3.98E-20		
Po-210		1.58E-16		
Tl-206		2.92E-19		
Th-232		1.26E-12		
Ra-228		1.25E-15		
Ac-228		2.50E-12		
Th-228		4.49E-12		
Ra-224		3.01E-14		
Rn-220		1.88E-15		
Po-216		4.55E-17		
Pb-212		4.10E-13		
Bi-212		3.39E-13		
Po-212		0.00E+00		
Tl-208		3.31E-12		
U-235		1.15E-12		
Th-231		6.38E-14		
Pa-231		1.21E-16		
Ac-227		2.90E-19		
Th-227		2.01E-16		
Fr-223		1.30E-18		
Ra-223		2.24E-16		
Rn-219		9.83E-17		
At-219		0.00E+00		
Bi-215		3.61E-22		
Po-215		3.01E-19		
Pb-211		1.26E-16		
Bi-211		7.93E-17		
Tl-207		2.35E-17		
Po-211		3.83E-20		
TOTAL		8.52E-11		

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Thu Jun 11 10:20:11 2015

SUMMARY
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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radioisotopes and Pathways)

NFSS2014Ind - 5. SUM

Direction	533	783	914	1105	1250	1486	2499
N	2.7E-04	1.1E-04	8.8E-05	6.6E-05	5.6E-05	4.4E-05	2.4E-05
NNW	2.2E-04	8.9E-05	6.5E-05	4.5E-05	3.6E-05	2.6E-05	1.1E-05
NW	2.2E-04	7.7E-05	5.9E-05	4.4E-05	3.7E-05	2.9E-05	1.6E-05
WNW	2.3E-04	1.2E-04	8.9E-05	6.3E-05	5.2E-05	3.9E-05	1.9E-05
W	2.6E-04	1.3E-04	1.0E-04	7.5E-05	6.4E-05	5.2E-05	2.8E-05
WSW	2.5E-04	1.3E-04	9.4E-05	6.7E-05	5.5E-05	4.1E-05	1.9E-05
SW	2.4E-04	9.4E-05	7.2E-05	5.3E-05	4.5E-05	3.6E-05	1.9E-05
SSW	2.1E-04	9.6E-05	7.1E-05	5.0E-05	4.1E-05	3.1E-05	1.5E-05
S	2.3E-04	9.5E-05	7.3E-05	5.5E-05	4.6E-05	3.7E-05	2.0E-05
SSE	2.6E-04	1.2E-04	9.1E-05	6.5E-05	5.3E-05	4.0E-05	1.9E-05
SSE	2.9E-04	1.3E-04	1.0E-04	7.6E-05	6.3E-05	5.0E-05	2.6E-05
ESE	3.2E-04	1.6E-04	1.2E-04	8.3E-05	6.8E-05	5.2E-05	2.4E-05
E	3.7E-04	1.6E-04	1.2E-04	8.7E-05	7.2E-05	5.6E-05	2.8E-05
ENE	3.8E-04	1.9E-04	1.4E-04	9.8E-05	7.9E-05	5.9E-05	2.7E-05
NE	3.8E-04	1.8E-04	1.4E-04	1.0E-04	8.8E-05	7.0E-05	3.7E-05
NNE	3.4E-04	1.7E-04	1.3E-04	9.2E-05	7.5E-05	5.7E-05	2.6E-05

Distance (m)

Direction 2629

N	2.3E-05
NNW	1.1E-05
NW	1.5E-05
WNW	1.8E-05
W	2.7E-05
WSW	1.8E-05
SW	1.8E-05
SSW	1.4E-05
S	1.9E-05
SSE	1.8E-05
SSE	2.5E-05
ESE	2.3E-05
E	2.6E-05
ENE	2.5E-05
NE	3.4E-05
NNE	2.4E-05

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Thu Jun 11 10:20:11 2015

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

Distance (m)

Direction 533 783 914 1105 1250 1486 2499

	NFSS2014					Ind	-	5.	SUM
N	6. 1E-11	2. 5E-11	1. 9E-11	1. 4E-11	1. 2E-11	9. 0E-12	4. 3E-12		
NNW	4. 8E-11	1. 9E-11	1. 4E-11	9. 0E-12	6. 9E-12	4. 8E-12	1. 4E-12		
NW	4. 8E-11	1. 6E-11	1. 2E-11	8. 8E-12	7. 2E-12	5. 5E-12	2. 5E-12		
WNW	5. 1E-11	2. 6E-11	1. 9E-11	1. 3E-11	1. 1E-11	7. 8E-12	3. 1E-12		
W	5. 7E-11	2. 8E-11	2. 1E-11	1. 6E-11	1. 4E-11	1. 1E-11	5. 4E-12		
WSW	5. 6E-11	2. 8E-11	2. 0E-11	1. 4E-11	1. 1E-11	8. 2E-12	3. 2E-12		
SW	5. 2E-11	2. 0E-11	1. 5E-11	1. 1E-11	9. 1E-12	7. 0E-12	3. 2E-12		
SSW	4. 7E-11	2. 1E-11	1. 5E-11	1. 0E-11	8. 2E-12	5. 9E-12	2. 2E-12		
S	5. 0E-11	2. 0E-11	1. 6E-11	1. 1E-11	9. 5E-12	7. 3E-12	3. 5E-12		
SSE	5. 7E-11	2. 7E-11	2. 0E-11	1. 4E-11	1. 1E-11	8. 0E-12	3. 1E-12		
SSE	6. 5E-11	2. 9E-11	2. 2E-11	1. 6E-11	1. 3E-11	1. 0E-11	4. 9E-12		
ESE	7. 2E-11	3. 4E-11	2. 5E-11	1. 8E-11	1. 4E-11	1. 1E-11	4. 4E-12		
E	8. 1E-11	3. 4E-11	2. 6E-11	1. 9E-11	1. 5E-11	1. 2E-11	5. 3E-12		
ENE	8. 5E-11	4. 1E-11	3. 0E-11	2. 1E-11	1. 7E-11	1. 3E-11	5. 0E-12		
NE	8. 4E-11	4. 0E-11	3. 1E-11	2. 3E-11	1. 9E-11	1. 5E-11	7. 3E-12		
NNE	7. 5E-11	3. 9E-11	2. 8E-11	2. 0E-11	1. 6E-11	1. 2E-11	4. 8E-12		

Distance (m)

Direction 2629

N	4. 0E-12
NNW	1. 3E-12
NW	2. 3E-12
WNW	2. 9E-12
W	5. 0E-12
WSW	3. 0E-12
SW	3. 0E-12
SSW	2. 0E-12
S	3. 2E-12
SSE	2. 9E-12
SSE	4. 5E-12
ESE	4. 1E-12
E	4. 9E-12
ENE	4. 6E-12
NE	6. 8E-12
NNE	4. 4E-12

NFSS2014Ind - 10. SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 11 10:17:45 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Ten

Comments: NFSS Technical Memo 2014 Year
Individual Dose

Dataset Name: NFSS2014 Ind.
Dataset Date: Jun 11, 2015 10:17 AM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

♀
Thu Jun 11 10:17:45 2015

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.09E-04
UB_Wall	1.20E-04
Bone_Sur	4.41E-03
Brain	1.15E-04
Breasts	1.26E-04
St_Wall	1.17E-04
SI_Wall	1.16E-04
ULI_Wall	1.25E-04
LLI_Wall	1.48E-04
Kidneys	2.17E-04
Liver	1.86E-04
Muscle	1.30E-04
Ovaries	1.28E-04
Pancreas	1.10E-04
R_Marrow	3.60E-04
Skin	1.77E-03
Spleen	1.21E-04
Testes	1.45E-04
Thymus	1.16E-04
Thyroid	1.21E-04
GB_Wall	1.11E-04
Ht_Wall	1.15E-04

	NFSS2014I nd	- 10. SUM
Uterus		1. 14E-04
ET_Reg		7. 16E-04
Lung_66		1. 58E-03
Effecti v		3. 94E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Sel ected Individ ual (mrem)
INGESTI ON	6. 29E-05
INHALATI ON	2. 06E-04
AIR IMMERSI ON	6. 22E-11
GROUND SURFACE	1. 25E-04
INTERNAL	2. 69E-04
EXTERNAL	1. 25E-04
TOTAL	3. 94E-04

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Thu Jun 11 10:17:45 2015

SUMMARY
Page 2

NUCL IDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nucl ide	Sel ected Individ ual (mrem)
U-238	3. 51E-05
Th-234	8. 91E-07
Pa-234m	1. 22E-05
Pa-234	2. 40E-07
U-234	4. 04E-05
Th-230	6. 90E-05
Ra-226	7. 21E-05
Rn-222	2. 14E-08
Po-218	3. 83E-13
Pb-214	1. 40E-05
At-218	1. 44E-12
Bi -214	8. 17E-05
Rn-218	8. 33E-15
Po-214	4. 53E-09
Tl -210	3. 19E-08
Pb-210	6. 88E-08
Bi -210	1. 11E-06
Hg-206	8. 98E-14
Po-210	2. 88E-10
Tl -206	2. 60E-12
Th-232	1. 66E-05
Ra-228	4. 14E-09
Ac-228	4. 70E-06
Th-228	3. 36E-05
Ra-224	5. 60E-08
Rn-220	3. 43E-09

	NFSS2014I nd	- 10. SUM
Po-216	8. 28E-11	
Pb-212	7. 54E-07	
Bi -212	8. 80E-07	
Po-212	0. 00E+00	
Tl -208	6. 08E-06	
U-235	4. 54E-06	
Th-231	1. 40E-07	
Pa-231	2. 32E-10	
Ac-227	7. 77E-13	
Th-227	3. 71E-10	
Fr-223	3. 50E-12	
Ra-223	4. 15E-10	
Rn-219	1. 80E-10	
At-219	0. 00E+00	
Bi -215	8. 08E-16	
Po-215	5. 49E-13	
Pb-211	3. 53E-10	
Bi -211	1. 45E-10	
Tl -207	1. 83E-10	
Po-211	6. 99E-14	
TOTAL	3. 94E-04	

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Thu Jun 11 10:17:45 2015

SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk
INGESTION	9. 73E-13		
INHALATION	3. 26E-11		
AIR IMMERSION	3. 30E-17		
GROUND SURFACE	6. 12E-11		
INTERNAL	3. 36E-11		
EXTERNAL	6. 12E-11		
TOTAL	9. 48E-11		

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Thu Jun 11 10:17:45 2015

SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	NFSS2014I nd - 10. SUM		
	Selected	Individual	Total
	Fatal	Cancer	Risk
U-238		5.70E-12	
Th-234		4.61E-13	
Pa-234m		2.13E-12	
Pa-234		1.31E-13	
U-234		7.37E-12	
Th-230		8.29E-12	
Ra-226		3.88E-12	
Rn-222		1.17E-14	
Po-218		1.71E-19	
Pb-214		7.48E-12	
At-218		1.77E-19	
Bi-214		4.32E-11	
Rn-218		4.56E-21	
Po-214		2.49E-15	
Tl-210		1.70E-14	
Pb-210		3.08E-14	
Bi-210		1.23E-13	
Hg-206		3.98E-20	
Po-210		1.58E-16	
Tl-206		2.92E-19	
Th-232		1.76E-12	
Ra-228		1.25E-15	
Ac-228		2.50E-12	
Th-228		6.27E-12	
Ra-224		3.02E-14	
Rn-220		1.88E-15	
Po-216		4.55E-17	
Pb-212		4.10E-13	
Bi-212		3.39E-13	
Po-212		0.00E+00	
Tl-208		3.31E-12	
U-235		1.32E-12	
Th-231		6.38E-14	
Pa-231		1.21E-16	
Ac-227		2.90E-19	
Th-227		2.01E-16	
Fr-223		1.30E-18	
Ra-223		2.24E-16	
Rn-219		9.83E-17	
At-219		0.00E+00	
Bi-215		3.61E-22	
Po-215		3.01E-19	
Pb-211		1.26E-16	
Bi-211		7.93E-17	
Tl-207		2.35E-17	
Po-211		3.83E-20	
TOTAL		9.48E-11	

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Thu Jun 11 10:17:45 2015

SUMMARY
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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radioisotopes and Pathways)

NFSS2014I nd - 10. SUM

Direction	533	783	914	1105	1250	1486	2499
N	2. 8E-04	1. 2E-04	9. 2E-05	7. 0E-05	5. 9E-05	4. 8E-05	2. 7E-05
NNW	2. 3E-04	9. 3E-05	6. 8E-05	4. 8E-05	3. 9E-05	2. 9E-05	1. 4E-05
NW	2. 3E-04	8. 1E-05	6. 2E-05	4. 7E-05	4. 0E-05	3. 2E-05	1. 9E-05
WNW	2. 4E-04	1. 2E-04	9. 3E-05	6. 7E-05	5. 5E-05	4. 2E-05	2. 1E-05
W	2. 6E-04	1. 3E-04	1. 0E-04	7. 9E-05	6. 8E-05	5. 5E-05	3. 1E-05
WSW	2. 6E-04	1. 3E-04	9. 9E-05	7. 1E-05	5. 8E-05	4. 4E-05	2. 2E-05
SW	2. 4E-04	9. 8E-05	7. 5E-05	5. 7E-05	4. 8E-05	3. 9E-05	2. 2E-05
SSW	2. 2E-04	1. 0E-04	7. 5E-05	5. 4E-05	4. 4E-05	3. 4E-05	1. 7E-05
S	2. 3E-04	9. 9E-05	7. 7E-05	5. 8E-05	5. 0E-05	4. 0E-05	2. 3E-05
SSE	2. 6E-04	1. 3E-04	9. 5E-05	6. 8E-05	5. 6E-05	4. 3E-05	2. 1E-05
SSE	3. 0E-04	1. 4E-04	1. 1E-04	8. 0E-05	6. 7E-05	5. 3E-05	2. 9E-05
ESE	3. 3E-04	1. 6E-04	1. 2E-04	8. 7E-05	7. 2E-05	5. 5E-05	2. 7E-05
E	3. 8E-04	1. 6E-04	1. 2E-04	9. 1E-05	7. 6E-05	6. 0E-05	3. 1E-05
ENE	3. 9E-04	1. 9E-04	1. 4E-04	1. 0E-04	8. 3E-05	6. 3E-05	3. 0E-05
NE	3. 9E-04	1. 9E-04	1. 5E-04	1. 1E-04	9. 2E-05	7. 4E-05	4. 0E-05
NNE	3. 5E-04	1. 8E-04	1. 3E-04	9. 7E-05	7. 9E-05	6. 0E-05	2. 9E-05

Distance (m)

Direction 2629

N	2. 5E-05
NNW	1. 3E-05
NW	1. 8E-05
WNW	2. 0E-05
W	3. 0E-05
WSW	2. 1E-05
SW	2. 1E-05
SSW	1. 6E-05
S	2. 2E-05
SSE	2. 0E-05
SSE	2. 7E-05
ESE	2. 6E-05
E	2. 9E-05
ENE	2. 8E-05
NE	3. 7E-05
NNE	2. 7E-05

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Thu Jun 11 10:17:45 2015

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

Distance (m)

Direction 533 783 914 1105 1250 1486 2499

	NFSS2014I							nd	-	10.	SUM
N	6. 7E-11	2. 7E-11	2. 1E-11	1. 5E-11	1. 3E-11	1. 0E-11	4. 8E-12				
NNW	5. 3E-11	2. 1E-11	1. 5E-11	1. 0E-11	7. 7E-12	5. 3E-12	1. 6E-12				
NW	5. 3E-11	1. 8E-11	1. 4E-11	9. 8E-12	8. 0E-12	6. 1E-12	2. 8E-12				
WNW	5. 7E-11	2. 9E-11	2. 1E-11	1. 5E-11	1. 2E-11	8. 7E-12	3. 4E-12				
W	6. 3E-11	3. 1E-11	2. 4E-11	1. 8E-11	1. 5E-11	1. 2E-11	6. 0E-12				
WSW	6. 2E-11	3. 1E-11	2. 3E-11	1. 6E-11	1. 3E-11	9. 1E-12	3. 6E-12				
SW	5. 8E-11	2. 2E-11	1. 7E-11	1. 2E-11	1. 0E-11	7. 7E-12	3. 6E-12				
SSW	5. 2E-11	2. 3E-11	1. 7E-11	1. 1E-11	9. 1E-12	6. 5E-12	2. 4E-12				
S	5. 6E-11	2. 3E-11	1. 7E-11	1. 3E-11	1. 0E-11	8. 1E-12	3. 9E-12				
SSE	6. 3E-11	3. 0E-11	2. 2E-11	1. 5E-11	1. 2E-11	8. 8E-12	3. 4E-12				
SSE	7. 3E-11	3. 2E-11	2. 4E-11	1. 8E-11	1. 5E-11	1. 1E-11	5. 4E-12				
ESE	8. 0E-11	3. 8E-11	2. 8E-11	2. 0E-11	1. 6E-11	1. 2E-11	4. 9E-12				
E	9. 0E-11	3. 8E-11	2. 9E-11	2. 1E-11	1. 7E-11	1. 3E-11	5. 9E-12				
ENE	9. 5E-11	4. 6E-11	3. 4E-11	2. 3E-11	1. 9E-11	1. 4E-11	5. 5E-12				
NE	9. 4E-11	4. 5E-11	3. 4E-11	2. 5E-11	2. 1E-11	1. 7E-11	8. 1E-12				
NNE	8. 3E-11	4. 3E-11	3. 1E-11	2. 2E-11	1. 8E-11	1. 3E-11	5. 3E-12				

Distance (m)

Direction 2629

N	4. 4E-12
NNW	1. 5E-12
NW	2. 5E-12
WNW	3. 2E-12
W	5. 5E-12
WSW	3. 3E-12
SW	3. 3E-12
SSW	2. 2E-12
S	3. 6E-12
SSE	3. 2E-12
SSE	5. 0E-12
ESE	4. 5E-12
E	5. 4E-12
ENE	5. 1E-12
NE	7. 5E-12
NNE	4. 9E-12

NFSS2014Ind - 15. SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 11 10:13:42 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Fifteen

Comments: NFSS Technical Memo 2014 Year
Individual Dose

Dataset Name: NFSS2014 Ind.
Dataset Date: Jun 11, 2015 10:13 AM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

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Thu Jun 11 10:13:42 2015

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.11E-04
UB_Wall	1.22E-04
Bone_Sur	1.05E-02
Brain	1.17E-04
Breasts	1.28E-04
St_Wall	1.18E-04
SI_Wall	1.18E-04
ULT_Wall	1.24E-04
LLI_Wall	1.41E-04
Kidneys	2.36E-04
Liver	1.93E-04
Muscle	1.32E-04
Ovaries	1.34E-04
Pancreas	1.12E-04
R_Marrow	5.53E-04
Skin	1.77E-03
Spleen	1.29E-04
Testes	1.51E-04
Thymus	1.17E-04
Thyroid	1.22E-04
GB_Wall	1.13E-04
Ht_Wall	1.17E-04

	NFSS2014Ind	- 15. SUM
Uterus	1. 16E-04	
ET_Reg	5. 59E-04	
Lung_66	1. 81E-03	
 Effecti v	 5. 06E-04	

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Sel ected Individ ual (mrem)
INGESTION	1. 33E-04
INHALATION	2. 49E-04
AIR IMMERSION	6. 22E-11
GROUND SURFACE	1. 25E-04
INTERNAL	3. 81E-04
EXTERNAL	1. 25E-04
 TOTAL	 5. 06E-04

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SUMMARY
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NUCLE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nucl i de	Sel ected Individ ual (mrem)
U-238	4. 10E-05
Th-234	8. 91E-07
Pa-234m	1. 22E-05
Pa-234	2. 40E-07
U-234	4. 75E-05
Th-230	8. 57E-05
Ra-226	1. 45E-04
Rn-222	2. 14E-08
Po-218	3. 83E-13
Pb-214	1. 40E-05
At-218	1. 44E-12
Bi -214	8. 17E-05
Rn-218	8. 33E-15
Po-214	4. 53E-09
Tl -210	3. 19E-08
Pb-210	6. 88E-08
Bi -210	1. 11E-06
Hg-206	8. 98E-14
Po-210	2. 88E-10
Tl -206	2. 60E-12
Th-232	2. 19E-05
Ra-228	4. 15E-09
Ac-228	4. 70E-06
Th-228	3. 75E-05
Ra-224	5. 63E-08
Rn-220	3. 43E-09

	NFSS2014I nd	- 15. SUM
Po-216	8. 28E-11	
Pb-212	7. 54E-07	
Bi -212	8. 80E-07	
Po-212	0. 00E+00	
Tl -208	6. 08E-06	
U-235	5. 08E-06	
Th-231	1. 40E-07	
Pa-231	2. 32E-10	
Ac-227	7. 77E-13	
Th-227	3. 71E-10	
Fr-223	3. 50E-12	
Ra-223	4. 15E-10	
Rn-219	1. 80E-10	
At-219	0. 00E+00	
Bi -215	8. 08E-16	
Po-215	5. 49E-13	
Pb-211	3. 53E-10	
Bi -211	1. 45E-10	
Tl -207	1. 83E-10	
Po-211	6. 99E-14	
TOTAL	5. 06E-04	

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual		
	Total	Lifetime	Fatal Cancer Risk
INGESTION	1. 68E-11		
INHALATION	2. 35E-11		
AIR IMMERSION	3. 30E-17		
GROUND SURFACE	6. 12E-11		
INTERNAL	4. 03E-11		
EXTERNAL	6. 12E-11		
TOTAL	1. 01E-10		

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SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	NFSS2014I nd - 15. SUM		
	Selected	Individual	Total
	Fatal	Cancer	Risk
U-238		4.38E-12	
Th-234		4.61E-13	
Pa-234m		2.13E-12	
Pa-234		1.31E-13	
U-234		5.70E-12	
Th-230		5.90E-12	
Ra-226		1.86E-11	
Rn-222		1.17E-14	
Po-218		1.71E-19	
Pb-214		7.48E-12	
At-218		1.77E-19	
Bi-214		4.32E-11	
Rn-218		4.56E-21	
Po-214		2.49E-15	
Tl-210		1.70E-14	
Pb-210		3.08E-14	
Bi-210		1.23E-13	
Hg-206		3.98E-20	
Po-210		1.58E-16	
Tl-206		2.92E-19	
Th-232		1.34E-12	
Ra-228		1.25E-15	
Ac-228		2.50E-12	
Th-228		4.22E-12	
Ra-224		3.02E-14	
Rn-220		1.88E-15	
Po-216		4.55E-17	
Pb-212		4.10E-13	
Bi-212		3.39E-13	
Po-212		0.00E+00	
Tl-208		3.31E-12	
U-235		1.14E-12	
Th-231		6.38E-14	
Pa-231		1.21E-16	
Ac-227		2.90E-19	
Th-227		2.01E-16	
Fr-223		1.30E-18	
Ra-223		2.24E-16	
Rn-219		9.83E-17	
At-219		0.00E+00	
Bi-215		3.61E-22	
Po-215		3.01E-19	
Pb-211		1.26E-16	
Bi-211		7.93E-17	
Tl-207		2.35E-17	
Po-211		3.83E-20	
TOTAL		1.01E-10	

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SUMMARY
Page 5INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radioisotopes and Pathways)

NFSS2014I nd - 15. SUM

Direction	533	783	914	1105	1250	1486	2499
N	3. 7E-04	1. 6E-04	1. 2E-04	9. 5E-05	8. 1E-05	6. 7E-05	4. 0E-05
NNW	2. 9E-04	1. 2E-04	9. 3E-05	6. 7E-05	5. 5E-05	4. 3E-05	2. 4E-05
NW	2. 9E-04	1. 1E-04	8. 5E-05	6. 6E-05	5. 7E-05	4. 7E-05	3. 0E-05
WNW	3. 1E-04	1. 6E-04	1. 2E-04	9. 1E-05	7. 6E-05	6. 0E-05	3. 3E-05
W	3. 4E-04	1. 8E-04	1. 4E-04	1. 1E-04	9. 3E-05	7. 6E-05	4. 6E-05
WSW	3. 4E-04	1. 7E-04	1. 3E-04	9. 6E-05	8. 0E-05	6. 2E-05	3. 4E-05
SW	3. 1E-04	1. 3E-04	1. 0E-04	7. 8E-05	6. 7E-05	5. 5E-05	3. 4E-05
SSW	2. 8E-04	1. 3E-04	1. 0E-04	7. 4E-05	6. 2E-05	4. 9E-05	2. 8E-05
S	3. 0E-04	1. 3E-04	1. 0E-04	8. 0E-05	6. 9E-05	5. 7E-05	3. 5E-05
SSE	3. 4E-04	1. 7E-04	1. 3E-04	9. 3E-05	7. 8E-05	6. 1E-05	3. 3E-05
SSE	3. 9E-04	1. 8E-04	1. 4E-04	1. 1E-04	9. 1E-05	7. 4E-05	4. 3E-05
ESE	4. 3E-04	2. 1E-04	1. 6E-04	1. 2E-04	9. 7E-05	7. 6E-05	4. 1E-05
E	4. 8E-04	2. 1E-04	1. 6E-04	1. 2E-04	1. 0E-04	8. 2E-05	4. 5E-05
ENE	5. 1E-04	2. 5E-04	1. 9E-04	1. 4E-04	1. 1E-04	8. 6E-05	4. 4E-05
NE	5. 0E-04	2. 5E-04	1. 9E-04	1. 5E-04	1. 2E-04	1. 0E-04	5. 7E-05
NNE	4. 5E-04	2. 4E-04	1. 8E-04	1. 3E-04	1. 1E-04	8. 3E-05	4. 3E-05

Distance (m)

Direction 2629

N	3. 8E-05
NNW	2. 3E-05
NW	2. 9E-05
WNW	3. 2E-05
W	4. 4E-05
WSW	3. 2E-05
SW	3. 3E-05
SSW	2. 7E-05
S	3. 4E-05
SSE	3. 2E-05
SSE	4. 1E-05
ESE	3. 9E-05
E	4. 3E-05
ENE	4. 2E-05
NE	5. 3E-05
NNE	4. 1E-05

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

Distance (m)

Direction 533 783 914 1105 1250 1486 2499

	NFSS2014I							nd	-	15.	SUM
N	7. 3E-11	3. 1E-11	2. 4E-11	1. 8E-11	1. 6E-11	1. 3E-11	7. 1E-12				
NNW	5. 8E-11	2. 4E-11	1. 8E-11	1. 3E-11	1. 0E-11	7. 6E-12	3. 7E-12				
NW	5. 8E-11	2. 1E-11	1. 6E-11	1. 2E-11	1. 0E-11	8. 5E-12	4. 9E-12				
WNW	6. 2E-11	3. 2E-11	2. 4E-11	1. 8E-11	1. 4E-11	1. 1E-11	5. 6E-12				
W	6. 8E-11	3. 5E-11	2. 7E-11	2. 1E-11	1. 8E-11	1. 5E-11	8. 4E-12				
WSW	6. 7E-11	3. 4E-11	2. 6E-11	1. 9E-11	1. 5E-11	1. 2E-11	5. 8E-12				
SW	6. 2E-11	2. 5E-11	2. 0E-11	1. 5E-11	1. 3E-11	1. 0E-11	5. 8E-12				
SSW	5. 6E-11	2. 6E-11	2. 0E-11	1. 4E-11	1. 2E-11	8. 9E-12	4. 5E-12				
S	6. 1E-11	2. 6E-11	2. 0E-11	1. 5E-11	1. 3E-11	1. 1E-11	6. 1E-12				
SSE	6. 8E-11	3. 3E-11	2. 5E-11	1. 8E-11	1. 5E-11	1. 1E-11	5. 7E-12				
SSE	7. 8E-11	3. 6E-11	2. 8E-11	2. 1E-11	1. 8E-11	1. 4E-11	7. 8E-12				
ESE	8. 6E-11	4. 2E-11	3. 2E-11	2. 3E-11	1. 9E-11	1. 5E-11	7. 2E-12				
E	9. 7E-11	4. 2E-11	3. 2E-11	2. 4E-11	2. 0E-11	1. 6E-11	8. 2E-12				
ENE	1. 0E-10	5. 0E-11	3. 7E-11	2. 7E-11	2. 2E-11	1. 7E-11	7. 9E-12				
NE	1. 0E-10	4. 9E-11	3. 8E-11	2. 9E-11	2. 4E-11	2. 0E-11	1. 1E-11				
NNE	8. 9E-11	4. 7E-11	3. 5E-11	2. 5E-11	2. 1E-11	1. 6E-11	7. 7E-12				

Distance (m)

Direction 2629

N	6. 7E-12
NNW	3. 5E-12
NW	4. 7E-12
WNW	5. 4E-12
W	7. 9E-12
WSW	5. 5E-12
SW	5. 5E-12
SSW	4. 4E-12
S	5. 8E-12
SSE	5. 4E-12
SSE	7. 3E-12
ESE	6. 8E-12
E	7. 8E-12
ENE	7. 5E-12
NE	1. 0E-11
NNE	7. 2E-12

NFSS2014Ind - Adult.SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Thu Jun 11 08:47:17 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Adult

Comments: NFSS Technical Memo 2014 Year
Individual Dose

Dataset Name: NFSS2014_Ind.
Dataset Date: Jun 11, 2015 08:47 AM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

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SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.09E-04
UB_Wall	1.20E-04
Bone_Sur	3.81E-03
Brain	1.15E-04
Breasts	1.26E-04
St_Wall	1.16E-04
SI_Wall	1.16E-04
ULT_Wall	1.22E-04
LLI_Wall	1.38E-04
Kidneys	2.20E-04
Liver	1.80E-04
Muscle	1.29E-04
Ovaries	1.29E-04
Pancreas	1.10E-04
R_Marrow	2.98E-04
Skin	1.77E-03
Spleen	1.18E-04
Testes	1.47E-04
Thymus	1.15E-04
Thyroid	1.20E-04
GB_Wall	1.11E-04
Ht_Wall	1.15E-04

	NFSS2014Ind - Adult SUM
Uterus	1.14E-04
ET_Reg	5.35E-04
Lung_66	1.58E-03
Effecti v	3.79E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	3.88E-05
INHALATION	2.16E-04
AIR IMMERSION	6.22E-11
GROUND SURFACE	1.25E-04
INTERNAL	2.54E-04
EXTERNAL	1.25E-04
TOTAL	3.79E-04

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SUMMARY
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NUCLE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	3.36E-05
Th-234	8.91E-07
Pa-234m	1.22E-05
Pa-234	2.40E-07
U-234	3.87E-05
Th-230	8.14E-05
Ra-226	4.51E-05
Rn-222	2.14E-08
Po-218	3.83E-13
Pb-214	1.40E-05
At-218	1.44E-12
Bi-214	8.17E-05
Rn-218	8.33E-15
Po-214	4.53E-09
Tl-210	3.19E-08
Pb-210	6.88E-08
Bi-210	1.11E-06
Hg-206	8.98E-14
Po-210	2.88E-10
Tl-206	2.60E-12
Th-232	2.13E-05
Ra-228	4.12E-09
Ac-228	4.70E-06
Th-228	3.16E-05
Ra-224	5.60E-08
Rn-220	3.43E-09

	NFSS2014Ind - Adult SUM
Po-216	8.28E-11
Pb-212	7.54E-07
Bi-212	8.80E-07
Po-212	0.00E+00
Tl-208	6.08E-06
U-235	4.40E-06
Th-231	1.40E-07
Pa-231	2.32E-10
Ac-227	7.77E-13
Th-227	3.71E-10
Fr-223	3.50E-12
Ra-223	4.15E-10
Rn-219	1.80E-10
At-219	0.00E+00
Bi-215	8.08E-16
Po-215	5.49E-13
Pb-211	3.53E-10
Bi-211	1.45E-10
Tl-207	1.83E-10
Po-211	6.99E-14
TOTAL	3.79E-04

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual			
	Total	Lifetime	Fatal	Cancer Risk

PATHWAY RISK SUMMARY

Pathway	Selected Individual			
	Total	Lifetime	Fatal	Cancer Risk
INGESTION	2.68E-11			
INHALATION	6.30E-11			
AIR IMMERSION	3.30E-17			
GROUND SURFACE	6.12E-11			
INTERNAL	8.99E-11			
EXTERNAL	6.12E-11			
TOTAL	1.51E-10			

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SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	NFSS2014 Individual - Adult. SUM		
	Selected Individual	Total Lifetime	Fatal Cancer Risk
U-238	1.06E-11		
Th-234	4.61E-13		
Pa-234m	2.13E-12		
Pa-234	1.31E-13		
U-234	1.33E-11		
Th-230	1.76E-11		
Ra-226	3.19E-11		
Rn-222	1.17E-14		
Po-218	1.71E-19		
Pb-214	7.48E-12		
At-218	1.77E-19		
Bi-214	4.32E-11		
Rn-218	4.56E-21		
Po-214	2.49E-15		
Tl-210	1.70E-14		
Pb-210	3.08E-14		
Bi-210	1.23E-13		
Hg-206	3.98E-20		
Po-210	1.58E-16		
Tl-206	2.92E-19		
Th-232	4.55E-12		
Ra-228	1.25E-15		
Ac-228	2.50E-12		
Th-228	1.13E-11		
Ra-224	3.04E-14		
Rn-220	1.88E-15		
Po-216	4.55E-17		
Pb-212	4.10E-13		
Bi-212	3.39E-13		
Po-212	0.00E+00		
Tl-208	3.31E-12		
U-235	1.70E-12		
Th-231	6.38E-14		
Pa-231	1.21E-16		
Ac-227	2.90E-19		
Th-227	2.01E-16		
Fr-223	1.30E-18		
Ra-223	2.24E-16		
Rn-219	9.83E-17		
At-219	0.00E+00		
Bi-215	3.61E-22		
Po-215	3.01E-19		
Pb-211	1.26E-16		
Bi-211	7.93E-17		
Tl-207	2.35E-17		
Po-211	3.83E-20		
TOTAL	1.51E-10		

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SUMMARY
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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radioisotopes and Pathways)

NFSS2014Ind - Adult.SUM

Direction	533	783	914	1105	1250	1486	2499
N	2.7E-04	1.1E-04	8.6E-05	6.4E-05	5.4E-05	4.3E-05	2.2E-05
NNW	2.2E-04	8.7E-05	6.2E-05	4.3E-05	3.4E-05	2.4E-05	9.9E-06
NW	2.2E-04	7.5E-05	5.7E-05	4.2E-05	3.5E-05	2.7E-05	1.4E-05
WNW	2.3E-04	1.2E-04	8.6E-05	6.1E-05	5.0E-05	3.7E-05	1.7E-05
W	2.5E-04	1.3E-04	9.7E-05	7.3E-05	6.2E-05	5.0E-05	2.7E-05
WSW	2.5E-04	1.3E-04	9.2E-05	6.5E-05	5.3E-05	3.9E-05	1.7E-05
SW	2.3E-04	9.1E-05	7.0E-05	5.1E-05	4.3E-05	3.4E-05	1.8E-05
SSW	2.1E-04	9.3E-05	6.9E-05	4.8E-05	3.9E-05	2.9E-05	1.3E-05
S	2.2E-04	9.3E-05	7.1E-05	5.3E-05	4.4E-05	3.5E-05	1.9E-05
SSE	2.5E-04	1.2E-04	8.9E-05	6.3E-05	5.1E-05	3.8E-05	1.7E-05
SSE	2.9E-04	1.3E-04	9.9E-05	7.3E-05	6.1E-05	4.8E-05	2.4E-05
ESE	3.2E-04	1.5E-04	1.1E-04	8.1E-05	6.6E-05	5.0E-05	2.3E-05
E	3.6E-04	1.5E-04	1.2E-04	8.4E-05	7.0E-05	5.4E-05	2.6E-05
ENE	3.8E-04	1.8E-04	1.3E-04	9.5E-05	7.7E-05	5.7E-05	2.5E-05
NE	3.8E-04	1.8E-04	1.4E-04	1.0E-04	8.6E-05	6.8E-05	3.5E-05
NNE	3.3E-04	1.7E-04	1.3E-04	9.0E-05	7.3E-05	5.5E-05	2.4E-05

Distance (m)

Direction 2629

N	2.1E-05
NNW	9.4E-06
NW	1.4E-05
WNW	1.6E-05
W	2.5E-05
WSW	1.6E-05
SW	1.6E-05
SSW	1.2E-05
S	1.7E-05
SSE	1.6E-05
SSE	2.3E-05
ESE	2.1E-05
E	2.4E-05
ENE	2.3E-05
NE	3.2E-05
NNE	2.3E-05

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

Distance (m)

Direction 533 783 914 1105 1250 1486 2499

	NFSS2014I						nd	-	Adul	t.	SUM
N	1. 1E-10	4. 6E-11	3. 5E-11	2. 7E-11	2. 3E-11	1. 8E-11	1. 0E-11				
NNW	8. 6E-11	3. 6E-11	2. 6E-11	1. 8E-11	1. 5E-11	1. 1E-11	5. 4E-12				
NW	8. 6E-11	3. 1E-11	2. 4E-11	1. 8E-11	1. 5E-11	1. 2E-11	7. 2E-12				
WNW	9. 2E-11	4. 8E-11	3. 6E-11	2. 6E-11	2. 1E-11	1. 6E-11	8. 2E-12				
W	1. 0E-10	5. 1E-11	4. 0E-11	3. 1E-11	2. 6E-11	2. 1E-11	1. 2E-11				
WSW	1. 0E-10	5. 1E-11	3. 8E-11	2. 7E-11	2. 2E-11	1. 7E-11	8. 4E-12				
SW	9. 3E-11	3. 8E-11	2. 9E-11	2. 2E-11	1. 9E-11	1. 5E-11	8. 5E-12				
SSW	8. 4E-11	3. 9E-11	2. 9E-11	2. 1E-11	1. 7E-11	1. 3E-11	6. 6E-12				
S	9. 0E-11	3. 8E-11	3. 0E-11	2. 3E-11	1. 9E-11	1. 6E-11	8. 9E-12				
SSE	1. 0E-10	4. 9E-11	3. 7E-11	2. 6E-11	2. 2E-11	1. 7E-11	8. 2E-12				
SSE	1. 2E-10	5. 3E-11	4. 1E-11	3. 1E-11	2. 6E-11	2. 1E-11	1. 1E-11				
ESE	1. 3E-10	6. 2E-11	4. 7E-11	3. 4E-11	2. 8E-11	2. 1E-11	1. 1E-11				
E	1. 4E-10	6. 3E-11	4. 8E-11	3. 5E-11	2. 9E-11	2. 3E-11	1. 2E-11				
ENE	1. 5E-10	7. 4E-11	5. 5E-11	3. 9E-11	3. 2E-11	2. 4E-11	1. 1E-11				
NE	1. 5E-10	7. 3E-11	5. 6E-11	4. 2E-11	3. 6E-11	2. 9E-11	1. 5E-11				
NNE	1. 3E-10	7. 0E-11	5. 2E-11	3. 7E-11	3. 1E-11	2. 3E-11	1. 1E-11				

Distance (m)

Direction 2629

N	9. 8E-12
NNW	5. 2E-12
NW	6. 9E-12
WNW	7. 8E-12
W	1. 1E-11
WSW	8. 0E-12
SW	8. 1E-12
SSW	6. 4E-12
S	8. 4E-12
SSE	7. 8E-12
SSE	1. 1E-11
ESE	9. 9E-12
E	1. 1E-11
ENE	1. 1E-11
NE	1. 4E-11
NNE	1. 1E-11

ATTACHMENT D
CAPP88-PC REPORTS – POPULATION

NFSS2014Pop (4).SUM
D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Wed Jun 10 16:11:13 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Infant

Comments: NFSS Technical Memo 2014 Year
Population Dose

Dataset Name: NFSS2014 Pop.
Dataset Date: Jun 10, 2015 04:10 PM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5eh9hl\Documents\CAP88\Population Files\NFSS2013.POP

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SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Sel ected Individ ual (mrem)	Col lecti ve Popul ation (person-rem)
Adrenal	6. 57E-05	6. 37E-04
UB_Wall	7. 16E-05	6. 82E-04
Bone_Sur	3. 64E-03	5. 86E-02
Brain	6. 89E-05	6. 60E-04
Breasts	7. 46E-05	7. 05E-04
St_Wall	7. 01E-05	6. 75E-04
SI_Wall	7. 01E-05	6. 80E-04
ULT_Wall	7. 97E-05	8. 37E-04
LLI_Wall	1. 05E-04	1. 27E-03
Kidneys	1. 82E-04	2. 23E-03
Liver	1. 63E-04	2. 13E-03
Muscle	7. 66E-05	7. 21E-04
Ovaries	7. 80E-05	7. 71E-04
Pancreas	6. 61E-05	6. 39E-04
R_Marrow	4. 85E-04	7. 49E-03
Skin	9. 44E-04	7. 47E-03
Spleen	7. 23E-05	7. 11E-04

	NFSS2014Pop (4). SUM
Testes	8. 86E-05
Thymus	6. 91E-05
Thyroid	7. 17E-05
GB_Wall	6. 66E-05
Ht_Wall	6. 88E-05
Uterus	6. 83E-05
ET_Reg	5. 63E-04
Lung_66	8. 41E-04
Effectiv	2. 68E-04
	2. 72E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	9. 99E-05	1. 74E-03
INHALATION	1. 02E-04	4. 72E-04
AIR IMMERSION	3. 19E-11	4. 84E-10
GROUND SURFACE	6. 61E-05	5. 15E-04
INTERNAL	2. 02E-04	2. 21E-03
EXTERNAL	6. 61E-05	5. 15E-04
TOTAL	2. 68E-04	2. 72E-03

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SUMMARY
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NUCLEI COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclei	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2. 20E-05	1. 52E-04
Th-234	4. 72E-07	3. 70E-06
Pa-234m	6. 46E-06	5. 03E-05
Pa-234	1. 27E-07	9. 91E-07
U-234	2. 47E-05	1. 68E-04
Th-230	4. 42E-05	3. 69E-04
Ra-226	8. 20E-05	1. 33E-03
Rn-222	1. 13E-08	8. 83E-08
Po-218	2. 03E-13	1. 58E-12
Pb-214	7. 41E-06	5. 77E-05
At-218	7. 63E-13	5. 94E-12
Bi-214	4. 33E-05	3. 37E-04
Rn-218	4. 42E-15	3. 44E-14
Po-214	2. 40E-09	1. 87E-08
Tl-210	1. 69E-08	1. 32E-07
Pb-210	3. 65E-08	2. 84E-07
Bi-210	5. 90E-07	4. 59E-06
Hg-206	4. 76E-14	3. 71E-13
Po-210	1. 53E-10	1. 19E-09

	NFSS2014Pop (4). SUM
Tl -206	1. 38E-12
Th-232	8. 35E-06
Ra-228	2. 23E-09
Ac-228	2. 49E-06
Th-228	1. 93E-05
Ra-224	3. 00E-08
Rn-220	1. 82E-09
Po-216	4. 39E-11
Pb-212	4. 00E-07
Bi -212	4. 66E-07
Po-212	0. 00E+00
Tl -208	3. 22E-06
U-235	2. 70E-06
Th-231	7. 41E-08
Pa-231	1. 23E-10
Ac-227	4. 12E-13
Th-227	1. 97E-10
Fr-223	1. 85E-12
Ra-223	2. 20E-10
Rn-219	9. 52E-11
At-219	0. 00E+00
Bi -215	4. 28E-16
Po-215	2. 91E-13
Pb-211	1. 87E-10
Bi -211	7. 70E-11
Tl -207	9. 68E-11
Po-211	3. 71E-14
TOTAL	2. 68E-04
	2. 72E-03

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Li fetic me Fatal Cancer Risk	Total Collective Popul ation Fatal Cancer Ri sk Per Year
Esophagu	5. 73E-13	5. 92E-11
Stomach	2. 22E-12	2. 28E-10
Col on	5. 93E-12	6. 38E-10
Li ver	9. 18E-13	1. 04E-10
LUNG	8. 40E-12	7. 45E-10
Bone	4. 15E-13	8. 43E-11
Skin	9. 27E-13	9. 36E-11
Breast	2. 88E-12	2. 93E-10
Ovary	7. 66E-13	7. 92E-11
Bl adder	1. 39E-12	1. 43E-10
Ki dneys	3. 29E-13	3. 84E-11
Thyroi d	1. 82E-13	1. 87E-11
Leukemi a	3. 33E-12	3. 45E-10
Resi dual	8. 44E-12	9. 05E-10
Total	3. 67E-11	3. 78E-09

NFSS2014Pop (4).SUM
PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	1. 45E-12	3. 36E-10
INHALATION	2. 81E-12	1. 68E-10
AIR IMMERSION	1. 69E-17	3. 39E-15
GROUND SURFACE	3. 24E-11	3. 27E-09
INTERNAL	4. 26E-12	5. 04E-10
EXTERNAL	3. 24E-11	3. 27E-09
TOTAL	3. 67E-11	3. 78E-09

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SUMMARY
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NUCL IDE RISK SUMMARY

Nucl ide	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	6. 32E-13	6. 01E-11
Th-234	2. 45E-13	2. 47E-11
Pa-234m	1. 13E-12	1. 14E-10
Pa-234	6. 92E-14	6. 98E-12
U-234	7. 14E-13	6. 64E-11
Th-230	7. 98E-13	5. 66E-11
Ra-226	1. 50E-12	2. 85E-10
Rn-222	6. 19E-15	6. 24E-13
Po-218	9. 06E-20	9. 13E-18
Pb-214	3. 96E-12	4. 00E-10
At-218	9. 39E-20	9. 47E-18
Bi-214	2. 29E-11	2. 31E-09
Rn-218	2. 42E-21	2. 44E-19
Po-214	1. 32E-15	1. 33E-13
Tl-210	9. 03E-15	9. 11E-13
Pb-210	1. 63E-14	1. 65E-12
Bi-210	6. 54E-14	6. 59E-12
Hg-206	2. 11E-20	2. 13E-18
Po-210	8. 39E-17	8. 46E-15
Tl-206	1. 55E-19	1. 56E-17
Th-232	1. 67E-13	1. 14E-11
Ra-228	6. 63E-16	7. 04E-14
Ac-228	1. 33E-12	1. 34E-10
Th-228	5. 32E-13	3. 33E-11
Ra-224	1. 59E-14	1. 69E-12
Rn-220	9. 96E-16	1. 00E-13
Po-216	2. 41E-17	2. 43E-15
Pb-212	2. 17E-13	2. 19E-11
Bi-212	1. 80E-13	1. 81E-11
Po-212	0. 00E+00	0. 00E+00
Tl-208	1. 75E-12	1. 77E-10
U-235	4. 50E-13	4. 50E-11

	NFSS2014Pop (4). SUM
Th-231	3. 38E-14
Pa-231	6. 40E-17
Ac-227	1. 54E-19
Th-227	1. 07E-16
Fr-223	6. 91E-19
Ra-223	1. 19E-16
Rn-219	5. 21E-17
At-219	0. 00E+00
Bi -215	1. 91E-22
Po-215	1. 59E-19
Pb-211	6. 68E-17
Bi -211	4. 21E-17
Tl -207	1. 24E-17
Po-211	2. 03E-20
TOTAL	3. 67E-11
	3. 78E-09

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SUMMARY
Page 5INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	1. 6E-04	5. 3E-05	2. 5E-05	1. 5E-05	1. 1E-05	5. 1E-06
NNW	0. 0E+00	1. 2E-04	2. 7E-05	8. 0E-06	4. 8E-06	3. 4E-06	1. 7E-06
NW	0. 0E+00	1. 1E-04	3. 2E-05	1. 4E-05	8. 5E-06	6. 0E-06	2. 9E-06
WNW	0. 0E+00	1. 7E-04	4. 5E-05	1. 8E-05	1. 1E-05	7. 4E-06	3. 6E-06
W	0. 0E+00	1. 8E-04	6. 3E-05	3. 2E-05	1. 9E-05	1. 3E-05	6. 2E-06
WSW	0. 0E+00	1. 8E-04	4. 8E-05	1. 9E-05	1. 1E-05	7. 8E-06	3. 8E-06
SW	0. 0E+00	1. 3E-04	4. 1E-05	1. 9E-05	1. 1E-05	7. 8E-06	3. 8E-06
SSW	0. 0E+00	1. 3E-04	3. 4E-05	1. 2E-05	0. 0E+00	5. 2E-06	2. 6E-06
S	0. 0E+00	1. 3E-04	4. 3E-05	2. 0E-05	1. 2E-05	8. 5E-06	4. 1E-06
SSE	0. 0E+00	1. 7E-04	4. 6E-05	1. 8E-05	1. 1E-05	7. 5E-06	3. 7E-06
SSE	0. 0E+00	1. 9E-04	6. 1E-05	2. 9E-05	1. 7E-05	1. 2E-05	5. 8E-06
ESE	0. 0E+00	2. 2E-04	6. 2E-05	2. 6E-05	1. 5E-05	1. 1E-05	5. 2E-06
E	0. 0E+00	2. 2E-04	6. 8E-05	3. 1E-05	1. 9E-05	1. 3E-05	6. 3E-06
ENE	0. 0E+00	2. 7E-04	7. 3E-05	2. 9E-05	1. 8E-05	1. 2E-05	6. 0E-06
NE	0. 0E+00	2. 6E-04	8. 8E-05	0. 0E+00	2. 6E-05	1. 8E-05	8. 7E-06
NNE	0. 0E+00	2. 5E-04	6. 9E-05	0. 0E+00	1. 7E-05	1. 2E-05	5. 7E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	3. 3E-07	2. 9E-07				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 2E-07	2. 0E-07	1. 8E-07
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 8E-07	2. 4E-07	2. 1E-07
WNW	1. 4E-06	0. 0E+00	0. 0E+00	0. 0E+00	3. 0E-07	2. 5E-07	2. 2E-07
W	2. 5E-06	1. 2E-06	8. 1E-07	5. 9E-07	4. 5E-07	3. 5E-07	3. 0E-07
WSW	1. 5E-06	7. 9E-07	5. 4E-07	4. 1E-07	3. 3E-07	2. 7E-07	2. 4E-07
SW	1. 5E-06	8. 0E-07	5. 5E-07	4. 2E-07	3. 4E-07	2. 8E-07	0. 0E+00
SSW	1. 1E-06	5. 8E-07	4. 1E-07	3. 3E-07	0. 0E+00	0. 0E+00	2. 1E-07

					NFSS2014Pop	(4). SUM	
S	1. 7E-06	8. 6E-07	5. 9E-07	4. 5E-07	3. 5E-07	2. 9E-07	2. 6E-07
SSE	1. 5E-06	7. 9E-07	5. 5E-07	4. 2E-07	3. 4E-07	2. 8E-07	2. 5E-07
SSE	2. 3E-06	1. 2E-06	7. 9E-07	5. 9E-07	4. 6E-07	3. 7E-07	3. 2E-07
ESE	2. 1E-06	1. 1E-06	7. 3E-07	5. 5E-07	4. 3E-07	3. 5E-07	3. 0E-07
E	2. 5E-06	1. 3E-06	8. 6E-07	6. 3E-07	4. 9E-07	3. 9E-07	3. 4E-07
ENE	2. 4E-06	1. 2E-06	8. 3E-07	6. 2E-07	4. 8E-07	3. 9E-07	3. 4E-07
NE	3. 5E-06	1. 7E-06	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00
NNE	2. 3E-06	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 2E-07

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SUMMARY
Page 6COLLECTIVE COMMITTED EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radiouclides and Pathways)

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	4. 8E-07	4. 2E-07	4. 1E-07	3. 0E-08	1. 1E-06	9. 1E-07
NNW	0. 0E+00	3. 7E-07	2. 2E-07	6. 1E-07	9. 1E-08	3. 0E-07	3. 4E-07
NW	0. 0E+00	3. 2E-07	2. 5E-07	1. 6E-06	6. 6E-07	6. 1E-07	6. 2E-06
WNW	0. 0E+00	5. 1E-07	3. 6E-07	6. 0E-06	3. 8E-06	3. 9E-07	2. 2E-05
W	0. 0E+00	5. 4E-07	5. 0E-07	2. 9E-05	3. 8E-06	5. 2E-08	2. 0E-06
WSW	0. 0E+00	5. 5E-07	3. 8E-07	1. 5E-07	1. 3E-06	1. 3E-06	2. 3E-06
SW	0. 0E+00	3. 9E-07	3. 3E-07	4. 1E-07	3. 1E-06	3. 0E-06	2. 2E-05
SSW	0. 0E+00	4. 0E-07	2. 7E-07	3. 0E-07	0. 0E+00	2. 2E-07	1. 6E-05
S	0. 0E+00	4. 0E-07	3. 4E-07	1. 6E-06	9. 8E-07	1. 8E-06	7. 6E-06
SSE	0. 0E+00	5. 2E-07	3. 7E-07	1. 1E-06	8. 0E-07	5. 6E-07	5. 4E-06
SSE	0. 0E+00	5. 7E-07	4. 8E-07	1. 3E-06	1. 0E-06	6. 2E-07	3. 9E-06
ESE	0. 0E+00	6. 7E-07	5. 0E-07	1. 0E-07	4. 5E-07	1. 7E-06	2. 6E-06
E	0. 0E+00	6. 7E-07	5. 5E-07	3. 7E-07	5. 8E-07	7. 9E-07	3. 4E-06
ENE	0. 0E+00	8. 1E-07	5. 8E-07	3. 2E-07	1. 2E-07	7. 6E-07	7. 2E-06
NE	0. 0E+00	7. 8E-07	7. 0E-07	0. 0E+00	4. 1E-07	1. 8E-06	1. 9E-06
NNE	0. 0E+00	7. 5E-07	5. 5E-07	0. 0E+00	6. 7E-08	8. 2E-07	1. 5E-06

Direction	Distance (m)						
	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 2E-05	1. 1E-04
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	9. 5E-05	2. 1E-04	1. 3E-04
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 2E-05	2. 2E-04	1. 5E-04
WNW	1. 3E-06	0. 0E+00	0. 0E+00	0. 0E+00	1. 2E-06	9. 7E-05	2. 2E-05
W	7. 7E-05	6. 1E-05	5. 9E-06	2. 1E-05	1. 1E-05	6. 4E-05	8. 9E-05
WSW	3. 5E-05	4. 0E-05	3. 0E-06	3. 6E-06	1. 9E-06	2. 3E-06	7. 8E-07
SW	7. 3E-05	9. 2E-06	3. 7E-05	3. 3E-06	4. 9E-07	1. 6E-07	0. 0E+00
SSW	6. 6E-05	2. 0E-06	1. 7E-06	4. 5E-06	0. 0E+00	0. 0E+00	6. 7E-07
S	4. 5E-05	1. 1E-05	1. 8E-05	1. 2E-08	7. 9E-06	5. 5E-06	2. 1E-06
SSE	3. 1E-05	1. 1E-04	1. 9E-04	6. 1E-05	2. 5E-05	3. 5E-06	1. 6E-06
SSE	2. 5E-05	5. 4E-05	6. 5E-05	2. 6E-05	6. 6E-06	2. 2E-06	3. 3E-06
ESE	5. 2E-06	3. 9E-05	2. 6E-06	3. 7E-06	2. 9E-06	8. 2E-06	4. 2E-06
E	3. 8E-06	1. 3E-05	4. 0E-06	8. 8E-06	1. 6E-06	5. 7E-06	3. 5E-06

	NFSS2014Pop (4). SUM						
ENE	3. 2E-06	8. 1E-06	2. 4E-06	1. 5E-06	5. 2E-07	3. 5E-07	1. 9E-07
NE	8. 4E-06	3. 0E-07	0. 0E+00				
NNE	1. 1E-07	0. 0E+00	6. 0E-06				

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SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radiouclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	2. 2E-11	7. 4E-12	3. 6E-12	2. 2E-12	1. 5E-12	7. 4E-13
NNW	0. 0E+00	1. 7E-11	3. 8E-12	1. 1E-12	6. 8E-13	4. 8E-13	2. 3E-13
NW	0. 0E+00	1. 4E-11	4. 5E-12	2. 0E-12	1. 2E-12	8. 6E-13	4. 2E-13
WNW	0. 0E+00	2. 3E-11	6. 3E-12	2. 5E-12	1. 5E-12	1. 1E-12	5. 1E-13
W	0. 0E+00	2. 5E-11	8. 7E-12	4. 5E-12	2. 7E-12	1. 9E-12	9. 1E-13
WSW	0. 0E+00	2. 5E-11	6. 7E-12	2. 6E-12	1. 6E-12	1. 1E-12	5. 4E-13
SW	0. 0E+00	1. 8E-11	5. 7E-12	2. 7E-12	1. 6E-12	1. 1E-12	5. 5E-13
SSW	0. 0E+00	1. 8E-11	4. 7E-12	1. 8E-12	0. 0E+00	7. 5E-13	3. 7E-13
S	0. 0E+00	1. 8E-11	6. 0E-12	2. 9E-12	1. 7E-12	1. 2E-12	6. 0E-13
SSE	0. 0E+00	2. 4E-11	6. 5E-12	2. 6E-12	1. 6E-12	1. 1E-12	5. 3E-13
SSE	0. 0E+00	2. 6E-11	8. 5E-12	4. 1E-12	2. 5E-12	1. 7E-12	8. 5E-13
ESE	0. 0E+00	3. 0E-11	8. 7E-12	3. 7E-12	2. 2E-12	1. 6E-12	7. 7E-13
E	0. 0E+00	3. 1E-11	9. 6E-12	4. 4E-12	2. 7E-12	1. 9E-12	9. 2E-13
ENE	0. 0E+00	3. 7E-11	1. 0E-11	4. 2E-12	2. 5E-12	1. 8E-12	8. 7E-13
NE	0. 0E+00	3. 6E-11	1. 2E-11	0. 0E+00	3. 7E-12	2. 6E-12	1. 3E-12
NNE	0. 0E+00	3. 4E-11	9. 7E-12	0. 0E+00	2. 4E-12	1. 7E-12	8. 3E-13

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	3. 3E-14	2. 7E-14				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 6E-14	1. 2E-14	1. 0E-14
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 5E-14	1. 9E-14	1. 5E-14
WNW	2. 0E-13	0. 0E+00	0. 0E+00	0. 0E+00	2. 9E-14	2. 0E-14	1. 6E-14
W	3. 6E-13	1. 7E-13	1. 1E-13	7. 3E-14	5. 1E-14	3. 6E-14	2. 9E-14
WSW	2. 1E-13	1. 0E-13	6. 6E-14	4. 6E-14	3. 3E-14	2. 4E-14	1. 9E-14
SW	2. 2E-13	1. 1E-13	6. 8E-14	4. 7E-14	3. 4E-14	2. 5E-14	0. 0E+00
SSW	1. 5E-13	7. 2E-14	4. 6E-14	3. 3E-14	0. 0E+00	0. 0E+00	1. 5E-14
S	2. 4E-13	1. 2E-13	7. 4E-14	5. 2E-14	3. 7E-14	2. 7E-14	2. 2E-14
SSE	2. 1E-13	1. 1E-13	6. 8E-14	4. 8E-14	3. 5E-14	2. 6E-14	2. 1E-14
SSE	3. 4E-13	1. 7E-13	1. 1E-13	7. 4E-14	5. 4E-14	4. 0E-14	3. 2E-14
ESE	3. 1E-13	1. 5E-13	9. 7E-14	6. 8E-14	5. 0E-14	3. 7E-14	3. 0E-14
E	3. 7E-13	1. 8E-13	1. 2E-13	8. 1E-14	5. 9E-14	4. 4E-14	3. 6E-14
ENE	3. 5E-13	1. 7E-13	1. 1E-13	7. 9E-14	5. 8E-14	4. 4E-14	3. 6E-14
NE	5. 1E-13	2. 5E-13	0. 0E+00				
NNE	3. 3E-13	0. 0E+00	3. 3E-14				

NFSS2014Pop (4). SUM

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SUMMARY
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COLLECTIVE FATAL CANCER RISK Per Year
(All Radioisotopes and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	8.5E-13	7.6E-13	7.5E-13	5.6E-14	2.0E-12	1.7E-12	
NNW	0.0E+00	6.6E-13	4.0E-13	1.1E-12	1.7E-13	5.6E-13	6.2E-13	
NW	0.0E+00	5.6E-13	4.6E-13	2.9E-12	1.2E-12	1.1E-12	1.2E-11	
WNW	0.0E+00	9.0E-13	6.5E-13	1.1E-11	6.9E-12	7.2E-13	4.1E-11	
W	0.0E+00	9.6E-13	9.1E-13	5.3E-11	7.1E-12	9.8E-14	3.7E-12	
WSW	0.0E+00	9.6E-13	6.9E-13	2.7E-13	2.5E-12	2.4E-12	4.3E-12	
SW	0.0E+00	6.9E-13	5.9E-13	7.6E-13	5.8E-12	5.5E-12	4.2E-11	
SSW	0.0E+00	7.2E-13	4.9E-13	5.5E-13	0.0E+00	4.2E-13	2.9E-11	
S	0.0E+00	7.0E-13	6.2E-13	3.0E-12	1.8E-12	3.4E-12	1.4E-11	
SSE	0.0E+00	9.3E-13	6.7E-13	2.0E-12	1.5E-12	1.0E-12	1.0E-11	
SSE	0.0E+00	1.0E-12	8.8E-13	2.3E-12	2.0E-12	1.2E-12	7.4E-12	
ESE	0.0E+00	1.2E-12	9.0E-13	1.9E-13	8.4E-13	3.3E-12	4.9E-12	
E	0.0E+00	1.2E-12	9.9E-13	6.9E-13	1.1E-12	1.5E-12	6.5E-12	
ENE	0.0E+00	1.4E-12	1.1E-12	5.9E-13	2.3E-13	1.4E-12	1.4E-11	
NE	0.0E+00	1.4E-12	1.3E-12	0.0E+00	7.7E-13	3.5E-12	3.5E-12	
NNE	0.0E+00	1.3E-12	1.0E-12	0.0E+00	1.3E-13	1.5E-12	2.9E-12	

		Distance (m)						
Direction		15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.1E-11	1.3E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.9E-11	1.7E-10	8.9E-11	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.8E-11	2.2E-10	1.4E-10	
WNW	2.3E-12	0.0E+00	0.0E+00	0.0E+00	1.5E-12	1.0E-10	2.1E-11	
W	1.4E-10	1.1E-10	1.0E-11	3.4E-11	1.7E-11	8.6E-11	1.1E-10	
WSW	6.3E-11	6.7E-11	4.7E-12	5.2E-12	2.5E-12	2.6E-12	8.1E-13	
SW	1.3E-10	1.6E-11	5.9E-11	4.9E-12	6.5E-13	1.9E-13	0.0E+00	
SSW	1.2E-10	3.3E-12	2.4E-12	5.8E-12	0.0E+00	0.0E+00	6.1E-13	
S	8.4E-11	1.8E-11	2.9E-11	1.8E-14	1.1E-11	6.7E-12	2.3E-12	
SSE	5.8E-11	1.9E-10	3.0E-10	9.0E-11	3.4E-11	4.3E-12	1.7E-12	
SSE	4.7E-11	9.8E-11	1.1E-10	4.3E-11	1.0E-11	3.2E-12	4.4E-12	
ESE	9.7E-12	7.0E-11	4.4E-12	6.0E-12	4.3E-12	1.1E-11	5.4E-12	
E	7.2E-12	2.4E-11	6.9E-12	1.5E-11	2.5E-12	8.2E-12	4.7E-12	
ENE	6.1E-12	1.5E-11	4.2E-12	2.6E-12	8.1E-13	5.1E-13	2.6E-13	
NE	1.6E-11	5.6E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	2.1E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.9E-12	

D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Wed Jun 10 16:07:34 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: One

Comments: NFSS Technical Memo 2014 Year
Population Dose

Dataset Name: NFSS2014 Pop.
Dataset Date: Jun 10, 2015 04:07 PM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5eh9hl\Documents\CAP88\Population Files\NFSS2013.POP

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SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Sel ected Individ ual (mrem)	Col lecti ve Popul ation (person-rem)
Adrenal	5.79E-05	4.97E-04
UB_Wall	6.39E-05	5.43E-04
Bone_Sur	1.09E-03	1.32E-02
Brain	6.11E-05	5.21E-04
Breasts	6.69E-05	5.66E-04
St_Wall	6.21E-05	5.32E-04
SI_Wall	6.22E-05	5.39E-04
ULT_Wall	6.98E-05	6.58E-04
LLI_Wall	9.01E-05	9.89E-04
Kidneys	1.20E-04	1.15E-03
Liver	1.04E-04	1.10E-03
Muscle	6.89E-05	5.82E-04
Ovaries	6.50E-05	5.46E-04
Pancreas	5.84E-05	5.00E-04
R_Marrow	1.55E-04	1.72E-03
Skin	9.36E-04	7.33E-03
Spleen	6.27E-05	5.39E-04

	NFSS2014Pop. SUM
Testes	7. 44E-05
Thymus	6. 13E-05
Thyroi d	6. 39E-05
GB_Wall	5. 89E-05
Ht_Wall	6. 11E-05
Uterus	6. 06E-05
ET_Reg	5. 89E-04
Lung_66	9. 33E-04
Effectiv	2. 04E-04
	1. 43E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	2. 24E-05	3. 88E-04
INHALATION	1. 15E-04	5. 31E-04
AIR IMMERSION	3. 19E-11	4. 84E-10
GROUND SURFACE	6. 61E-05	5. 15E-04
INTERNAL	1. 38E-04	9. 19E-04
EXTERNAL	6. 61E-05	5. 15E-04
TOTAL	2. 04E-04	1. 43E-03

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SUMMARY
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NUCLEI COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclei	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2. 06E-05	1. 15E-04
Th-234	4. 72E-07	3. 69E-06
Pa-234m	6. 46E-06	5. 03E-05
Pa-234	1. 27E-07	9. 91E-07
U-234	2. 34E-05	1. 30E-04
Th-230	3. 58E-05	1. 84E-04
Ra-226	2. 85E-05	3. 48E-04
Rn-222	1. 13E-08	8. 83E-08
Po-218	2. 03E-13	1. 58E-12
Pb-214	7. 41E-06	5. 77E-05
At-218	7. 63E-13	5. 94E-12
Bi-214	4. 33E-05	3. 37E-04
Rn-218	4. 42E-15	3. 44E-14
Po-214	2. 40E-09	1. 87E-08
Tl-210	1. 69E-08	1. 32E-07
Pb-210	3. 65E-08	2. 84E-07
Bi-210	5. 90E-07	4. 59E-06
Hg-206	4. 76E-14	3. 71E-13
Po-210	1. 53E-10	1. 19E-09

	NFSS2014Pop. SUM
TI -206	1. 38E-12
Th-232	7. 74E-06
Ra-228	2. 19E-09
Ac-228	2. 49E-06
Th-228	2. 01E-05
Ra-224	3. 00E-08
Rn-220	1. 82E-09
Po-216	4. 39E-11
Pb-212	4. 00E-07
Bi -212	4. 66E-07
Po-212	0. 00E+00
TI -208	3. 22E-06
U-235	2. 58E-06
Th-231	7. 41E-08
Pa-231	1. 23E-10
Ac-227	4. 12E-13
Th-227	1. 97E-10
Fr-223	1. 85E-12
Ra-223	2. 20E-10
Rn-219	9. 52E-11
At-219	0. 00E+00
Bi -215	4. 28E-16
Po-215	2. 91E-13
Pb-211	1. 87E-10
Bi -211	7. 70E-11
TI -207	9. 68E-11
Po-211	3. 71E-14
TOTAL	2. 04E-04
	1. 43E-03

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Li feti me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	5. 78E-13	6. 03E-11
Stomach	2. 24E-12	2. 33E-10
Colon	6. 15E-12	6. 84E-10
Liver	9. 56E-13	1. 12E-10
LUNG	9. 34E-12	8. 08E-10
Bone	5. 70E-13	1. 17E-10
Skin	9. 28E-13	9. 37E-11
Breast	2. 89E-12	2. 95E-10
Ovary	7. 74E-13	8. 07E-11
Bladder	1. 40E-12	1. 46E-10
Kidneys	3. 46E-13	4. 16E-11
Thyroid	1. 83E-13	1. 90E-11
Leukemia	3. 35E-12	3. 51E-10
Residual	8. 66E-12	9. 52E-10
Total	3. 84E-11	3. 99E-09

NFSS2014Pop. SUM
PATHWAY RISK SUMMARY

Pathway	Selected Total Fatal Cancer	Individual Lifetime Risk	Total Population Fatal Cancer Risk Per Year
INGESTION	2. 21E-12		5. 00E-10
INHALATION	3. 72E-12		2. 22E-10
AIR IMMERSION	1. 69E-17		3. 39E-15
GROUND SURFACE	3. 24E-11		3. 27E-09
INTERNAL	5. 93E-12		7. 22E-10
EXTERNAL	3. 24E-11		3. 27E-09
TOTAL	3. 84E-11		3. 99E-09

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SUMMARY
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NUCL IDE RISK SUMMARY

Nuclide	Selected Total Fatal Cancer	Individual Lifetime Risk	Total Population Fatal Cancer Risk Per Year
U-238	8. 61E-13		8. 46E-11
Th-234	2. 45E-13		2. 47E-11
Pa-234m	1. 13E-12		1. 14E-10
Pa-234	6. 92E-14		6. 98E-12
U-234	9. 71E-13		9. 32E-11
Th-230	1. 07E-12		7. 72E-11
Ra-226	2. 17E-12		4. 14E-10
Rn-222	6. 19E-15		6. 24E-13
Po-218	9. 06E-20		9. 13E-18
Pb-214	3. 96E-12		4. 00E-10
At-218	9. 39E-20		9. 47E-18
Bi-214	2. 29E-11		2. 31E-09
Rn-218	2. 42E-21		2. 44E-19
Po-214	1. 32E-15		1. 33E-13
Tl-210	9. 03E-15		9. 11E-13
Pb-210	1. 63E-14		1. 65E-12
Bi-210	6. 54E-14		6. 59E-12
Hg-206	2. 11E-20		2. 13E-18
Po-210	8. 39E-17		8. 46E-15
Tl-206	1. 55E-19		1. 56E-17
Th-232	2. 24E-13		1. 55E-11
Ra-228	6. 63E-16		7. 22E-14
Ac-228	1. 33E-12		1. 34E-10
Th-228	7. 05E-13		4. 45E-11
Ra-224	1. 59E-14		1. 72E-12
Rn-220	9. 96E-16		1. 00E-13
Po-216	2. 41E-17		2. 43E-15
Pb-212	2. 17E-13		2. 19E-11
Bi-212	1. 80E-13		1. 81E-11
Po-212	0. 00E+00		0. 00E+00
Tl-208	1. 75E-12		1. 77E-10
U-235	4. 70E-13		4. 72E-11

	NFSS2014Pop. SUM
Th-231	3. 38E-14
Pa-231	6. 40E-17
Ac-227	1. 54E-19
Th-227	1. 07E-16
Fr-223	6. 91E-19
Ra-223	1. 19E-16
Rn-219	5. 21E-17
At-219	0. 00E+00
Bi -215	1. 91E-22
Po-215	1. 59E-19
Pb-211	6. 68E-17
Bi -211	4. 21E-17
Tl -207	1. 24E-17
Po-211	2. 03E-20
TOTAL	3. 84E-11
	3. 99E-09

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SUMMARY
Page 5INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	1. 2E-04	3. 9E-05	1. 9E-05	1. 1E-05	7. 6E-06	3. 6E-06
NNW	0. 0E+00	9. 5E-05	2. 0E-05	5. 8E-06	3. 4E-06	2. 4E-06	1. 1E-06
NW	0. 0E+00	8. 0E-05	2. 4E-05	1. 0E-05	6. 2E-06	4. 2E-06	2. 0E-06
WNW	0. 0E+00	1. 3E-04	3. 4E-05	1. 3E-05	7. 8E-06	5. 4E-06	2. 5E-06
W	0. 0E+00	1. 4E-04	4. 7E-05	2. 3E-05	1. 4E-05	9. 5E-06	4. 4E-06
WSW	0. 0E+00	1. 4E-04	3. 6E-05	1. 4E-05	8. 1E-06	5. 6E-06	2. 6E-06
SW	0. 0E+00	9. 9E-05	3. 0E-05	1. 4E-05	8. 2E-06	5. 6E-06	2. 7E-06
SSW	0. 0E+00	1. 0E-04	2. 5E-05	9. 1E-06	0. 0E+00	3. 7E-06	1. 8E-06
S	0. 0E+00	1. 0E-04	3. 2E-05	1. 5E-05	8. 8E-06	6. 1E-06	2. 9E-06
SSE	0. 0E+00	1. 3E-04	3. 4E-05	1. 3E-05	7. 8E-06	5. 4E-06	2. 6E-06
SSE	0. 0E+00	1. 4E-04	4. 5E-05	2. 1E-05	1. 2E-05	8. 6E-06	4. 0E-06
ESE	0. 0E+00	1. 7E-04	4. 7E-05	1. 9E-05	1. 1E-05	7. 8E-06	3. 7E-06
E	0. 0E+00	1. 7E-04	5. 1E-05	2. 3E-05	1. 4E-05	9. 4E-06	4. 4E-06
ENE	0. 0E+00	2. 0E-04	5. 5E-05	2. 2E-05	1. 3E-05	8. 9E-06	4. 2E-06
NE	0. 0E+00	2. 0E-04	6. 6E-05	0. 0E+00	1. 9E-05	1. 3E-05	6. 2E-06
NNE	0. 0E+00	1. 9E-04	5. 2E-05	0. 0E+00	1. 2E-05	8. 5E-06	4. 0E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 6E-07	1. 3E-07				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	8. 8E-08	7. 1E-08	6. 2E-08
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 3E-07	9. 7E-08	8. 2E-08
WNW	9. 6E-07	0. 0E+00	0. 0E+00	0. 0E+00	1. 5E-07	1. 1E-07	8. 9E-08
W	1. 7E-06	7. 9E-07	5. 0E-07	3. 5E-07	2. 5E-07	1. 8E-07	1. 4E-07
WSW	1. 0E-06	4. 9E-07	3. 2E-07	2. 2E-07	1. 6E-07	1. 2E-07	1. 0E-07
SW	1. 0E-06	4. 9E-07	3. 2E-07	2. 3E-07	1. 7E-07	1. 3E-07	0. 0E+00
SSW	6. 8E-07	3. 4E-07	2. 2E-07	1. 6E-07	0. 0E+00	0. 0E+00	8. 1E-08

NFSS2014Pop. SUM							
S	1. 1E-06	5. 3E-07	3. 4E-07	2. 4E-07	1. 8E-07	1. 3E-07	1. 1E-07
SSE	9. 9E-07	4. 8E-07	3. 1E-07	2. 2E-07	1. 7E-07	1. 3E-07	1. 1E-07
SSE	1. 6E-06	7. 5E-07	4. 8E-07	3. 4E-07	2. 5E-07	1. 8E-07	1. 5E-07
ESE	1. 4E-06	6. 9E-07	4. 4E-07	3. 1E-07	2. 3E-07	1. 7E-07	1. 4E-07
E	1. 7E-06	8. 3E-07	5. 3E-07	3. 7E-07	2. 7E-07	2. 0E-07	1. 7E-07
ENE	1. 6E-06	7. 9E-07	5. 1E-07	3. 6E-07	2. 7E-07	2. 0E-07	1. 7E-07
NE	2. 4E-06	1. 2E-06	0. 0E+00				
NNE	1. 6E-06	0. 0E+00	1. 6E-07				

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SUMMARY
Page 6COLLECTIVE COMMITTED EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radiouclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	3. 7E-07	3. 2E-07	3. 0E-07	2. 2E-08	7. 8E-07	6. 5E-07
NNW	0. 0E+00	2. 8E-07	1. 6E-07	4. 5E-07	6. 5E-08	2. 1E-07	2. 3E-07
NW	0. 0E+00	2. 4E-07	1. 9E-07	1. 1E-06	4. 7E-07	4. 4E-07	4. 3E-06
WNW	0. 0E+00	3. 9E-07	2. 7E-07	4. 4E-06	2. 7E-06	2. 8E-07	1. 5E-05
W	0. 0E+00	4. 1E-07	3. 8E-07	2. 1E-05	2. 8E-06	3. 8E-08	1. 4E-06
WSW	0. 0E+00	4. 1E-07	2. 9E-07	1. 1E-07	9. 8E-07	9. 4E-07	1. 6E-06
SW	0. 0E+00	3. 0E-07	2. 4E-07	3. 0E-07	2. 3E-06	2. 1E-06	1. 6E-05
SSW	0. 0E+00	3. 1E-07	2. 0E-07	2. 2E-07	0. 0E+00	1. 6E-07	1. 1E-05
S	0. 0E+00	3. 0E-07	2. 5E-07	1. 2E-06	7. 1E-07	1. 3E-06	5. 3E-06
SSE	0. 0E+00	4. 0E-07	2. 8E-07	8. 0E-07	5. 8E-07	4. 0E-07	3. 7E-06
SSE	0. 0E+00	4. 3E-07	3. 6E-07	9. 2E-07	7. 6E-07	4. 5E-07	2. 7E-06
ESE	0. 0E+00	5. 1E-07	3. 7E-07	7. 6E-08	3. 3E-07	1. 2E-06	1. 8E-06
E	0. 0E+00	5. 1E-07	4. 1E-07	2. 7E-07	4. 2E-07	5. 7E-07	2. 4E-06
ENE	0. 0E+00	6. 1E-07	4. 4E-07	2. 4E-07	8. 9E-08	5. 5E-07	5. 1E-06
NE	0. 0E+00	5. 9E-07	5. 2E-07	0. 0E+00	3. 0E-07	1. 3E-06	1. 3E-06
NNE	0. 0E+00	5. 7E-07	4. 1E-07	0. 0E+00	4. 9E-08	6. 0E-07	1. 1E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 6E-05	5. 0E-05				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 8E-05	7. 6E-05	4. 3E-05
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 5E-05	8. 9E-05	5. 8E-05
WNW	8. 7E-07	0. 0E+00	0. 0E+00	0. 0E+00	5. 8E-07	4. 2E-05	9. 0E-06
W	5. 3E-05	4. 0E-05	3. 7E-06	1. 2E-05	6. 1E-06	3. 2E-05	4. 3E-05
WSW	2. 3E-05	2. 5E-05	1. 7E-06	1. 9E-06	9. 7E-07	1. 0E-06	3. 3E-07
SW	4. 8E-05	5. 7E-06	2. 1E-05	1. 8E-06	2. 4E-07	7. 3E-08	0. 0E+00
SSW	4. 2E-05	1. 2E-06	8. 9E-07	2. 2E-06	0. 0E+00	0. 0E+00	2. 6E-07
S	3. 0E-05	6. 5E-06	1. 0E-05	6. 5E-09	4. 0E-06	2. 5E-06	9. 0E-07
SSE	2. 1E-05	6. 6E-05	1. 1E-04	3. 2E-05	1. 2E-05	1. 6E-06	6. 7E-07
SSE	1. 7E-05	3. 4E-05	4. 0E-05	1. 5E-05	3. 6E-06	1. 1E-06	1. 6E-06
ESE	3. 5E-06	2. 5E-05	1. 6E-06	2. 1E-06	1. 5E-06	4. 1E-06	2. 0E-06
E	2. 6E-06	8. 4E-06	2. 4E-06	5. 1E-06	9. 0E-07	2. 9E-06	1. 7E-06

	NFSS2014Pop. SUM							
ENE	2. 2E-06	5. 2E-06	1. 5E-06	9. 0E-07	2. 9E-07	1. 8E-07	9. 3E-08	
NE	5. 8E-06	2. 0E-07	0. 0E+00					
NNE	7. 5E-08	0. 0E+00	2. 9E-06					

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

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	2. 3E-11	7. 7E-12	3. 8E-12	2. 3E-12	1. 6E-12	7. 7E-13
NNW	0. 0E+00	1. 8E-11	4. 0E-12	1. 2E-12	7. 1E-13	5. 0E-13	2. 4E-13
NW	0. 0E+00	1. 5E-11	4. 6E-12	2. 1E-12	1. 3E-12	8. 9E-13	4. 3E-13
WNW	0. 0E+00	2. 4E-11	6. 6E-12	2. 6E-12	1. 6E-12	1. 1E-12	5. 3E-13
W	0. 0E+00	2. 6E-11	9. 1E-12	4. 7E-12	2. 8E-12	2. 0E-12	9. 4E-13
WSW	0. 0E+00	2. 6E-11	7. 0E-12	2. 7E-12	1. 7E-12	1. 2E-12	5. 6E-13
SW	0. 0E+00	1. 9E-11	5. 9E-12	2. 8E-12	1. 7E-12	1. 2E-12	5. 7E-13
SSW	0. 0E+00	1. 9E-11	5. 0E-12	1. 8E-12	0. 0E+00	7. 8E-13	3. 8E-13
S	0. 0E+00	1. 9E-11	6. 2E-12	3. 0E-12	1. 8E-12	1. 3E-12	6. 2E-13
SSE	0. 0E+00	2. 5E-11	6. 8E-12	2. 7E-12	1. 6E-12	1. 1E-12	5. 6E-13
SSE	0. 0E+00	2. 7E-11	8. 9E-12	4. 3E-12	2. 6E-12	1. 8E-12	8. 8E-13
ESE	0. 0E+00	3. 2E-11	9. 1E-12	3. 8E-12	2. 3E-12	1. 6E-12	8. 0E-13
E	0. 0E+00	3. 2E-11	1. 0E-11	4. 6E-12	2. 8E-12	2. 0E-12	9. 6E-13
ENE	0. 0E+00	3. 8E-11	1. 1E-11	4. 3E-12	2. 6E-12	1. 9E-12	9. 1E-13
NE	0. 0E+00	3. 7E-11	1. 3E-11	0. 0E+00	3. 9E-12	2. 7E-12	1. 3E-12
NNE	0. 0E+00	3. 6E-11	1. 0E-11	0. 0E+00	2. 5E-12	1. 8E-12	8. 7E-13

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	3. 5E-14	2. 9E-14				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 7E-14	1. 3E-14	1. 1E-14
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 7E-14	2. 0E-14	1. 6E-14
WNW	2. 1E-13	0. 0E+00	0. 0E+00	0. 0E+00	3. 0E-14	2. 2E-14	1. 7E-14
W	3. 7E-13	1. 8E-13	1. 1E-13	7. 7E-14	5. 4E-14	3. 8E-14	3. 1E-14
WSW	2. 2E-13	1. 1E-13	6. 9E-14	4. 9E-14	3. 5E-14	2. 6E-14	2. 1E-14
SW	2. 3E-13	1. 1E-13	7. 1E-14	5. 0E-14	3. 6E-14	2. 7E-14	0. 0E+00
SSW	1. 5E-13	7. 5E-14	4. 9E-14	3. 5E-14	0. 0E+00	0. 0E+00	1. 6E-14
S	2. 5E-13	1. 2E-13	7. 7E-14	5. 4E-14	4. 0E-14	2. 9E-14	2. 4E-14
SSE	2. 2E-13	1. 1E-13	7. 1E-14	5. 0E-14	3. 7E-14	2. 8E-14	2. 3E-14
SSE	3. 5E-13	1. 7E-13	1. 1E-13	7. 8E-14	5. 7E-14	4. 2E-14	3. 4E-14
ESE	3. 2E-13	1. 6E-13	1. 0E-13	7. 2E-14	5. 3E-14	3. 9E-14	3. 2E-14
E	3. 8E-13	1. 9E-13	1. 2E-13	8. 5E-14	6. 2E-14	4. 6E-14	3. 8E-14
ENE	3. 6E-13	1. 8E-13	1. 2E-13	8. 3E-14	6. 1E-14	4. 6E-14	3. 8E-14
NE	5. 3E-13	2. 6E-13	0. 0E+00				
NNE	3. 5E-13	0. 0E+00	3. 5E-14				

NFSS2014Pop. SUM

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COLLECTIVE FATAL CANCER RISK Per Year
(All Radioisotopes and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	8.9E-13	8.0E-13	7.8E-13	5.9E-14	2.1E-12	1.8E-12	
NNW	0.0E+00	6.9E-13	4.1E-13	1.2E-12	1.7E-13	5.8E-13	6.5E-13	
NW	0.0E+00	5.9E-13	4.8E-13	3.0E-12	1.3E-12	1.2E-12	1.2E-11	
WNW	0.0E+00	9.4E-13	6.8E-13	1.1E-11	7.2E-12	7.5E-13	4.2E-11	
W	0.0E+00	1.0E-12	9.5E-13	5.5E-11	7.4E-12	1.0E-13	3.8E-12	
WSW	0.0E+00	1.0E-12	7.2E-13	2.8E-13	2.6E-12	2.5E-12	4.5E-12	
SW	0.0E+00	7.2E-13	6.1E-13	7.9E-13	6.0E-12	5.8E-12	4.3E-11	
SSW	0.0E+00	7.5E-13	5.1E-13	5.7E-13	0.0E+00	4.3E-13	3.0E-11	
S	0.0E+00	7.4E-13	6.5E-13	3.1E-12	1.9E-12	3.6E-12	1.5E-11	
SSE	0.0E+00	9.7E-13	7.0E-13	2.1E-12	1.6E-12	1.1E-12	1.1E-11	
SSE	0.0E+00	1.1E-12	9.2E-13	2.4E-12	2.0E-12	1.2E-12	7.7E-12	
ESE	0.0E+00	1.2E-12	9.4E-13	2.0E-13	8.7E-13	3.4E-12	5.1E-12	
E	0.0E+00	1.2E-12	1.0E-12	7.2E-13	1.1E-12	1.5E-12	6.7E-12	
ENE	0.0E+00	1.5E-12	1.1E-12	6.2E-13	2.4E-13	1.5E-12	1.4E-11	
NE	0.0E+00	1.4E-12	1.3E-12	0.0E+00	8.0E-13	3.6E-12	3.7E-12	
NNE	0.0E+00	1.4E-12	1.0E-12	0.0E+00	1.3E-13	1.6E-12	3.0E-12	

		Distance (m)						
Direction		15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.4E-11	1.4E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.7E-11	1.9E-10	1.0E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.1E-11	2.4E-10	1.5E-10	
WNW	2.4E-12	0.0E+00	0.0E+00	0.0E+00	1.6E-12	1.1E-10	2.3E-11	
W	1.5E-10	1.1E-10	1.0E-11	3.5E-11	1.7E-11	9.1E-11	1.2E-10	
WSW	6.6E-11	7.0E-11	4.9E-12	5.5E-12	2.7E-12	2.8E-12	8.7E-13	
SW	1.4E-10	1.6E-11	6.2E-11	5.1E-12	6.9E-13	2.0E-13	0.0E+00	
SSW	1.2E-10	3.4E-12	2.6E-12	6.2E-12	0.0E+00	0.0E+00	6.6E-13	
S	8.7E-11	1.9E-11	3.0E-11	1.9E-14	1.1E-11	7.1E-12	2.5E-12	
SSE	6.0E-11	1.9E-10	3.1E-10	9.4E-11	3.6E-11	4.5E-12	1.8E-12	
SSE	4.9E-11	1.0E-10	1.2E-10	4.5E-11	1.1E-11	3.3E-12	4.6E-12	
ESE	1.0E-11	7.2E-11	4.6E-12	6.3E-12	4.5E-12	1.2E-11	5.8E-12	
E	7.4E-12	2.5E-11	7.2E-12	1.5E-11	2.7E-12	8.7E-12	5.0E-12	
ENE	6.4E-12	1.5E-11	4.4E-12	2.7E-12	8.5E-13	5.4E-13	2.7E-13	
NE	1.7E-11	5.8E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	2.2E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.4E-12	

D O S E A N D R I S K S U M M A R I E S
NFSS2014Pop (2).SUM

Non-Radon Population Assessment
Wed Jun 10 16:05:52 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Five

Comments: NFSS Technical Memo 2014 Year
Population Dose

Dataset Name: NFSS2014 Pop.
Dataset Date: Jun 10, 2015 04:05 PM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5eh9hl\Documents\CAP88\Population Files\NFSS2013.POP

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SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Sel ected Individ ual (mrem)	Col lecti ve Popul ation (person-rem)
Adrenal	5. 67E-05	4. 71E-04
UB_Wall	6. 27E-05	5. 18E-04
Bone_Sur	1. 17E-03	1. 25E-02
Brain	5. 99E-05	4. 96E-04
Breasts	6. 57E-05	5. 41E-04
St_Wall	6. 07E-05	5. 04E-04
SI_Wall	6. 05E-05	5. 06E-04
ULT_Wall	6. 51E-05	5. 74E-04
LLI_Wall	7. 71E-05	7. 61E-04
Kidneys	1. 08E-04	9. 61E-04
Liver	9. 27E-05	8. 78E-04
Muscle	6. 77E-05	5. 56E-04
Ovaries	6. 54E-05	5. 29E-04
Pancreas	5. 72E-05	4. 75E-04
R_Marrow	1. 35E-04	1. 35E-03
Skin	9. 35E-04	7. 31E-03
Spleen	6. 15E-05	5. 14E-04

	NFSS2014Pop (2). SUM
Testes	7. 42E-05
Thymus	6. 01E-05
Thyroid	6. 27E-05
GB_Wall	5. 77E-05
Ht_Wall	5. 99E-05
Uterus	5. 93E-05
ET_Reg	3. 68E-04
Lung_66	8. 65E-04
Effectiv	1. 92E-04
	1. 30E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	1. 66E-05	2. 81E-04
INHALATION	1. 09E-04	5. 04E-04
AIR IMMERSION	3. 19E-11	4. 84E-10
GROUND SURFACE	6. 61E-05	5. 15E-04
INTERNAL	1. 26E-04	7. 85E-04
EXTERNAL	6. 61E-05	5. 15E-04
TOTAL	1. 92E-04	1. 30E-03

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SUMMARY
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NUCLEI COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclei	Selected Individual (mrem)	Collective Population (person-rem)
U-238	1. 84E-05	9. 97E-05
Th-234	4. 72E-07	3. 69E-06
Pa-234m	6. 46E-06	5. 03E-05
Pa-234	1. 27E-07	9. 91E-07
U-234	2. 09E-05	1. 12E-04
Th-230	3. 60E-05	1. 83E-04
Ra-226	2. 28E-05	2. 57E-04
Rn-222	1. 13E-08	8. 83E-08
Po-218	2. 03E-13	1. 58E-12
Pb-214	7. 41E-06	5. 77E-05
At-218	7. 63E-13	5. 94E-12
Bi-214	4. 33E-05	3. 37E-04
Rn-218	4. 42E-15	3. 44E-14
Po-214	2. 40E-09	1. 87E-08
Tl-210	1. 69E-08	1. 32E-07
Pb-210	3. 65E-08	2. 84E-07
Bi-210	5. 90E-07	4. 59E-06
Hg-206	4. 76E-14	3. 71E-13
Po-210	1. 53E-10	1. 19E-09

	NFSS2014Pop (2). SUM
Tl -206	1. 38E-12
Th-232	8. 32E-06
Ra-228	2. 19E-09
Ac-228	2. 49E-06
Th-228	1. 82E-05
Ra-224	2. 99E-08
Rn-220	1. 82E-09
Po-216	4. 39E-11
Pb-212	4. 00E-07
Bi -212	4. 66E-07
Po-212	0. 00E+00
Tl -208	3. 22E-06
U-235	2. 38E-06
Th-231	7. 41E-08
Pa-231	1. 23E-10
Ac-227	4. 12E-13
Th-227	1. 97E-10
Fr-223	1. 85E-12
Ra-223	2. 20E-10
Rn-219	9. 52E-11
At-219	0. 00E+00
Bi -215	4. 28E-16
Po-215	2. 91E-13
Pb-211	1. 87E-10
Bi -211	7. 70E-11
Tl -207	9. 68E-11
Po-211	3. 71E-14
TOTAL	1. 92E-04
	1. 30E-03

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Li fetic me Fatal Cancer Risk	Total Collective Popul ation Fatal Cancer Ri sk Per Year
Esophagu	5. 66E-13	5. 73E-11
Stomach	2. 20E-12	2. 22E-10
Col on	5. 73E-12	5. 86E-10
Li ver	8. 71E-13	8. 99E-11
LUNG	1. 74E-11	1. 27E-09
Bone	1. 58E-13	1. 59E-11
Ski n	9. 27E-13	9. 35E-11
Breast	2. 87E-12	2. 89E-10
Ovary	7. 62E-13	7. 69E-11
Bl adder	1. 37E-12	1. 39E-10
Ki dneys	3. 20E-13	3. 44E-11
Thyroi d	1. 80E-13	1. 82E-11
Leukemi a	3. 26E-12	3. 29E-10
Resi dual	8. 09E-12	8. 17E-10
Total	4. 47E-11	4. 04E-09

NFSS2014Pop (2).SUM
PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	2.32E-13	4.95E-11
INHALATION	1.20E-11	7.16E-10
AIR IMMERSION	1.69E-17	3.39E-15
GROUND SURFACE	3.24E-11	3.27E-09
INTERNAL	1.22E-11	7.65E-10
EXTERNAL	3.24E-11	3.27E-09
TOTAL	4.47E-11	4.04E-09

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SUMMARY
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NUCL IDE RISK SUMMARY

Nuclide	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	2.10E-12	1.25E-10
Th-234	2.45E-13	2.47E-11
Pa-234m	1.13E-12	1.14E-10
Pa-234	6.92E-14	6.98E-12
U-234	2.61E-12	1.84E-10
Th-230	3.05E-12	1.82E-10
Ra-226	1.46E-12	9.18E-11
Rn-222	6.19E-15	6.24E-13
Po-218	9.06E-20	9.13E-18
Pb-214	3.96E-12	4.00E-10
At-218	9.39E-20	9.47E-18
Bi-214	2.29E-11	2.31E-09
Rn-218	2.42E-21	2.44E-19
Po-214	1.32E-15	1.33E-13
Tl-210	9.03E-15	9.11E-13
Pb-210	1.63E-14	1.65E-12
Bi-210	6.54E-14	6.59E-12
Hg-206	2.11E-20	2.13E-18
Po-210	8.39E-17	8.46E-15
Tl-206	1.55E-19	1.56E-17
Th-232	6.45E-13	3.88E-11
Ra-228	6.63E-16	6.73E-14
Ac-228	1.33E-12	1.34E-10
Th-228	2.30E-12	1.42E-10
Ra-224	1.60E-14	2.01E-12
Rn-220	9.96E-16	1.00E-13
Po-216	2.41E-17	2.43E-15
Pb-212	2.17E-13	2.19E-11
Bi-212	1.80E-13	1.81E-11
Po-212	0.00E+00	0.00E+00
Tl-208	1.75E-12	1.77E-10
U-235	5.98E-13	5.42E-11

	NFSS2014Pop (2). SUM
Th-231	3. 38E-14
Pa-231	6. 40E-17
Ac-227	1. 54E-19
Th-227	1. 07E-16
Fr-223	6. 91E-19
Ra-223	1. 19E-16
Rn-219	5. 21E-17
At-219	0. 00E+00
Bi -215	1. 91E-22
Po-215	1. 59E-19
Pb-211	6. 68E-17
Bi -211	4. 21E-17
Tl -207	1. 24E-17
Po-211	2. 03E-20
TOTAL	4. 47E-11
	4. 04E-09

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SUMMARY
Page 5INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	1. 1E-04	3. 7E-05	1. 8E-05	1. 0E-05	7. 2E-06	3. 4E-06
NNW	0. 0E+00	8. 9E-05	1. 9E-05	5. 5E-06	3. 2E-06	2. 2E-06	1. 1E-06
NW	0. 0E+00	7. 6E-05	2. 2E-05	9. 8E-06	5. 8E-06	4. 0E-06	1. 9E-06
WNW	0. 0E+00	1. 2E-04	3. 2E-05	1. 2E-05	7. 3E-06	5. 1E-06	2. 4E-06
W	0. 0E+00	1. 3E-04	4. 4E-05	2. 2E-05	1. 3E-05	8. 9E-06	4. 2E-06
WSW	0. 0E+00	1. 3E-04	3. 4E-05	1. 3E-05	7. 6E-06	5. 3E-06	2. 5E-06
SW	0. 0E+00	9. 3E-05	2. 9E-05	1. 3E-05	7. 7E-06	5. 3E-06	2. 5E-06
SSW	0. 0E+00	9. 6E-05	2. 4E-05	8. 5E-06	0. 0E+00	3. 5E-06	1. 6E-06
S	0. 0E+00	9. 5E-05	3. 0E-05	1. 4E-05	8. 3E-06	5. 7E-06	2. 7E-06
SSE	0. 0E+00	1. 2E-04	3. 2E-05	1. 2E-05	7. 3E-06	5. 1E-06	2. 4E-06
SSE	0. 0E+00	1. 3E-04	4. 3E-05	2. 0E-05	1. 2E-05	8. 1E-06	3. 8E-06
ESE	0. 0E+00	1. 6E-04	4. 4E-05	1. 8E-05	1. 1E-05	7. 3E-06	3. 5E-06
E	0. 0E+00	1. 6E-04	4. 8E-05	2. 2E-05	1. 3E-05	8. 8E-06	4. 2E-06
ENE	0. 0E+00	1. 9E-04	5. 1E-05	2. 0E-05	1. 2E-05	8. 3E-06	4. 0E-06
NE	0. 0E+00	1. 9E-04	6. 2E-05	0. 0E+00	1. 8E-05	1. 2E-05	5. 8E-06
NNE	0. 0E+00	1. 8E-04	4. 9E-05	0. 0E+00	1. 2E-05	8. 0E-06	3. 8E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 5E-07	1. 2E-07				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	7. 6E-08	6. 0E-08	5. 2E-08
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 1E-07	8. 5E-08	7. 0E-08
WNW	8. 9E-07	0. 0E+00	0. 0E+00	0. 0E+00	1. 3E-07	9. 4E-08	7. 7E-08
W	1. 6E-06	7. 4E-07	4. 7E-07	3. 2E-07	2. 3E-07	1. 6E-07	1. 3E-07
WSW	9. 5E-07	4. 5E-07	2. 9E-07	2. 0E-07	1. 5E-07	1. 1E-07	9. 0E-08
SW	9. 6E-07	4. 6E-07	2. 9E-07	2. 1E-07	1. 5E-07	1. 1E-07	0. 0E+00
SSW	6. 4E-07	3. 1E-07	2. 0E-07	1. 4E-07	0. 0E+00	0. 0E+00	6. 9E-08

	NFSS2014Pop (2). SUM						
S	1. 0E-06	4. 9E-07	3. 2E-07	2. 2E-07	1. 6E-07	1. 2E-07	9. 8E-08
SSE	9. 2E-07	4. 5E-07	2. 9E-07	2. 0E-07	1. 5E-07	1. 1E-07	9. 4E-08
SSE	1. 5E-06	7. 0E-07	4. 4E-07	3. 1E-07	2. 3E-07	1. 7E-07	1. 4E-07
ESE	1. 3E-06	6. 4E-07	4. 1E-07	2. 9E-07	2. 1E-07	1. 6E-07	1. 3E-07
E	1. 6E-06	7. 7E-07	4. 9E-07	3. 4E-07	2. 5E-07	1. 8E-07	1. 5E-07
ENE	1. 5E-06	7. 4E-07	4. 7E-07	3. 3E-07	2. 4E-07	1. 8E-07	1. 5E-07
NE	2. 2E-06	1. 1E-06	0. 0E+00				
NNE	1. 5E-06	0. 0E+00	1. 4E-07				

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SUMMARY
Page 6COLLECTIVE COMMITTED EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radiouclides and Pathways)

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	3. 4E-07	3. 0E-07	2. 8E-07	2. 1E-08	7. 3E-07	6. 1E-07
NNW	0. 0E+00	2. 7E-07	1. 5E-07	4. 2E-07	6. 1E-08	2. 0E-07	2. 2E-07
NW	0. 0E+00	2. 3E-07	1. 8E-07	1. 1E-06	4. 5E-07	4. 1E-07	4. 0E-06
WNW	0. 0E+00	3. 6E-07	2. 6E-07	4. 2E-06	2. 6E-06	2. 6E-07	1. 4E-05
W	0. 0E+00	3. 9E-07	3. 5E-07	2. 0E-05	2. 6E-06	3. 6E-08	1. 3E-06
WSW	0. 0E+00	3. 9E-07	2. 7E-07	1. 0E-07	9. 2E-07	8. 8E-07	1. 5E-06
SW	0. 0E+00	2. 8E-07	2. 3E-07	2. 9E-07	2. 1E-06	2. 0E-06	1. 5E-05
SSW	0. 0E+00	2. 9E-07	1. 9E-07	2. 0E-07	0. 0E+00	1. 5E-07	1. 0E-05
S	0. 0E+00	2. 8E-07	2. 4E-07	1. 1E-06	6. 7E-07	1. 2E-06	5. 0E-06
SSE	0. 0E+00	3. 7E-07	2. 6E-07	7. 6E-07	5. 4E-07	3. 8E-07	3. 5E-06
SSE	0. 0E+00	4. 0E-07	3. 4E-07	8. 7E-07	7. 1E-07	4. 2E-07	2. 6E-06
ESE	0. 0E+00	4. 8E-07	3. 5E-07	7. 2E-08	3. 1E-07	1. 2E-06	1. 7E-06
E	0. 0E+00	4. 8E-07	3. 9E-07	2. 6E-07	3. 9E-07	5. 4E-07	2. 3E-06
ENE	0. 0E+00	5. 8E-07	4. 1E-07	2. 2E-07	8. 4E-08	5. 2E-07	4. 8E-06
NE	0. 0E+00	5. 6E-07	4. 9E-07	0. 0E+00	2. 8E-07	1. 3E-06	1. 2E-06
NNE	0. 0E+00	5. 4E-07	3. 9E-07	0. 0E+00	4. 6E-08	5. 6E-07	1. 0E-06

Direction	Distance (m)						
	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 4E-05	4. 5E-05
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 3E-05	6. 4E-05	3. 5E-05
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 3E-05	7. 8E-05	5. 0E-05
WNW	8. 1E-07	0. 0E+00	0. 0E+00	0. 0E+00	5. 2E-07	3. 7E-05	7. 8E-06
W	5. 0E-05	3. 7E-05	3. 4E-06	1. 1E-05	5. 6E-06	2. 9E-05	3. 8E-05
WSW	2. 2E-05	2. 3E-05	1. 6E-06	1. 8E-06	8. 7E-07	9. 0E-07	2. 9E-07
SW	4. 5E-05	5. 2E-06	2. 0E-05	1. 6E-06	2. 2E-07	6. 4E-08	0. 0E+00
SSW	3. 9E-05	1. 1E-06	8. 1E-07	2. 0E-06	0. 0E+00	0. 0E+00	2. 2E-07
S	2. 8E-05	6. 1E-06	9. 4E-06	6. 0E-09	3. 6E-06	2. 2E-06	7. 9E-07
SSE	1. 9E-05	6. 1E-05	9. 7E-05	2. 9E-05	1. 1E-05	1. 4E-06	5. 9E-07
SSE	1. 6E-05	3. 2E-05	3. 7E-05	1. 4E-05	3. 3E-06	1. 0E-06	1. 4E-06
ESE	3. 3E-06	2. 3E-05	1. 4E-06	1. 9E-06	1. 4E-06	3. 7E-06	1. 8E-06
E	2. 4E-06	7. 8E-06	2. 3E-06	4. 7E-06	8. 2E-07	2. 7E-06	1. 5E-06

	NFSS2014Pop (2). SUM							
ENE	2. 1E-06	4. 9E-06	1. 4E-06	8. 3E-07	2. 6E-07	1. 6E-07	8. 3E-08	
NE	5. 4E-06	1. 8E-07	0. 0E+00					
NNE	7. 0E-08	0. 0E+00	2. 6E-06					

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INDIVIDUAL LIFE TIME RISK (deaths) (All Radiouclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	2. 7E-11	8. 8E-12	4. 3E-12	2. 6E-12	1. 8E-12	8. 6E-13
NNW	0. 0E+00	2. 1E-11	4. 6E-12	1. 3E-12	8. 0E-13	5. 5E-13	2. 7E-13
NW	0. 0E+00	1. 8E-11	5. 3E-12	2. 4E-12	1. 4E-12	1. 0E-12	4. 8E-13
WNW	0. 0E+00	2. 8E-11	7. 6E-12	3. 0E-12	1. 8E-12	1. 2E-12	5. 9E-13
W	0. 0E+00	3. 0E-11	1. 1E-11	5. 3E-12	3. 2E-12	2. 2E-12	1. 0E-12
WSW	0. 0E+00	3. 0E-11	8. 0E-12	3. 1E-12	1. 9E-12	1. 3E-12	6. 2E-13
SW	0. 0E+00	2. 2E-11	6. 8E-12	3. 2E-12	1. 9E-12	1. 3E-12	6. 3E-13
SSW	0. 0E+00	2. 2E-11	5. 7E-12	2. 1E-12	0. 0E+00	8. 7E-13	4. 2E-13
S	0. 0E+00	2. 2E-11	7. 2E-12	3. 4E-12	2. 0E-12	1. 4E-12	6. 8E-13
SSE	0. 0E+00	2. 9E-11	7. 8E-12	3. 0E-12	1. 8E-12	1. 3E-12	6. 1E-13
SSE	0. 0E+00	3. 1E-11	1. 0E-11	4. 8E-12	2. 9E-12	2. 0E-12	9. 7E-13
ESE	0. 0E+00	3. 7E-11	1. 0E-11	4. 4E-12	2. 6E-12	1. 8E-12	8. 8E-13
E	0. 0E+00	3. 7E-11	1. 1E-11	5. 2E-12	3. 1E-12	2. 2E-12	1. 1E-12
ENE	0. 0E+00	4. 5E-11	1. 2E-11	4. 9E-12	3. 0E-12	2. 1E-12	1. 0E-12
NE	0. 0E+00	4. 3E-11	1. 5E-11	0. 0E+00	4. 4E-12	3. 0E-12	1. 5E-12
NNE	0. 0E+00	4. 2E-11	1. 2E-11	0. 0E+00	2. 8E-12	2. 0E-12	9. 6E-13

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	3. 5E-14	2. 8E-14				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 6E-14	1. 1E-14	8. 9E-15
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 6E-14	1. 8E-14	1. 4E-14
WNW	2. 3E-13	0. 0E+00	0. 0E+00	0. 0E+00	3. 0E-14	2. 0E-14	1. 6E-14
W	4. 1E-13	1. 9E-13	1. 2E-13	8. 0E-14	5. 5E-14	3. 8E-14	3. 0E-14
WSW	2. 4E-13	1. 1E-13	7. 2E-14	4. 9E-14	3. 5E-14	2. 5E-14	1. 9E-14
SW	2. 5E-13	1. 2E-13	7. 4E-14	5. 1E-14	3. 6E-14	2. 6E-14	0. 0E+00
SSW	1. 6E-13	7. 8E-14	4. 9E-14	3. 4E-14	0. 0E+00	0. 0E+00	1. 4E-14
S	2. 7E-13	1. 3E-13	8. 0E-14	5. 5E-14	3. 9E-14	2. 8E-14	2. 2E-14
SSE	2. 4E-13	1. 2E-13	7. 3E-14	5. 1E-14	3. 6E-14	2. 6E-14	2. 1E-14
SSE	3. 8E-13	1. 8E-13	1. 2E-13	8. 0E-14	5. 7E-14	4. 2E-14	3. 3E-14
ESE	3. 5E-13	1. 7E-13	1. 1E-13	7. 4E-14	5. 3E-14	3. 9E-14	3. 1E-14
E	4. 1E-13	2. 0E-13	1. 3E-13	8. 8E-14	6. 3E-14	4. 6E-14	3. 7E-14
ENE	4. 0E-13	1. 9E-13	1. 2E-13	8. 6E-14	6. 2E-14	4. 6E-14	3. 7E-14
NE	5. 8E-13	2. 8E-13	0. 0E+00				
NNE	3. 8E-13	0. 0E+00	3. 4E-14				

NFSS2014Pop (2). SUM

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COLLECTIVE FATAL CANCER RISK Per Year
(All Radioisotopes and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.0E-12	9.1E-13	8.8E-13	6.6E-14	2.4E-12	2.0E-12	
NNW	0.0E+00	8.1E-13	4.7E-13	1.3E-12	2.0E-13	6.5E-13	7.1E-13	
NW	0.0E+00	6.8E-13	5.5E-13	3.4E-12	1.4E-12	1.3E-12	1.3E-11	
WNW	0.0E+00	1.1E-12	7.9E-13	1.3E-11	8.2E-12	8.4E-13	4.7E-11	
W	0.0E+00	1.2E-12	1.1E-12	6.2E-11	8.3E-12	1.1E-13	4.3E-12	
WSW	0.0E+00	1.2E-12	8.3E-13	3.2E-13	2.9E-12	2.8E-12	5.0E-12	
SW	0.0E+00	8.4E-13	7.1E-13	9.0E-13	6.8E-12	6.5E-12	4.8E-11	
SSW	0.0E+00	8.7E-13	5.9E-13	6.5E-13	0.0E+00	4.8E-13	3.3E-11	
S	0.0E+00	8.6E-13	7.4E-13	3.5E-12	2.1E-12	4.0E-12	1.7E-11	
SSE	0.0E+00	1.1E-12	8.0E-13	2.4E-12	1.7E-12	1.2E-12	1.2E-11	
SSE	0.0E+00	1.2E-12	1.1E-12	2.7E-12	2.3E-12	1.4E-12	8.5E-12	
ESE	0.0E+00	1.4E-12	1.1E-12	2.3E-13	9.8E-13	3.8E-12	5.6E-12	
E	0.0E+00	1.4E-12	1.2E-12	8.1E-13	1.3E-12	1.7E-12	7.4E-12	
ENE	0.0E+00	1.7E-12	1.3E-12	7.0E-13	2.7E-13	1.7E-12	1.6E-11	
NE	0.0E+00	1.7E-12	1.5E-12	0.0E+00	9.0E-13	4.0E-12	4.1E-12	
NNE	0.0E+00	1.6E-12	1.2E-12	0.0E+00	1.5E-13	1.8E-12	3.3E-12	

		Distance (m)						
Direction		15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.3E-11	1.3E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.6E-11	1.6E-10	7.9E-11	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-11	2.2E-10	1.3E-10	
WNW	2.7E-12	0.0E+00	0.0E+00	0.0E+00	1.5E-12	1.0E-10	2.1E-11	
W	1.6E-10	1.2E-10	1.1E-11	3.7E-11	1.8E-11	9.0E-11	1.1E-10	
WSW	7.2E-11	7.4E-11	5.1E-12	5.6E-12	2.7E-12	2.6E-12	8.1E-13	
SW	1.5E-10	1.7E-11	6.4E-11	5.2E-12	6.8E-13	1.9E-13	0.0E+00	
SSW	1.3E-10	3.5E-12	2.6E-12	6.1E-12	0.0E+00	0.0E+00	5.8E-13	
S	9.4E-11	2.0E-11	3.1E-11	1.9E-14	1.1E-11	6.8E-12	2.3E-12	
SSE	6.5E-11	2.0E-10	3.2E-10	9.5E-11	3.5E-11	4.3E-12	1.7E-12	
SSE	5.3E-11	1.1E-10	1.2E-10	4.7E-11	1.1E-11	3.3E-12	4.5E-12	
ESE	1.1E-11	7.7E-11	4.8E-12	6.5E-12	4.6E-12	1.2E-11	5.5E-12	
E	8.1E-12	2.6E-11	7.6E-12	1.6E-11	2.7E-12	8.6E-12	4.9E-12	
ENE	6.9E-12	1.6E-11	4.6E-12	2.8E-12	8.6E-13	5.4E-13	2.7E-13	
NE	1.8E-11	6.2E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	2.3E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.1E-12	

D O S E A N D R I S K S U M M A R I E S
NFSS2014Pop (3).SUM

Non-Radon Population Assessment
Wed Jun 10 16:03:41 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Ten

Comments: NFSS Technical Memo 2014 Year
Population Dose

Dataset Name: NFSS2014 Pop.
Dataset Date: Jun 10, 2015 04:03 PM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5eh9hl\Documents\CAP88\Population Files\NFSS2013.POP

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SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Sel ected Individ ual (mrem)	Col lective Popul ation (person-rem)
Adrenal	5. 57E-05	4. 53E-04
UB_Wall	6. 17E-05	4. 98E-04
Bone_Sur	1. 67E-03	1. 89E-02
Brain	5. 89E-05	4. 77E-04
Breasts	6. 46E-05	5. 21E-04
St_Wall	5. 96E-05	4. 83E-04
SI_Wall	5. 93E-05	4. 83E-04
ULT_Wall	6. 23E-05	5. 26E-04
LLI_Wall	7. 00E-05	6. 41E-04
Kidneys	1. 02E-04	8. 55E-04
Liver	8. 67E-05	7. 66E-04
Muscle	6. 67E-05	5. 37E-04
Ovaries	6. 50E-05	5. 11E-04
Pancreas	5. 62E-05	4. 56E-04
R_Marrow	1. 49E-04	1. 56E-03
Skin	9. 34E-04	7. 29E-03
Spleen	6. 11E-05	5. 04E-04

	NFSS2014Pop (3). SUM
Testes	7. 42E-05
Thymus	5. 91E-05
Thyroid	6. 17E-05
GB_Wall	5. 66E-05
Ht_Wall	5. 89E-05
Uterus	5. 83E-05
ET_Reg	3. 67E-04
Lung_66	8. 11E-04
Effectiv	1. 91E-04
	1. 33E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	1. 93E-05	3. 30E-04
INHALATION	1. 06E-04	4. 87E-04
AIR IMMERSION	3. 19E-11	4. 84E-10
GROUND SURFACE	6. 61E-05	5. 15E-04
INTERNAL	1. 25E-04	8. 17E-04
EXTERNAL	6. 61E-05	5. 15E-04
TOTAL	1. 91E-04	1. 33E-03

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SUMMARY
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NUCLEI COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclei	Selected Individual (mrem)	Collective Population (person-rem)
U-238	1. 73E-05	9. 24E-05
Th-234	4. 72E-07	3. 68E-06
Pa-234m	6. 46E-06	5. 03E-05
Pa-234	1. 27E-07	9. 91E-07
U-234	2. 00E-05	1. 05E-04
Th-230	3. 48E-05	1. 73E-04
Ra-226	2. 62E-05	3. 19E-04
Rn-222	1. 13E-08	8. 83E-08
Po-218	2. 03E-13	1. 58E-12
Pb-214	7. 41E-06	5. 77E-05
At-218	7. 63E-13	5. 94E-12
Bi-214	4. 33E-05	3. 37E-04
Rn-218	4. 42E-15	3. 44E-14
Po-214	2. 40E-09	1. 87E-08
Tl-210	1. 69E-08	1. 32E-07
Pb-210	3. 65E-08	2. 84E-07
Bi-210	5. 90E-07	4. 59E-06
Hg-206	4. 76E-14	3. 71E-13
Po-210	1. 53E-10	1. 19E-09

	NFSS2014Pop (3). SUM
Tl -206	1. 38E-12
Th-232	8. 41E-06
Ra-228	2. 19E-09
Ac-228	2. 49E-06
Th-228	1. 72E-05
Ra-224	2. 99E-08
Rn-220	1. 82E-09
Po-216	4. 39E-11
Pb-212	4. 00E-07
Bi -212	4. 66E-07
Po-212	0. 00E+00
Tl -208	3. 22E-06
U-235	2. 29E-06
Th-231	7. 41E-08
Pa-231	1. 23E-10
Ac-227	4. 12E-13
Th-227	1. 97E-10
Fr-223	1. 85E-12
Ra-223	2. 20E-10
Rn-219	9. 52E-11
At-219	0. 00E+00
Bi -215	4. 28E-16
Po-215	2. 91E-13
Pb-211	1. 87E-10
Bi -211	7. 70E-11
Tl -207	9. 68E-11
Po-211	3. 71E-14
TOTAL	1. 91E-04
	1. 33E-03

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CANCER RISK SUMMARY

Cancer	Selected Individual Total Li feti me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	5. 68E-13	5. 75E-11
Stomach	2. 20E-12	2. 23E-10
Colon	5. 78E-12	5. 96E-10
Liver	8. 85E-13	9. 16E-11
LUNG	2. 20E-11	1. 55E-09
Bone	1. 85E-13	1. 81E-11
Skin	9. 27E-13	9. 35E-11
Breast	2. 87E-12	2. 90E-10
Ovary	7. 67E-13	7. 74E-11
Bladder	1. 37E-12	1. 39E-10
Kidneys	3. 29E-13	3. 55E-11
Thyroid	1. 80E-13	1. 82E-11
Leukemia	3. 27E-12	3. 30E-10
Residual	8. 11E-12	8. 20E-10
Total	4. 95E-11	4. 33E-09

NFSS2014Pop (3).SUM
PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	3.10E-13	6.61E-11
INHALATION	1.67E-11	9.97E-10
AIR IMMERSION	1.69E-17	3.39E-15
GROUND SURFACE	3.24E-11	3.27E-09
INTERNAL	1.70E-11	1.06E-09
EXTERNAL	3.24E-11	3.27E-09
TOTAL	4.95E-11	4.33E-09

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	2.92E-12	1.75E-10
Th-234	2.45E-13	2.47E-11
Pa-234m	1.13E-12	1.14E-10
Pa-234	6.92E-14	6.98E-12
U-234	3.63E-12	2.54E-10
Th-230	4.25E-12	2.54E-10
Ra-226	1.99E-12	1.24E-10
Rn-222	6.19E-15	6.24E-13
Po-218	9.06E-20	9.13E-18
Pb-214	3.96E-12	4.00E-10
At-218	9.39E-20	9.47E-18
Bi-214	2.29E-11	2.31E-09
Rn-218	2.42E-21	2.44E-19
Po-214	1.32E-15	1.33E-13
Tl-210	9.03E-15	9.11E-13
Pb-210	1.63E-14	1.65E-12
Bi-210	6.54E-14	6.59E-12
Hg-206	2.11E-20	2.13E-18
Po-210	8.39E-17	8.46E-15
Tl-206	1.55E-19	1.56E-17
Th-232	8.99E-13	5.41E-11
Ra-228	6.63E-16	6.74E-14
Ac-228	1.33E-12	1.34E-10
Th-228	3.19E-12	1.97E-10
Ra-224	1.61E-14	2.16E-12
Rn-220	9.96E-16	1.00E-13
Po-216	2.41E-17	2.43E-15
Pb-212	2.17E-13	2.19E-11
Bi-212	1.80E-13	1.81E-11
Po-212	0.00E+00	0.00E+00
Tl-208	1.75E-12	1.77E-10
U-235	6.77E-13	5.98E-11

	NFSS2014Pop (3). SUM
Th-231	3. 38E-14
Pa-231	6. 40E-17
Ac-227	1. 54E-19
Th-227	1. 07E-16
Fr-223	6. 91E-19
Ra-223	1. 19E-16
Rn-219	5. 21E-17
At-219	0. 00E+00
Bi -215	1. 91E-22
Po-215	1. 59E-19
Pb-211	6. 68E-17
Bi -211	4. 21E-17
Tl -207	1. 24E-17
Po-211	2. 03E-20
TOTAL	4. 95E-11
	4. 33E-09

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INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	1. 1E-04	3. 7E-05	1. 8E-05	1. 0E-05	7. 2E-06	3. 4E-06
NNW	0. 0E+00	8. 9E-05	1. 9E-05	5. 5E-06	3. 2E-06	2. 2E-06	1. 1E-06
NW	0. 0E+00	7. 5E-05	2. 2E-05	9. 8E-06	5. 8E-06	4. 0E-06	1. 9E-06
WNW	0. 0E+00	1. 2E-04	3. 2E-05	1. 2E-05	7. 3E-06	5. 0E-06	2. 4E-06
W	0. 0E+00	1. 3E-04	4. 4E-05	2. 2E-05	1. 3E-05	8. 9E-06	4. 2E-06
WSW	0. 0E+00	1. 3E-04	3. 4E-05	1. 3E-05	7. 6E-06	5. 3E-06	2. 5E-06
SW	0. 0E+00	9. 3E-05	2. 9E-05	1. 3E-05	7. 7E-06	5. 3E-06	2. 5E-06
SSW	0. 0E+00	9. 6E-05	2. 4E-05	8. 5E-06	0. 0E+00	3. 5E-06	1. 7E-06
S	0. 0E+00	9. 4E-05	3. 0E-05	1. 4E-05	8. 3E-06	5. 7E-06	2. 7E-06
SSE	0. 0E+00	1. 2E-04	3. 2E-05	1. 2E-05	7. 3E-06	5. 1E-06	2. 4E-06
SSE	0. 0E+00	1. 3E-04	4. 2E-05	2. 0E-05	1. 2E-05	8. 1E-06	3. 8E-06
ESE	0. 0E+00	1. 6E-04	4. 4E-05	1. 8E-05	1. 1E-05	7. 3E-06	3. 5E-06
E	0. 0E+00	1. 6E-04	4. 8E-05	2. 1E-05	1. 3E-05	8. 8E-06	4. 2E-06
ENE	0. 0E+00	1. 9E-04	5. 1E-05	2. 0E-05	1. 2E-05	8. 3E-06	4. 0E-06
NE	0. 0E+00	1. 9E-04	6. 2E-05	0. 0E+00	1. 8E-05	1. 2E-05	5. 8E-06
NNE	0. 0E+00	1. 8E-04	4. 9E-05	0. 0E+00	1. 2E-05	8. 0E-06	3. 8E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 5E-07	1. 2E-07				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	8. 0E-08	6. 4E-08	5. 6E-08
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 2E-07	8. 9E-08	7. 5E-08
WNW	9. 0E-07	0. 0E+00	0. 0E+00	0. 0E+00	1. 4E-07	9. 8E-08	8. 1E-08
W	1. 6E-06	7. 4E-07	4. 7E-07	3. 2E-07	2. 3E-07	1. 6E-07	1. 3E-07
WSW	9. 6E-07	4. 6E-07	2. 9E-07	2. 1E-07	1. 5E-07	1. 1E-07	9. 4E-08
SW	9. 6E-07	4. 6E-07	3. 0E-07	2. 1E-07	1. 5E-07	1. 2E-07	0. 0E+00
SSW	6. 4E-07	3. 1E-07	2. 0E-07	1. 5E-07	0. 0E+00	0. 0E+00	7. 3E-08

					NFSS2014Pop	(3). SUM	
S	1. 0E-06	5. 0E-07	3. 2E-07	2. 3E-07	1. 7E-07	1. 2E-07	1. 0E-07
SSE	9. 3E-07	4. 5E-07	2. 9E-07	2. 1E-07	1. 5E-07	1. 2E-07	9. 8E-08
SSE	1. 5E-06	7. 0E-07	4. 5E-07	3. 2E-07	2. 3E-07	1. 7E-07	1. 4E-07
ESE	1. 3E-06	6. 5E-07	4. 1E-07	2. 9E-07	2. 2E-07	1. 6E-07	1. 3E-07
E	1. 6E-06	7. 8E-07	5. 0E-07	3. 5E-07	2. 5E-07	1. 9E-07	1. 6E-07
ENE	1. 5E-06	7. 5E-07	4. 8E-07	3. 4E-07	2. 5E-07	1. 9E-07	1. 5E-07
NE	2. 2E-06	1. 1E-06	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00
NNE	1. 5E-06	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 5E-07

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SUMMARY
Page 6COLLECTIVE COMMITTED EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radiouclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	3. 4E-07	3. 0E-07	2. 8E-07	2. 1E-08	7. 3E-07	6. 1E-07
NNW	0. 0E+00	2. 7E-07	1. 5E-07	4. 2E-07	6. 1E-08	2. 0E-07	2. 2E-07
NW	0. 0E+00	2. 3E-07	1. 8E-07	1. 1E-06	4. 5E-07	4. 1E-07	4. 0E-06
WNW	0. 0E+00	3. 6E-07	2. 6E-07	4. 1E-06	2. 6E-06	2. 6E-07	1. 4E-05
W	0. 0E+00	3. 9E-07	3. 5E-07	2. 0E-05	2. 6E-06	3. 6E-08	1. 3E-06
WSW	0. 0E+00	3. 9E-07	2. 7E-07	1. 0E-07	9. 2E-07	8. 8E-07	1. 5E-06
SW	0. 0E+00	2. 8E-07	2. 3E-07	2. 9E-07	2. 1E-06	2. 0E-06	1. 5E-05
SSW	0. 0E+00	2. 9E-07	1. 9E-07	2. 0E-07	0. 0E+00	1. 5E-07	1. 0E-05
S	0. 0E+00	2. 8E-07	2. 4E-07	1. 1E-06	6. 7E-07	1. 2E-06	5. 0E-06
SSE	0. 0E+00	3. 7E-07	2. 6E-07	7. 6E-07	5. 4E-07	3. 8E-07	3. 5E-06
SSE	0. 0E+00	4. 0E-07	3. 4E-07	8. 7E-07	7. 1E-07	4. 2E-07	2. 6E-06
ESE	0. 0E+00	4. 8E-07	3. 5E-07	7. 1E-08	3. 1E-07	1. 2E-06	1. 7E-06
E	0. 0E+00	4. 8E-07	3. 8E-07	2. 6E-07	3. 9E-07	5. 4E-07	2. 3E-06
ENE	0. 0E+00	5. 7E-07	4. 1E-07	2. 2E-07	8. 4E-08	5. 2E-07	4. 8E-06
NE	0. 0E+00	5. 6E-07	4. 9E-07	0. 0E+00	2. 8E-07	1. 2E-06	1. 2E-06
NNE	0. 0E+00	5. 4E-07	3. 9E-07	0. 0E+00	4. 6E-08	5. 6E-07	1. 0E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 4E-05	4. 6E-05				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 4E-05	6. 9E-05	3. 8E-05
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 4E-05	8. 1E-05	5. 3E-05
WNW	8. 2E-07	0. 0E+00	0. 0E+00	0. 0E+00	5. 4E-07	3. 9E-05	8. 2E-06
W	5. 0E-05	3. 8E-05	3. 4E-06	1. 1E-05	5. 7E-06	3. 0E-05	3. 9E-05
WSW	2. 2E-05	2. 3E-05	1. 6E-06	1. 8E-06	9. 0E-07	9. 4E-07	3. 0E-07
SW	4. 5E-05	5. 3E-06	2. 0E-05	1. 7E-06	2. 3E-07	6. 7E-08	0. 0E+00
SSW	3. 9E-05	1. 1E-06	8. 3E-07	2. 0E-06	0. 0E+00	0. 0E+00	2. 3E-07
S	2. 8E-05	6. 1E-06	9. 5E-06	6. 1E-09	3. 7E-06	2. 3E-06	8. 3E-07
SSE	1. 9E-05	6. 2E-05	9. 9E-05	3. 0E-05	1. 1E-05	1. 5E-06	6. 1E-07
SSE	1. 6E-05	3. 2E-05	3. 7E-05	1. 4E-05	3. 4E-06	1. 0E-06	1. 5E-06
ESE	3. 3E-06	2. 3E-05	1. 5E-06	2. 0E-06	1. 4E-06	3. 8E-06	1. 8E-06
E	2. 4E-06	7. 9E-06	2. 3E-06	4. 8E-06	8. 4E-07	2. 7E-06	1. 6E-06

	NFSS2014Pop (3). SUM							
ENE	2. 1E-06	4. 9E-06	1. 4E-06	8. 5E-07	2. 7E-07	1. 7E-07	8. 6E-08	
NE	5. 4E-06	1. 8E-07	0. 0E+00					
NNE	7. 1E-08	0. 0E+00	2. 7E-06					

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INDIVIDUAL LIFE TIME RISK (deaths) (All Radiouclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	3. 0E-11	9. 7E-12	4. 7E-12	2. 8E-12	1. 9E-12	9. 3E-13
NNW	0. 0E+00	2. 3E-11	5. 0E-12	1. 5E-12	8. 7E-13	6. 0E-13	2. 9E-13
NW	0. 0E+00	2. 0E-11	5. 9E-12	2. 6E-12	1. 6E-12	1. 1E-12	5. 1E-13
WNW	0. 0E+00	3. 1E-11	8. 4E-12	3. 3E-12	2. 0E-12	1. 4E-12	6. 4E-13
W	0. 0E+00	3. 3E-11	1. 2E-11	5. 8E-12	3. 5E-12	2. 4E-12	1. 1E-12
WSW	0. 0E+00	3. 3E-11	8. 8E-12	3. 4E-12	2. 0E-12	1. 4E-12	6. 8E-13
SW	0. 0E+00	2. 4E-11	7. 5E-12	3. 5E-12	2. 1E-12	1. 4E-12	6. 8E-13
SSW	0. 0E+00	2. 5E-11	6. 3E-12	2. 3E-12	0. 0E+00	9. 5E-13	4. 5E-13
S	0. 0E+00	2. 4E-11	7. 9E-12	3. 7E-12	2. 2E-12	1. 6E-12	7. 4E-13
SSE	0. 0E+00	3. 2E-11	8. 5E-12	3. 3E-12	2. 0E-12	1. 4E-12	6. 6E-13
SSE	0. 0E+00	3. 5E-11	1. 1E-11	5. 3E-12	3. 2E-12	2. 2E-12	1. 1E-12
ESE	0. 0E+00	4. 1E-11	1. 2E-11	4. 8E-12	2. 9E-12	2. 0E-12	9. 6E-13
E	0. 0E+00	4. 1E-11	1. 3E-11	5. 7E-12	3. 4E-12	2. 4E-12	1. 1E-12
ENE	0. 0E+00	4. 9E-11	1. 3E-11	5. 4E-12	3. 2E-12	2. 3E-12	1. 1E-12
NE	0. 0E+00	4. 8E-11	1. 6E-11	0. 0E+00	4. 8E-12	3. 3E-12	1. 6E-12
NNE	0. 0E+00	4. 6E-11	1. 3E-11	0. 0E+00	3. 1E-12	2. 2E-12	1. 0E-12

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	3. 7E-14	2. 9E-14				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 7E-14	1. 2E-14	9. 5E-15
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 8E-14	1. 9E-14	1. 5E-14
WNW	2. 4E-13	0. 0E+00	0. 0E+00	0. 0E+00	3. 2E-14	2. 2E-14	1. 7E-14
W	4. 4E-13	2. 0E-13	1. 3E-13	8. 6E-14	5. 9E-14	4. 1E-14	3. 2E-14
WSW	2. 6E-13	1. 2E-13	7. 7E-14	5. 3E-14	3. 7E-14	2. 6E-14	2. 1E-14
SW	2. 7E-13	1. 3E-13	7. 9E-14	5. 4E-14	3. 8E-14	2. 7E-14	0. 0E+00
SSW	1. 8E-13	8. 4E-14	5. 3E-14	3. 6E-14	0. 0E+00	0. 0E+00	1. 5E-14
S	2. 9E-13	1. 4E-13	8. 6E-14	5. 9E-14	4. 2E-14	3. 0E-14	2. 3E-14
SSE	2. 6E-13	1. 2E-13	7. 8E-14	5. 4E-14	3. 9E-14	2. 8E-14	2. 2E-14
SSE	4. 1E-13	2. 0E-13	1. 2E-13	8. 6E-14	6. 1E-14	4. 4E-14	3. 5E-14
ESE	3. 7E-13	1. 8E-13	1. 1E-13	7. 9E-14	5. 6E-14	4. 1E-14	3. 3E-14
E	4. 5E-13	2. 2E-13	1. 4E-13	9. 5E-14	6. 8E-14	4. 9E-14	3. 9E-14
ENE	4. 3E-13	2. 1E-13	1. 3E-13	9. 2E-14	6. 6E-14	4. 9E-14	3. 9E-14
NE	6. 3E-13	3. 0E-13	0. 0E+00				
NNE	4. 1E-13	0. 0E+00	3. 6E-14				

NFSS2014Pop (3). SUM

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COLLECTIVE FATAL CANCER RISK Per Year
(All Radioisotopes and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.1E-12	1.0E-12	9.7E-13	7.2E-14	2.6E-12	2.2E-12	
NNW	0.0E+00	8.9E-13	5.2E-13	1.5E-12	2.1E-13	7.0E-13	7.7E-13	
NW	0.0E+00	7.6E-13	6.1E-13	3.7E-12	1.6E-12	1.4E-12	1.4E-11	
WNW	0.0E+00	1.2E-12	8.7E-13	1.4E-11	8.9E-12	9.2E-13	5.1E-11	
W	0.0E+00	1.3E-12	1.2E-12	6.8E-11	9.1E-12	1.2E-13	4.6E-12	
WSW	0.0E+00	1.3E-12	9.1E-13	3.5E-13	3.2E-12	3.1E-12	5.4E-12	
SW	0.0E+00	9.3E-13	7.8E-13	9.9E-13	7.4E-12	7.0E-12	5.2E-11	
SSW	0.0E+00	9.6E-13	6.5E-13	7.1E-13	0.0E+00	5.3E-13	3.6E-11	
S	0.0E+00	9.5E-13	8.2E-13	3.9E-12	2.3E-12	4.3E-12	1.8E-11	
SSE	0.0E+00	1.3E-12	8.8E-13	2.6E-12	1.9E-12	1.3E-12	1.3E-11	
SSE	0.0E+00	1.4E-12	1.2E-12	3.0E-12	2.5E-12	1.5E-12	9.2E-12	
ESE	0.0E+00	1.6E-12	1.2E-12	2.5E-13	1.1E-12	4.1E-12	6.1E-12	
E	0.0E+00	1.6E-12	1.3E-12	8.9E-13	1.4E-12	1.9E-12	8.1E-12	
ENE	0.0E+00	1.9E-12	1.4E-12	7.7E-13	2.9E-13	1.8E-12	1.7E-11	
NE	0.0E+00	1.9E-12	1.7E-12	0.0E+00	9.9E-13	4.4E-12	4.4E-12	
NNE	0.0E+00	1.8E-12	1.3E-12	0.0E+00	1.6E-13	2.0E-12	3.6E-12	

		Distance (m)						
Direction		15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.6E-11	1.4E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.3E-11	1.7E-10	8.5E-11	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.2E-11	2.3E-10	1.4E-10	
WNW	2.9E-12	0.0E+00	0.0E+00	0.0E+00	1.7E-12	1.1E-10	2.2E-11	
W	1.8E-10	1.3E-10	1.2E-11	4.0E-11	1.9E-11	9.7E-11	1.2E-10	
WSW	7.8E-11	8.0E-11	5.5E-12	6.0E-12	2.8E-12	2.8E-12	8.6E-13	
SW	1.6E-10	1.9E-11	6.9E-11	5.6E-12	7.2E-13	2.0E-13	0.0E+00	
SSW	1.4E-10	3.8E-12	2.8E-12	6.5E-12	0.0E+00	0.0E+00	6.2E-13	
S	1.0E-10	2.2E-11	3.3E-11	2.1E-14	1.2E-11	7.3E-12	2.5E-12	
SSE	7.0E-11	2.2E-10	3.4E-10	1.0E-10	3.7E-11	4.6E-12	1.8E-12	
SSE	5.7E-11	1.2E-10	1.3E-10	5.0E-11	1.2E-11	3.5E-12	4.7E-12	
ESE	1.2E-11	8.3E-11	5.2E-12	6.9E-12	4.9E-12	1.2E-11	5.9E-12	
E	8.7E-12	2.8E-11	8.2E-12	1.7E-11	2.9E-12	9.2E-12	5.2E-12	
ENE	7.4E-12	1.8E-11	5.0E-12	3.0E-12	9.2E-13	5.7E-13	2.8E-13	
NE	2.0E-11	6.7E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	2.5E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.7E-12	

D O S E A N D R I S K S U M M A R I E S
NFSS2014Pop (5).SUM

Non-Radon Population Assessment
Wed Jun 10 15:50:34 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Fifteen
Comments: NFSS Technical Memo 2014 Year
Population Dose

Dataset Name: NFSS2014 Pop.
Dataset Date: Jun 10, 2015 03:50 PM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5eh9hl\Documents\CAP88\Population Files\NFSS2013.POP

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SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Sel ected Individ ual (mrem)	Col lecti ve Popul ation (person-rem)
Adrenal	5. 61E-05	4. 49E-04
UB_Wall	6. 19E-05	4. 93E-04
Bone_Sur	3. 24E-03	3. 95E-02
Brain	5. 93E-05	4. 74E-04
Breasts	6. 49E-05	5. 16E-04
St_Wall	5. 98E-05	4. 77E-04
SI_Wall	5. 94E-05	4. 75E-04
ULT_Wall	6. 13E-05	5. 01E-04
LLI_Wall	6. 63E-05	5. 70E-04
Kidneys	1. 07E-04	8. 50E-04
Liver	8. 81E-05	7. 25E-04
Muscle	6. 69E-05	5. 33E-04
Ovaries	6. 71E-05	5. 13E-04
Pancreas	5. 64E-05	4. 51E-04
R_Marrow	1. 94E-04	2. 13E-03
Skin	9. 34E-04	7. 28E-03
Spleen	6. 26E-05	5. 21E-04

	NFSS2014Pop (5). SUM
Testes	7. 62E-05
Thymus	5. 93E-05
Thyroid	6. 20E-05
GB_Wall	5. 69E-05
Ht_Wall	5. 91E-05
Uterus	5. 86E-05
ET_Reg	2. 86E-04
Lung_66	9. 26E-04
Effectiv	2. 26E-04
	1. 66E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	3. 25E-05	5. 57E-04
INHALATION	1. 28E-04	5. 87E-04
AIR IMMERSION	3. 19E-11	4. 84E-10
GROUND SURFACE	6. 61E-05	5. 15E-04
INTERNAL	1. 60E-04	1. 14E-03
EXTERNAL	6. 61E-05	5. 15E-04
TOTAL	2. 26E-04	1. 66E-03

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SUMMARY
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NUCLEI COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclei	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2. 00E-05	1. 04E-04
Th-234	4. 72E-07	3. 68E-06
Pa-234m	6. 46E-06	5. 03E-05
Pa-234	1. 27E-07	9. 91E-07
U-234	2. 32E-05	1. 20E-04
Th-230	4. 29E-05	2. 09E-04
Ra-226	4. 22E-05	5. 61E-04
Rn-222	1. 13E-08	8. 83E-08
Po-218	2. 03E-13	1. 58E-12
Pb-214	7. 41E-06	5. 77E-05
At-218	7. 63E-13	5. 94E-12
Bi-214	4. 33E-05	3. 37E-04
Rn-218	4. 42E-15	3. 44E-14
Po-214	2. 40E-09	1. 87E-08
Tl-210	1. 69E-08	1. 32E-07
Pb-210	3. 65E-08	2. 84E-07
Bi-210	5. 90E-07	4. 59E-06
Hg-206	4. 76E-14	3. 71E-13
Po-210	1. 53E-10	1. 19E-09

	NFSS2014Pop (5). SUM
Tl -206	1. 38E-12
Th-232	1. 11E-05
Ra-228	2. 19E-09
Ac-228	2. 49E-06
Th-228	1. 92E-05
Ra-224	3. 01E-08
Rn-220	1. 82E-09
Po-216	4. 39E-11
Pb-212	4. 00E-07
Bi -212	4. 66E-07
Po-212	0. 00E+00
Tl -208	3. 22E-06
U-235	2. 54E-06
Th-231	7. 41E-08
Pa-231	1. 23E-10
Ac-227	4. 12E-13
Th-227	1. 97E-10
Fr-223	1. 85E-12
Ra-223	2. 20E-10
Rn-219	9. 52E-11
At-219	0. 00E+00
Bi -215	4. 28E-16
Po-215	2. 91E-13
Pb-211	1. 87E-10
Bi -211	7. 70E-11
Tl -207	9. 68E-11
Po-211	3. 71E-14
TOTAL	2. 26E-04
	1. 66E-03

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Li feti me Fatal Cancer Risk	Total Collective Popul ation Fatal Cancer Ri sk Per Year
Esophagu	6. 11E-13	6. 69E-11
Stomach	2. 37E-12	2. 60E-10
Col on	6. 28E-12	7. 09E-10
Li ver	1. 42E-12	2. 09E-10
LUNG	1. 76E-11	1. 34E-09
Bone	1. 22E-12	2. 35E-10
Skin	9. 31E-13	9. 43E-11
Breast	2. 96E-12	3. 09E-10
Ovary	8. 69E-13	9. 92E-11
Bl adder	1. 47E-12	1. 61E-10
Ki dneys	4. 30E-13	5. 60E-11
Thyroi d	1. 92E-13	2. 08E-11
Leukemi a	3. 55E-12	3. 90E-10
Resi dual	8. 73E-12	9. 55E-10
Total	4. 86E-11	4. 90E-09

NFSS2014Pop (5).SUM
PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	4.10E-12	9.13E-10
INHALATION	1.20E-11	7.19E-10
AIR IMMERSION	1.69E-17	3.39E-15
GROUND SURFACE	3.24E-11	3.27E-09
INTERNAL	1.61E-11	1.63E-09
EXTERNAL	3.24E-11	3.27E-09
TOTAL	4.86E-11	4.90E-09

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NUCL IDE RISK SUMMARY

Nuclide	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	2.23E-12	1.36E-10
Th-234	2.45E-13	2.47E-11
Pa-234m	1.13E-12	1.14E-10
Pa-234	6.92E-14	6.98E-12
U-234	2.74E-12	1.91E-10
Th-230	2.93E-12	1.88E-10
Ra-226	5.35E-12	9.48E-10
Rn-222	6.19E-15	6.24E-13
Po-218	9.06E-20	9.13E-18
Pb-214	3.96E-12	4.00E-10
At-218	9.39E-20	9.47E-18
Bi-214	2.29E-11	2.31E-09
Rn-218	2.42E-21	2.44E-19
Po-214	1.32E-15	1.33E-13
Tl-210	9.03E-15	9.11E-13
Pb-210	1.63E-14	1.65E-12
Bi-210	6.54E-14	6.59E-12
Hg-206	2.11E-20	2.13E-18
Po-210	8.39E-17	8.46E-15
Tl-206	1.55E-19	1.56E-17
Th-232	6.85E-13	4.09E-11
Ra-228	6.63E-16	6.79E-14
Ac-228	1.33E-12	1.34E-10
Th-228	2.15E-12	1.30E-10
Ra-224	1.60E-14	2.07E-12
Rn-220	9.96E-16	1.00E-13
Po-216	2.41E-17	2.43E-15
Pb-212	2.17E-13	2.19E-11
Bi-212	1.80E-13	1.81E-11
Po-212	0.00E+00	0.00E+00
Tl-208	1.75E-12	1.77E-10
U-235	5.94E-13	5.18E-11

	NFSS2014Pop (5). SUM	
Th-231	3. 38E-14	3. 41E-12
Pa-231	6. 40E-17	6. 46E-15
Ac-227	1. 54E-19	1. 55E-17
Th-227	1. 07E-16	1. 07E-14
Fr-223	6. 91E-19	6. 96E-17
Ra-223	1. 19E-16	1. 20E-14
Rn-219	5. 21E-17	5. 25E-15
At-219	0. 00E+00	0. 00E+00
Bi -215	1. 91E-22	1. 93E-20
Po-215	1. 59E-19	1. 61E-17
Pb-211	6. 68E-17	6. 74E-15
Bi -211	4. 21E-17	4. 24E-15
Tl -207	1. 24E-17	1. 25E-15
Po-211	2. 03E-20	2. 05E-18
TOTAL	4. 86E-11	4. 90E-09

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SUMMARY
Page 5INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radioisotopes and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	1. 4E-04	4. 4E-05	2. 1E-05	1. 2E-05	8. 5E-06	4. 0E-06
NNW	0. 0E+00	1. 1E-04	2. 3E-05	6. 5E-06	3. 8E-06	2. 7E-06	1. 3E-06
NW	0. 0E+00	8. 9E-05	2. 6E-05	1. 2E-05	6. 8E-06	4. 7E-06	2. 2E-06
WNW	0. 0E+00	1. 4E-04	3. 8E-05	1. 5E-05	8. 7E-06	6. 0E-06	2. 8E-06
W	0. 0E+00	1. 5E-04	5. 2E-05	2. 6E-05	1. 5E-05	1. 1E-05	4. 9E-06
WSW	0. 0E+00	1. 5E-04	4. 0E-05	1. 5E-05	9. 0E-06	6. 2E-06	2. 9E-06
SW	0. 0E+00	1. 1E-04	3. 4E-05	1. 5E-05	9. 1E-06	6. 3E-06	3. 0E-06
SSW	0. 0E+00	1. 1E-04	2. 8E-05	1. 0E-05	0. 0E+00	4. 1E-06	2. 0E-06
S	0. 0E+00	1. 1E-04	3. 5E-05	1. 7E-05	9. 8E-06	6. 7E-06	3. 2E-06
SSE	0. 0E+00	1. 5E-04	3. 8E-05	1. 5E-05	8. 7E-06	6. 0E-06	2. 8E-06
SSE	0. 0E+00	1. 6E-04	5. 0E-05	2. 3E-05	1. 4E-05	9. 5E-06	4. 5E-06
ESE	0. 0E+00	1. 9E-04	5. 2E-05	2. 1E-05	1. 3E-05	8. 7E-06	4. 1E-06
E	0. 0E+00	1. 9E-04	5. 7E-05	2. 5E-05	1. 5E-05	1. 0E-05	4. 9E-06
ENE	0. 0E+00	2. 3E-04	6. 1E-05	2. 4E-05	1. 4E-05	9. 8E-06	4. 7E-06
NE	0. 0E+00	2. 2E-04	7. 3E-05	0. 0E+00	2. 1E-05	1. 4E-05	6. 9E-06
NNE	0. 0E+00	2. 1E-04	5. 7E-05	0. 0E+00	1. 4E-05	9. 5E-06	4. 5E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 9E-07	1. 6E-07				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 1E-07	8. 8E-08	7. 8E-08
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 5E-07	1. 2E-07	1. 0E-07
WNW	1. 1E-06	0. 0E+00	0. 0E+00	0. 0E+00	1. 7E-07	1. 3E-07	1. 1E-07
W	1. 9E-06	8. 9E-07	5. 7E-07	4. 0E-07	2. 8E-07	2. 1E-07	1. 7E-07
WSW	1. 1E-06	5. 5E-07	3. 6E-07	2. 6E-07	1. 9E-07	1. 5E-07	1. 2E-07
SW	1. 1E-06	5. 6E-07	3. 6E-07	2. 6E-07	1. 9E-07	1. 5E-07	0. 0E+00
SSW	7. 7E-07	3. 8E-07	2. 5E-07	1. 9E-07	0. 0E+00	0. 0E+00	9. 9E-08

					NFSS2014Pop	(5). SUM	
S	1. 2E-06	6. 0E-07	3. 9E-07	2. 8E-07	2. 1E-07	1. 6E-07	1. 3E-07
SSE	1. 1E-06	5. 4E-07	3. 6E-07	2. 6E-07	1. 9E-07	1. 5E-07	1. 3E-07
SSE	1. 7E-06	8. 4E-07	5. 4E-07	3. 8E-07	2. 8E-07	2. 1E-07	1. 8E-07
ESE	1. 6E-06	7. 7E-07	5. 0E-07	3. 6E-07	2. 7E-07	2. 0E-07	1. 7E-07
E	1. 9E-06	9. 3E-07	6. 0E-07	4. 2E-07	3. 1E-07	2. 4E-07	1. 9E-07
ENE	1. 8E-06	8. 9E-07	5. 8E-07	4. 1E-07	3. 1E-07	2. 3E-07	1. 9E-07
NE	2. 7E-06	1. 3E-06	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00
NNE	1. 7E-06	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 8E-07

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SUMMARY

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COLLECTIVE COMMITTED EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radiouclides and Pathways)

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	4. 1E-07	3. 5E-07	3. 3E-07	2. 5E-08	8. 7E-07	7. 2E-07
NNW	0. 0E+00	3. 2E-07	1. 8E-07	5. 0E-07	7. 3E-08	2. 4E-07	2. 6E-07
NW	0. 0E+00	2. 7E-07	2. 1E-07	1. 3E-06	5. 3E-07	4. 9E-07	4. 8E-06
WNW	0. 0E+00	4. 3E-07	3. 0E-07	4. 9E-06	3. 0E-06	3. 1E-07	1. 7E-05
W	0. 0E+00	4. 6E-07	4. 2E-07	2. 3E-05	3. 1E-06	4. 2E-08	1. 5E-06
WSW	0. 0E+00	4. 6E-07	3. 2E-07	1. 2E-07	1. 1E-06	1. 0E-06	1. 8E-06
SW	0. 0E+00	3. 3E-07	2. 7E-07	3. 4E-07	2. 5E-06	2. 4E-06	1. 7E-05
SSW	0. 0E+00	3. 4E-07	2. 2E-07	2. 4E-07	0. 0E+00	1. 8E-07	1. 2E-05
S	0. 0E+00	3. 3E-07	2. 8E-07	1. 3E-06	7. 9E-07	1. 4E-06	5. 9E-06
SSE	0. 0E+00	4. 4E-07	3. 1E-07	8. 9E-07	6. 4E-07	4. 4E-07	4. 2E-06
SSE	0. 0E+00	4. 8E-07	4. 0E-07	1. 0E-06	8. 4E-07	5. 0E-07	3. 0E-06
ESE	0. 0E+00	5. 6E-07	4. 1E-07	8. 4E-08	3. 6E-07	1. 4E-06	2. 0E-06
E	0. 0E+00	5. 7E-07	4. 5E-07	3. 0E-07	4. 7E-07	6. 4E-07	2. 7E-06
ENE	0. 0E+00	6. 8E-07	4. 8E-07	2. 6E-07	9. 9E-08	6. 1E-07	5. 6E-06
NE	0. 0E+00	6. 6E-07	5. 8E-07	0. 0E+00	3. 3E-07	1. 5E-06	1. 5E-06
NNE	0. 0E+00	6. 4E-07	4. 6E-07	0. 0E+00	5. 5E-08	6. 6E-07	1. 2E-06

Direction	Distance (m)						
	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 8E-05	5. 9E-05
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	4. 6E-05	9. 5E-05	5. 4E-05
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	1. 8E-05	1. 1E-04	7. 1E-05
WNW	9. 8E-07	0. 0E+00	0. 0E+00	0. 0E+00	6. 9E-07	5. 0E-05	1. 1E-05
W	5. 9E-05	4. 5E-05	4. 1E-06	1. 4E-05	7. 0E-06	3. 8E-05	5. 0E-05
WSW	2. 6E-05	2. 8E-05	2. 0E-06	2. 2E-06	1. 1E-06	1. 2E-06	4. 0E-07
SW	5. 4E-05	6. 4E-06	2. 4E-05	2. 1E-06	2. 8E-07	8. 6E-08	0. 0E+00
SSW	4. 7E-05	1. 3E-06	1. 0E-06	2. 6E-06	0. 0E+00	0. 0E+00	3. 2E-07
S	3. 4E-05	7. 4E-06	1. 2E-05	7. 5E-09	4. 6E-06	3. 0E-06	1. 1E-06
SSE	2. 3E-05	7. 4E-05	1. 2E-04	3. 7E-05	1. 4E-05	1. 9E-06	8. 0E-07
SSE	1. 9E-05	3. 8E-05	4. 5E-05	1. 7E-05	4. 1E-06	1. 3E-06	1. 9E-06
ESE	3. 9E-06	2. 8E-05	1. 8E-06	2. 4E-06	1. 8E-06	4. 7E-06	2. 3E-06
E	2. 9E-06	9. 4E-06	2. 8E-06	5. 8E-06	1. 0E-06	3. 4E-06	2. 0E-06

	NFSS2014Pop (5). SUM							
ENE	2. 4E-06	5. 9E-06	1. 7E-06	1. 0E-06	3. 3E-07	2. 1E-07	1. 1E-07	
NE	6. 4E-06	2. 2E-07	0. 0E+00					
NNE	8. 4E-08	0. 0E+00	3. 4E-06					

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SUMMARY
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INDIVIDUAL LIFE TIME RISK (deaths) (All Radiouclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	2. 9E-11	9. 6E-12	4. 7E-12	2. 8E-12	2. 0E-12	9. 4E-13
NNW	0. 0E+00	2. 3E-11	5. 0E-12	1. 5E-12	8. 7E-13	6. 1E-13	3. 0E-13
NW	0. 0E+00	1. 9E-11	5. 8E-12	2. 6E-12	1. 6E-12	1. 1E-12	5. 3E-13
WNW	0. 0E+00	3. 1E-11	8. 3E-12	3. 3E-12	2. 0E-12	1. 4E-12	6. 5E-13
W	0. 0E+00	3. 3E-11	1. 1E-11	5. 8E-12	3. 5E-12	2. 4E-12	1. 2E-12
WSW	0. 0E+00	3. 3E-11	8. 7E-12	3. 4E-12	2. 0E-12	1. 4E-12	6. 9E-13
SW	0. 0E+00	2. 4E-11	7. 4E-12	3. 4E-12	2. 1E-12	1. 4E-12	7. 0E-13
SSW	0. 0E+00	2. 4E-11	6. 2E-12	2. 3E-12	0. 0E+00	9. 6E-13	4. 6E-13
S	0. 0E+00	2. 4E-11	7. 8E-12	3. 7E-12	2. 2E-12	1. 6E-12	7. 5E-13
SSE	0. 0E+00	3. 2E-11	8. 5E-12	3. 3E-12	2. 0E-12	1. 4E-12	6. 7E-13
SSE	0. 0E+00	3. 4E-11	1. 1E-11	5. 3E-12	3. 2E-12	2. 2E-12	1. 1E-12
ESE	0. 0E+00	4. 0E-11	1. 1E-11	4. 8E-12	2. 9E-12	2. 0E-12	9. 7E-13
E	0. 0E+00	4. 1E-11	1. 3E-11	5. 7E-12	3. 4E-12	2. 4E-12	1. 2E-12
ENE	0. 0E+00	4. 9E-11	1. 3E-11	5. 4E-12	3. 2E-12	2. 3E-12	1. 1E-12
NE	0. 0E+00	4. 7E-11	1. 6E-11	0. 0E+00	4. 8E-12	3. 3E-12	1. 6E-12
NNE	0. 0E+00	4. 6E-11	1. 3E-11	0. 0E+00	3. 1E-12	2. 2E-12	1. 1E-12

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	4. 3E-14	3. 5E-14				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 2E-14	1. 7E-14	1. 5E-14
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	3. 4E-14	2. 5E-14	2. 1E-14
WNW	2. 5E-13	0. 0E+00	0. 0E+00	0. 0E+00	3. 8E-14	2. 7E-14	2. 2E-14
W	4. 5E-13	2. 1E-13	1. 3E-13	9. 3E-14	6. 6E-14	4. 7E-14	3. 8E-14
WSW	2. 7E-13	1. 3E-13	8. 4E-14	5. 9E-14	4. 3E-14	3. 2E-14	2. 6E-14
SW	2. 7E-13	1. 3E-13	8. 6E-14	6. 1E-14	4. 4E-14	3. 3E-14	0. 0E+00
SSW	1. 8E-13	9. 1E-14	5. 9E-14	4. 3E-14	0. 0E+00	0. 0E+00	2. 1E-14
S	3. 0E-13	1. 4E-13	9. 3E-14	6. 6E-14	4. 8E-14	3. 6E-14	2. 9E-14
SSE	2. 7E-13	1. 3E-13	8. 5E-14	6. 1E-14	4. 5E-14	3. 4E-14	2. 8E-14
SSE	4. 2E-13	2. 1E-13	1. 3E-13	9. 3E-14	6. 8E-14	5. 1E-14	4. 2E-14
ESE	3. 8E-13	1. 9E-13	1. 2E-13	8. 6E-14	6. 3E-14	4. 8E-14	3. 9E-14
E	4. 6E-13	2. 3E-13	1. 4E-13	1. 0E-13	7. 5E-14	5. 6E-14	4. 6E-14
ENE	4. 4E-13	2. 2E-13	1. 4E-13	1. 0E-13	7. 4E-14	5. 6E-14	4. 6E-14
NE	6. 4E-13	3. 1E-13	0. 0E+00				
NNE	4. 2E-13	0. 0E+00	4. 2E-14				

NFSS2014Pop (5). SUM

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COLLECTIVE FATAL CANCER RISK Per Year
(All Radioisotopes and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.1E-12	1.0E-12	9.7E-13	7.2E-14	2.6E-12	2.2E-12	
NNW	0.0E+00	8.8E-13	5.2E-13	1.5E-12	2.2E-13	7.1E-13	7.9E-13	
NW	0.0E+00	7.4E-13	6.0E-13	3.7E-12	1.6E-12	1.5E-12	1.5E-11	
WNW	0.0E+00	1.2E-12	8.6E-13	1.4E-11	8.9E-12	9.2E-13	5.2E-11	
W	0.0E+00	1.3E-12	1.2E-12	6.8E-11	9.1E-12	1.3E-13	4.7E-12	
WSW	0.0E+00	1.3E-12	9.0E-13	3.5E-13	3.2E-12	3.1E-12	5.5E-12	
SW	0.0E+00	9.2E-13	7.7E-13	9.8E-13	7.4E-12	7.1E-12	5.3E-11	
SSW	0.0E+00	9.5E-13	6.4E-13	7.1E-13	0.0E+00	5.3E-13	3.7E-11	
S	0.0E+00	9.3E-13	8.1E-13	3.9E-12	2.3E-12	4.4E-12	1.8E-11	
SSE	0.0E+00	1.2E-12	8.8E-13	2.6E-12	1.9E-12	1.3E-12	1.3E-11	
SSE	0.0E+00	1.3E-12	1.1E-12	3.0E-12	2.5E-12	1.5E-12	9.4E-12	
ESE	0.0E+00	1.6E-12	1.2E-12	2.5E-13	1.1E-12	4.2E-12	6.2E-12	
E	0.0E+00	1.6E-12	1.3E-12	8.9E-13	1.4E-12	1.9E-12	8.2E-12	
ENE	0.0E+00	1.9E-12	1.4E-12	7.7E-13	2.9E-13	1.8E-12	1.7E-11	
NE	0.0E+00	1.8E-12	1.7E-12	0.0E+00	9.9E-13	4.4E-12	4.5E-12	
NNE	0.0E+00	1.8E-12	1.3E-12	0.0E+00	1.6E-13	2.0E-12	3.7E-12	

		Distance (m)						
Direction		15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-11	1.7E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-10	2.4E-10	1.3E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.1E-11	3.0E-10	1.9E-10	
WNW	3.0E-12	0.0E+00	0.0E+00	0.0E+00	2.0E-12	1.4E-10	2.9E-11	
W	1.8E-10	1.4E-10	1.3E-11	4.3E-11	2.1E-11	1.1E-10	1.5E-10	
WSW	8.0E-11	8.5E-11	6.0E-12	6.7E-12	3.3E-12	3.4E-12	1.1E-12	
SW	1.7E-10	2.0E-11	7.5E-11	6.3E-12	8.4E-13	2.5E-13	0.0E+00	
SSW	1.5E-10	4.1E-12	3.1E-12	7.6E-12	0.0E+00	0.0E+00	8.5E-13	
S	1.0E-10	2.3E-11	3.6E-11	2.3E-14	1.4E-11	8.8E-12	3.1E-12	
SSE	7.3E-11	2.3E-10	3.8E-10	1.1E-10	4.3E-11	5.6E-12	2.3E-12	
SSE	5.9E-11	1.2E-10	1.4E-10	5.4E-11	1.3E-11	4.0E-12	5.6E-12	
ESE	1.2E-11	8.7E-11	5.5E-12	7.5E-12	5.5E-12	1.4E-11	7.0E-12	
E	9.0E-12	3.0E-11	8.7E-12	1.8E-11	3.2E-12	1.0E-11	6.1E-12	
ENE	7.7E-12	1.8E-11	5.3E-12	3.2E-12	1.0E-12	6.5E-13	3.3E-13	
NE	2.0E-11	6.9E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	2.6E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-11	

D O S E A N D R I S K S U M M A R I E S
NFSS2014Pop (6).SUM

Non-Radon Population Assessment
Wed Jun 10 15:45:37 2015

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

Source Category: Area
Source Type: Area
Emission Year: 2014
DOSE Age Group: Adult

Comments: NFSS Technical Memo 2014 Year
Population Dose

Dataset Name: NFSS2014 Pop.
Dataset Date: Jun 10, 2015 03:45 PM
Wind File: C:\Users\h5eh9hl\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5eh9hl\Documents\CAP88\Population Files\NFSS2013.POP

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SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Sel ected Individ ual (mrem)	Col lecti ve Popul ation (person-rem)
Adrenal	5.49E-05	4.31E-04
UB_Wall	6.09E-05	4.77E-04
Bone_Sur	1.45E-03	1.06E-02
Brain	5.81E-05	4.56E-04
Breasts	6.39E-05	5.00E-04
St_Wall	5.88E-05	4.61E-04
SI_Wall	5.84E-05	4.58E-04
ULT_Wall	6.00E-05	4.79E-04
LLI_Wall	6.41E-05	5.32E-04
Kidneys	9.90E-05	7.44E-04
Liver	8.26E-05	6.35E-04
Muscle	6.59E-05	5.16E-04
Ovaries	6.46E-05	4.88E-04
Pancreas	5.54E-05	4.34E-04
R_Marrow	1.22E-04	9.85E-04
Skin	9.33E-04	7.27E-03
Spleen	5.94E-05	4.68E-04

	NFSS2014Pop (6). SUM
Testes	7. 39E-05
Thymus	5. 83E-05
Thyroid	6. 09E-05
GB_Wall	5. 59E-05
Ht_Wall	5. 81E-05
Uterus	5. 76E-05
ET_Reg	2. 73E-04
Lung_66	8. 09E-04
Effectiv	1. 84E-04
	1. 15E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	7. 77E-06	1. 24E-04
INHALATION	1. 10E-04	5. 09E-04
AIR IMMERSION	3. 19E-11	4. 84E-10
GROUND SURFACE	6. 61E-05	5. 15E-04
INTERNAL	1. 18E-04	6. 33E-04
EXTERNAL	6. 61E-05	5. 15E-04
TOTAL	1. 84E-04	1. 15E-03

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SUMMARY
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NUCLEI COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclei	Selected Individual (mrem)	Collective Population (person-rem)
U-238	1. 62E-05	8. 21E-05
Th-234	4. 72E-07	3. 68E-06
Pa-234m	6. 46E-06	5. 03E-05
Pa-234	1. 27E-07	9. 91E-07
U-234	1. 88E-05	9. 44E-05
Th-230	4. 02E-05	1. 96E-04
Ra-226	1. 51E-05	1. 29E-04
Rn-222	1. 13E-08	8. 83E-08
Po-218	2. 03E-13	1. 58E-12
Pb-214	7. 41E-06	5. 77E-05
At-218	7. 63E-13	5. 94E-12
Bi-214	4. 33E-05	3. 37E-04
Rn-218	4. 42E-15	3. 44E-14
Po-214	2. 40E-09	1. 87E-08
Tl-210	1. 69E-08	1. 32E-07
Pb-210	3. 65E-08	2. 84E-07
Bi-210	5. 90E-07	4. 59E-06
Hg-206	4. 76E-14	3. 71E-13
Po-210	1. 53E-10	1. 19E-09

	NFSS2014Pop (6). SUM
Tl -206	1. 38E-12
Th-232	1. 07E-05
Ra-228	2. 18E-09
Ac-228	2. 49E-06
Th-228	1. 61E-05
Ra-224	2. 99E-08
Rn-220	1. 82E-09
Po-216	4. 39E-11
Pb-212	4. 00E-07
Bi -212	4. 66E-07
Po-212	0. 00E+00
Tl -208	3. 22E-06
U-235	2. 19E-06
Th-231	7. 41E-08
Pa-231	1. 23E-10
Ac-227	4. 12E-13
Th-227	1. 97E-10
Fr-223	1. 85E-12
Ra-223	2. 20E-10
Rn-219	9. 52E-11
At-219	0. 00E+00
Bi -215	4. 28E-16
Po-215	2. 91E-13
Pb-211	1. 87E-10
Bi -211	7. 70E-11
Tl -207	9. 68E-11
Po-211	3. 71E-14
TOTAL	1. 84E-04
	1. 15E-03

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Li feti me Fatal Cancer Risk	Total Collective Popul ation Fatal Cancer Ri sk Per Year
Esophagu	6. 27E-13	6. 88E-11
Stomach	2. 43E-12	2. 71E-10
Col on	6. 53E-12	7. 55E-10
Li ver	1. 63E-12	2. 33E-10
LUNG	3. 75E-11	2. 54E-09
Bone	1. 64E-12	2. 86E-10
Ski n	9. 32E-13	9. 45E-11
Breast	2. 99E-12	3. 15E-10
Ovary	9. 15E-13	1. 05E-10
Bl adder	1. 51E-12	1. 64E-10
Ki dneys	5. 20E-13	6. 43E-11
Thyroi d	1. 97E-13	2. 16E-11
Leukemi a	3. 65E-12	4. 02E-10
Resi dual	8. 94E-12	9. 94E-10
Total	7. 00E-11	6. 32E-09

NFSS2014Pop (6).SUM
PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	5.28E-12	1.12E-09
INHALATION	3.23E-11	1.93E-09
AIR IMMERSION	1.69E-17	3.39E-15
GROUND SURFACE	3.24E-11	3.27E-09
INTERNAL	3.76E-11	3.04E-09
EXTERNAL	3.24E-11	3.27E-09
TOTAL	7.00E-11	6.32E-09

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SUMMARY
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NUCL IDE RISK SUMMARY

Nuclide	Selected Individual Total Li-fet i me Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	5.38E-12	3.24E-10
Th-234	2.45E-13	2.47E-11
Pa-234m	1.13E-12	1.14E-10
Pa-234	6.92E-14	6.98E-12
U-234	6.46E-12	4.18E-10
Th-230	8.85E-12	5.45E-10
Ra-226	8.45E-12	1.26E-09
Rn-222	6.19E-15	6.24E-13
Po-218	9.06E-20	9.13E-18
Pb-214	3.96E-12	4.00E-10
At-218	9.39E-20	9.47E-18
Bi-214	2.29E-11	2.31E-09
Rn-218	2.42E-21	2.44E-19
Po-214	1.32E-15	1.33E-13
Tl-210	9.03E-15	9.11E-13
Pb-210	1.63E-14	1.65E-12
Bi-210	6.54E-14	6.59E-12
Hg-206	2.11E-20	2.13E-18
Po-210	8.39E-17	8.46E-15
Tl-206	1.55E-19	1.56E-17
Th-232	2.33E-12	1.39E-10
Ra-228	6.63E-16	6.87E-14
Ac-228	1.33E-12	1.34E-10
Th-228	5.78E-12	3.47E-10
Ra-224	1.62E-14	2.69E-12
Rn-220	9.96E-16	1.00E-13
Po-216	2.41E-17	2.43E-15
Pb-212	2.17E-13	2.19E-11
Bi-212	1.80E-13	1.81E-11
Po-212	0.00E+00	0.00E+00
Tl-208	1.75E-12	1.77E-10
U-235	8.80E-13	6.89E-11

NFSS2014Pop (6). SUM		
Th-231	3. 38E-14	3. 41E-12
Pa-231	6. 40E-17	6. 46E-15
Ac-227	1. 54E-19	1. 55E-17
Th-227	1. 07E-16	1. 07E-14
Fr-223	6. 91E-19	6. 96E-17
Ra-223	1. 19E-16	1. 20E-14
Rn-219	5. 21E-17	5. 25E-15
At-219	0. 00E+00	0. 00E+00
Bi -215	1. 91E-22	1. 93E-20
Po-215	1. 59E-19	1. 61E-17
Pb-211	6. 68E-17	6. 74E-15
Bi -211	4. 21E-17	4. 24E-15
Tl -207	1. 24E-17	1. 25E-15
Po-211	2. 03E-20	2. 05E-18
TOTAL	7. 00E-11	6. 32E-09

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SUMMARY
Page 5INDIVIDUAL COMMITTED EFFECTIVE DOSE EQUIVALENT (mrem)
(All Radionuclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	1. 1E-04	3. 6E-05	1. 7E-05	9. 9E-06	6. 8E-06	3. 2E-06
NNW	0. 0E+00	8. 6E-05	1. 8E-05	5. 2E-06	3. 1E-06	2. 1E-06	1. 0E-06
NW	0. 0E+00	7. 3E-05	2. 1E-05	9. 4E-06	5. 5E-06	3. 8E-06	1. 8E-06
WNW	0. 0E+00	1. 2E-04	3. 1E-05	1. 2E-05	7. 0E-06	4. 8E-06	2. 2E-06
W	0. 0E+00	1. 2E-04	4. 2E-05	2. 1E-05	1. 2E-05	8. 5E-06	4. 0E-06
WSW	0. 0E+00	1. 3E-04	3. 2E-05	1. 2E-05	7. 3E-06	5. 0E-06	2. 3E-06
SW	0. 0E+00	8. 9E-05	2. 7E-05	1. 2E-05	7. 3E-06	5. 0E-06	2. 4E-06
SSW	0. 0E+00	9. 2E-05	2. 3E-05	8. 1E-06	0. 0E+00	3. 3E-06	1. 6E-06
S	0. 0E+00	9. 1E-05	2. 9E-05	1. 3E-05	7. 9E-06	5. 4E-06	2. 5E-06
SSE	0. 0E+00	1. 2E-04	3. 1E-05	1. 2E-05	7. 0E-06	4. 8E-06	2. 3E-06
SSE	0. 0E+00	1. 3E-04	4. 1E-05	1. 9E-05	1. 1E-05	7. 7E-06	3. 6E-06
ESE	0. 0E+00	1. 5E-04	4. 2E-05	1. 7E-05	1. 0E-05	7. 0E-06	3. 3E-06
E	0. 0E+00	1. 5E-04	4. 6E-05	2. 1E-05	1. 2E-05	8. 4E-06	4. 0E-06
ENE	0. 0E+00	1. 8E-04	4. 9E-05	1. 9E-05	1. 1E-05	7. 9E-06	3. 7E-06
NE	0. 0E+00	1. 8E-04	5. 9E-05	0. 0E+00	1. 7E-05	1. 2E-05	5. 5E-06
NNE	0. 0E+00	1. 7E-04	4. 7E-05	0. 0E+00	1. 1E-05	7. 6E-06	3. 6E-06

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	1. 3E-07	1. 0E-07				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	6. 0E-08	4. 5E-08	3. 7E-08
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	9. 5E-08	6. 9E-08	5. 5E-08
WNW	8. 4E-07	0. 0E+00	0. 0E+00	0. 0E+00	1. 1E-07	7. 8E-08	6. 1E-08
W	1. 5E-06	6. 9E-07	4. 3E-07	2. 9E-07	2. 0E-07	1. 4E-07	1. 1E-07
WSW	8. 9E-07	4. 2E-07	2. 6E-07	1. 8E-07	1. 3E-07	9. 1E-08	7. 3E-08
SW	9. 0E-07	4. 2E-07	2. 7E-07	1. 8E-07	1. 3E-07	9. 4E-08	0. 0E+00
SSW	5. 9E-07	2. 8E-07	1. 8E-07	1. 2E-07	0. 0E+00	0. 0E+00	5. 4E-08

	NFSS2014Pop (6).SUM						
S	9.7E-07	4.5E-07	2.9E-07	2.0E-07	1.4E-07	1.0E-07	8.1E-08
SSE	8.6E-07	4.1E-07	2.6E-07	1.8E-07	1.3E-07	9.5E-08	7.7E-08
SSE	1.4E-06	6.5E-07	4.1E-07	2.8E-07	2.0E-07	1.5E-07	1.2E-07
ESE	1.3E-06	5.9E-07	3.7E-07	2.6E-07	1.9E-07	1.4E-07	1.1E-07
E	1.5E-06	7.2E-07	4.5E-07	3.1E-07	2.2E-07	1.6E-07	1.3E-07
ENE	1.4E-06	6.9E-07	4.3E-07	3.0E-07	2.2E-07	1.6E-07	1.3E-07
NE	2.1E-06	1.0E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	1.4E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-07

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SUMMARY
Page 6COLLECTIVE COMMITTED EFFECTIVE DOSE EQUIVALENT (person rem)
(All Radiouclides and Pathways)

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	3.3E-07	2.8E-07	2.7E-07	2.0E-08	7.0E-07	5.7E-07
NNW	0.0E+00	2.6E-07	1.5E-07	4.0E-07	5.8E-08	1.9E-07	2.0E-07
NW	0.0E+00	2.2E-07	1.7E-07	1.0E-06	4.2E-07	3.9E-07	3.8E-06
WNW	0.0E+00	3.5E-07	2.5E-07	4.0E-06	2.5E-06	2.5E-07	1.4E-05
W	0.0E+00	3.7E-07	3.4E-07	1.9E-05	2.5E-06	3.4E-08	1.2E-06
WSW	0.0E+00	3.8E-07	2.6E-07	9.9E-08	8.8E-07	8.4E-07	1.5E-06
SW	0.0E+00	2.7E-07	2.2E-07	2.7E-07	2.0E-06	1.9E-06	1.4E-05
SSW	0.0E+00	2.8E-07	1.8E-07	2.0E-07	0.0E+00	1.4E-07	9.5E-06
S	0.0E+00	2.7E-07	2.3E-07	1.1E-06	6.4E-07	1.2E-06	4.7E-06
SSE	0.0E+00	3.6E-07	2.5E-07	7.2E-07	5.2E-07	3.6E-07	3.3E-06
SSE	0.0E+00	3.9E-07	3.3E-07	8.3E-07	6.8E-07	4.0E-07	2.4E-06
ESE	0.0E+00	4.6E-07	3.4E-07	6.8E-08	2.9E-07	1.1E-06	1.6E-06
E	0.0E+00	4.6E-07	3.7E-07	2.5E-07	3.8E-07	5.1E-07	2.1E-06
ENE	0.0E+00	5.5E-07	3.9E-07	2.1E-07	8.0E-08	4.9E-07	4.5E-06
NE	0.0E+00	5.4E-07	4.7E-07	0.0E+00	2.7E-07	1.2E-06	1.2E-06
NNE	0.0E+00	5.2E-07	3.7E-07	0.0E+00	4.4E-08	5.3E-07	9.6E-07

Distance (m)							
Direction	15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05	3.8E-05
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-05	4.8E-05	2.6E-05
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-05	6.3E-05	3.9E-05
WNW	7.6E-07	0.0E+00	0.0E+00	0.0E+00	4.5E-07	3.0E-05	6.2E-06
W	4.7E-05	3.5E-05	3.1E-06	1.0E-05	5.0E-06	2.5E-05	3.2E-05
WSW	2.0E-05	2.1E-05	1.4E-06	1.6E-06	7.6E-07	7.6E-07	2.4E-07
SW	4.2E-05	4.8E-06	1.8E-05	1.5E-06	1.9E-07	5.4E-08	0.0E+00
SSW	3.6E-05	9.8E-07	7.2E-07	1.7E-06	0.0E+00	0.0E+00	1.7E-07
S	2.6E-05	5.6E-06	8.5E-06	5.3E-09	3.1E-06	1.9E-06	6.5E-07
SSE	1.8E-05	5.6E-05	8.8E-05	2.6E-05	9.7E-06	1.2E-06	4.8E-07
SSE	1.5E-05	3.0E-05	3.4E-05	1.3E-05	2.9E-06	8.9E-07	1.2E-06
ESE	3.1E-06	2.1E-05	1.3E-06	1.8E-06	1.2E-06	3.2E-06	1.5E-06
E	2.3E-06	7.3E-06	2.1E-06	4.3E-06	7.4E-07	2.3E-06	1.3E-06

	NFSS2014Pop (6). SUM						
ENE	1. 9E-06	4. 5E-06	1. 3E-06	7. 6E-07	2. 3E-07	1. 4E-07	7. 2E-08
NE	5. 1E-06	1. 7E-07	0. 0E+00				
NNE	6. 6E-08	0. 0E+00	2. 2E-06				

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

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0. 0E+00	4. 2E-11	1. 4E-11	6. 5E-12	3. 9E-12	2. 7E-12	1. 3E-12
NNW	0. 0E+00	3. 3E-11	7. 1E-12	2. 0E-12	1. 2E-12	8. 4E-13	4. 0E-13
NW	0. 0E+00	2. 8E-11	8. 2E-12	3. 6E-12	2. 2E-12	1. 5E-12	7. 1E-13
WNW	0. 0E+00	4. 4E-11	1. 2E-11	4. 6E-12	2. 7E-12	1. 9E-12	8. 8E-13
W	0. 0E+00	4. 7E-11	1. 6E-11	8. 1E-12	4. 8E-12	3. 3E-12	1. 6E-12
WSW	0. 0E+00	4. 7E-11	1. 2E-11	4. 8E-12	2. 8E-12	2. 0E-12	9. 3E-13
SW	0. 0E+00	3. 4E-11	1. 1E-11	4. 8E-12	2. 9E-12	2. 0E-12	9. 4E-13
SSW	0. 0E+00	3. 5E-11	8. 8E-12	3. 2E-12	0. 0E+00	1. 3E-12	6. 2E-13
S	0. 0E+00	3. 5E-11	1. 1E-11	5. 2E-12	3. 1E-12	2. 1E-12	1. 0E-12
SSE	0. 0E+00	4. 6E-11	1. 2E-11	4. 6E-12	2. 7E-12	1. 9E-12	9. 0E-13
SSE	0. 0E+00	4. 9E-11	1. 6E-11	7. 3E-12	4. 4E-12	3. 0E-12	1. 4E-12
ESE	0. 0E+00	5. 8E-11	1. 6E-11	6. 6E-12	4. 0E-12	2. 7E-12	1. 3E-12
E	0. 0E+00	5. 8E-11	1. 8E-11	8. 0E-12	4. 7E-12	3. 3E-12	1. 6E-12
ENE	0. 0E+00	7. 0E-11	1. 9E-11	7. 5E-12	4. 5E-12	3. 1E-12	1. 5E-12
NE	0. 0E+00	6. 8E-11	2. 3E-11	0. 0E+00	6. 6E-12	4. 6E-12	2. 2E-12
NNE	0. 0E+00	6. 6E-11	1. 8E-11	0. 0E+00	4. 3E-12	3. 0E-12	1. 4E-12

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	0. 0E+00	5. 5E-14	4. 4E-14				
NNW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	2. 8E-14	2. 1E-14	1. 8E-14
NW	0. 0E+00	0. 0E+00	0. 0E+00	0. 0E+00	4. 2E-14	3. 1E-14	2. 6E-14
WNW	3. 4E-13	0. 0E+00	0. 0E+00	0. 0E+00	4. 9E-14	3. 5E-14	2. 8E-14
W	6. 0E-13	2. 8E-13	1. 8E-13	1. 2E-13	8. 5E-14	6. 0E-14	4. 8E-14
WSW	3. 6E-13	1. 7E-13	1. 1E-13	7. 7E-14	5. 5E-14	4. 0E-14	3. 3E-14
SW	3. 6E-13	1. 7E-13	1. 1E-13	7. 8E-14	5. 6E-14	4. 2E-14	0. 0E+00
SSW	2. 4E-13	1. 2E-13	7. 6E-14	5. 4E-14	0. 0E+00	0. 0E+00	2. 5E-14
S	3. 9E-13	1. 9E-13	1. 2E-13	8. 4E-14	6. 1E-14	4. 5E-14	3. 6E-14
SSE	3. 5E-13	1. 7E-13	1. 1E-13	7. 7E-14	5. 7E-14	4. 3E-14	3. 5E-14
SSE	5. 6E-13	2. 7E-13	1. 7E-13	1. 2E-13	8. 6E-14	6. 4E-14	5. 1E-14
ESE	5. 1E-13	2. 4E-13	1. 6E-13	1. 1E-13	8. 0E-14	5. 9E-14	4. 8E-14
E	6. 1E-13	2. 9E-13	1. 9E-13	1. 3E-13	9. 5E-14	7. 0E-14	5. 7E-14
ENE	5. 8E-13	2. 8E-13	1. 8E-13	1. 3E-13	9. 3E-14	7. 0E-14	5. 7E-14
NE	8. 5E-13	4. 1E-13	0. 0E+00				
NNE	5. 6E-13	0. 0E+00	5. 3E-14				

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COLLECTIVE FATAL CANCER RISK Per Year
(All Radioisotopes and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.6E-12	1.4E-12	1.4E-12	1.0E-13	3.5E-12	3.0E-12	
NNW	0.0E+00	1.3E-12	7.3E-13	2.0E-12	3.0E-13	9.8E-13	1.1E-12	
NW	0.0E+00	1.1E-12	8.5E-13	5.2E-12	2.2E-12	2.0E-12	2.0E-11	
WNW	0.0E+00	1.7E-12	1.2E-12	2.0E-11	1.2E-11	1.3E-12	7.0E-11	
W	0.0E+00	1.8E-12	1.7E-12	9.5E-11	1.3E-11	1.7E-13	6.4E-12	
WSW	0.0E+00	1.8E-12	1.3E-12	4.9E-13	4.4E-12	4.3E-12	7.5E-12	
SW	0.0E+00	1.3E-12	1.1E-12	1.4E-12	1.0E-11	9.7E-12	7.1E-11	
SSW	0.0E+00	1.4E-12	9.1E-13	9.8E-13	0.0E+00	7.3E-13	4.9E-11	
S	0.0E+00	1.3E-12	1.1E-12	5.4E-12	3.2E-12	5.9E-12	2.5E-11	
SSE	0.0E+00	1.8E-12	1.2E-12	3.6E-12	2.6E-12	1.8E-12	1.7E-11	
SSE	0.0E+00	1.9E-12	1.6E-12	4.2E-12	3.4E-12	2.0E-12	1.3E-11	
ESE	0.0E+00	2.3E-12	1.7E-12	3.4E-13	1.5E-12	5.7E-12	8.3E-12	
E	0.0E+00	2.3E-12	1.8E-12	1.2E-12	1.9E-12	2.6E-12	1.1E-11	
ENE	0.0E+00	2.7E-12	2.0E-12	1.1E-12	4.1E-13	2.5E-12	2.3E-11	
NE	0.0E+00	2.6E-12	2.4E-12	0.0E+00	1.4E-12	6.1E-12	6.1E-12	
NNE	0.0E+00	2.6E-12	1.9E-12	0.0E+00	2.2E-13	2.7E-12	5.0E-12	

		Distance (m)						
Direction		15000	25000	35000	45000	55000	65000	75000
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.8E-11	2.2E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-10	3.0E-10	1.6E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-11	3.7E-10	2.3E-10	
WNW	4.0E-12	0.0E+00	0.0E+00	0.0E+00	2.5E-12	1.8E-10	3.7E-11	
W	2.4E-10	1.8E-10	1.7E-11	5.6E-11	2.7E-11	1.4E-10	1.8E-10	
WSW	1.1E-10	1.1E-10	7.8E-12	8.6E-12	4.2E-12	4.3E-12	1.4E-12	
SW	2.2E-10	2.6E-11	9.7E-11	8.0E-12	1.1E-12	3.1E-13	0.0E+00	
SSW	1.9E-10	5.3E-12	4.0E-12	9.6E-12	0.0E+00	0.0E+00	1.0E-12	
S	1.4E-10	3.0E-11	4.6E-11	2.9E-14	1.8E-11	1.1E-11	3.8E-12	
SSE	9.5E-11	3.0E-10	4.8E-10	1.4E-10	5.5E-11	6.9E-12	2.8E-12	
SSE	7.8E-11	1.6E-10	1.8E-10	6.9E-11	1.6E-11	5.0E-12	7.0E-12	
ESE	1.6E-11	1.1E-10	7.1E-12	9.6E-12	6.9E-12	1.8E-11	8.7E-12	
E	1.2E-11	3.9E-11	1.1E-11	2.3E-11	4.1E-12	1.3E-11	7.6E-12	
ENE	1.0E-11	2.4E-11	6.8E-12	4.1E-12	1.3E-12	8.1E-13	4.1E-13	
NE	2.7E-11	9.1E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	3.5E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-11	

ATTACHMENT E

NATIONAL CLIMATIC DATA CENTER, NIAGARA FALLS, NEW YORK

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)
NOAA, National Climatic Data Center
Month: 01/2014
Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground (In)	Precipitation (In)	Pressure (inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date			
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg. Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	Dir	max 2-minute Speed	Dir	
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	20	10	15	M	6	13	50	0	-	-	SN BR	M	M	M	T	29.67	30.39	4.1	33	10.0	24	280	20	280	01
02	14	5	10	M	4	9	55	0	-	-	SN BLSN	M	M	M	T	29.49	30.18	15.8	04	16.3	31	040	25	050	02
03	12	-3	5	M	-3	2	60	0	-	-	SN	M	M	M	T	29.62	30.37	3.5	30	7.6	24	190	18	190	03
04	34	12	23	M	10	21	42	0	-	-	RA FZRA SN BR UP	M	M	M	0.00	29.43	30.11	15.9	21	16.7	39	200	30	200	04
05	35	30	33	M	24	30	32	0	-	-	RA SN BR UP BLSN	M	M	M	0.23	29.31	29.92	1.8	08	5.2	20	240	15	230	05
06	45	0	23	M	13	18	42	0	-	-	SN BLSN	M	M	M	0.24	28.90	29.62	21.5	25	23.5	49	250	39	250	06
07	6	-3	2	M	-7	1	63	0	-	-	SN BLSN	M	M	M	T	29.39	30.16	27.5	25	27.9	55	260	41	250	07
08	19	5	12	M	5	12	53	0	-	-	SN	M	M	M	T	29.69	30.43	14.5	26	14.9	37	270	30	270	08
09	23	7	15	M	8	13	50	0	-	-	SN BR	M	M	M	T	29.86	30.57	2.4	22	4.7	20	270	15	270	09
10	38	20	29	M	29	31	36	0	-	-	RA SN BR	M	M	M	T	29.57	30.21	4.5	17	5.0	13	200	9	180	10
11	50*	35	43*	M	39	41	22	0	-	-	RA DZ BR	M	M	M	0.15	28.84	29.47	12.3	22	14.0	33	270	26	230	11
12	35	31	33	M	27	31	32	0	-	-	DZ SN	M	M	M	T	29.12	29.83	13.7	24	14.7	35	250	25	260	12
13	49	33	41	M	32	37	24	0	-	-	RA	M	M	M	0.12	29.10	29.75	14.0	20	14.2	32	210	25	200	13
14	43	27	35	M	31	34	30	0	-	-	BR HZ	M	M	M	0.02	29.08	29.76	6.5	23	8.1	25	230	20	230	14
15	35	25	30	M	21	27	35	0	-	-	SN	M	M	M	T	29.20	29.90	16.4	24	16.9	44	250	32	240	15
16	31	25	28	M	18	24	37	0	-	-	SN BR	M	M	M	T	29.24	29.91	6.7	20	7.9	25	220	21	220	16
17	35	26	31	M	23	28	34	0	-	-	SN BR	M	M	M	0.01	29.13	29.81	8.6	22	9.9	36	220	28	230	17
18	30	17	24	M	15	19	41	0	-	-	SN BR UP BLSN	M	M	M	T	29.21	29.91	16.5	24	17.0	37	240	29	230	18
19	28	17	23	M	17	22	42	0	-	-	SN BLSN	M	M	M	T	29.00	29.65	18.6	24	20.7	52	240	39	230	19
20	30	11	21	M	13	19	44	0	-	-	SN BR UP	M	M	M	0.01	29.05	29.79	8.8	31	11.7	28	260	23	250	20
21	11	4	8	M	0	5	57	0	-	-	SN BR	M	M	M	0.01	29.43	30.17	7.4	02	7.8	17	020	15	030	21
22	8	1	5	M	-2	3	60	0	-	-	SN BR	M	M	M	0.01	29.41	30.13	3.8	27	5.3	14	240	12	240	22
23	12	-4*	4	M	2	6	61	0	-	-	SN BR	M	M	M	0.01	29.50	30.25	6.2	29	8.7	21	310	18	310	23
24	18	-1	9	M	0	8	56	0	-	-	SN BLSN	M	M	M	T	29.50	30.15	20.3	22	20.7	51	240	38	220	24
25	25	9	17	M	11	16	48	0	-	-	SN BR BLSN	M	M	M	0.16	28.78	29.46	15.9	24	20.7	41	210	32	220	25
26	29	3	16	M	4	10	49	0	-	-	SN BLSN	M	M	M	T	28.98	29.67	12.1	22	13.7	38	210	28	210	26
27	29	1	15	M	4	11	50	0	-	-	SN FZFG BR BLSN	M	M	M	0.02	29.08	29.85	19.8	26	20.4	47	270	38	280	27
28	6	-2	2*	M	-5	1	63	0	-	-	SN BLSN	M	M	M	T	29.58	30.31	19.5	24	20.0	36	200	29	230	28
29	14	1	8	M	1	7	57	0	-	-	SN HZ BLSN	M	M	M	T	29.45	30.18	20.4	24	20.7	41	240	33	250	29
30	31	9	20	M	3	16	45	0	-	-	UP	M	M	M	T	29.47	30.14	14.9	20	15.6	44	250	35	240	30
31	33	28	31	M	22	28	34	0	-	-	SN	M	M	M	T	29.38	30.06	13.3	23	13.5	38	240	24	240	31
	26.7	12.2	19.5		11.8	17.5	45.3	0.0	<-----Monthly Averages Totals----->				M	M	0.99	29.31	30.00	9.9	24	14.0	<Monthly Average				
	M	M	M		<-----Departure From Normal----->										M										

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 1404 M M M

Cooling: 0 M M M

Greatest 24-hr Precipitation: 0.46 Date: 05-06

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.68 09 1053

Minimum 29.23 11 1453

Number of Days with ----->

Max Temp >=90: 0
Max Temp <=32: 29
Thunderstorms : 0

Min Temp <=32: 29

Min Temp <=0 : 6

Heavy Fog : 0

Precipitation >=.01 inch: 12
Precipitation >=.10 inch: 5
Snowfall >=1.0 inch : M

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

Data Version:
VER3

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 02/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)

NIAGARA FALLS, NY

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

D a t e	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)	Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees								D a t e	
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	Dir	max 2-minute Speed	Dir		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	39	24	32	M	29	31	33	0	-	-	RA SN BR	M	M	M	0.46	29.39	30.04	4.6	19	7.4	31	250	25	260	01	
02	36	23	30	M	24	27	35	0	-	-	SN BR	M	M	M	0.10	29.36	30.09	8.4	30	9.1	18	310	15	290	02	
03	24	14	19	M	13	19	46	0	-	-	SN BR HZ	M	M	T	29.62	30.33	3.0	34	5.3	16	030	13	030	03		
04	25	11	18	M	11	17	47	0	-	-	SN BR HZ	M	M	M	0.00	29.75	30.44	1.6	07	3.9	15	060	13	060	04	
05	23	12	18	M	16	19	47	0	-	-	SN BR UP BLSN	M	M	M	0.79	29.36	30.05	13.2	04	15.2	35	080	29	060	05	
06	19	-2	9	M	7	11	56	0	-	-	SN MIFG BR HZ BLSN	M	M	M	T	29.62	30.32	11.1	23	11.7	40	240	30	240	06	
07	14	6	10	M	3	8	55	0	-	-	SN HZ BLSN	M	M	M	T	29.60	30.32	21.5	23	21.8	43	230	31	230	07	
08	15	5	10	M	5	10	55	0	-	-	SN BR	M	M	M	T	29.60	30.32	11.7	23	11.9	29	240	22	230	08	
09	19	8	14	M	10	13	51	0	-	-	SN BR	M	M	M	T	29.43	30.13	3.2	24	6.1	17	280	15	270	09	
10	20	4	12	M	5	10	53	0	-	-	SN BR	M	M	M	T	29.53	30.26	7.8	27	10.9	23	300	20	300	10	
11	14	-2	6	M	1	8	59	0	-	-	SN	M	M	M	T	29.75	30.49	8.2	27	8.5	20	270	15	280	11	
12	22	-10*	6*	M	-3	4	59	0	-	-	HZ	M	M	M	0.00	29.70	30.40	0.3	20	0.7	6	200	6	200	12	
13	25	20	23	M	8	15	42	0	-	-	SN BR	M	M	M	T	29.23	29.93	4.1	05	M	17	060	15	070	13	
14	27	21	24	M	19	23	41	0	-	-	SN BR	M	M	M	T	28.90	29.60	9.0	23	9.1	25	240	22	240	14	
15	25	12	19	M	15	20	46	0	-	-	SN BR	M	M	M	T	29.20	29.91	10.4	28	11.6	24	270	18	280	15	
16	18	8	13	M	6	11	52	0	-	-	SN BR	M	M	M	T	29.41	30.14	6.4	29	8.9	20	320	16	330	16	
17	31	-7	12	M	1	10	53	0	-	-	SN BR	M	M	M	T	29.65	30.31	3.7	10	6.8	24	130	18	160	17	
18	31	22	27	M	20	24	38	0	-	-	SN BR HZ BLSN	M	M	M	T	29.21	29.90	13.1	21	15.6	37	160	28	230	18	
19	43	23	33	M	26	32	32	0	-	-	RA SN BR	M	M	M	T	29.10	29.79	9.5	23	12.0	31	280	26	290	19	
20	38	27	33	M	28	32	32	0	-	-	RA SN BR HZ VCTS	M	M	M	T	29.36	30.00	5.4	13	9.3	24	150	18	100	20	
21	48*	34	41*	M	30	34	24	0	-	-	RA SN BR	M	M	M	0.70	28.97	29.64	18.8	23	22.1	53	240	41	250	21	
22	38	34	36	M	21	30	29	0	-	-	SN	M	M	M	T	29.17	29.86	27.0	23	27.1	51	230	40	240	22	
23	34	23	29	M	19	26	36	0	-	-	SN	M	M	M	0.00	29.30	29.98	13.8	24	14.4	31	220	26	220	23	
24	24	18	21	M	10	18	44	0	-	-	SN BR	M	M	M	T	29.35	30.05	16.9	27	17.5	36	280	31	270	24	
25	20	14	17	M	8	15	48	0	-	-	SN	M	M	M	T	29.39	30.06	13.8	25	14.9	27	270	22	280	25	
26	20	6	13	M	-1	8	52	0	-	-	SN	M	M	M	T	29.26	29.95	16.0	26	18.2	37	280	30	290	26	
27	17	4	11	M	0	8	54	0	-	-	SN BLSN	M	M	M	T	29.07	29.81	18.1	26	20.4	46	260	37	260	27	
28	14	0	7	M	-6	5	58	0	-	-	SN	M	M	M	0.00	29.64	30.36	4.5	23	8.0	19	290	15	260	28	
						25.8	12.6	19.2		11.6	17.4	45.6	0.0	<----Monthly Averages Totals----->				M	M	2.05	29.39	29.95	7.5	25	M	<Monthly Average
						M	M	M						<-----Departure From Normal----->				M								

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 1277 M M M

Cooling: 0 M M M

Greatest 24-hr Precipitation: 0.79 Date: 05

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date (LST)

Maximum 30.58 11 2353

Minimum 29.48 21 0629

Max Temp >=90: 0	Min Temp <=32: 26	Precipitation >=.01 inch: 4
Max Temp <=32: 21	Min Temp <=0 : 5	Precipitation >=.10 inch: 4
Thunderstorms : 0	Heavy Fog : 0	Snowfall >=1.0 inch : M

Data Version:
VER3

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

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 03/2014

**Station Location: NIAGARA FALLS INTL AIRPORT (04724)
NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground (In)	Precipitation (In)	Pressure (inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date			
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg. Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	Dir	max 2-minute Speed	Dir	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
01	34	10	22	M	9	20	43	0	-	-	SN BR	M	M	M	0.04	29.47	30.16	6.3	26	10.4	25	230	21	250	01
02	16	4	10	M	2	9	55	0	-	-	SN BR	M	M	M	T	29.57	30.28	9.9	31	10.8	20	330	16	300	02
03	9	-3	3*	M	-3	3	62	0	-	-	SN BR	M	M	M	T	29.70	30.43	7.7	31	10.6	23	330	20	320	03
04	15	-4*	6	M	1	6	59	0	-	-	SN BR	M	M	M	T	29.67	30.38	5.6	21	6.1	16	220	14	220	04
05	21	5	13	M	8	13	52	0	-	-	SN BR	M	M	M	T	29.72	30.46	4.7	02	6.9	20	010	16	030	05
06	25	0	13	M	1	10	52	0	-	-		M	M	M	0.00	29.83	30.52	8.4	09	8.8	22	080	18	070	06
07	41	6	24	M	13	22	41	0	-	-		M	M	M	0.00	29.44	30.10	5.0	20	6.4	18	200	15	190	07
08	34	24	29	M	23	28	36	0	-	-	SN BR HZ	M	M	M	T	29.30	29.99	7.1	30	9.3	19	330	15	330	08
09	34	14	24	M	15	21	41	0	-	-		M	M	M	0.00	29.41	30.07	13.2	24	15.1	36	210	28	220	09
10	45	33	39	M	30	35	26	0	-	-	SN BR HZ	M	M	M	T	29.03	29.67	15.6	23	15.7	39	240	31	240	10
11	51	34	43	M	33	37	22	0	-	-	RA BR HZ	M	M	M	T	29.00	29.67	6.9	23	7.3	18	190	15	190	11
12	38	12	25	M	20	23	40	0	-	-	RA SN FG+ FG FZFG BR HZ BLSN	M	M	M	0.63	28.97	29.65	16.1	03	18.4	47	040	35	030	12
13	18	3	11	M	1	10	54	0	-	-	SN UP	M	M	M	T	29.31	30.04	11.3	28	15.4	27	240	22	300	13
14	50	18	34	M	23	32	31	0	-	-	RA	M	M	M	T	29.10	29.77	17.7	21	18.5	41	230	32	220	14
15	39	20	30	M	23	29	35	0	-	-	RA SN	M	M	M	T	29.18	29.92	15.6	28	17.8	38	280	31	300	15
16	21	12	17	M	4	13	48	0	-	-	SN	M	M	M	T	29.65	30.36	8.6	35	9.1	24	350	20	340	16
17	29	9	19	M	8	16	46	0	-	-		M	M	M	0.00	29.47	30.15	8.0	07	8.8	20	060	16	070	17
18	45	18	32	M	18	26	33	0	-	-		M	M	M	0.00	29.44	30.12	5.3	07	7.1	19	030	16	030	18
19	49	29	39	M	31	37	26	0	-	-	RA DZ BR	M	M	M	0.36	29.20	29.82	10.3	18	12.4	33	180	23	180	19
20	40	29	35	M	26	31	30	0	-	-	SN BR UP	M	M	M	T	29.13	29.83	18.7	26	19.1	39	280	31	270	20
21	38	24	31	M	20	27	34	0	-	-		M	M	M	0.00	29.37	30.04	4.6	26	8.3	21	280	16	280	21
22	43	25	34	M	25	30	31	0	-	-	RA SN BR UP	M	M	M	0.01	29.21	29.91	12.6	27	15.3	31	280	25	260	22
23	25	17	21	M	8	17	44	0	-	-	SN	M	M	M	T	29.57	30.28	12.7	31	13.0	27	320	23	310	23
24	25	16	21	M	10	17	44	0	-	-	SN	M	M	M	T	29.59	30.26	9.0	27	11.1	23	270	18	290	24
25	35	18	27	M	13	22	38	0	-	-		M	M	M	0.00	29.32	30.00	9.5	25	13.7	34	260	28	270	25
26	24	13	19	M	4	15	46	0	-	-	SN	M	M	M	T	29.54	30.26	13.0	30	13.7	29	320	23	290	26
27	44	14	29	M	15	27	36	0	-	-	RA	M	M	M	T	29.51	30.14	8.5	19	9.0	36	210	26	210	27
28	51	36	44*	M	35	40	21	0	-	-	RA	M	M	M	T	29.18	29.87	11.2	22	13.5	39	250	29	250	28
29	38	31	35	M	29	32	30	0	-	-	RA SN PL FG BR	M	M	M	T	29.49	30.14	13.4	05	14.0	33	060	28	060	29
30	44	30	37	M	25	31	28	0	-	-	SN BR	M	M	M	T	29.36	30.04	12.4	35	13.0	28	360	23	330	30
31	52*	25	39	M	26	33	26	0	-	-		M	M	M	0.00	29.52	30.20	1.0	02	2.5	11	320	10	330	31
	34.6	16.8	25.7		16.0	23.0	39.0	0.0			<----Monthly Averages Totals----->	M	M	1.04		29.40	30.11	4.5	27	11.6	<Monthly Average				
	M	M	M								<-----Departure From Normal----->	M													

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 1210 M M M

Cooling: 0 M M M

Greatest 24-hr Precipitation: 0.63 Date: 12

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time

(LST) Maximum 30.67 06 0853

Minimum 29.48 12 1353

Max Temp >=90: 0	Min Temp <=32: 28	Precipitation >=.01 inch: 4
Max Temp <=32: 11	Min Temp <=0 : 3	Precipitation >=.10 inch: 2
Thunderstorms : 0	Heavy Fog : 1	Snowfall >=1.0 inch : M

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

**Data Version:
VER3**

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 04/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)

NIAGARA FALLS, NY

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

D a t e	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	1200 UTC	1800 UTC	2400 LST	2400 LST	Snow/Ice on Ground(In)		Precipitation (In)		Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees						D a t e
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg. Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST						Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	Dir	max 5-second Speed	Dir	max 2-minute Speed	Dir			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26		
01	65	31	48	M	30	38	17	0	-	-			M	M	M	T	29.32	29.97	5.3	17	9.3	27	250	22	210	01		
02	48	30	39	M	28	34	26	0	-	-			M	M	M	0.00	29.44	30.14	10.2	25	11.5	28	260	23	270	02		
03	41	23	32	M	24	31	33	0	-	-			M	M	M	T	29.51	30.16	9.5	07	9.9	28	070	22	070	03		
04	51	34	43	M	37	40	22	0	-	-			M	M	M	0.41	29.04	29.67	7.3	18	15.4	48	230	37	230	04		
05	39	28	34	M	25	31	31	0	-	-			M	M	M	0.01	29.25	29.97	18.3	26	19.2	50	240	38	240	05		
06	50	25	38	M	25	33	27	0	-	-			M	M	M	0.00	29.52	30.19	3.5	22	4.5	19	240	15	240	06		
07	55	30	43	M	31	37	22	0	-	-			M	M	M	0.59	29.23	29.83	6.5	10	8.1	24	070	20	070	07		
08	52	32	42	M	35	37	23	0	-	-			M	M	M	0.46	28.84	29.52	6.4	28	10.3	29	270	22	280	08		
09	49	31	40	M	28	35	25	0	-	-			M	M	M	0.00	29.23	29.92	4.3	28	8.6	23	240	18	230	09		
10	68	33	51	M	34	43	14	0	-	-			M	M	M	0.27	29.21	29.84	16.7	22	17.6	49	220	35	240	10		
11	64	37	51	M	36	43	14	0	-	-			M	M	M	0.00	29.34	30.01	2.1	23	3.9	16	010	13	360	11		
12	65	36	51	M	37	44	14	0	-	-			M	M	M	0.06	29.46	30.10	3.8	10	8.5	27	080	20	090	12		
13	74	45	60*	M	48	53	5	0	-	-			M	M	M	0.04	29.21	29.83	7.5	22	12.3	37	250	28	250	13		
14	74*	40	57	M	49	53	8	0	-	-			M	M	M	0.30	29.00	29.63	11.3	22	14.5	41	210	33	230	14		
15	40	24	32	M	24	29	33	0	-	-			M	M	M	0.29	29.15	29.87	16.4	30	16.7	33	290	28	290	15		
16	37	23*	30*	M	15	25	35	0	-	-			M	M	M	0.00	29.75	30.48	5.4	31	9.7	30	310	24	310	16		
17	59	27	43	M	24	36	22	0	-	-			M	M	M	0.00	29.82	30.47	5.7	13	8.0	21	180	15	180	17		
18	58	36	47	M	33	41	18	0	-	-			M	M	M	T	29.63	30.28	4.7	24	9.2	24	190	18	190	18		
19	52	29	41	M	28	36	24	0	-	-			M	M	M	0.00	29.74	30.42	6.7	02	9.1	25	030	17	020	19		
20	66	32	49	M	29	41	16	0	-	-			M	M	M	0.00	29.67	30.31	3.2	07	6.1	M	M	9	060	20		
21	72	45	59	M	33	46	6	0	-	-			M	M	M	0.00	29.34	29.93	8.4	21	9.2	22	260	17	260	21		
22	61	40	51	M	41	45	14	0	-	-			M	M	M	0.43	29.00	29.64	11.8	28	14.0	35	290	29	300	22		
23	47	35	41	M	28	35	24	0	-	-			M	M	M	0.05	29.24	29.94	14.0	32	14.6	28	330	22	290	23		
24	53	31	42	M	19	34	23	0	-	-			M	M	M	0.00	29.47	30.12	5.3	34	7.4	21	300	14	290	24		
25	59	38	49	M	30	40	16	0	-	-			M	M	M	0.28	29.15	29.78	4.8	07	11.5	27	280	21	280	25		
26	48	37	43	M	36	40	22	0	-	-			M	M	M	0.05	29.19	29.87	9.0	30	11.7	24	310	20	320	26		
27	54	38	46	M	31	39	19	0	-	-			M	M	M	0.00	29.48	30.16	6.5	01	8.4	22	060	16	030	27		
28	58	34	46	M	30	40	19	0	-	-			M	M	M	0.00	29.45	30.09	12.4	08	12.6	33	080	24	070	28		
29	58	47	53	M	42	46	12	0	-	-			M	M	M	0.62	29.28	29.94	13.2	13	14.4	35	140	24	130	29		
30	55	45	50	M	46	48	15	0	-	-			M	M	M	0.64	29.29	29.92	5.7	12	6.9	28	130	23	130	30		

<-----Monthly Averages | Totals----->

M

M

4.50

29.34

30.00

2.1

25

10.8

<Monthly Average

<-----Departure From Normal----->

M

M

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 599 M M M

Cooling: 0 M M M

Greatest 24-hr Precipitation: 1.05 Date: 07-08

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.58 17 0653

Minimum 29.27 08 0453

Max Temp >=90: 0

Max Temp <=32: 14

Min Temp <=0 : 0

Thunderstorms : 0

Heavy Fog : 1

Min Temp <=32: 14

Min Temp <=0 : 0

Precipitation >=.01 inch: 15

Precipitation >=.10 inch: 10

Snowfall >=1.0 inch : M

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

Data Version:

VER3

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 05/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)**NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)	Precipitation (In)	Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date			
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 2-minute Dir				
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	57	44	51	M	42	46	14	0	-	-	RA DZ FG BR	M	M	M	0.03	29.13	29.77	13.5	23	13.8	37	240	29	230	01
02	53	43	48	M	40	44	17	0	-	-	RA	M	M	M	T	29.10	29.76	13.8	23	13.9	31	240	24	240	02
03	57	45	51	M	42	45	14	0	-	-	RA	M	M	M	0.06	29.09	29.73	13.2	22	13.7	34	230	28	230	03
04	57	39	48	M	33	41	17	0	-	-	RA	M	M	M	0.00	29.17	29.85	16.5	28	17.4	36	270	30	280	04
05	56	33*	45	M	33	41	20	0	-	-	RA	M	M	M	0.00	29.38	30.03	3.7	28	5.5	16	290	13	300	05
06	59	41	50	M	32	43	15	0	-	-	RA	M	M	M	0.00	29.39	30.06	5.3	36	6.2	19	010	14	360	06
07	64	41	53	M	33	44	12	0	-	-	RA	M	M	M	T	29.49	30.14	10.4	08	10.7	24	060	20	060	07
08	76	48	62	M	48	54	3	0	-	-	TSRA RA	M	M	M	0.03	29.41	30.03	4.9	07	6.0	17	050	14	070	08
09	83	55	69	M	54	60	0	4	-	-	RA	M	M	M	0.11	29.25	29.86	10.0	22	11.5	54	240	44	260	09
10	64	48	56	M	46	52	9	0	-	-	RA	M	M	M	0.00	29.21	29.86	13.7	23	14.0	32	230	24	220	10
11	71	40	56	M	37	47	9	0	-	-	BR	M	M	M	0.00	29.41	30.06	4.8	22	5.8	24	220	20	220	11
12	76	51	64	M	54	58	1	0	-	-	RA	M	M	M	T	29.41	30.04	3.4	21	5.3	20	240	17	230	12
13	84*	52	68	M	61	64	0	3	-	-	RA BR VCTS	M	M	M	0.63	29.39	30.01	5.8	20	8.7	46	330	33	320	13
14	71	59	65	M	60	62	0	0	-	-	TSRA RA BR HZ	M	M	M	0.30	29.42	30.04	2.0	05	8.0	38	280	30	280	14
15	74	50	62	M	57	60	3	0	-	-	RA BR	M	M	M	0.43	29.25	29.87	10.5	19	11.6	32	180	26	180	15
16	50	41	46	M	41	44	19	0	-	-	RA BR	M	M	M	0.31	29.29	29.95	7.0	25	9.5	20	210	17	210	16
17	53	37	45*	M	37	42	20	0	-	-	RA	M	M	M	0.02	29.42	30.10	6.4	25	7.6	25	260	18	260	17
18	60	38	49	M	37	44	16	0	-	-	RA BR	M	M	M	0.01	29.58	30.24	6.6	21	8.1	26	230	21	220	18
19	68	41	55	M	42	48	10	0	-	-	RA	M	M	M	T	29.57	30.22	7.4	22	8.2	23	210	20	240	19
20	70	45	58	M	45	51	7	0	-	-	RA	M	M	M	0.15	29.48	30.10	3.0	17	5.4	21	080	15	220	20
21	72	52	62	M	56	58	3	0	-	-	RA BR	M	M	M	0.02	29.24	29.86	3.9	20	6.1	19	260	15	230	21
22	69	51	60	M	51	55	5	0	-	-	FG BR HZ	M	M	M	T	29.21	29.86	8.7	30	9.7	26	290	22	290	22
23	57	47	52	M	47	49	13	0	-	-	RA BR	M	M	M	0.02	29.35	30.01	7.6	24	8.6	18	240	14	220	23
24	71	45	58	M	48	53	7	0	-	-	BR	M	M	M	0.00	29.47	30.12	6.0	22	6.9	19	220	16	230	24
25	75	46	61	M	46	53	4	0	-	-	BR	M	M	M	0.00	29.48	30.11	8.7	21	8.8	24	210	21	210	25
26	80	55	68	M	50	58	0	3	-	-	BR	M	M	M	0.00	29.37	29.98	11.8	23	11.9	32	240	24	230	26
27	80	61	71*	M	59	63	0	6	-	-	BR	M	M	M	0.18	29.23	29.84	8.7	22	9.3	28	230	22	240	27
28	65	56	61	M	52	56	4	0	-	-	BR	M	M	M	0.00	29.36	30.02	8.9	06	9.9	22	060	18	060	28
29	66	51	59	M	51	54	6	0	-	-	FG BR	M	M	M	0.00	29.48	30.12	6.0	04	6.5	18	030	15	030	29
30	76	46	61	M	50	56	4	0	-	-	FG BR	M	M	M	0.00	29.52	30.15	3.3	33	4.7	19	010	14	020	30
31	74	51	63	M	41	52	2	0	-	-	FG BR	M	M	M	0.00	29.60	30.25	6.3	08	7.0	24	070	18	070	31
	67.4	46.8	57.1		46.0	51.5	8.2	0.5	<-----Monthly Averages Totals----->						M	M	2.30	29.36	30.00	4.3	23	9.0	<Monthly Average		
	M	M	M		<-----Departure From Normal----->												M								

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 254 M M M

Cooling: 16 M M M

Greatest 24-hr Precipitation: 0.74 Date: 15-16

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.29 31 0806

Minimum 29.64 03 1553

Max Temp >=90: 0 Min Temp <=32: 0

Number of Days with -----> Max Temp <=32: 0 Min Temp <=0 : 0

Thunderstorms : 2 Heavy Fog : 0

Precipitation >=.01 inch: 14

Precipitation >=.10 inch: 7

Snowfall >=1.0 inch : M

Data Version: VER3

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 06/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)**NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)							Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)	Precipitation (In)	Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date						
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST	1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 2-minute Speed	Dir	Speed	Dir					
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26				
01	81	47	64	M	46	55	1	0	-	-	M	M	M	0.00	29.55	30.17	3.0	18	5.2	20	260	14	240	01					
02	82	64	73	M	61	66	0	8	-	-	M	M	M	T	29.37	29.97	13.4	21	13.8	29	220	24	220	02					
03	80	54	67	M	60	64	0	2	-	-	M	M	M	0.50	29.20	29.82	10.8	24	13.5	40	250	30	240	03					
04	71	51	61	M	50	55	4	0	-	-	M	M	M	0.00	29.23	29.84	6.1	23	7.6	23	210	18	220	04					
05	64	45*	55*	M	46	50	10	0	-	-	M	M	M	0.00	29.18	29.84	6.8	33	8.1	20	300	15	010	05					
06	74	46	60	M	47	54	5	0	-	-	M	M	M	0.00	29.34	29.98	4.6	27	7.0	22	300	17	300	06					
07	80	50	65	M	48	56	0	0	-	-	M	M	M	0.00	29.38	30.01	0.6	01	2.1	15	360	13	360	07					
08	78	54	66	M	54	58	0	1	-	-	M	M	M	0.59	29.24	29.87	4.1	02	6.2	18	200	15	040	08					
09	76	57	67	M	58	61	0	2	-	-	M	M	M	0.00	29.31	29.94	6.4	03	7.7	24	030	17	030	09					
10	77	58	68	M	59	63	0	3	-	-	M	M	M	0.00	29.31	29.94	6.2	06	6.9	19	050	16	070	10					
11	82	64	73	M	63	67	0	8	-	-	TS RA BR VCTS		M	M	M	0.16	29.23	29.84	3.8	18	6.9	26	220	20	200	11			
12	79	67	73	M	64	67	0	8	-	-	TSRA RA BR		M	M	M	0.25	29.17	29.78	9.3	20	9.5	24	200	18	190	12			
13	75	56	66	M	59	62	0	1	-	-	RA BR		M	M	M	0.08	29.14	29.78	8.3	26	11.1	27	310	21	310	13			
14	65	51	58	M	48	52	7	0	-	-	RA		M	M	M	0.00	29.40	30.06	7.5	27	9.1	21	280	18	280	14			
15	73	48	61	M	52	56	4	0	-	-	BR		M	M	M	0.00	29.52	30.15	3.5	05	4.6	16	360	13	060	15			
16	83	54	69	M	60	63	0	4	-	-	TS BR		M	M	M	0.03	29.41	30.02	5.5	22	6.9	28	230	20	200	16			
17	88	63	76	M	66	69	0	11	-	-	RA BR		M	M	M	0.70	29.30	29.90	10.1	23	11.9	41	240	31	230	17			
18	76	65	71	M	62	65	0	6	-	-	RA		M	M	M	0.01	29.36	29.99	4.2	27	7.7	23	310	20	310	18			
19	75	54	65	M	51	58	0	0	-	-	RA		M	M	M	0.00	29.46	30.10	7.1	04	7.6	23	020	17	050	19			
20	74	51	63	M	46	54	2	0	-	-	RA		M	M	M	0.00	29.44	30.06	4.3	05	5.7	17	020	14	030	20			
21	75	55	65	M	47	55	0	0	-	-	RA		M	M	M	T	29.34	29.96	5.4	06	5.8	20	030	15	050	21			
22	79	53	66	M	50	58	0	1	-	-	RA		M	M	M	0.00	29.34	29.97	3.7	06	5.0	18	030	14	030	22			
23	83	56	70	M	60	64	0	5	-	-	TS TSRA RA BR		M	M	M	T	29.34	29.96	1.3	18	4.9	17	210	13	200	23			
24	86	70	78	M	67	70	0	13	-	-	TS TSRA RA BR		M	M	M	0.67	29.26	29.88	11.9	22	12.6	35	240	25	230	24			
25	76	67	72	M	67	68	0	7	-	-	RA BR		M	M	M	0.02	29.26	29.88	3.3	35	6.9	17	040	14	030	25			
26	80	65	73	M	59	64	0	8	-	-	BR		M	M	M	0.00	29.36	29.99	3.5	36	5.4	17	030	13	030	26			
27	85	61	73	M	61	65	0	8	-	-	FG+ BR		M	M	M	0.00	29.47	30.11	4.6	09	5.7	19	040	15	040	27			
28	88*	63	76	M	64	69	0	11	-	-	TS TSRA RA VCTS		M	M	M	0.00	29.52	30.13	2.5	12	5.7	17	180	14	060	28			
29	86	70	78	M	67	70	0	13	-	-	TS TSRA RA VCTS		M	M	M	0.14	29.43	30.03	10.7	20	11.1	43	250	32	250	29			
30	87	69	78*	M	69	72	0	13	-	-	TS TSRA RA VCTS		M	M	M	0.00	29.29	29.89	10.5	21	10.6	26	230	20	230	30			
	78.6	57.6	68.1		57.0	61.7	1.1	4.4	<----Monthly Averages Totals----->						M	M	3.15	29.34	29.96	2.0	23	7.8	<Monthly Average						
	M	M	M						<-----Departure From Normal----->						M														

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 33 M M M
Cooling: 133 M M M

Greatest 24-hr Precipitation: 0.70 Date: 17

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.27 01 0321

Minimum 29.72 13 0519

Number of Days with -----> Max Temp >=90: 0 Min Temp <=32: 0
Max Temp <=32: 0 Min Temp <=0 : 0
Thunderstorms : 8 Heavy Fog : 1**Data Version: VER3**

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 07/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)**NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

D a t e	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)	Precipitation (In)	Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees						D a t e				
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 2-minute Speed	Dir	Speed	Dir		
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
01	86	71	79*	M	68	71	0	14	-	-	TS	M	M	M	0.10	29.09	29.70	15.6	22	16.4	45	240	33	240	01	
02	84	67	76	M	64	68	0	11	-	-		M	M	M	T	29.18	29.81	10.5	23	11.8	32	260	24	260	02	
03	73	59	66	M	61	63	0	1	-	-	RA	M	M	M	0.07	29.31	29.95	4.6	31	6.7	23	320	17	320	03	
04	73	52	63	M	49	56	2	0	-	-		M	M	M	0.00	29.52	30.17	7.6	33	8.0	23	340	16	310	04	
05	78	52	65	M	49	57	0	0	-	-		M	M	M	0.00	29.57	30.18	8.4	24	10.4	30	210	22	220	05	
06	81	61	71	M	57	63	0	6	-	-		M	M	M	0.00	29.34	29.93	13.8	22	14.1	37	250	28	230	06	
07	80	68	74	M	67	69	0	9	-	-	RA BR VCTS	M	M	M	0.69	29.07	29.67	15.0	23	15.3	38	200	31	220	07	
08	77	62	70	M	65	67	0	5	-	-	RA BR	M	M	M	0.65	29.00	29.62	12.6	23	13.6	45	220	36	240	08	
09	72	58	65	M	56	60	0	0	-	-		M	M	M	0.00	29.20	29.86	7.8	29	9.6	21	330	16	320	09	
10	75	51	63	M	51	57	2	0	-	-		M	M	M	0.00	29.49	30.15	2.8	05	3.8	16	030	13	010	10	
11	79	54	67	M	55	60	0	2	-	-		M	M	M	0.00	29.57	30.20	3.6	05	4.6	17	010	13	020	11	
12	83	58	71	M	57	63	0	6	-	-		M	M	M	0.00	29.49	30.09	5.4	22	6.6	24	270	18	250	12	
13	83	69	76	M	66	69	0	11	-	-	TS RA BR	M	M	M	0.02	29.20	29.81	11.5	22	13.0	33	220	26	210	13	
14	79	60	70	M	60	64	0	5	-	-		M	M	M	0.00	29.22	29.83	3.8	05	4.9	13	030	10	030	14	
15	78	59	69	M	58	63	0	4	-	-	RA	M	M	M	0.04	29.09	29.71	10.0	23	11.6	36	260	26	250	15	
16	72	53	63	M	54	57	2	0	-	-	RA	M	M	M	0.17	29.23	29.87	8.1	26	8.9	26	230	21	230	16	
17	73	51	62	M	52	57	3	0	-	-		M	M	M	0.00	29.39	30.05	6.5	25	7.9	25	220	20	240	17	
18	77	50*	64	M	51	58	1	0	-	-	RA BR	M	M	M	0.00	29.57	30.21	0.5	33	3.1	14	240	12	250	18	
19	70	59	65	M	60	62	0	0	-	-	RA BR	M	M	M	0.33	29.53	30.15	4.4	14	5.6	24	180	16	170	19	
20	78	64	71	M	63	66	0	6	-	-	BR	M	M	M	T	29.44	30.07	4.7	19	5.8	17	250	13	250	20	
21	82	60	71	M	64	67	0	6	-	-	BR	M	M	M	0.00	29.47	30.10	1.0	20	3.5	15	010	10	230	21	
22	86*	60	73	M	63	67	0	8	-	-	BR	M	M	M	0.00	29.43	30.03	6.2	22	6.7	23	220	18	240	22	
23	76	62	69	M	62	65	0	4	-	-	RA BR HZ	M	M	M	T	29.28	29.91	7.3	31	11.7	27	320	23	320	23	
24	73	56	65	M	49	56	0	0	-	-		M	M	M	0.00	29.39	30.03	6.2	01	7.0	20	040	16	030	24	
25	76	52	64	M	54	59	1	0	-	-	BR	M	M	M	0.00	29.38	30.01	7.7	22	7.9	24	210	21	220	25	
26	79	62	71	M	59	64	0	6	-	-		M	M	M	T	29.27	29.87	8.6	22	9.2	24	220	18	220	26	
27	82	65	74	M	64	67	0	9	-	-	TSRA RA BR HZ	M	M	M	0.43	29.06	29.66	8.1	25	11.1	29	330	24	330	27	
28	69	57	63	M	56	59	2	0	-	-	RA BR	M	M	M	1.15	29.07	29.72	10.5	35	12.7	28	030	22	330	28	
29	70	52	61*	M	53	57	4	0	-	-	RA	M	M	M	0.05	29.28	29.93	6.8	27	8.6	23	280	20	280	29	
30	70	57	64	M	57	59	1	0	-	-	TS TSRA BR VCTS	M	M	M	3.74	29.32	29.96	5.1	20	7.2	33	330	25	340	30	
31	75	56	66	M	56	60	0	1	-	-	RA	M	M	M	0.04	29.37	30.01	8.4	22	8.7	26	220	22	210	31	
	77.1	58.6	67.8		58.1	62.3	0.6	3.7	<----Monthly Averages Totals----->						M	M	7.49	29.32	29.94	5.0	24	8.9	<Monthly Average			
	M	M	M						<-----Departure From Normal----->						M											

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 18 M M M

Cooling: 114 M M M

Greatest 24-hr Precipitation: 3.79 Date: 29-30

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time
(LST)
Maximum 30.25 18 0806

Minimum 29.50 08 1353

Max Temp >=90: 0 Min Temp <=32: 0

Number of Days with -----> Max Temp <=32: 0 Min Temp <=0 : 0

Thunderstorms : 5 Heavy Fog : 0

Precipitation >=.01 inch: 13
Precipitation >=.10 inch: 8
Snowfall >=1.0 inch : M

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

Data Version: VER3

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 08/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)**NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)	Precipitation (In)	Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date			
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 2-minute Speed			
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	80	62	71	M	61	65	0	6	-	-	RA BR	M	M	M	0.20	29.46	30.09	5.5	21	7.8	20	030	16	020	01
02	80	62	71	M	63	66	0	6	-	-	BR VCTS	M	M	M	0.00	29.47	30.09	1.9	04	4.6	18	010	14	150	02
03	75	61	68	M	63	65	0	3	-	-	RA BR	M	M	M	0.05	29.46	30.08	1.2	10	2.6	15	070	13	060	03
04	81	61	71	M	62	65	0	6	-	-	BR HZ	M	M	M	0.00	29.44	30.05	5.1	23	6.2	23	210	18	230	04
05	74	61	68	M	61	63	0	3	-	-	TSRA RA FG+ BR	M	M	M	0.10	29.39	30.02	1.5	31	2.9	14	330	12	330	05
06	76	59	68	M	56	61	0	3	-	-	BR	M	M	M	0.00	29.35	29.98	3.8	36	4.0	19	040	14	360	06
07	75	58	67	M	55	60	0	2	-	-	BR	M	M	M	0.00	29.41	30.06	5.8	34	6.5	19	340	14	340	07
08	76	54	65	M	55	59	0	0	-	-	BR	M	M	M	0.00	29.49	30.13	2.7	02	3.0	16	030	13	010	08
09	80	54	67	M	55	60	0	2	-	-	BR	M	M	M	0.00	29.51	30.14	3.4	04	4.0	18	030	15	030	09
10	84	57	71	M	58	62	0	6	-	-	RA BR	M	M	M	0.00	29.49	30.11	3.7	07	4.2	19	010	15	050	10
11	85	60	73	M	59	64	0	8	-	-	RA BR	M	M	M	T	29.36	29.95	7.9	16	9.1	29	160	21	160	11
12	79	65	72	M	64	66	0	7	-	-	RA BR	M	M	M	0.45	29.12	29.72	11.3	18	12.1	28	150	22	190	12
13	73	53	63	M	56	59	2	0	-	-	RA	M	M	M	0.00	29.16	29.81	12.3	27	13.4	32	280	26	290	13
14	67	51	59*	M	48	53	6	0	-	-	RA	M	M	M	T	29.26	29.89	12.1	29	12.4	28	270	23	300	14
15	72	54	63	M	47	54	2	0	-	-	RA	M	M	M	T	29.29	29.93	11.3	27	11.9	28	280	22	300	15
16	70	55	63	M	56	59	2	0	-	-	RA	M	M	M	0.22	29.26	29.87	12.1	23	12.3	34	220	26	220	16
17	74	59	67	M	57	61	0	2	-	-	RA	M	M	M	0.00	29.31	29.95	5.9	34	7.0	19	350	16	330	17
18	71	53	62	M	54	58	3	0	-	-	RA	M	M	M	0.00	29.31	29.93	4.8	04	6.0	16	340	13	030	18
19	79	53	66	M	58	62	0	1	-	-	RA	M	M	M	0.00	29.22	29.85	2.8	07	4.7	12	110	10	040	19
20	78	67	73	M	64	67	0	8	-	-	RA	M	M	M	T	29.24	29.87	5.9	20	6.7	19	210	15	210	20
21	81	66	74	M	65	68	0	9	-	-	BR	M	M	M	0.00	29.31	29.93	6.4	24	7.1	21	240	17	220	21
22	80	62	71	M	64	66	0	6	-	-	FG BR	M	M	M	0.00	29.34	29.97	5.7	03	6.4	17	010	14	030	22
23	76	63	70	M	64	66	0	5	-	-	DZ FG+ BR	M	M	M	T	29.41	30.05	9.0	06	9.3	22	030	18	030	23
24	80	59	70	M	61	64	0	5	-	-	BR	M	M	M	0.00	29.51	30.13	5.2	09	6.1	19	050	15	050	24
25	83	58	71	M	59	63	0	6	-	-	RA	M	M	M	0.00	29.50	30.12	4.2	19	5.1	20	190	16	190	25
26	85	66	76*	M	64	68	0	11	-	-	RA BR	M	M	M	0.00	29.43	30.04	11.8	22	12.2	28	220	22	220	26
27	77	60	69	M	58	63	0	4	-	-	BR	M	M	M	0.09	29.39	30.03	7.1	34	8.0	25	340	22	330	27
28	71	50	61	M	48	54	4	0	-	-	RA	M	M	M	0.00	29.44	30.09	7.1	32	7.7	23	320	18	350	28
29	77	50*	64	M	52	57	1	0	-	-	RA	M	M	M	0.00	29.52	30.14	2.3	13	3.5	13	240	22	050	29
30	87*	61	74	M	63	67	0	9	-	-	BR VCTS	M	M	M	T	29.31	29.92	13.4	22	13.4	27	240	22	220	30
31	79	69	74	M	68	70	0	9	-	-	BR VCTS	M	M	M	T	29.31	29.92	13.4	22	13.4	27	240	22	210	31
	77.6	58.8	68.2		58.6	62.4	0.6	4.1	<----Monthly Averages Totals----->						M	M	1.11	29.37	30.00	2.0	25	7.5	<Monthly Average		
	M	M	M		<-----Departure From Normal----->												M								

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 20 M M M

Cooling: 127 M M M

Greatest 24-hr Precipitation: 0.45 Date: 12

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.20 29 0753

Minimum 29.68 12 1515

Max Temp >=90: 0	Min Temp <=32: 0	Precipitation >=.01 inch: 6
Number of Days with ----->	Max Temp <=32: 0	Precipitation >=.10 inch: 4
Thunderstorms : 1	Min Temp <=0 : 0	Snowfall >=1.0 inch : M
	Heavy Fog : 2	

Data Version: VER3

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 09/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)**NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground (In)		Precipitation (In)		Pressure (inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date	
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	Water Equiv	Snow Fall	Water Equiv	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	Dir	max 2-minute Speed
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	84	68	76	M	68	71	0	11	-	-	BR	M	M	M	0.08	29.28	29.89	9.4	20	9.7	30	230	23	240	01
02	78	61	70	M	67	68	0	5	-	-	RA BR	M	M	M	0.82	29.21	29.83	9.5	24	9.9	38	280	25	270	02
03	80	54	67	M	59	63	0	2	-	-	FG+ FG BR	M	M	M	0.00	29.38	30.02	5.2	22	5.8	23	210	17	200	03
04	85	58	72	M	60	65	0	7	-	-	BR	M	M	M	0.00	29.44	30.06	6.8	21	8.1	26	250	21	230	04
05	87*	68	78*	M	66	70	0	13	-	-	TSRA RA BR VCTS	M	M	M	1.49	29.37	29.97	11.6	22	12.7	42	300	33	300	05
06	70	53	62	M	58	61	3	0	-	-	RA BR	M	M	M	0.10	29.33	29.96	6.4	27	8.9	26	310	21	320	06
07	70	50	60	M	48	54	5	0	-	-		M	M	M	0.00	29.52	30.18	2.4	33	3.0	16	310	13	320	07
08	78	50	64	M	52	57	1	0	-	-		M	M	M	0.00	29.57	30.20	4.2	11	4.8	16	080	12	120	08
09	77	58	68	M	58	62	0	3	-	-		M	M	M	0.00	29.48	30.09	5.4	16	6.8	20	180	14	200	09
10	78	64	71	M	64	67	0	6	-	-	RA	M	M	M	0.10	29.28	29.85	14.0	18	14.5	43	200	33	200	10
11	75	52	64	M	55	58	1	0	-	-		M	M	M	0.08	29.19	29.87	11.1	27	15.2	44	230	32	220	11
12	58	45	52	M	43	48	13	0	-	-	RA BR	M	M	M	T	29.59	30.25	5.6	04	6.5	18	360	15	020	12
13	59	45	52	M	46	48	13	0	-	-		M	M	M	0.17	29.51	30.17	3.2	35	7.7	27	280	21	310	13
14	60	40	50	M	43	47	15	0	-	-		M	M	M	0.00	29.65	30.30	0.7	07	3.1	13	360	9	040	14
15	67	46	57	M	48	52	8	0	-	-	RA	M	M	M	0.15	29.52	30.14	3.7	23	4.3	20	210	16	230	15
16	65	48	57	M	47	52	8	0	-	-	BR	M	M	M	0.01	29.41	30.06	6.2	30	7.1	20	240	15	270	16
17	69	44	57	M	46	51	8	0	-	-		M	M	M	0.00	29.36	30.01	5.1	23	5.5	24	220	21	210	17
18	58	40	49*	M	45	47	16	0	-	-	RA DZ FG BR	M	M	M	T	29.44	30.12	4.1	03	4.5	23	010	17	360	18
19	66	36*	51	M	42	47	14	0	-	-	BR	M	M	M	0.00	29.60	30.24	3.9	10	5.0	16	100	13	110	19
20	77	58	68	M	58	62	0	3	-	-		M	M	M	0.00	29.33	29.93	17.3	21	17.5	42	220	33	210	20
21	76	51	64	M	58	62	1	0	-	-	RA BR	M	M	M	0.24	29.02	29.64	13.9	24	16.9	40	210	33	220	21
22	56	44	50	M	41	46	15	0	-	-	DZ	M	M	M	0.01	29.38	30.07	11.1	30	12.8	28	310	23	320	22
23	70	44	57	M	47	52	8	0	-	-		M	M	M	0.00	29.65	30.32	7.5	24	7.9	23	210	18	210	23
24	77	46	62	M	51	56	3	0	-	-	BR	M	M	M	0.00	29.80	30.45	2.3	09	4.7	18	020	14	020	24
25	73	49	61	M	51	55	4	0	-	-		M	M	M	0.00	29.72	30.36	2.1	04	3.3	16	020	13	360	25
26	76	45	61	M	51	55	4	0	-	-	BR	M	M	M	0.00	29.65	30.30	1.2	01	1.8	13	320	9	350	26
27	79	47	63	M	51	56	2	0	-	-	BCFG BR HZ	M	M	M	0.00	29.63	30.26	1.3	36	1.7	11	020	9	360	27
28	80	49	65	M	55	58	0	0	-	-	BR	M	M	M	0.00	29.50	30.12	0.9	34	1.5	13	350	10	030	28
29	77	54	66	M	58	61	0	1	-	-	FG+ FG BR	M	M	M	0.00	29.33	29.95	4.3	22	5.1	15	200	14	210	29
30	72	52	62	M	56	59	3	0	-	-	RA BCFG BR	M	M	M	T	29.26	29.90	3.0	04	4.1	16	010	13	050	30
	72.6	50.6	61.6		53.1	57.0	4.8	1.7	<----Monthly Averages Totals----->						M	M	3.25	29.45	30.11	3.2	23	7.3	<Monthly Average		
	M	M	M						<-----Departure From Normal----->						M										

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 145 M M M

Cooling: 51 M M M

Greatest 24-hr Precipitation: 1.59 Date: 05-06

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.52 24 0854

Minimum 29.54 21 1359

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

Max Temp <=32: 0 Min Temp <=0 : 0

Thunderstorms : 1 Heavy Fog : 2

Precipitation >=.01 inch: 11

Precipitation >=.10 inch: 7

Snowfall >=1.0 inch : M

Data Version: VER3

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

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA
(final)**

NOAA, National Climatic Data Center

Month: 10/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)**NIAGARA FALLS, NY**

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

Date	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground(In)	Precipitation (In)	Pressure(inches of Hg)		Wind: Speed=mph Dir=tens of degrees						Date			
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 2-minute Speed			
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	68	58	63	M	57	59	2	0	-	-	BR HZ	M	M	M	0.00	29.41	30.05	8.3	06	8.9	17	050	14	040	01
02	74	52	63	M	55	59	2	0	-	-	FG+ BR	M	M	M	0.00	29.41	30.04	3.5	16	5.9	17	220	14	230	02
03	78	56	67	M	57	60	0	2	-	-	RA BR	M	M	M	0.26	29.10	29.69	10.6	17	11.9	37	140	28	160	03
04	59	40	50	M	44	47	15	0	-	-	RA BR	M	M	M	0.42	28.95	29.60	14.1	24	14.6	35	240	26	220	04
05	53	39	46	M	39	43	19	0	-	-	RA BR	M	M	M	0.06	29.10	29.76	9.4	22	11.6	30	260	23	260	05
06	64	49	57	M	46	51	8	0	-	-	RA BR	M	M	M	0.09	29.13	29.76	11.9	19	12.6	33	190	25	200	06
07	64	53	59	M	50	54	6	0	-	-	RA	M	M	M	0.35	29.13	29.76	9.0	21	11.1	32	220	25	220	07
08	60	43	52	M	41	47	13	0	-	-	RA BR	M	M	M	0.03	29.13	29.80	16.5	26	17.2	43	260	35	270	08
09	60	38	49	M	36	42	16	0	-	-		M	M	M	0.00	29.34	30.00	9.3	27	11.3	31	270	24	260	09
10	56	40	48	M	38	44	17	0	-	-		M	M	M	0.00	29.46	30.12	4.9	29	5.8	18	270	16	310	10
11	56	37	47	M	36	42	18	0	-	-		M	M	M	0.00	29.51	30.18	3.4	31	4.0	18	280	15	290	11
12	61	32	47	M	36	41	18	0	-	-		M	M	M	0.00	29.57	30.23	3.8	09	4.5	16	140	13	050	12
13	70	42	56	M	54	57	9	0	-	-	RA	M	M	M	0.15	29.42	30.05	5.9	18	7.2	21	200	17	190	13
14	80*	61	71*	M	59	64	0	6	-	-	RA	M	M	M	0.04	29.23	29.83	14.7	17	15.0	40	190	28	170	14
15	73	52	63	M	56	58	2	0	-	-	RA FG+ BR	M	M	M	0.02	29.16	29.81	4.0	22	8.0	32	060	25	060	15
16	65	51	58	M	54	56	7	0	-	-	FG+ BR	M	M	M	0.00	29.05	29.67	8.6	23	9.4	24	220	18	230	16
17	63	54	59	M	52	55	6	0	-	-	RA DZ BR	M	M	M	0.02	28.95	29.56	12.6	23	12.9	33	220	24	210	17
18	58	42	50	M	42	45	15	0	-	-	RA BR	M	M	M	0.07	29.04	29.73	12.9	30	15.0	30	320	24	320	18
19	48	37	43	M	30	37	22	0	-	-	RA	M	M	T	0.00	29.41	30.08	7.4	31	9.8	23	340	18	330	19
20	56	38	47	M	43	46	18	0	-	-	RA BR	M	M	M	0.06	29.25	29.88	8.4	21	9.1	27	220	21	220	20
21	53	44	49	M	46	47	16	0	-	-	RA DZ BR	M	M	M	0.21	29.24	29.93	7.9	01	10.1	25	030	20	030	21
22	49	43	46	M	40	43	19	0	-	-		M	M	M	0.00	29.55	30.22	8.0	02	8.3	20	030	16	030	22
23	59	43	51	M	41	45	14	0	-	-		M	M	M	0.00	29.47	30.11	9.5	33	9.9	21	320	17	310	23
24	56	37	47	M	40	44	18	0	-	-	HZ	M	M	M	0.00	29.36	30.01	7.1	26	8.5	24	240	14	240	24
25	63	48	56	M	47	51	9	0	-	-	HZ	M	M	M	0.00	29.11	29.73	11.8	25	13.8	39	240	32	240	25
26	52	35	44	M	37	42	21	0	-	-		M	M	M	0.00	29.13	29.80	13.6	27	14.1	32	280	24	270	26
27	60	31*	46	M	37	43	19	0	-	-	RA	M	M	T	0.00	29.30	29.94	1.9	17	4.9	17	340	15	340	27
28	73	51	62	M	54	58	3	0	-	-	RA	M	M	M	0.02	29.14	29.78	13.6	22	14.2	38	220	30	220	28
29	56	44	50	M	37	44	15	0	-	-		M	M	M	0.00	29.26	29.92	12.0	27	12.6	27	250	22	280	29
30	48	35	42*	M	35	40	23	0	-	-		M	M	M	0.00	29.40	30.06	3.9	30	6.4	22	300	16	300	30
31	49	40	45	M	39	42	20	0	-	-	RA BR	M	M	M	0.08	29.31	29.97	3.8	11	5.1	17	200	14	200	31
	60.8	44.0	52.4		44.5	48.6	12.6	0.3	<----Monthly Averages Totals----->						M	M	1.88	29.26	29.90	4.8	24	10.1	<Monthly Average		
	M	M	M		<-----Departure From Normal----->												M								

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 390 M M M

Cooling: 8 M M M

Greatest 24-hr Precipitation: 0.59 Date: 03-04

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.31 12 0929

Minimum 29.50 17 2256

Max Temp >=90: 0 Min Temp <=32: 2

Number of Days with -----> Max Temp <=32: 0 Min Temp <=0 : 0

Thunderstorms : 0 Heavy Fog : 3

Precipitation >=.01 inch: 15

Precipitation >=.10 inch: 5

Snowfall >=1.0 inch : M

Data Version: VER3

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

**QUALITY CONTROLLED LOCAL CLIMATOLOGICAL
DATA
(final)**

NOAA, National Climatic Data Center

Month: 11/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)

NIAGARA FALLS, NY

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

D a t e	Temperature (Fahrenheit)						Degree Days Base 65 Degrees		Sun		Significant Weather	Snow/Ice on Ground (In)		Precipitation (In)		Pressure (inches of Hg)		Wind: Speed=mph Dir=tens of degrees						D a t e	
	Max.	Min.	Avg.	Dep From Normal	Avg. Dew pt.	Avg. Wet Bulb	Heating	Cooling	Sunrise LST	Sunset LST		1200 UTC	1800 UTC	2400 LST	2400 LST	Avg. Station	Avg. Sea Level	Resultant Speed	Res Dir	Avg. Speed	max 5-second Speed	max 2-minute Speed	Dir	Dir	
	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25	26
01	42	35	39	M	32	35	26	0	-	-	RA DZ SN BR	M	M	M	0.08	29.46	30.15	8.1	02	8.5	17	050	12	050	01
02	42	31	37	M	25	32	28	0	-	-		M	M	M	0.00	29.60	30.28	7.8	31	10.2	24	270	18	270	02
03	57	36	47	M	31	41	18	0	-	-		M	M	M	0.00	29.51	30.15	14.1	24	14.5	37	230	26	230	03
04	60	52	56	M	40	48	9	0	-	-	RA BR	M	M	M	0.20	29.33	29.95	18.2	23	18.6	40	230	30	220	04
05	54	34	44	M	37	42	21	0	-	-	BR	M	M	M	0.00	29.39	30.07	11.4	25	12.5	32	240	26	250	05
06	50	33	42	M	37	40	23	0	-	-	RA BR	M	M	M	T	29.23	29.86	2.8	09	3.7	15	060	14	060	06
07	43	29	36	M	29	34	29	0	-	-	RA SN BR	M	M	M	0.16	29.26	29.94	8.4	31	8.7	22	280	17	280	07
08	46	27	37	M	31	36	28	0	-	-	RA BR	M	M	M	0.07	29.19	29.84	9.8	21	12.4	35	230	28	230	08
09	49	31	40	M	32	37	25	0	-	-		M	M	M	T	29.22	29.89	8.1	23	10.7	28	240	21	240	09
10	58	41	50	M	33	42	15	0	-	-		M	M	M	0.00	29.31	29.97	3.0	18	6.9	23	260	20	260	10
11	67*	47	57*	M	40	49	8	0	-	-	RA	M	M	M	0.00	29.15	29.78	10.8	20	11.3	28	210	22	210	11
12	55	33	44	M	27	34	21	0	-	-	RA BR	M	M	M	0.03	29.34	30.05	16.7	27	17.2	34	260	28	260	12
13	34	26	30	M	24	29	35	0	-	-	SN BR	M	M	M	T	29.45	30.13	9.2	26	9.7	21	270	16	260	13
14	36	24	30	M	20	26	35	0	-	-	SN	M	M	M	T	29.46	30.17	11.8	28	12.2	24	280	21	290	14
15	37	22	30	M	20	27	35	0	-	-	SN BR	M	M	M	0.00	29.64	30.32	7.5	26	8.1	28	270	23	260	15
16	36	28	32	M	26	29	33	0	-	-	SN FG BR	M	M	M	0.12	29.49	30.14	1.8	30	3.9	14	260	12	250	16
17	33	22	28	M	28	30	37	0	-	-		M	M	M	0.21	29.05	29.70	6.5	26	10.7	39	280	31	280	17
18	23	16	20*	M	8	17	45	0	-	-		M	M	M	0.00	29.13	29.85	25.6	26	25.7	49	270	38	250	18
19	32	13*	23	M	15	20	42	0	-	-	TSSN SN FG+ FZFG BR UP BLSN	M	M	M	0.15	29.33	29.99	12.1	22	15.0	41	220	30	200	19
20	29	18	24	M	13	21	41	0	-	-	SN HZ BLSN	M	M	M	T	29.19	29.90	20.1	27	20.2	39	270	32	270	20
21	26	17	22	M	12	19	43	0	-	-	SN	M	M	M	T	29.62	30.36	10.8	26	11.1	27	270	21	270	21
22	46	23	35	M	29	34	30	0	-	-	RA BR	M	M	M	0.04	29.49	30.13	17.5	21	17.9	36	230	28	230	22
23	53	44	49	M	39	44	16	0	-	-	RA BR	M	M	M	0.11	29.29	29.91	9.2	20	11.0	26	230	18	210	23
24	65	42	54	M	44	49	11	0	-	-	RA DZ BR	M	M	M	0.35	28.73	29.38	22.0	22	25.2	63	240	44	240	24
25	42	33	38	M	27	33	27	0	-	-	RA DZ	M	M	M	T	29.24	29.97	21.7	25	22.4	51	230	39	250	25
26	34	28	31	M	25	29	34	0	-	-	SN BR	M	M	M	T	29.50	30.17	4.8	06	6.5	21	050	17	050	26
27	35	28	32	M	24	28	33	0	-	-	SN	M	M	M	0.07	29.41	30.10	3.4	29	7.3	28	320	21	340	27
28	28	18	23	M	14	20	42	0	-	-	SN	M	M	M	0.03	29.57	30.27	9.7	27	10.5	29	300	23	300	28
29	46	22	34	M	24	30	31	0	-	-	RA BR	M	M	M	T	29.39	30.04	9.1	17	10.4	34	190	23	210	29
30	57	43	50	M	44	48	15	0	-	-		M	M	M	0.16	29.15	29.82	15.5	22	17.2	33	210	25	220	30
	43.8	29.9	36.9		27.7	33.4	27.9	0.0	<----Monthly Averages Totals---->						M	M	1.78	29.34	30.01	8.8	24	12.7	<Monthly Average		
	M	M	M		<-----Departure From Normal----->										M										

Degree Days Monthly Season to Date

Total Departure Total Departure

Heating: 836 M M M

Cooling: 0 M M M

Greatest 24-hr Precipitation: 0.42 Date: 23-24

Greatest 24-hr Snowfall: M Date: M

Greatest Snow Depth: M Date: M

Sea Level Pressure Date Time (LST)

Maximum 30.49 21 1853

Minimum 29.20 24 1312

Max Temp >=90: 0	Min Temp <=32: 18
Max Temp <=32: 5	Min Temp <=0 : 0
Thunderstorms : 1	Heavy Fog : 1

Precipitation >=.01 inch: 14

Precipitation >=.10 inch: 8

Snowfall >=1.0 inch : M

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

Data Version:
VER3

QUALITY CONTROLLED LOCAL CLIMATOLOGICAL DATA (final)

NOAA, National Climatic Data Center

Month: 12/2014

Station Location: NIAGARA FALLS INTL AIRPORT (04724)

NIAGARA FALLS, NY

Lat. 43.108 Lon. -78.938

Elevation(Ground): 585 ft. above sea level

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

Attachment F

2014 NIAGARA FALLS STORAGE SITE

- **Radon Flux Results**
- **Site Map**

2014 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	U	0.0295	±	0.0147	0.0515	51			0.1002	±	0.0251	0.0236
2	U	0.0066	±	0.0174	0.0579	52			0.0490	±	0.0100	0.0237
3	U	0.0000	±	0.0241	0.0865	53			0.1058	±	0.0153	0.0347
4	U	0.0193	±	0.0104	0.0441	54			0.1045	±	0.0194	0.0236
5		0.0327	±	0.0083	0.0311	55			0.0524	±	0.0096	0.0179
6		0.0472	±	0.0103	0.0276	56			0.1129	±	0.0146	0.0359
7		0.0608	±	0.0193	0.0533	57			0.0685	±	0.0119	0.0203
8		0.0636	±	0.0105	0.0217	58			0.0530	±	0.0156	0.0236
9		0.1502	±	0.0184	0.0216	59			0.0584	±	0.0112	0.0433
10		0.0330	±	0.0096	0.0201	60			0.0895	±	0.0130	0.0168
10-DUP ^b		0.0444	±	0.0094	0.0201	60-DUP ^b			0.0943	±	0.0138	0.0220
11		0.1188	±	0.0242	0.0751	61			0.0977	±	0.0139	0.0181
12		0.0387	±	0.0085	0.0317	62			0.4636	±	0.0456	0.0610
13	U	0.0753	±	0.0186	0.0529	63	U	0.0239	±	0.0325	0.1325	
14	U	0.0454	±	0.0285	0.1297	64			0.4134	±	0.0409	0.0578
15		0.0874	±	0.0128	0.0248	65			0.0763	±	0.0128	0.0221
16	U	0.0242	±	0.0099	0.0398	66			0.1005	±	0.0147	0.0308
17		0.0430	±	0.0108	0.0402	67	U	0.0582	±	0.0196	0.0648	
18	U	0.0435	±	0.0311	0.1382	68			0.0380	±	0.0086	0.0100
19		0.0636	±	0.0104	0.0238	69			0.0700	±	0.0116	0.0167
20		0.0587	±	0.0111	0.0341	70			0.0484	±	0.0093	0.0107
20-DUP ^b		0.0516	±	0.0102	0.0419	70-DUP ^b			0.0413	±	0.0089	0.0204
21	U	0.0034	±	0.0166	0.0487	71	U	0.0565	±	0.0291	0.1135	
22		0.0565	±	0.0110	0.0202	72			0.0920	±	0.0130	0.0180
23	U	0.0346	±	0.0176	0.1040	73			0.1364	±	0.0185	0.0538
24		0.0618	±	0.0115	0.0179	74	U	0.0650	±	0.0391	0.1179	
25		0.0825	±	0.0121	0.0166	75			0.0492	±	0.0103	0.0181
26	U	0.0828	±	0.0257	0.0715	76	U	0.0424	±	0.0144	0.0522	
27	U	0.0554	±	0.0291	0.1050	77			0.0654	±	0.0124	0.0435
28		0.0447	±	0.0087	0.0179	78			0.1002	±	0.0238	0.0238
29	U	0.0452	±	0.0107	0.0483	79			0.0628	±	0.0120	0.0238
30		0.0621	±	0.0110	0.0255	80	J	0.0521	±	0.0097	0.0221	
30-DUP ^b		0.0703	±	0.0127	0.0282	80-DUP ^b	J	0.0238	±	0.0128	0.0572	
31	U	0.0402	±	0.0255	0.0922	81			0.0364	±	0.0105	0.0324
32		0.0387	±	0.0100	0.0332	82	U	0.0516	±	0.0195	0.0707	
33	U	0.0338	±	0.0111	0.0573	83			0.1940	±	0.0325	0.0692
34		0.0443	±	0.0151	0.0236	84			0.0665	±	0.0105	0.0112
35	U	0.0221	±	0.0139	0.0445	85			0.0592	±	0.0107	0.0220
36		0.0561	±	0.0103	0.0219	86			0.0338	±	0.0074	0.0107
37	U	0.0282	±	0.0085	0.0293	87			0.0721	±	0.0221	0.0239
38	U	0.0279	±	0.0256	0.1096	88			0.0737	±	0.0114	0.0332
39	U	0.0351	±	0.0096	0.0360	89			0.0468	±	0.0098	0.0259
40		0.0760	±	0.0126	0.0218	90	U	0.0234	±	0.0159	0.0573	
40-DUP ^b		0.0687	±	0.0111	0.0219	90-DUP ^b	J	0.0407	±	0.0133	0.0427	
41		0.1306	±	0.0171	0.0403	91			0.0771	±	0.0214	0.0645
42		0.0505	±	0.0105	0.0197	92			0.0783	±	0.0136	0.0467
43	U	0.0423	±	0.0249	0.1097	93			0.0541	±	0.0113	0.0317
44		0.0591	±	0.0107	0.0180	94	U	0.0294	±	0.0253	0.1146	
45		0.0581	±	0.0096	0.0218	95			0.0505	±	0.0113	0.0328
46		0.0601	±	0.0111	0.0107	96			0.0345	±	0.0078	0.0222
47		0.0821	±	0.0204	0.0780	97			0.0381	±	0.0091	0.0206
48		0.0381	±	0.0092	0.0181	98			0.0836	±	0.0216	0.0239
49		0.0534	±	0.0097	0.0220	99			0.0309	±	0.0090	0.0246
50	U	0.0042	±	0.0191	0.0669	100	U	0.0412	±	0.0125	0.0332	
50-DUP ^b	J	0.0427	±	0.0084	0.0107	100-DUP ^b	J	0.0248	±	0.0124	0.0403	

2014 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
			101	0.1455	± 0.0182	0.0347	151	U	0.0231	± 0.0335	0.1346
102			0.0700	± 0.0114	0.0108		152		0.0629	± 0.0105	0.0115
103	U	0.0529	± 0.0222	0.1065		153	U	0.0205	± 0.0096	0.0371	
104		0.0565	± 0.0102	0.0247		154	U	0.0900	± 0.0298	0.1207	
105		0.0627	± 0.0119	0.0221		155	U	0.0087	± 0.0122	0.0492	
106		0.0818	± 0.0141	0.0437		156		0.0479	± 0.0104	0.0224	
107	U	0.0711	± 0.0261	0.1114		157	U	0.0096	± 0.0172	0.0598	
108		0.0556	± 0.0101	0.0114		158		0.1228	± 0.0234	0.0241	
109		0.0604	± 0.0116	0.0350		159		0.0692	± 0.0122	0.0114	
110	J	0.0448	± 0.0095	0.0202		160		0.0613	± 0.0105	0.0223	
110-DUP ^b	J	0.0115	± 0.0161	0.0608		160-DUP ^b		0.0752	± 0.0123	0.0223	
111	U	0.0231	± 0.0410	0.1156		161		0.0939	± 0.0138	0.0183	
112		0.0747	± 0.0111	0.0114		162		0.0644	± 0.0120	0.0109	
113		0.0588	± 0.0110	0.0374		163		0.1359	± 0.0286	0.0258	
114	U	0.0653	± 0.0316	0.1230		164		0.0816	± 0.0132	0.0182	
115	U	0.0354	± 0.0095	0.0400		165		0.1295	± 0.0176	0.0442	
116		0.0489	± 0.0100	0.0296		166		0.0868	± 0.0144	0.0206	
117	U	0.0107	± 0.0150	0.0539		167		0.1428	± 0.0273	0.0658	
118	U	0.0203	± 0.0341	0.0985		168		0.1192	± 0.0161	0.0184	
119		0.0810	± 0.0122	0.0183		169		0.0474	± 0.0097	0.0353	
120		0.0438	± 0.0086	0.0222		170		0.1596	± 0.0210	0.0331	
120-DUP ^b		0.0346	± 0.0085	0.0170		170-DUP ^b		0.1469	± 0.0199	0.0208	
121		0.0347	± 0.0076	0.0102		171	U	0.0832	± 0.0375	0.1041	
122	U	0.0086	± 0.0061	0.0399		172		0.1194	± 0.0156	0.0103	
123		0.1128	± 0.0254	0.0242		173		0.0557	± 0.0106	0.0223	
124		0.0851	± 0.0128	0.0102		174	U	0.0673	± 0.0208	0.0679	
125		0.1178	± 0.0165	0.0351		175		0.0749	± 0.0117	0.0184	
126		0.0526	± 0.0111	0.0410		176		0.0315	± 0.0080	0.0282	
127	U	0.0457	± 0.0293	0.0939		177		0.0597	± 0.0139	0.0438	
128		0.1364	± 0.0180	0.0350		178	U	0.0443	± 0.0246	0.1254	
129		0.0812	± 0.0137	0.0381		179		0.0417	± 0.0082	0.0184	
130	U	-0.0013	± 0.0166	0.0455		180	J	0.0589	± 0.0121	0.0406	
130-DUP ^b	J	0.0370	± 0.0107	0.0445		180-DUP ^b	J	0.0206	± 0.0157	0.0632	
131	U	0.0622	± 0.0243	0.0889		181 ^c		0.0344	± 0.0078	0.0117	
132		0.0249	± 0.0076	0.0230		182 ^c		0.0834	± 0.0144	0.0372	
133		0.0384	± 0.0079	0.0224		183 ^c	U	0.0546	± 0.0339	0.1057	
134	U	0.0289	± 0.0307	0.1165		Average background		0.05746	(pCi/m ² /s)		
135	U	0.0104	± 0.0127	0.0407				IWCS	Value	Units	
136	U	0.0220	± 0.0150	0.0429			Average ^e	0.0642	(pCi/m ² /s)		
137		0.0570	± 0.0127	0.0209			High ^f	0.4636	(pCi/m ² /s)		
138	U	0.0404	± 0.0360	0.1123			Low	-0.0013	(pCi/m ² /s)		
139		0.0535	± 0.0103	0.0184							
140	J	0.0464	± 0.0097	0.0223							
140-DUP ^b	U	0.0693	± 0.0168	0.0405							
141		0.0555	± 0.0108	0.0184							
142	U	0.0495	± 0.0204	0.0579							
143	U	0.0488	± 0.0281	0.0892							
144		0.0506	± 0.0112	0.0337							
145		0.0926	± 0.0143	0.0223							
146		0.1459	± 0.0194	0.0442							
147	U	0.0356	± 0.0182	0.1070							
148		0.1039	± 0.0147	0.0184							
149		0.0445	± 0.0090	0.0244							
150		0.0702	± 0.0135	0.0313							
150-DUP ^b		0.0504	± 0.0113	0.0208							

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

a. Radon-222 flux was performed on August 18-19, 2014

b. Every 10th canister is counted twice as a quality control

(QC) duplicate to evaluate analytical precision.

c. Background:

181-Lewiston-Porter Central School

182-Lewiston Water Pollution Control Center

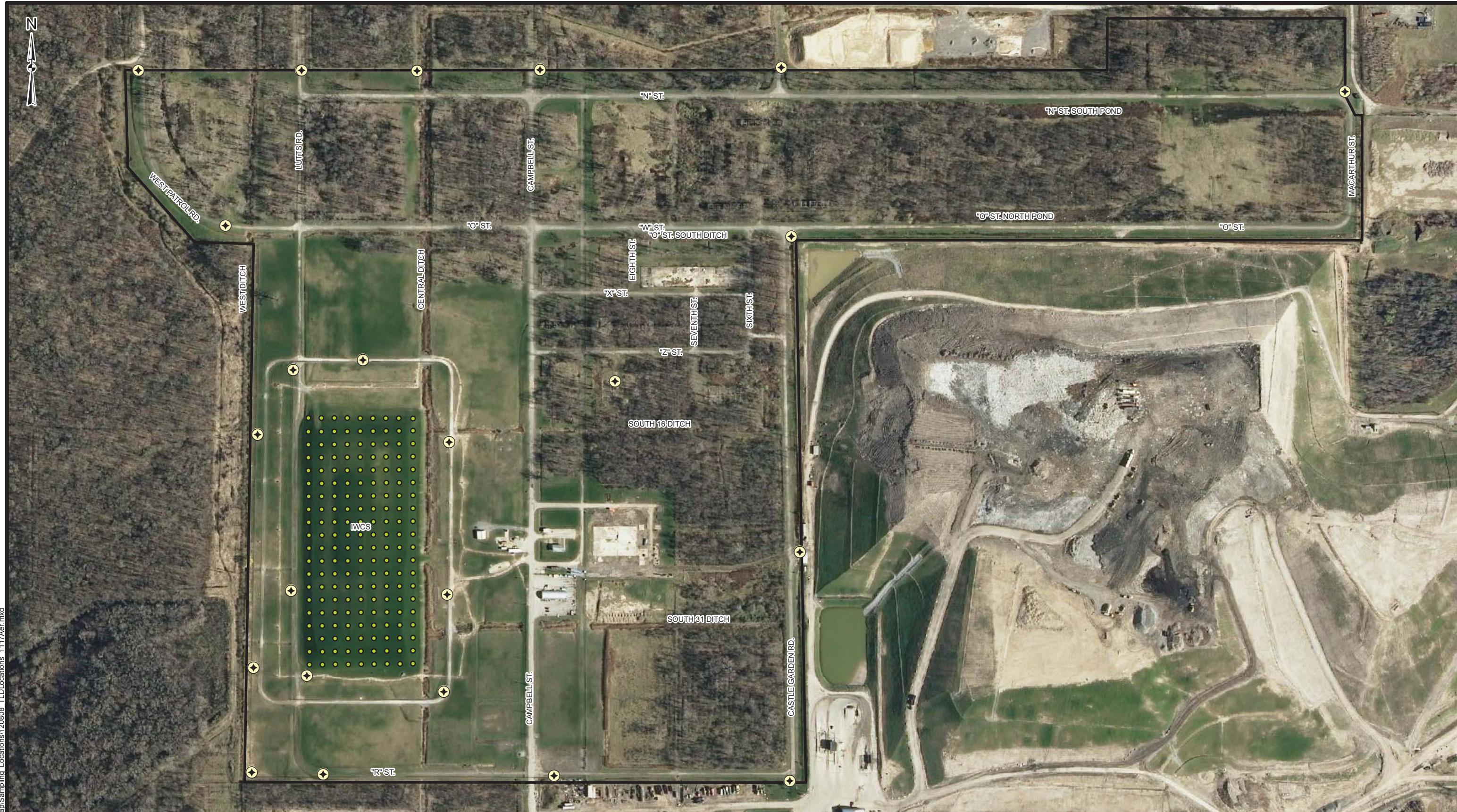
183-Balmer Rd. (CWM Secondary Gate)

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

J - indicates a estimated value due to the relative percent difference between the primary finding and duplicate (-DUP) exceeds 30%.

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

f. Highest detectable finding.



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

0 175 350 700
Feet



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of Engineers® BUFFALO, NY
Buffalo District

Name: 120808_TLDLocations_1117Aer.mxd
Drawn By: H5TDESPM
Date Saved: 21 Mar 2013
Time Saved: 10:43:19 AM

TLD/RADON MONITORING AND RADON FLUX SAMPLING LOCATION MAP

NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE :



Environmental Monitoring Locations

- 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 TLD, RadTrack and Radon Flux Sampling.

0 0.25 0.5 1
Miles



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OFF-SITE EXTERNAL GAMMA RADIATION/RADON MONITORING AND RADON FLUX SAMPLING LOCATION MAP