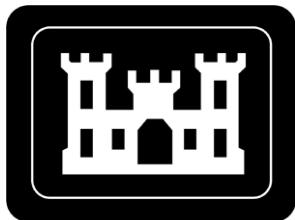

FUSRAP CY2019 NESHAP ANNUAL REPORT FOR NIAGARA FALLS STORAGE SITE (NFSS)

LEWISTON, NEW YORK

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

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ACRONYMS AND ABBREVIATIONS

BNI	Bechtel National, Inc.
CAP88-PC Ver 3	Clean Air Act Assessment Package-1988, Version 3.0 (Revised in 2013)
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 2019 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 CY2019, 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 NESHAP 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 NESHAP report the Annual Climatological Summary report for Niagara Falls International Airport from NOAA was unavailable for the month of December at the time of writing this report and the monthly Quality Controlled Local Climatological Data reports for the airport were used to calculate the 2019 annual mean temperature (8.4 degrees Centigrade) and the total precipitation (91.3 centimeters) for input into CAP88. The data used to estimate these annual mean values is located in Attachment E.

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 CY2019 meteorological data were entered into CAP88-PC (see Attachment E):

Average temperature	8.4 °C (47.1 °F) NFIA
Precipitation,	91.3 cm (35.9 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	1.8 E-04 mrem, SSW @ 914 m
Off-site worker - Adult	4.1 E-04 mrem, SE @ 533 m
School – Age Fifteen	6.5 E-05 mrem, W @ 2499 m
Farm - Infant	1.5 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	9.4 E-05 mrem, SE @ 533 m
School - Age Fifteen	1.5 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	9.4 E-05	NA	NA	NA	NA	NA
Resident SSW at 914 m	9.7 E-05	1.4 E-04	1.1 E-04	1.0 E-04	1.1 E-04	1.8 E-04
School W at 2499 m	8.7 E-06	1.5 E-05	1.0 E-05	9.1 E-06	NA	NA
Farmer S at 1105 m	7.5 E-05	1.1 E-04	8.2 E-05	7.7 E-05	8.6 E-05	1.5 E-04

Bold font indicates the highest individual (time corrected) used for the NESHAP 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. A population distribution map, generated using Landscan 2013 data, is included in Attachment F. 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 3.94 E-03 person-rem for an infant. The maximum annual effective dose for the each population age group is as follows (Attachment D):

Population:	Adult	1.62 E-03 person-rem
	Fifteen-year old	2.36 E-03 person-rem
	Ten-year old	1.89 E-03 person-rem
	Five-year old	1.85 E-03 person-rem
	One-year old	2.04 E-03 person-rem
	Infant	3.94 E-03 person-rem

5.2 RADON-222 FLUX

Radon-222 flux is measured with 180 activated charcoal canisters systematically placed at 15-m intervals across the surface of the IWCS and sealed to the surface for a 24-hr exposure period (July 8th – 9th, 2019). Individual results ranged from non-detect to 23.0501 pCi/m²/s, with an average result including detects and non-detects of 0.2109 pCi/m²/s. All but one individual measurement were well below the NESHAP standard for radon flux of 20 pCi/m²/s, with the lone exception, location 65, being adjacent to the location of the highest result from the previous year. Gamma walkover surveys over this anomalous region were performed to identify any elevated surface activity indicative of short-lived radon progeny deposited during flux. A cluster of localized yet highly temporally variable areas were identified and confined within a representative area of approximately 225 m². Biased investigative flux measurements, as guided by the gamma walkover surveys, were performed throughout October, 2019. These results ranged from 0.1145 to 243.0714 pCi/m²/s.

Compliance with 40 CFR 61, Subpart Q is demonstrated by the average radon-222 flux for the entire source. As calculated by the arithmetic mean of all systematic measurements collected in July, 2019 like in previous years, the average radon-222 flux over the IWCS for CY2019 was 0.2109 pCi/m²/s. This result is well within the established standard specified in 40 CFR 61, Subpart Q.

Although biased investigative measurements produced additional elevated results, these are only representative of a small area of the overall IWCS; these individual results do not represent the same area as the systematic measurements and cannot be interpreted with the same weight. Additionally, these areas of elevated flux experience immense temporal variability. Therefore the investigative results are themselves biased high as measurements were predominately performed during periods of perceived elevated flux and from the immediate locations of the highest flux. If these results are included in a site-wide weighted mean as per the equation presented in Method 115 part 2.1.7 within 40 CFR 61 Appendix B, the calculation is as follows:

$$J_s = \frac{J_1 A_1 + J_2 A_2}{A_t}$$

Where:

J_s = Mean flux for the total IWCS (pCi/m²/s),

J₁ = Mean flux for the heterogeneous region (pCi/m²/s),

A₁ = Area of the heterogeneous region (m²),

J₂ = Mean flux for the remainder of the IWCS (pCi/m²/s),

A₂ = Area of the remainder of the IWCS (m²), and

A_t = Total IWCS area (m²).

This may be done to account the flux contribution from this small localized region of the greater IWCS displaying temporal and spatial heterogeneity. Flux from the vast majority of the IWCS is reliably characterized with single 10-inch diameter activated carbon canisters placed at 15-meter intervals across the Structure for a 24-hour exposure period. The adjusted arithmetic mean of the majority of the IWCS, excluding locations 62 and 65 which are considered in the heterogeneous region, is 0.0825 pCi/m²/s. The local mean of all systematic and biased measurements in the 225 m² heterogeneous region surrounding locations 62 and 65 is 50.9892 pCi/m²/s. Therefore the site-wide weighted average flux from both regions would be 0.3689 pCi/m²/s as calculated in Attachment F, Table 6c. This result is still well within the established standard specified in 40 CFR 61, Subpart Q.

All individual measurement results and maps of measurement locations are provided in Attachment F. As in previous years, these results are 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*.

40 CFR 61, Appendix B to Part 61. *Test Methods*.

ATTACHMENT A

ANNUAL WIND EROSION EMISSION CALCULATION

A.1 ANNUAL WIND EROSION

In 2019, 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 2019 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:

$U_{a1} = 38$	$U_{a2} = 22$	$U_{a3} = 25$	$U_{a4} = 30$	$U_{a5} = 48$	$U_{a6} = 22$
$U_{a7} = 26$	$U_{a8} = 32$	$U_{a9} = 25$	$U_{a10} = 25$	$U_{a11} = 22$	$U_{a12} = 28$
$U_{a13} = 31$	$U_{a14} = 31$	$U_{a15} = 26$	$U_{a16} = 33$	$U_{a17} = 23$	$U_{a18} = 21$
$U_{a19} = 26$	$U_{a20} = 24$	$U_{a21} = 30$	$U_{a22} = 30$	$U_{a23} = 32$	$U_{a24} = 25$
$U_{a25} = 28$	$U_{a26} = 32$	$U_{a27} = 38$			

^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	6.78E-01	U ₂₁	9.24E-01
U ₂	6.78E-01	U ₁₂	8.62E-01	U ₂₂	9.24E-01
U ₃	7.70E-01	U ₁₃	9.55E-01	U ₂₃	9.86E-01
U ₄	9.24E-01	U ₁₄	9.55E-01	U ₂₄	7.70E-01
U ₅	1.48E+00	U ₁₅	8.01E-01	U ₂₅	8.62E-01
U ₆	6.78E-01	U ₁₆	1.02E+00	U ₂₆	9.86E-01
U ₇	8.01E-01	U ₁₇	7.08E-01	U ₂₇	1.17E+00
U ₈	9.86E-01	U ₁₈	6.47E-01		
U ₉	7.70E-01	U ₁₉	8.01E-01		
U ₁₀	7.70E-01	U ₂₀	7.39E-01		

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

$$P_N = 58 (U^* - U_t)^2 + 25(U^* - U_t) = 33.80 \text{ g/m}^2$$

The erosion potentials (P_N) for each period between disturbances are all less than or equal to the threshold friction velocity except for U₁, U₅, and U₂₇.

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:

$$P = k \sum P_N = 16.90 \text{ g/m}^2$$

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:

$$PM_{10} = P(1-V) / (PE/50)^2 = 0.35 \text{ g/m}^2/\text{yr}$$

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

$$E = A (PM_{10}) = 272,346 \text{ g soil}$$

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.
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- 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 NESHAP 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 2019 NESHAP 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 NESHAP 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 NESHAP 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 2019

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	3.54E-06	Th-232	0.8	2.18E-07	U-235	1.1	3.00E-07
Th-234			Ra-228			Th-231		
Pa-234m			Ac-228			Pa-231		
Pa-234			Th-228	0.9	2.45E-07	Ac-227		
U-234	12.5	3.40E-06	Ra-224			Th-227		
Th-230	5.5	1.50E-06	Rn-220			Fr-223		
Ra-226	6.9	1.88E-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.

ATTACHMENT C
CAPP88-PC REPORTS – INDIVIDUAL

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Fri May 29 09:43:48 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Adult

Comments: NFSS Technical Memo 2019 Year
Individual Dose

Dataset Name: NFSS2019 Ind Adu
Dataset Date: May 29, 2020 09:43 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.54E-04
UB_Wall	1.70E-04
Bone_Sur	5.34E-03
Brain	1.62E-04
Breasts	1.77E-04
St_Wall	1.64E-04
SI_Wall	1.63E-04
ULI_Wall	1.72E-04
LLI_Wall	1.95E-04
Kidneys	3.09E-04
Liver	2.53E-04
Muscle	1.83E-04
Ovaries	1.82E-04
Pancreas	1.55E-04
R_Marrow	4.20E-04
Skin	2.49E-03
Spleen	1.67E-04
Testes	2.07E-04
Thymus	1.63E-04
Thyroid	1.70E-04
GB_Wall	1.56E-04
Ht_Wall	1.62E-04
Uterus	1.61E-04
ET_Reg	7.45E-04
Lung_66	2.20E-03
Effectiv	5.31E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	5.49E-05
INHALATION	2.99E-04
AIR IMMERSION	8.67E-11
GROUND SURFACE	1.76E-04
INTERNAL	3.54E-04
EXTERNAL	1.76E-04
TOTAL	5.31E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	4.67E-05
Th-234	1.26E-06
Pa-234m	1.72E-05
Pa-234	3.39E-07
U-234	5.38E-05
Th-230	1.13E-04
Ra-226	6.34E-05
Rn-222	3.03E-08
Po-218	5.41E-13
Pb-214	1.98E-05
At-218	2.03E-12
Bi-214	1.16E-04
Rn-218	1.18E-14
Po-214	6.40E-09
Tl-210	4.51E-08
Pb-210	9.73E-08
Bi-210	1.57E-06
Hg-206	1.27E-13
Po-210	4.08E-10
Tl-206	3.67E-12
Th-232	2.97E-05
Ra-228	5.81E-09
Ac-228	6.63E-06
Th-228	4.40E-05
Ra-224	7.89E-08
Rn-220	4.84E-09
Po-216	1.17E-10
Pb-212	1.06E-06
Bi-212	1.24E-06
Po-212	0.00E+00
Tl-208	8.57E-06
U-235	6.18E-06
Th-231	1.98E-07
Pa-231	3.28E-10
Ac-227	1.10E-12
Th-227	5.26E-10
Fr-223	4.96E-12
Ra-223	5.88E-10
Rn-219	2.54E-10
At-219	0.00E+00
Bi-215	1.15E-15
Po-215	7.77E-13
Pb-211	5.00E-10
Bi-211	2.06E-10
Tl-207	2.59E-10
Po-211	9.91E-14
TOTAL	5.31E-04

CANCER RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Cancer	

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.80E-11
INHALATION	8.76E-11
AIR IMMERSION	4.60E-17
GROUND SURFACE	8.65E-11
INTERNAL	1.26E-10
EXTERNAL	8.65E-11
TOTAL	2.12E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	1.46E-11
Th-234	6.50E-13
Pa-234m	3.01E-12
Pa-234	1.84E-13
U-234	1.84E-11
Th-230	2.45E-11
Ra-226	4.50E-11
Rn-222	1.65E-14
Po-218	2.42E-19
Pb-214	1.06E-11
At-218	2.51E-19
Bi-214	6.10E-11
Rn-218	6.44E-21
Po-214	3.51E-15
Tl-210	2.41E-14
Pb-210	4.36E-14
Bi-210	1.74E-13
Hg-206	5.63E-20
Po-210	2.24E-16
Tl-206	4.13E-19
Th-232	6.31E-12
Ra-228	1.76E-15
Ac-228	3.53E-12
Th-228	1.58E-11
Ra-224	4.29E-14
Rn-220	2.65E-15
Po-216	6.42E-17
Pb-212	5.79E-13
Bi-212	4.79E-13
Po-212	0.00E+00
Tl-208	4.66E-12
U-235	2.38E-12
Th-231	9.04E-14
Pa-231	1.71E-16
Ac-227	4.12E-19
Th-227	2.85E-16
Fr-223	1.85E-18
Ra-223	3.17E-16
Rn-219	1.39E-16
At-219	0.00E+00
Bi-215	5.11E-22
Po-215	4.26E-19
Pb-211	1.79E-16
Bi-211	1.12E-16
Tl-207	3.33E-17
Po-211	5.43E-20
TOTAL	2.12E-10

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	3.8E-04	1.6E-04	1.2E-04	9.0E-05	7.6E-05	6.0E-05	3.1E-05
NNW	3.0E-04	1.2E-04	8.8E-05	6.0E-05	4.8E-05	3.4E-05	1.4E-05
NW	3.0E-04	1.1E-04	8.0E-05	5.9E-05	4.9E-05	3.9E-05	2.0E-05
WNW	3.2E-04	1.6E-04	1.2E-04	8.6E-05	7.0E-05	5.3E-05	2.4E-05
W	3.5E-04	1.8E-04	1.4E-04	1.0E-04	8.8E-05	7.0E-05	3.8E-05
WSW	3.5E-04	1.8E-04	1.3E-04	9.1E-05	7.4E-05	5.5E-05	2.5E-05
SW	3.2E-04	1.3E-04	9.8E-05	7.2E-05	6.1E-05	4.8E-05	2.5E-05
SSW	2.9E-04	1.3E-04	9.7E-05	6.8E-05	5.5E-05	4.1E-05	1.8E-05
S	3.1E-04	1.3E-04	1.0E-04	7.5E-05	6.3E-05	5.0E-05	2.6E-05
SSE	3.6E-04	1.7E-04	1.2E-04	8.8E-05	7.2E-05	5.3E-05	2.4E-05
SSE	4.1E-04	1.8E-04	1.4E-04	1.0E-04	8.6E-05	6.8E-05	3.5E-05
ESE	4.5E-04	2.1E-04	1.6E-04	1.1E-04	9.3E-05	7.0E-05	3.2E-05
E	5.1E-04	2.2E-04	1.6E-04	1.2E-04	9.9E-05	7.6E-05	3.7E-05
ENE	5.3E-04	2.6E-04	1.9E-04	1.3E-04	1.1E-04	8.1E-05	3.5E-05
NE	5.3E-04	2.5E-04	1.9E-04	1.4E-04	1.2E-04	9.6E-05	4.9E-05
NNE	4.7E-04	2.4E-04	1.8E-04	1.3E-04	1.0E-04	7.7E-05	3.4E-05
Direction	Distance (m)						
	2629						
N	2.9E-05						
NNW	1.3E-05						
NW	1.9E-05						
WNW	2.3E-05						
W	3.5E-05						
WSW	2.3E-05						
SW	2.3E-05						
SSW	1.7E-05						
S	2.5E-05						
SSE	2.3E-05						
SSE	3.2E-05						
ESE	3.0E-05						
E	3.5E-05						
ENE	3.3E-05						
NE	4.6E-05						
NNE	3.2E-05						

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	1.5E-10	6.5E-11	5.0E-11	3.8E-11	3.2E-11	2.6E-11	1.5E-11
NNW	1.2E-10	5.0E-11	3.7E-11	2.6E-11	2.1E-11	1.6E-11	7.7E-12
NW	1.2E-10	4.4E-11	3.4E-11	2.6E-11	2.2E-11	1.8E-11	1.0E-11
WNW	1.3E-10	6.7E-11	5.0E-11	3.6E-11	3.0E-11	2.3E-11	1.2E-11
W	1.4E-10	7.2E-11	5.6E-11	4.3E-11	3.7E-11	3.0E-11	1.7E-11
WSW	1.4E-10	7.2E-11	5.4E-11	3.9E-11	3.2E-11	2.4E-11	1.2E-11
SW	1.3E-10	5.3E-11	4.1E-11	3.1E-11	2.6E-11	2.1E-11	1.2E-11
SSW	1.2E-10	5.4E-11	4.1E-11	2.9E-11	2.4E-11	1.8E-11	9.5E-12
S	1.3E-10	5.4E-11	4.2E-11	3.2E-11	2.7E-11	2.2E-11	1.3E-11
SSE	1.4E-10	6.9E-11	5.2E-11	3.7E-11	3.1E-11	2.4E-11	1.2E-11
SSE	1.6E-10	7.5E-11	5.8E-11	4.3E-11	3.7E-11	2.9E-11	1.6E-11
ESE	1.8E-10	8.7E-11	6.6E-11	4.8E-11	3.9E-11	3.0E-11	1.5E-11
E	2.0E-10	8.8E-11	6.7E-11	5.0E-11	4.2E-11	3.3E-11	1.7E-11
ENE	2.1E-10	1.0E-10	7.8E-11	5.6E-11	4.6E-11	3.5E-11	1.6E-11
NE	2.1E-10	1.0E-10	7.9E-11	6.0E-11	5.1E-11	4.1E-11	2.2E-11
NNE	1.9E-10	9.8E-11	7.3E-11	5.3E-11	4.3E-11	3.3E-11	1.6E-11

Direction	Distance (m)						
	2629						
N	1.4E-11						
NNW	7.4E-12						
NW	9.8E-12						
WNW	1.1E-11						
W	1.6E-11						
WSW	1.1E-11						
SW	1.1E-11						
SSW	9.1E-12						
S	1.2E-11						
SSE	1.1E-11						
SSE	1.5E-11						
ESE	1.4E-11						
E	1.6E-11						
ENE	1.5E-11						
NE	2.1E-11						
NNE	1.5E-11						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Fri May 29 09:46:02 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Fifteen

Comments: NFSS Technical Memo 2019 Year
Individual Dose

Dataset Name: NFSS2019 Ind Fif
Dataset Date: May 29, 2020 09:45 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.57E-04
UB_Wall	1.72E-04
Bone_Sur	1.47E-02
Brain	1.66E-04
Breasts	1.80E-04
St_Wall	1.67E-04
SI_Wall	1.66E-04
ULI_Wall	1.75E-04
LLI_Wall	1.99E-04
Kidneys	3.31E-04
Liver	2.72E-04
Muscle	1.86E-04
Ovaries	1.89E-04
Pancreas	1.58E-04
R_Marrow	7.80E-04
Skin	2.49E-03
Spleen	1.82E-04
Testes	2.13E-04
Thymus	1.66E-04
Thyroid	1.73E-04
GB_Wall	1.59E-04
Ht_Wall	1.65E-04
Uterus	1.64E-04
ET_Reg	7.79E-04
Lung_66	2.51E-03
Effectiv	7.10E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	1.88E-04
INHALATION	3.46E-04
AIR IMMERSION	8.67E-11
GROUND SURFACE	1.76E-04
INTERNAL	5.33E-04
EXTERNAL	1.76E-04
TOTAL	7.10E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	5.70E-05
Th-234	1.26E-06
Pa-234m	1.72E-05
Pa-234	3.39E-07
U-234	6.60E-05
Th-230	1.19E-04
Ra-226	2.04E-04
Rn-222	3.03E-08
Po-218	5.41E-13
Pb-214	1.98E-05
At-218	2.03E-12
Bi-214	1.16E-04
Rn-218	1.18E-14
Po-214	6.40E-09
Tl-210	4.51E-08
Pb-210	9.73E-08
Bi-210	1.57E-06
Hg-206	1.27E-13
Po-210	4.08E-10
Tl-206	3.67E-12
Th-232	3.05E-05
Ra-228	5.85E-09
Ac-228	6.63E-06
Th-228	5.22E-05
Ra-224	7.93E-08
Rn-220	4.84E-09
Po-216	1.17E-10
Pb-212	1.06E-06
Bi-212	1.24E-06
Po-212	0.00E+00
Tl-208	8.57E-06
U-235	7.13E-06
Th-231	1.98E-07
Pa-231	3.28E-10
Ac-227	1.10E-12
Th-227	5.26E-10
Fr-223	4.96E-12
Ra-223	5.88E-10
Rn-219	2.54E-10
At-219	0.00E+00
Bi-215	1.15E-15
Po-215	7.77E-13
Pb-211	5.00E-10
Bi-211	2.06E-10
Tl-207	2.59E-10
Po-211	9.91E-14
TOTAL	7.10E-04

CANCER RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Cancer	

PATHWAY RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Pathway	
INGESTION	2.37E-11
INHALATION	3.26E-11
AIR IMMERSION	4.60E-17
GROUND SURFACE	8.65E-11
INTERNAL	5.64E-11
EXTERNAL	8.65E-11
TOTAL	1.43E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	6.08E-12
Th-234	6.50E-13
Pa-234m	3.01E-12
Pa-234	1.84E-13
U-234	7.92E-12
Th-230	8.20E-12
Ra-226	2.63E-11
Rn-222	1.65E-14
Po-218	2.42E-19
Pb-214	1.06E-11
At-218	2.51E-19
Bi-214	6.10E-11
Rn-218	6.44E-21
Po-214	3.51E-15
Tl-210	2.41E-14
Pb-210	4.36E-14
Bi-210	1.74E-13
Hg-206	5.63E-20
Po-210	2.24E-16
Tl-206	4.13E-19
Th-232	1.85E-12
Ra-228	1.76E-15
Ac-228	3.53E-12
Th-228	5.87E-12
Ra-224	4.25E-14
Rn-220	2.65E-15
Po-216	6.42E-17
Pb-212	5.79E-13
Bi-212	4.79E-13
Po-212	0.00E+00
Tl-208	4.66E-12
U-235	1.60E-12
Th-231	9.04E-14
Pa-231	1.71E-16
Ac-227	4.12E-19
Th-227	2.85E-16
Fr-223	1.85E-18
Ra-223	3.17E-16
Rn-219	1.39E-16
At-219	0.00E+00
Bi-215	5.11E-22
Po-215	4.26E-19
Pb-211	1.79E-16
Bi-211	1.12E-16
Tl-207	3.33E-17
Po-211	5.43E-20
TOTAL	1.43E-10

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	5.1E-04	2.2E-04	1.7E-04	1.3E-04	1.1E-04	9.4E-05	5.7E-05
NNW	4.1E-04	1.7E-04	1.3E-04	9.5E-05	7.8E-05	6.1E-05	3.4E-05
NW	4.1E-04	1.5E-04	1.2E-04	9.3E-05	8.0E-05	6.6E-05	4.2E-05
WNW	4.4E-04	2.3E-04	1.7E-04	1.3E-04	1.1E-04	8.5E-05	4.7E-05
W	4.8E-04	2.5E-04	1.9E-04	1.5E-04	1.3E-04	1.1E-04	6.5E-05
WSW	4.7E-04	2.5E-04	1.9E-04	1.4E-04	1.1E-04	8.8E-05	4.8E-05
SW	4.4E-04	1.8E-04	1.4E-04	1.1E-04	9.5E-05	7.8E-05	4.8E-05
SSW	4.0E-04	1.9E-04	1.4E-04	1.0E-04	8.8E-05	6.9E-05	4.0E-05
S	4.3E-04	1.9E-04	1.5E-04	1.1E-04	9.8E-05	8.1E-05	5.0E-05
SSE	4.8E-04	2.4E-04	1.8E-04	1.3E-04	1.1E-04	8.6E-05	4.7E-05
SSE	5.5E-04	2.6E-04	2.0E-04	1.5E-04	1.3E-04	1.1E-04	6.1E-05
ESE	6.0E-04	3.0E-04	2.2E-04	1.7E-04	1.4E-04	1.1E-04	5.8E-05
E	6.8E-04	3.0E-04	2.3E-04	1.7E-04	1.5E-04	1.2E-04	6.5E-05
ENE	7.1E-04	3.5E-04	2.6E-04	1.9E-04	1.6E-04	1.2E-04	6.2E-05
NE	7.0E-04	3.5E-04	2.7E-04	2.0E-04	1.7E-04	1.4E-04	8.0E-05
NNE	6.3E-04	3.3E-04	2.5E-04	1.8E-04	1.5E-04	1.2E-04	6.1E-05
Direction	Distance (m)						
	2629						
N	5.4E-05						
NNW	3.3E-05						
NW	4.1E-05						
WNW	4.5E-05						
W	6.2E-05						
WSW	4.6E-05						
SW	4.6E-05						
SSW	3.9E-05						
S	4.8E-05						
SSE	4.5E-05						
SSE	5.8E-05						
ESE	5.5E-05						
E	6.1E-05						
ENE	5.9E-05						
NE	7.6E-05						
NNE	5.8E-05						

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	1.0E-10	4.4E-11	3.4E-11	2.6E-11	2.2E-11	1.8E-11	1.0E-11
NNW	8.2E-11	3.4E-11	2.5E-11	1.8E-11	1.4E-11	1.1E-11	5.2E-12
NW	8.1E-11	3.0E-11	2.3E-11	1.7E-11	1.5E-11	1.2E-11	7.0E-12
WNW	8.7E-11	4.6E-11	3.4E-11	2.5E-11	2.1E-11	1.6E-11	8.1E-12
W	9.6E-11	4.9E-11	3.8E-11	2.9E-11	2.5E-11	2.1E-11	1.2E-11
WSW	9.5E-11	4.9E-11	3.6E-11	2.6E-11	2.2E-11	1.7E-11	8.3E-12
SW	8.8E-11	3.6E-11	2.8E-11	2.1E-11	1.8E-11	1.5E-11	8.3E-12
SSW	7.9E-11	3.7E-11	2.8E-11	2.0E-11	1.6E-11	1.3E-11	6.5E-12
S	8.5E-11	3.7E-11	2.9E-11	2.2E-11	1.9E-11	1.5E-11	8.8E-12
SSE	9.6E-11	4.7E-11	3.5E-11	2.6E-11	2.1E-11	1.6E-11	8.1E-12
SSE	1.1E-10	5.1E-11	4.0E-11	3.0E-11	2.5E-11	2.0E-11	1.1E-11
ESE	1.2E-10	5.9E-11	4.5E-11	3.3E-11	2.7E-11	2.1E-11	1.0E-11
E	1.4E-10	6.0E-11	4.6E-11	3.4E-11	2.9E-11	2.2E-11	1.2E-11
ENE	1.4E-10	7.1E-11	5.3E-11	3.8E-11	3.1E-11	2.4E-11	1.1E-11
NE	1.4E-10	7.0E-11	5.4E-11	4.1E-11	3.5E-11	2.8E-11	1.5E-11
NNE	1.3E-10	6.7E-11	5.0E-11	3.6E-11	3.0E-11	2.3E-11	1.1E-11

Direction	Distance (m)						
	2629						
N	9.6E-12						
NNW	5.1E-12						
NW	6.7E-12						
WNW	7.7E-12						
W	1.1E-11						
WSW	7.8E-12						
SW	7.9E-12						
SSW	6.2E-12						
S	8.3E-12						
SSE	7.7E-12						
SSE	1.1E-11						
ESE	9.8E-12						
E	1.1E-11						
ENE	1.1E-11						
NE	1.4E-11						
NNE	1.0E-11						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Fri May 29 09:48:33 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Ten

Comments: NFSS Technical Memo 2019 Year
Individual Dose

Dataset Name: NFSS2019 Ind Ten
Dataset Date: May 29, 2020 09:48 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.54E-04
UB_Wall	1.70E-04
Bone_Sur	6.21E-03
Brain	1.63E-04
Breasts	1.78E-04
St_Wall	1.65E-04
SI_Wall	1.64E-04
ULI_Wall	1.77E-04
LLI_Wall	2.09E-04
Kidneys	3.05E-04
Liver	2.62E-04
Muscle	1.83E-04
Ovaries	1.80E-04
Pancreas	1.55E-04
R_Marrow	5.07E-04
Skin	2.49E-03
Spleen	1.71E-04
Testes	2.05E-04
Thymus	1.63E-04
Thyroid	1.70E-04
GB_Wall	1.57E-04
Ht_Wall	1.63E-04
Uterus	1.61E-04
ET_Reg	9.98E-04
Lung_66	2.20E-03
Effectiv	5.52E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	8.90E-05
INHALATION	2.87E-04
AIR IMMERSION	8.67E-11
GROUND SURFACE	1.76E-04
INTERNAL	3.76E-04
EXTERNAL	1.76E-04
TOTAL	5.52E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	4.87E-05
Th-234	1.26E-06
Pa-234m	1.72E-05
Pa-234	3.39E-07
U-234	5.61E-05
Th-230	9.59E-05
Ra-226	1.02E-04
Rn-222	3.03E-08
Po-218	5.41E-13
Pb-214	1.98E-05
At-218	2.03E-12
Bi-214	1.16E-04
Rn-218	1.18E-14
Po-214	6.40E-09
Tl-210	4.51E-08
Pb-210	9.73E-08
Bi-210	1.57E-06
Hg-206	1.27E-13
Po-210	4.08E-10
Tl-206	3.67E-12
Th-232	2.31E-05
Ra-228	5.83E-09
Ac-228	6.63E-06
Th-228	4.67E-05
Ra-224	7.90E-08
Rn-220	4.84E-09
Po-216	1.17E-10
Pb-212	1.06E-06
Bi-212	1.24E-06
Po-212	0.00E+00
Tl-208	8.57E-06
U-235	6.37E-06
Th-231	1.98E-07
Pa-231	3.28E-10
Ac-227	1.10E-12
Th-227	5.26E-10
Fr-223	4.96E-12
Ra-223	5.88E-10
Rn-219	2.54E-10
At-219	0.00E+00
Bi-215	1.15E-15
Po-215	7.77E-13
Pb-211	5.00E-10
Bi-211	2.06E-10
Tl-207	2.59E-10
Po-211	9.91E-14
TOTAL	5.52E-04

CANCER RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Cancer	

PATHWAY RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Pathway	
INGESTION	1.37E-12
INHALATION	4.53E-11
AIR IMMERSION	4.60E-17
GROUND SURFACE	8.65E-11
INTERNAL	4.67E-11
EXTERNAL	8.65E-11
TOTAL	1.33E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	7.91E-12
Th-234	6.50E-13
Pa-234m	3.01E-12
Pa-234	1.84E-13
U-234	1.02E-11
Th-230	1.15E-11
Ra-226	5.41E-12
Rn-222	1.65E-14
Po-218	2.42E-19
Pb-214	1.06E-11
At-218	2.51E-19
Bi-214	6.10E-11
Rn-218	6.44E-21
Po-214	3.51E-15
Tl-210	2.41E-14
Pb-210	4.36E-14
Bi-210	1.74E-13
Hg-206	5.63E-20
Po-210	2.24E-16
Tl-206	4.13E-19
Th-232	2.44E-12
Ra-228	1.76E-15
Ac-228	3.53E-12
Th-228	8.73E-12
Ra-224	4.26E-14
Rn-220	2.65E-15
Po-216	6.42E-17
Pb-212	5.79E-13
Bi-212	4.79E-13
Po-212	0.00E+00
Tl-208	4.66E-12
U-235	1.86E-12
Th-231	9.04E-14
Pa-231	1.71E-16
Ac-227	4.12E-19
Th-227	2.85E-16
Fr-223	1.85E-18
Ra-223	3.17E-16
Rn-219	1.39E-16
At-219	0.00E+00
Bi-215	5.11E-22
Po-215	4.26E-19
Pb-211	1.79E-16
Bi-211	1.12E-16
Tl-207	3.33E-17
Po-211	5.43E-20
TOTAL	1.33E-10

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	4.0E-04	1.7E-04	1.3E-04	9.8E-05	8.3E-05	6.7E-05	3.8E-05
NNW	3.2E-04	1.3E-04	9.6E-05	6.8E-05	5.5E-05	4.1E-05	2.0E-05
NW	3.2E-04	1.1E-04	8.8E-05	6.6E-05	5.6E-05	4.5E-05	2.6E-05
WNW	3.4E-04	1.7E-04	1.3E-04	9.4E-05	7.8E-05	6.0E-05	3.0E-05
W	3.7E-04	1.9E-04	1.5E-04	1.1E-04	9.6E-05	7.8E-05	4.4E-05
WSW	3.7E-04	1.9E-04	1.4E-04	1.0E-04	8.2E-05	6.3E-05	3.1E-05
SW	3.4E-04	1.4E-04	1.1E-04	8.0E-05	6.8E-05	5.5E-05	3.1E-05
SSW	3.1E-04	1.4E-04	1.1E-04	7.6E-05	6.2E-05	4.8E-05	2.4E-05
S	3.3E-04	1.4E-04	1.1E-04	8.2E-05	7.0E-05	5.7E-05	3.3E-05
SSE	3.7E-04	1.8E-04	1.3E-04	9.7E-05	7.9E-05	6.1E-05	3.0E-05
SSE	4.2E-04	1.9E-04	1.5E-04	1.1E-04	9.5E-05	7.6E-05	4.1E-05
ESE	4.7E-04	2.3E-04	1.7E-04	1.2E-04	1.0E-04	7.8E-05	3.8E-05
E	5.3E-04	2.3E-04	1.7E-04	1.3E-04	1.1E-04	8.4E-05	4.4E-05
ENE	5.5E-04	2.7E-04	2.0E-04	1.4E-04	1.2E-04	8.9E-05	4.2E-05
NE	5.5E-04	2.7E-04	2.0E-04	1.5E-04	1.3E-04	1.0E-04	5.6E-05
NNE	4.9E-04	2.5E-04	1.9E-04	1.4E-04	1.1E-04	8.5E-05	4.1E-05
Direction	Distance (m)						
	2629						
N	3.6E-05						
NNW	1.9E-05						
NW	2.5E-05						
WNW	2.9E-05						
W	4.2E-05						
WSW	2.9E-05						
SW	3.0E-05						
SSW	2.3E-05						
S	3.1E-05						
SSE	2.9E-05						
SSE	3.9E-05						
ESE	3.6E-05						
E	4.1E-05						
ENE	4.0E-05						
NE	5.3E-05						
NNE	3.9E-05						

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	9.5E-11	3.9E-11	3.0E-11	2.2E-11	1.8E-11	1.4E-11	6.9E-12
NNW	7.5E-11	3.0E-11	2.1E-11	1.4E-11	1.1E-11	7.5E-12	2.3E-12
NW	7.5E-11	2.6E-11	1.9E-11	1.4E-11	1.1E-11	8.7E-12	3.9E-12
WNW	8.0E-11	4.1E-11	3.0E-11	2.1E-11	1.7E-11	1.2E-11	4.9E-12
W	8.8E-11	4.4E-11	3.4E-11	2.5E-11	2.1E-11	1.7E-11	8.5E-12
WSW	8.7E-11	4.3E-11	3.2E-11	2.2E-11	1.8E-11	1.3E-11	5.1E-12
SW	8.1E-11	3.1E-11	2.4E-11	1.7E-11	1.4E-11	1.1E-11	5.1E-12
SSW	7.3E-11	3.2E-11	2.3E-11	1.6E-11	1.3E-11	9.3E-12	3.4E-12
S	7.8E-11	3.2E-11	2.4E-11	1.8E-11	1.5E-11	1.2E-11	5.5E-12
SSE	8.9E-11	4.2E-11	3.1E-11	2.1E-11	1.7E-11	1.3E-11	4.9E-12
SSE	1.0E-10	4.6E-11	3.5E-11	2.5E-11	2.1E-11	1.6E-11	7.8E-12
ESE	1.1E-10	5.3E-11	4.0E-11	2.8E-11	2.3E-11	1.7E-11	7.0E-12
E	1.3E-10	5.4E-11	4.1E-11	2.9E-11	2.4E-11	1.8E-11	8.4E-12
ENE	1.3E-10	6.4E-11	4.7E-11	3.3E-11	2.7E-11	2.0E-11	7.9E-12
NE	1.3E-10	6.3E-11	4.8E-11	3.6E-11	3.0E-11	2.4E-11	1.2E-11
NNE	1.2E-10	6.0E-11	4.4E-11	3.1E-11	2.5E-11	1.9E-11	7.6E-12

Direction	Distance (m)						
	2629						
N	6.4E-12						
NNW	2.1E-12						
NW	3.6E-12						
WNW	4.5E-12						
W	7.9E-12						
WSW	4.7E-12						
SW	4.8E-12						
SSW	3.2E-12						
S	5.1E-12						
SSE	4.6E-12						
SSE	7.2E-12						
ESE	6.5E-12						
E	7.8E-12						
ENE	7.3E-12						
NE	1.1E-11						
NNE	7.0E-12						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Fri May 29 09:46:36 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Five

Comments: NFSS Technical Memo 2019 Year
Individual Dose

Dataset Name: NFSS2019 Ind Fiv
Dataset Date: May 29, 2020 09:46 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.56E-04
UB_Wall	1.72E-04
Bone_Sur	3.81E-03
Brain	1.65E-04
Breasts	1.80E-04
St_Wall	1.67E-04
SI_Wall	1.67E-04
ULI_Wall	1.84E-04
LLI_Wall	2.28E-04
Kidneys	3.17E-04
Liver	2.75E-04
Muscle	1.85E-04
Ovaries	1.80E-04
Pancreas	1.58E-04
R_Marrow	4.15E-04
Skin	2.49E-03
Spleen	1.70E-04
Testes	2.04E-04
Thymus	1.65E-04
Thyroid	1.72E-04
GB_Wall	1.59E-04
Ht_Wall	1.65E-04
Uterus	1.63E-04
ET_Reg	1.00E-03
Lung_66	2.34E-03
Effectiv	5.37E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	6.43E-05
INHALATION	2.96E-04
AIR IMMERSION	8.67E-11
GROUND SURFACE	1.76E-04
INTERNAL	3.61E-04
EXTERNAL	1.76E-04
TOTAL	5.37E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	5.12E-05
Th-234	1.26E-06
Pa-234m	1.72E-05
Pa-234	3.39E-07
U-234	5.80E-05
Th-230	9.87E-05
Ra-226	7.67E-05
Rn-222	3.03E-08
Po-218	5.41E-13
Pb-214	1.98E-05
At-218	2.03E-12
Bi-214	1.16E-04
Rn-218	1.18E-14
Po-214	6.40E-09
Tl-210	4.51E-08
Pb-210	9.73E-08
Bi-210	1.57E-06
Hg-206	1.27E-13
Po-210	4.08E-10
Tl-206	3.67E-12
Th-232	2.27E-05
Ra-228	5.83E-09
Ac-228	6.63E-06
Th-228	4.95E-05
Ra-224	7.88E-08
Rn-220	4.84E-09
Po-216	1.17E-10
Pb-212	1.06E-06
Bi-212	1.24E-06
Po-212	0.00E+00
Tl-208	8.57E-06
U-235	6.56E-06
Th-231	1.98E-07
Pa-231	3.28E-10
Ac-227	1.10E-12
Th-227	5.26E-10
Fr-223	4.96E-12
Ra-223	5.88E-10
Rn-219	2.54E-10
At-219	0.00E+00
Bi-215	1.15E-15
Po-215	7.77E-13
Pb-211	5.00E-10
Bi-211	2.06E-10
Tl-207	2.59E-10
Po-211	9.91E-14
TOTAL	5.37E-04

CANCER RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Cancer	

PATHWAY RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Pathway	
INGESTION	8.71E-13
INHALATION	3.25E-11
AIR IMMERSION	4.60E-17
GROUND SURFACE	8.65E-11
INTERNAL	3.34E-11
EXTERNAL	8.65E-11
TOTAL	1.20E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	5.68E-12
Th-234	6.50E-13
Pa-234m	3.01E-12
Pa-234	1.84E-13
U-234	7.27E-12
Th-230	8.26E-12
Ra-226	3.96E-12
Rn-222	1.65E-14
Po-218	2.42E-19
Pb-214	1.06E-11
At-218	2.51E-19
Bi-214	6.10E-11
Rn-218	6.44E-21
Po-214	3.51E-15
Tl-210	2.41E-14
Pb-210	4.36E-14
Bi-210	1.74E-13
Hg-206	5.63E-20
Po-210	2.24E-16
Tl-206	4.13E-19
Th-232	1.75E-12
Ra-228	1.76E-15
Ac-228	3.53E-12
Th-228	6.25E-12
Ra-224	4.25E-14
Rn-220	2.65E-15
Po-216	6.42E-17
Pb-212	5.79E-13
Bi-212	4.79E-13
Po-212	0.00E+00
Tl-208	4.66E-12
U-235	1.62E-12
Th-231	9.04E-14
Pa-231	1.71E-16
Ac-227	4.12E-19
Th-227	2.85E-16
Fr-223	1.85E-18
Ra-223	3.17E-16
Rn-219	1.39E-16
At-219	0.00E+00
Bi-215	5.11E-22
Po-215	4.26E-19
Pb-211	1.79E-16
Bi-211	1.12E-16
Tl-207	3.33E-17
Po-211	5.43E-20
TOTAL	1.20E-10

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	3.8E-04	1.6E-04	1.2E-04	9.3E-05	7.8E-05	6.3E-05	3.4E-05
NNW	3.1E-04	1.2E-04	9.1E-05	6.3E-05	5.0E-05	3.7E-05	1.6E-05
NW	3.1E-04	1.1E-04	8.3E-05	6.2E-05	5.2E-05	4.1E-05	2.3E-05
WNW	3.3E-04	1.7E-04	1.2E-04	8.9E-05	7.3E-05	5.5E-05	2.6E-05
W	3.6E-04	1.8E-04	1.4E-04	1.1E-04	9.0E-05	7.3E-05	4.0E-05
WSW	3.5E-04	1.8E-04	1.3E-04	9.4E-05	7.7E-05	5.8E-05	2.7E-05
SW	3.3E-04	1.3E-04	1.0E-04	7.5E-05	6.3E-05	5.0E-05	2.7E-05
SSW	3.0E-04	1.3E-04	1.0E-04	7.1E-05	5.8E-05	4.3E-05	2.1E-05
S	3.2E-04	1.3E-04	1.0E-04	7.7E-05	6.5E-05	5.2E-05	2.9E-05
SSE	3.6E-04	1.7E-04	1.3E-04	9.1E-05	7.4E-05	5.6E-05	2.6E-05
SSE	4.1E-04	1.9E-04	1.4E-04	1.1E-04	8.9E-05	7.1E-05	3.7E-05
ESE	4.5E-04	2.2E-04	1.6E-04	1.2E-04	9.6E-05	7.3E-05	3.4E-05
E	5.1E-04	2.2E-04	1.7E-04	1.2E-04	1.0E-04	7.9E-05	4.0E-05
ENE	5.4E-04	2.6E-04	1.9E-04	1.4E-04	1.1E-04	8.4E-05	3.8E-05
NE	5.3E-04	2.6E-04	2.0E-04	1.5E-04	1.2E-04	9.9E-05	5.2E-05
NNE	4.7E-04	2.5E-04	1.8E-04	1.3E-04	1.1E-04	8.0E-05	3.7E-05
Direction	Distance (m)						
	2629						
N	3.2E-05						
NNW	1.6E-05						
NW	2.2E-05						
WNW	2.5E-05						
W	3.8E-05						
WSW	2.6E-05						
SW	2.6E-05						
SSW	2.0E-05						
S	2.7E-05						
SSE	2.5E-05						
SSE	3.5E-05						
ESE	3.2E-05						
E	3.7E-05						
ENE	3.6E-05						
NE	4.8E-05						
NNE	3.4E-05						

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	8.5E-11	3.5E-11	2.7E-11	2.0E-11	1.6E-11	1.3E-11	6.2E-12
NNW	6.7E-11	2.7E-11	1.9E-11	1.3E-11	9.9E-12	6.8E-12	2.0E-12
NW	6.7E-11	2.3E-11	1.7E-11	1.2E-11	1.0E-11	7.8E-12	3.6E-12
WNW	7.2E-11	3.7E-11	2.7E-11	1.9E-11	1.5E-11	1.1E-11	4.4E-12
W	7.9E-11	3.9E-11	3.0E-11	2.3E-11	1.9E-11	1.5E-11	7.7E-12
WSW	7.8E-11	3.9E-11	2.9E-11	2.0E-11	1.6E-11	1.2E-11	4.6E-12
SW	7.3E-11	2.8E-11	2.1E-11	1.6E-11	1.3E-11	9.9E-12	4.6E-12
SSW	6.6E-11	2.9E-11	2.1E-11	1.5E-11	1.2E-11	8.4E-12	3.1E-12
S	7.1E-11	2.9E-11	2.2E-11	1.6E-11	1.3E-11	1.0E-11	5.0E-12
SSE	8.0E-11	3.8E-11	2.8E-11	1.9E-11	1.6E-11	1.1E-11	4.5E-12
SSE	9.2E-11	4.1E-11	3.1E-11	2.3E-11	1.9E-11	1.5E-11	7.0E-12
ESE	1.0E-10	4.8E-11	3.6E-11	2.5E-11	2.1E-11	1.5E-11	6.4E-12
E	1.1E-10	4.9E-11	3.7E-11	2.7E-11	2.2E-11	1.7E-11	7.6E-12
ENE	1.2E-10	5.8E-11	4.3E-11	3.0E-11	2.4E-11	1.8E-11	7.2E-12
NE	1.2E-10	5.7E-11	4.4E-11	3.2E-11	2.7E-11	2.1E-11	1.1E-11
NNE	1.1E-10	5.4E-11	4.0E-11	2.8E-11	2.3E-11	1.7E-11	6.9E-12
Direction	Distance (m)						
	2629						
N	5.8E-12						
NNW	1.9E-12						
NW	3.3E-12						
WNW	4.1E-12						
W	7.1E-12						
WSW	4.2E-12						
SW	4.3E-12						
SSW	2.9E-12						
S	4.6E-12						
SSE	4.1E-12						
SSE	6.5E-12						
ESE	5.9E-12						
E	7.0E-12						
ENE	6.7E-12						
NE	9.7E-12						
NNE	6.4E-12						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Fri May 29 09:48:11 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: One

Comments: NFSS Technical Memo 2019 Year
Individual Dose

Dataset Name: NFSS2019 Ind One
Dataset Date: May 29, 2020 09:48 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.61E-04
UB_Wall	1.77E-04
Bone_Sur	3.62E-03
Brain	1.69E-04
Breasts	1.85E-04
St_Wall	1.72E-04
SI_Wall	1.73E-04
ULI_Wall	2.01E-04
LLI_Wall	2.75E-04
Kidneys	3.55E-04
Liver	3.19E-04
Muscle	1.90E-04
Ovaries	1.80E-04
Pancreas	1.62E-04
R_Marrow	4.87E-04
Skin	2.50E-03
Spleen	1.74E-04
Testes	2.05E-04
Thymus	1.70E-04
Thyroid	1.77E-04
GB_Wall	1.63E-04
Ht_Wall	1.69E-04
Uterus	1.68E-04
ET_Reg	1.60E-03
Lung_66	2.53E-03
Effectiv	5.74E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	8.48E-05
INHALATION	3.13E-04
AIR IMMERSION	8.67E-11
GROUND SURFACE	1.76E-04
INTERNAL	3.97E-04
EXTERNAL	1.76E-04
TOTAL	5.74E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	5.74E-05
Th-234	1.26E-06
Pa-234m	1.72E-05
Pa-234	3.39E-07
U-234	6.51E-05
Th-230	9.74E-05
Ra-226	9.73E-05
Rn-222	3.03E-08
Po-218	5.41E-13
Pb-214	1.98E-05
At-218	2.03E-12
Bi-214	1.16E-04
Rn-218	1.18E-14
Po-214	6.40E-09
Tl-210	4.51E-08
Pb-210	9.73E-08
Bi-210	1.57E-06
Hg-206	1.27E-13
Po-210	4.08E-10
Tl-206	3.67E-12
Th-232	2.10E-05
Ra-228	5.84E-09
Ac-228	6.63E-06
Th-228	5.47E-05
Ra-224	7.90E-08
Rn-220	4.84E-09
Po-216	1.17E-10
Pb-212	1.06E-06
Bi-212	1.24E-06
Po-212	0.00E+00
Tl-208	8.57E-06
U-235	7.13E-06
Th-231	1.98E-07
Pa-231	3.28E-10
Ac-227	1.10E-12
Th-227	5.26E-10
Fr-223	4.96E-12
Ra-223	5.88E-10
Rn-219	2.54E-10
At-219	0.00E+00
Bi-215	1.15E-15
Po-215	7.77E-13
Pb-211	5.00E-10
Bi-211	2.06E-10
Tl-207	2.59E-10
Po-211	9.91E-14
TOTAL	5.74E-04

CANCER RISK SUMMARY

	Selected Individual
	Total Lifetime
	Fatal Cancer Risk
Cancer	

PATHWAY RISK SUMMARY

	Selected Individual
	Total Lifetime
	Fatal Cancer Risk
Pathway	
INGESTION	8.47E-12
INHALATION	1.01E-11
AIR IMMERSION	4.60E-17
GROUND SURFACE	8.65E-11
INTERNAL	1.85E-11
EXTERNAL	8.65E-11
TOTAL	1.05E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	2.53E-12
Th-234	6.50E-13
Pa-234m	3.01E-12
Pa-234	1.84E-13
U-234	2.84E-12
Th-230	2.92E-12
Ra-226	7.87E-12
Rn-222	1.65E-14
Po-218	2.42E-19
Pb-214	1.06E-11
At-218	2.51E-19
Bi-214	6.10E-11
Rn-218	6.44E-21
Po-214	3.51E-15
Tl-210	2.41E-14
Pb-210	4.36E-14
Bi-210	1.74E-13
Hg-206	5.63E-20
Po-210	2.24E-16
Tl-206	4.13E-19
Th-232	6.10E-13
Ra-228	1.76E-15
Ac-228	3.53E-12
Th-228	1.92E-12
Ra-224	4.24E-14
Rn-220	2.65E-15
Po-216	6.42E-17
Pb-212	5.79E-13
Bi-212	4.79E-13
Po-212	0.00E+00
Tl-208	4.66E-12
U-235	1.28E-12
Th-231	9.04E-14
Pa-231	1.71E-16
Ac-227	4.12E-19
Th-227	2.85E-16
Fr-223	1.85E-18
Ra-223	3.17E-16
Rn-219	1.39E-16
At-219	0.00E+00
Bi-215	5.11E-22
Po-215	4.26E-19
Pb-211	1.79E-16
Bi-211	1.12E-16
Tl-207	3.33E-17
Po-211	5.43E-20
TOTAL	1.05E-10

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	4.1E-04	1.7E-04	1.3E-04	1.0E-04	8.7E-05	7.0E-05	3.9E-05
NNW	3.3E-04	1.4E-04	1.0E-04	7.0E-05	5.7E-05	4.2E-05	2.1E-05
NW	3.3E-04	1.2E-04	9.1E-05	6.9E-05	5.9E-05	4.7E-05	2.8E-05
WNW	3.5E-04	1.8E-04	1.4E-04	9.8E-05	8.1E-05	6.2E-05	3.2E-05
W	3.8E-04	1.9E-04	1.5E-04	1.2E-04	1.0E-04	8.1E-05	4.6E-05
WSW	3.8E-04	1.9E-04	1.4E-04	1.0E-04	8.5E-05	6.5E-05	3.2E-05
SW	3.5E-04	1.4E-04	1.1E-04	8.3E-05	7.1E-05	5.7E-05	3.2E-05
SSW	3.2E-04	1.5E-04	1.1E-04	7.9E-05	6.5E-05	5.0E-05	2.6E-05
S	3.4E-04	1.5E-04	1.1E-04	8.6E-05	7.3E-05	5.9E-05	3.4E-05
SSE	3.9E-04	1.9E-04	1.4E-04	1.0E-04	8.2E-05	6.3E-05	3.2E-05
SSE	4.4E-04	2.0E-04	1.6E-04	1.2E-04	9.8E-05	7.9E-05	4.3E-05
ESE	4.8E-04	2.4E-04	1.8E-04	1.3E-04	1.1E-04	8.1E-05	4.0E-05
E	5.5E-04	2.4E-04	1.8E-04	1.3E-04	1.1E-04	8.7E-05	4.6E-05
ENE	5.7E-04	2.8E-04	2.1E-04	1.5E-04	1.2E-04	9.3E-05	4.4E-05
NE	5.7E-04	2.8E-04	2.1E-04	1.6E-04	1.4E-04	1.1E-04	5.8E-05
NNE	5.1E-04	2.6E-04	2.0E-04	1.4E-04	1.2E-04	8.8E-05	4.2E-05

Direction	Distance (m)						
	2629						
N	3.7E-05						
NNW	2.0E-05						
NW	2.6E-05						
WNW	3.0E-05						
W	4.4E-05						
WSW	3.1E-05						
SW	3.1E-05						
SSW	2.4E-05						
S	3.2E-05						
SSE	3.0E-05						
SSE	4.0E-05						
ESE	3.8E-05						
E	4.3E-05						
ENE	4.1E-05						
NE	5.5E-05						
NNE	4.0E-05						

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	7.5E-11	3.2E-11	2.5E-11	1.8E-11	1.6E-11	1.3E-11	6.7E-12
NNW	6.0E-11	2.5E-11	1.8E-11	1.2E-11	9.9E-12	7.2E-12	3.0E-12
NW	5.9E-11	2.1E-11	1.6E-11	1.2E-11	1.0E-11	8.1E-12	4.4E-12
WNW	6.4E-11	3.3E-11	2.5E-11	1.8E-11	1.4E-11	1.1E-11	5.1E-12
W	7.0E-11	3.6E-11	2.8E-11	2.1E-11	1.8E-11	1.5E-11	8.1E-12
WSW	6.9E-11	3.5E-11	2.6E-11	1.9E-11	1.5E-11	1.2E-11	5.3E-12
SW	6.4E-11	2.6E-11	2.0E-11	1.5E-11	1.3E-11	1.0E-11	5.3E-12
SSW	5.8E-11	2.7E-11	2.0E-11	1.4E-11	1.1E-11	8.6E-12	3.9E-12
S	6.2E-11	2.6E-11	2.0E-11	1.5E-11	1.3E-11	1.0E-11	5.7E-12
SSE	7.0E-11	3.4E-11	2.6E-11	1.8E-11	1.5E-11	1.1E-11	5.2E-12
SSE	8.1E-11	3.7E-11	2.9E-11	2.1E-11	1.8E-11	1.4E-11	7.5E-12
ESE	8.9E-11	4.3E-11	3.3E-11	2.3E-11	1.9E-11	1.5E-11	6.9E-12
E	1.0E-10	4.4E-11	3.3E-11	2.5E-11	2.0E-11	1.6E-11	8.0E-12
ENE	1.1E-10	5.2E-11	3.9E-11	2.8E-11	2.3E-11	1.7E-11	7.6E-12
NE	1.0E-10	5.1E-11	3.9E-11	3.0E-11	2.5E-11	2.0E-11	1.1E-11
NNE	9.2E-11	4.9E-11	3.6E-11	2.6E-11	2.1E-11	1.6E-11	7.3E-12
Direction	Distance (m)						
	2629						
N	6.3E-12						
NNW	2.8E-12						
NW	4.1E-12						
WNW	4.8E-12						
W	7.6E-12						
WSW	5.0E-12						
SW	5.0E-12						
SSW	3.7E-12						
S	5.3E-12						
SSE	4.9E-12						
SSE	7.0E-12						
ESE	6.5E-12						
E	7.5E-12						
ENE	7.1E-12						
NE	9.9E-12						
NNE	6.9E-12						

D O S E A N D R I S K S U M M A R I E S

Non-Radon Individual Assessment
Fri May 29 09:47:21 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Infant

Comments: NFSS Technical Memo 2019 Year
Individual Dose

Dataset Name: NFSS2019 Ind Inf
Dataset Date: May 29, 2020 09:47 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)
Adrenal	1.87E-04
UB_Wall	2.02E-04
Bone_Sur	1.25E-02
Brain	1.95E-04
Breasts	2.10E-04
St_Wall	1.99E-04
SI_Wall	1.99E-04
ULI_Wall	2.32E-04
LLI_Wall	3.21E-04
Kidneys	5.58E-04
Liver	5.11E-04
Muscle	2.16E-04
Ovaries	2.22E-04
Pancreas	1.88E-04
R_Marrow	1.63E-03
Skin	2.52E-03
Spleen	2.06E-04
Testes	2.50E-04
Thymus	1.95E-04
Thyroid	2.02E-04
GB_Wall	1.89E-04
Ht_Wall	1.95E-04
Uterus	1.93E-04
ET_Reg	1.53E-03
Lung_66	2.29E-03
Effectiv	8.03E-04

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)
INGESTION	3.49E-04
INHALATION	2.77E-04
AIR IMMERSION	8.67E-11
GROUND SURFACE	1.76E-04
INTERNAL	6.27E-04
EXTERNAL	1.76E-04
TOTAL	8.03E-04

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem)
U-238	6.27E-05
Th-234	1.26E-06
Pa-234m	1.72E-05
Pa-234	3.39E-07
U-234	7.02E-05
Th-230	1.24E-04
Ra-226	2.89E-04
Rn-222	3.03E-08
Po-218	5.41E-13
Pb-214	1.98E-05
At-218	2.03E-12
Bi-214	1.16E-04
Rn-218	1.18E-14
Po-214	6.40E-09
Tl-210	4.51E-08
Pb-210	9.73E-08
Bi-210	1.57E-06
Hg-206	1.27E-13
Po-210	4.08E-10
Tl-206	3.67E-12
Th-232	2.33E-05
Ra-228	5.93E-09
Ac-228	6.63E-06
Th-228	5.30E-05
Ra-224	7.91E-08
Rn-220	4.84E-09
Po-216	1.17E-10
Pb-212	1.06E-06
Bi-212	1.24E-06
Po-212	0.00E+00
Tl-208	8.57E-06
U-235	7.59E-06
Th-231	1.98E-07
Pa-231	3.28E-10
Ac-227	1.10E-12
Th-227	5.26E-10
Fr-223	4.96E-12
Ra-223	5.88E-10
Rn-219	2.54E-10
At-219	0.00E+00
Bi-215	1.15E-15
Po-215	7.77E-13
Pb-211	5.00E-10
Bi-211	2.06E-10
Tl-207	2.59E-10
Po-211	9.91E-14
TOTAL	8.03E-04

CANCER RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Cancer	

PATHWAY RISK SUMMARY

	Selected Individual Total Lifetime Fatal Cancer Risk
Pathway	
INGESTION	5.21E-12
INHALATION	7.62E-12
AIR IMMERSION	4.60E-17
GROUND SURFACE	8.65E-11
INTERNAL	1.28E-11
EXTERNAL	8.65E-11
TOTAL	9.93E-11

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	1.81E-12
Th-234	6.50E-13
Pa-234m	3.01E-12
Pa-234	1.84E-13
U-234	2.04E-12
Th-230	2.18E-12
Ra-226	5.10E-12
Rn-222	1.65E-14
Po-218	2.42E-19
Pb-214	1.06E-11
At-218	2.51E-19
Bi-214	6.10E-11
Rn-218	6.44E-21
Po-214	3.51E-15
Tl-210	2.41E-14
Pb-210	4.36E-14
Bi-210	1.74E-13
Hg-206	5.63E-20
Po-210	2.24E-16
Tl-206	4.13E-19
Th-232	4.56E-13
Ra-228	1.76E-15
Ac-228	3.53E-12
Th-228	1.45E-12
Ra-224	4.23E-14
Rn-220	2.65E-15
Po-216	6.42E-17
Pb-212	5.79E-13
Bi-212	4.79E-13
Po-212	0.00E+00
Tl-208	4.66E-12
U-235	1.21E-12
Th-231	9.04E-14
Pa-231	1.71E-16
Ac-227	4.12E-19
Th-227	2.85E-16
Fr-223	1.85E-18
Ra-223	3.17E-16
Rn-219	1.39E-16
At-219	0.00E+00
Bi-215	5.11E-22
Po-215	4.26E-19
Pb-211	1.79E-16
Bi-211	1.12E-16
Tl-207	3.33E-17
Po-211	5.43E-20
TOTAL	9.93E-11

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

Direction	Distance (m)						
	533	783	914	1105	1250	1486	2499
N	5.9E-04	2.7E-04	2.1E-04	1.7E-04	1.5E-04	1.3E-04	8.6E-05
NNW	4.7E-04	2.2E-04	1.7E-04	1.3E-04	1.1E-04	9.0E-05	6.0E-05
NW	4.7E-04	1.9E-04	1.6E-04	1.3E-04	1.1E-04	9.6E-05	6.9E-05
WNW	5.0E-04	2.8E-04	2.2E-04	1.7E-04	1.4E-04	1.2E-04	7.5E-05
W	5.5E-04	2.9E-04	2.4E-04	1.9E-04	1.7E-04	1.4E-04	9.5E-05
WSW	5.4E-04	2.9E-04	2.3E-04	1.7E-04	1.5E-04	1.2E-04	7.6E-05
SW	5.1E-04	2.3E-04	1.8E-04	1.5E-04	1.3E-04	1.1E-04	7.6E-05
SSW	4.6E-04	2.3E-04	1.8E-04	1.4E-04	1.2E-04	1.0E-04	6.7E-05
S	4.9E-04	2.3E-04	1.9E-04	1.5E-04	1.3E-04	1.1E-04	7.9E-05
SSE	5.5E-04	2.8E-04	2.2E-04	1.7E-04	1.4E-04	1.2E-04	7.5E-05
SSE	6.3E-04	3.1E-04	2.4E-04	1.9E-04	1.7E-04	1.4E-04	9.1E-05
ESE	6.8E-04	3.5E-04	2.7E-04	2.1E-04	1.8E-04	1.4E-04	8.7E-05
E	7.7E-04	3.5E-04	2.8E-04	2.1E-04	1.8E-04	1.5E-04	9.5E-05
ENE	8.0E-04	4.1E-04	3.2E-04	2.4E-04	2.0E-04	1.6E-04	9.2E-05
NE	8.0E-04	4.1E-04	3.2E-04	2.5E-04	2.2E-04	1.8E-04	1.1E-04
NNE	7.1E-04	3.9E-04	3.0E-04	2.2E-04	1.9E-04	1.5E-04	9.0E-05
Direction	Distance (m)						
	2629						
N	8.3E-05						
NNW	5.9E-05						
NW	6.8E-05						
WNW	7.3E-05						
W	9.2E-05						
WSW	7.4E-05						
SW	7.4E-05						
SSW	6.5E-05						
S	7.6E-05						
SSE	7.3E-05						
SSE	8.8E-05						
ESE	8.4E-05						
E	9.1E-05						
ENE	8.9E-05						
NE	1.1E-04						
NNE	8.7E-05						

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

		Distance (m)						
Direction		533	783	914	1105	1250	1486	2499
N	7.1E-11	3.0E-11	2.3E-11	1.7E-11	1.4E-11	1.1E-11	6.0E-12	
NNW	5.6E-11	2.3E-11	1.7E-11	1.1E-11	9.0E-12	6.4E-12	2.4E-12	
NW	5.6E-11	2.0E-11	1.5E-11	1.1E-11	9.3E-12	7.3E-12	3.7E-12	
WNW	6.0E-11	3.1E-11	2.3E-11	1.6E-11	1.3E-11	1.0E-11	4.4E-12	
W	6.6E-11	3.3E-11	2.6E-11	2.0E-11	1.7E-11	1.3E-11	7.3E-12	
WSW	6.5E-11	3.3E-11	2.5E-11	1.7E-11	1.4E-11	1.1E-11	4.6E-12	
SW	6.0E-11	2.4E-11	1.9E-11	1.4E-11	1.1E-11	9.0E-12	4.6E-12	
SSW	5.5E-11	2.5E-11	1.8E-11	1.3E-11	1.0E-11	7.7E-12	3.3E-12	
S	5.9E-11	2.5E-11	1.9E-11	1.4E-11	1.2E-11	9.5E-12	5.0E-12	
SSE	6.7E-11	3.2E-11	2.4E-11	1.7E-11	1.4E-11	1.0E-11	4.5E-12	
SSE	7.6E-11	3.5E-11	2.7E-11	2.0E-11	1.7E-11	1.3E-11	6.7E-12	
ESE	8.4E-11	4.1E-11	3.1E-11	2.2E-11	1.8E-11	1.4E-11	6.1E-12	
E	9.5E-11	4.1E-11	3.1E-11	2.3E-11	1.9E-11	1.5E-11	7.2E-12	
ENE	9.9E-11	4.9E-11	3.6E-11	2.6E-11	2.1E-11	1.6E-11	6.8E-12	
NE	9.8E-11	4.8E-11	3.7E-11	2.8E-11	2.3E-11	1.9E-11	9.7E-12	
NNE	8.7E-11	4.6E-11	3.4E-11	2.4E-11	2.0E-11	1.5E-11	6.6E-12	
		Distance (m)						
Direction		2629						
N	5.6E-12							
NNW	2.3E-12							
NW	3.5E-12							
WNW	4.1E-12							
W	6.8E-12							
WSW	4.3E-12							
SW	4.3E-12							
SSW	3.1E-12							
S	4.7E-12							
SSE	4.2E-12							
SSE	6.3E-12							
ESE	5.7E-12							
E	6.7E-12							
ENE	6.4E-12							
NE	9.0E-12							
NNE	6.1E-12							

ATTACHMENT D
CAPP88-PC REPORTS – POPULATION

D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Fri May 29 09:51:02 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Adult

Comments: NFSS Technical Memo 2019 Year
Population Dose

Dataset Name: NFSS2019 Pop Adu
Dataset Date: May 29, 2020 09:50 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND
Pop File: C:\Users\h5tderjc\Documents\CAP88\Population Files\NFSS2013.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenal	7.80E-05	6.30E-04
UB_Wall	8.64E-05	6.98E-04
Bone_Sur	2.03E-03	1.50E-02
Brain	8.25E-05	6.67E-04
Breasts	9.07E-05	7.32E-04
St_Wall	8.34E-05	6.74E-04
SI_Wall	8.28E-05	6.71E-04
ULI_Wall	8.52E-05	7.00E-04
LLI_Wall	9.10E-05	7.78E-04
Kidneys	1.40E-04	1.07E-03
Liver	1.17E-04	9.20E-04
Muscle	9.35E-05	7.55E-04
Ovaries	9.14E-05	7.10E-04
Pancreas	7.86E-05	6.35E-04
R_Marrow	1.72E-04	1.42E-03
Skin	1.32E-03	1.06E-02
Spleen	8.43E-05	6.84E-04
Testes	1.05E-04	8.16E-04
Thymus	8.28E-05	6.69E-04
Thyroid	8.65E-05	6.98E-04
GB_Wall	7.93E-05	6.41E-04
Ht_Wall	8.25E-05	6.66E-04
Uterus	8.17E-05	6.60E-04
ET_Reg	3.81E-04	1.99E-03
Lung_66	1.13E-03	5.34E-03
Effectiv	2.58E-04	1.62E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	1.10E-05	1.82E-04
INHALATION	1.53E-04	6.85E-04
AIR IMMERSION	4.45E-11	6.42E-10
GROUND SURFACE	9.40E-05	7.55E-04
INTERNAL	1.64E-04	8.67E-04
EXTERNAL	9.40E-05	7.55E-04
TOTAL	2.58E-04	1.62E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2.26E-05	1.12E-04
Th-234	6.69E-07	5.38E-06
Pa-234m	9.16E-06	7.35E-05
Pa-234	1.80E-07	1.45E-06
U-234	2.61E-05	1.28E-04
Th-230	5.58E-05	2.66E-04
Ra-226	2.11E-05	1.84E-04
Rn-222	1.61E-08	1.30E-07
Po-218	2.88E-13	2.32E-12
Pb-214	1.05E-05	8.46E-05
At-218	1.08E-12	8.71E-12
Bi-214	6.16E-05	4.95E-04
Rn-218	6.28E-15	5.04E-14
Po-214	3.41E-09	2.74E-08
Tl-210	2.40E-08	1.93E-07
Pb-210	5.19E-08	4.17E-07
Bi-210	8.39E-07	6.74E-06
Hg-206	6.77E-14	5.44E-13
Po-210	2.17E-10	1.75E-09
Tl-206	1.96E-12	1.57E-11
Th-232	1.48E-05	6.89E-05
Ra-228	3.10E-09	2.68E-08
Ac-228	3.54E-06	2.84E-05
Th-228	2.24E-05	1.01E-04
Ra-224	4.24E-08	6.35E-07
Rn-220	2.58E-09	2.07E-08
Po-216	6.23E-11	5.00E-10
Pb-212	5.67E-07	4.56E-06
Bi-212	6.61E-07	5.31E-06
Po-212	0.00E+00	0.00E+00
Tl-208	4.57E-06	3.67E-05
U-235	3.08E-06	1.84E-05
Th-231	1.06E-07	8.48E-07
Pa-231	1.75E-10	1.41E-09
Ac-227	5.87E-13	4.71E-12
Th-227	2.80E-10	2.25E-09
Fr-223	2.64E-12	2.12E-11
Ra-223	3.13E-10	2.52E-09
Rn-219	1.36E-10	1.09E-09
At-219	0.00E+00	0.00E+00
Bi-215	6.10E-16	4.90E-15
Po-215	4.14E-13	3.33E-12
Pb-211	2.66E-10	2.14E-09
Bi-211	1.10E-10	8.82E-10
Tl-207	1.38E-10	1.11E-09
Po-211	5.28E-14	4.24E-13
TOTAL	2.58E-04	1.62E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	8.91E-13	1.01E-10
Stomach	3.45E-12	3.97E-10
Colon	9.28E-12	1.11E-09
Liver	2.31E-12	3.41E-10
LUNG	5.23E-11	3.50E-09
Bone	2.31E-12	4.18E-10
Skin	1.32E-12	1.38E-10
Breast	4.25E-12	4.62E-10
Ovary	1.30E-12	1.53E-10
Bladder	2.14E-12	2.41E-10
Kidneys	7.35E-13	9.36E-11
Thyroid	2.79E-13	3.16E-11
Leukemia	5.18E-12	5.89E-10
Residual	1.27E-11	1.46E-09
Total	9.85E-11	9.03E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	7.51E-12	1.64E-09
INHALATION	4.49E-11	2.59E-09
AIR IMMERSION	2.36E-17	4.50E-15
GROUND SURFACE	4.61E-11	4.80E-09
INTERNAL	5.24E-11	4.23E-09
EXTERNAL	4.61E-11	4.80E-09
TOTAL	9.85E-11	9.03E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	7.46E-12	4.36E-10
Th-234	3.47E-13	3.61E-11
Pa-234m	1.60E-12	1.67E-10
Pa-234	9.81E-14	1.02E-11
U-234	8.97E-12	5.66E-10
Th-230	1.23E-11	7.36E-10
Ra-226	1.19E-11	1.82E-09
Rn-222	8.80E-15	9.16E-13
Po-218	1.29E-19	1.34E-17
Pb-214	5.64E-12	5.87E-10
At-218	1.34E-19	1.39E-17
Bi-214	3.25E-11	3.38E-09
Rn-218	3.43E-21	3.57E-19
Po-214	1.87E-15	1.95E-13
Tl-210	1.28E-14	1.34E-12
Pb-210	2.32E-14	2.42E-12
Bi-210	9.29E-14	9.67E-12
Hg-206	3.00E-20	3.12E-18
Po-210	1.19E-16	1.24E-14
Tl-206	2.20E-19	2.29E-17
Th-232	3.24E-12	1.87E-10
Ra-228	9.40E-16	1.00E-13
Ac-228	1.88E-12	1.96E-10
Th-228	8.05E-12	4.68E-10
Ra-224	2.30E-14	3.79E-12
Rn-220	1.41E-15	1.47E-13
Po-216	3.42E-17	3.56E-15
Pb-212	3.08E-13	3.21E-11
Bi-212	2.55E-13	2.65E-11
Po-212	0.00E+00	0.00E+00
Tl-208	2.48E-12	2.59E-10
U-235	1.24E-12	9.78E-11
Th-231	4.82E-14	5.01E-12
Pa-231	9.12E-17	9.49E-15
Ac-227	2.19E-19	2.28E-17
Th-227	1.52E-16	1.58E-14
Fr-223	9.84E-19	1.02E-16
Ra-223	1.69E-16	1.76E-14
Rn-219	7.42E-17	7.72E-15
At-219	0.00E+00	0.00E+00
Bi-215	2.72E-22	2.83E-20
Po-215	2.27E-19	2.36E-17
Pb-211	9.52E-17	9.90E-15
Bi-211	5.99E-17	6.24E-15
Tl-207	1.77E-17	1.84E-15
Po-211	2.89E-20	3.01E-18
TOTAL	9.85E-11	9.03E-09

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.5E-04	5.0E-05	2.4E-05	1.4E-05	9.7E-06	4.6E-06
NNW	0.0E+00	1.2E-04	2.6E-05	7.4E-06	4.4E-06	3.0E-06	1.4E-06
NW	0.0E+00	1.0E-04	3.0E-05	1.3E-05	7.8E-06	5.4E-06	2.5E-06
WNW	0.0E+00	1.6E-04	4.3E-05	1.7E-05	9.9E-06	6.8E-06	3.2E-06
W	0.0E+00	1.7E-04	6.0E-05	3.0E-05	1.8E-05	1.2E-05	5.6E-06
WSW	0.0E+00	1.8E-04	4.5E-05	1.7E-05	1.0E-05	7.1E-06	3.3E-06
SW	0.0E+00	1.3E-04	3.9E-05	1.8E-05	1.0E-05	7.2E-06	3.4E-06
SSW	0.0E+00	1.3E-04	3.2E-05	1.2E-05	0.0E+00	4.7E-06	2.2E-06
S	0.0E+00	1.3E-04	4.0E-05	1.9E-05	1.1E-05	7.7E-06	3.6E-06
SSE	0.0E+00	1.7E-04	4.4E-05	1.7E-05	9.9E-06	6.9E-06	3.2E-06
SSE	0.0E+00	1.8E-04	5.7E-05	2.7E-05	1.6E-05	1.1E-05	5.1E-06
ESE	0.0E+00	2.1E-04	5.9E-05	2.4E-05	1.4E-05	9.9E-06	4.7E-06
E	0.0E+00	2.2E-04	6.5E-05	2.9E-05	1.7E-05	1.2E-05	5.6E-06
ENE	0.0E+00	2.6E-04	6.9E-05	2.7E-05	1.6E-05	1.1E-05	5.3E-06
NE	0.0E+00	2.5E-04	8.3E-05	0.0E+00	2.4E-05	1.7E-05	7.9E-06
NNE	0.0E+00	2.4E-04	6.6E-05	0.0E+00	1.6E-05	1.1E-05	5.1E-06

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

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	4.6E-07	4.0E-07	3.8E-07	2.8E-08	9.9E-07	8.2E-07
NNW	0.0E+00	3.6E-07	2.1E-07	5.7E-07	8.3E-08	2.7E-07	2.9E-07
NW	0.0E+00	3.1E-07	2.4E-07	1.5E-06	6.0E-07	5.6E-07	5.4E-06
WNW	0.0E+00	4.9E-07	3.4E-07	5.6E-06	3.5E-06	3.5E-07	1.9E-05
W	0.0E+00	5.2E-07	4.8E-07	2.7E-05	3.6E-06	4.8E-08	1.8E-06
WSW	0.0E+00	5.3E-07	3.6E-07	1.4E-07	1.2E-06	1.2E-06	2.1E-06
SW	0.0E+00	3.8E-07	3.1E-07	3.9E-07	2.9E-06	2.7E-06	2.0E-05
SSW	0.0E+00	3.9E-07	2.6E-07	2.8E-07	0.0E+00	2.0E-07	1.4E-05
S	0.0E+00	3.8E-07	3.2E-07	1.5E-06	9.1E-07	1.7E-06	6.8E-06
SSE	0.0E+00	5.0E-07	3.5E-07	1.0E-06	7.3E-07	5.1E-07	4.7E-06
SSE	0.0E+00	5.4E-07	4.6E-07	1.2E-06	9.6E-07	5.7E-07	3.5E-06
ESE	0.0E+00	6.4E-07	4.7E-07	9.7E-08	4.2E-07	1.6E-06	2.3E-06
E	0.0E+00	6.5E-07	5.2E-07	3.5E-07	5.3E-07	7.3E-07	3.1E-06
ENE	0.0E+00	7.8E-07	5.5E-07	3.0E-07	1.1E-07	7.0E-07	6.4E-06
NE	0.0E+00	7.5E-07	6.7E-07	0.0E+00	3.8E-07	1.7E-06	1.7E-06
NNE	0.0E+00	7.3E-07	5.3E-07	0.0E+00	6.2E-08	7.6E-07	1.4E-06

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

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	5.9E-11	1.9E-11	9.3E-12	5.5E-12	3.8E-12	1.8E-12	
NNW	0.0E+00	4.6E-11	1.0E-11	2.9E-12	1.7E-12	1.2E-12	5.7E-13	
NW	0.0E+00	3.9E-11	1.2E-11	5.2E-12	3.1E-12	2.1E-12	1.0E-12	
WNW	0.0E+00	6.2E-11	1.7E-11	6.5E-12	3.9E-12	2.7E-12	1.3E-12	
W	0.0E+00	6.6E-11	2.3E-11	1.2E-11	6.9E-12	4.8E-12	2.2E-12	
WSW	0.0E+00	6.7E-11	1.8E-11	6.8E-12	4.0E-12	2.8E-12	1.3E-12	
SW	0.0E+00	4.8E-11	1.5E-11	6.9E-12	4.1E-12	2.8E-12	1.4E-12	
SSW	0.0E+00	4.9E-11	1.2E-11	4.5E-12	0.0E+00	1.9E-12	9.0E-13	
S	0.0E+00	4.9E-11	1.6E-11	7.4E-12	4.4E-12	3.1E-12	1.5E-12	
SSE	0.0E+00	6.4E-11	1.7E-11	6.6E-12	3.9E-12	2.7E-12	1.3E-12	
SSE	0.0E+00	6.9E-11	2.2E-11	1.0E-11	6.2E-12	4.3E-12	2.1E-12	
ESE	0.0E+00	8.2E-11	2.3E-11	9.5E-12	5.7E-12	3.9E-12	1.9E-12	
E	0.0E+00	8.2E-11	2.5E-11	1.1E-11	6.8E-12	4.7E-12	2.3E-12	
ENE	0.0E+00	9.9E-11	2.7E-11	1.1E-11	6.4E-12	4.5E-12	2.1E-12	
NE	0.0E+00	9.6E-11	3.2E-11	0.0E+00	9.4E-12	6.6E-12	3.1E-12	
NNE	0.0E+00	9.2E-11	2.5E-11	0.0E+00	6.1E-12	4.3E-12	2.1E-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	7.8E-14	6.3E-14	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.0E-14	3.1E-14	2.6E-14	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.0E-14	4.4E-14	3.6E-14	
WNW	4.8E-13	0.0E+00	0.0E+00	0.0E+00	6.8E-14	4.8E-14	3.9E-14	
W	8.6E-13	4.0E-13	2.5E-13	1.7E-13	1.2E-13	8.4E-14	6.7E-14	
WSW	5.2E-13	2.5E-13	1.6E-13	1.1E-13	7.8E-14	5.7E-14	4.7E-14	
SW	5.2E-13	2.5E-13	1.6E-13	1.1E-13	8.0E-14	5.9E-14	0.0E+00	
SSW	3.5E-13	1.7E-13	1.1E-13	7.7E-14	0.0E+00	0.0E+00	3.6E-14	
S	5.7E-13	2.7E-13	1.7E-13	1.2E-13	8.6E-14	6.4E-14	5.2E-14	
SSE	5.1E-13	2.5E-13	1.6E-13	1.1E-13	8.1E-14	6.1E-14	5.0E-14	
SSE	8.0E-13	3.9E-13	2.4E-13	1.7E-13	1.2E-13	9.1E-14	7.3E-14	
ESE	7.3E-13	3.5E-13	2.3E-13	1.6E-13	1.1E-13	8.5E-14	6.9E-14	
E	8.8E-13	4.2E-13	2.7E-13	1.9E-13	1.4E-13	1.0E-13	8.1E-14	
ENE	8.4E-13	4.1E-13	2.6E-13	1.8E-13	1.3E-13	1.0E-13	8.1E-14	
NE	1.2E-12	5.9E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	8.0E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.6E-14	

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	2.3E-12	2.0E-12	1.9E-12	1.4E-13	5.1E-12	4.2E-12	
NNW	0.0E+00	1.8E-12	1.0E-12	2.9E-12	4.2E-13	1.4E-12	1.5E-12	
NW	0.0E+00	1.5E-12	1.2E-12	7.4E-12	3.1E-12	2.9E-12	2.8E-11	
WNW	0.0E+00	2.4E-12	1.7E-12	2.8E-11	1.8E-11	1.8E-12	1.0E-10	
W	0.0E+00	2.6E-12	2.4E-12	1.4E-10	1.8E-11	2.5E-13	9.1E-12	
WSW	0.0E+00	2.6E-12	1.8E-12	7.0E-13	6.3E-12	6.1E-12	1.1E-11	
SW	0.0E+00	1.9E-12	1.5E-12	2.0E-12	1.5E-11	1.4E-11	1.0E-10	
SSW	0.0E+00	1.9E-12	1.3E-12	1.4E-12	0.0E+00	1.0E-12	7.1E-11	
S	0.0E+00	1.9E-12	1.6E-12	7.7E-12	4.6E-12	8.5E-12	3.5E-11	
SSE	0.0E+00	2.5E-12	1.8E-12	5.2E-12	3.8E-12	2.6E-12	2.5E-11	
SSE	0.0E+00	2.7E-12	2.3E-12	6.0E-12	4.9E-12	2.9E-12	1.8E-11	
ESE	0.0E+00	3.2E-12	2.4E-12	4.9E-13	2.1E-12	8.2E-12	1.2E-11	
E	0.0E+00	3.2E-12	2.6E-12	1.8E-12	2.7E-12	3.7E-12	1.6E-11	
ENE	0.0E+00	3.8E-12	2.8E-12	1.5E-12	5.8E-13	3.6E-12	3.4E-11	
NE	0.0E+00	3.7E-12	3.3E-12	0.0E+00	2.0E-12	8.7E-12	8.7E-12	
NNE	0.0E+00	3.6E-12	2.6E-12	0.0E+00	3.2E-13	3.9E-12	7.1E-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	9.7E-11	3.1E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-10	4.3E-10	2.3E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.0E-11	5.3E-10	3.3E-10	
WNW	5.7E-12	0.0E+00	0.0E+00	0.0E+00	3.5E-12	2.5E-10	5.1E-11	
W	3.5E-10	2.6E-10	2.4E-11	7.8E-11	3.8E-11	2.0E-10	2.6E-10	
WSW	1.5E-10	1.6E-10	1.1E-11	1.2E-11	6.0E-12	6.2E-12	1.9E-12	
SW	3.2E-10	3.7E-11	1.4E-10	1.1E-11	1.5E-12	4.4E-13	0.0E+00	
SSW	2.8E-10	7.7E-12	5.7E-12	1.4E-11	0.0E+00	0.0E+00	1.5E-12	
S	2.0E-10	4.3E-11	6.6E-11	4.2E-14	2.5E-11	1.6E-11	5.4E-12	
SSE	1.4E-10	4.3E-10	6.9E-10	2.1E-10	7.8E-11	9.9E-12	4.0E-12	
SSE	1.1E-10	2.3E-10	2.6E-10	9.9E-11	2.3E-11	7.2E-12	9.9E-12	
ESE	2.3E-11	1.6E-10	1.0E-11	1.4E-11	9.9E-12	2.6E-11	1.2E-11	
E	1.7E-11	5.6E-11	1.6E-11	3.4E-11	5.8E-12	1.9E-11	1.1E-11	
ENE	1.5E-11	3.5E-11	9.8E-12	5.9E-12	1.9E-12	1.2E-12	5.9E-13	
NE	3.9E-11	1.3E-12	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	5.0E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-11	

D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Fri May 29 09:51:32 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Fifteen

Comments: NFSS Technical Memo 2019 Year
Population Dose

Dataset Name: NFSS2019 Pop Fif
Dataset Date: May 29, 2020 09:51 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND
Pop File: C:\Users\h5tderjc\Documents\CAP88\Population Files\NFSS2013.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenal	7.96E-05	6.56E-04
UB_Wall	8.78E-05	7.21E-04
Bone_Sur	4.57E-03	5.73E-02
Brain	8.41E-05	6.93E-04
Breasts	9.21E-05	7.54E-04
St_Wall	8.48E-05	6.98E-04
SI_Wall	8.43E-05	6.95E-04
ULI_Wall	8.71E-05	7.32E-04
LLI_Wall	9.41E-05	8.34E-04
Kidneys	1.50E-04	1.23E-03
Liver	1.24E-04	1.05E-03
Muscle	9.50E-05	7.79E-04
Ovaries	9.50E-05	7.46E-04
Pancreas	8.01E-05	6.59E-04
R_Marrow	2.73E-04	3.10E-03
Skin	1.33E-03	1.07E-02
Spleen	8.89E-05	7.62E-04
Testes	1.08E-04	8.50E-04
Thymus	8.42E-05	6.92E-04
Thyroid	8.80E-05	7.23E-04
GB_Wall	8.07E-05	6.64E-04
Ht_Wall	8.39E-05	6.90E-04
Uterus	8.31E-05	6.83E-04
ET_Reg	3.98E-04	2.08E-03
Lung_66	1.29E-03	6.08E-03
Effectiv	3.17E-04	2.36E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	4.62E-05	8.17E-04
INHALATION	1.77E-04	7.90E-04
AIR IMMERSION	4.45E-11	6.42E-10
GROUND SURFACE	9.40E-05	7.55E-04
INTERNAL	2.23E-04	1.61E-03
EXTERNAL	9.40E-05	7.55E-04
TOTAL	3.17E-04	2.36E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2.77E-05	1.42E-04
Th-234	6.69E-07	5.38E-06
Pa-234m	9.16E-06	7.35E-05
Pa-234	1.80E-07	1.45E-06
U-234	3.22E-05	1.63E-04
Th-230	5.96E-05	2.83E-04
Ra-226	5.96E-05	8.16E-04
Rn-222	1.61E-08	1.30E-07
Po-218	2.88E-13	2.32E-12
Pb-214	1.05E-05	8.46E-05
At-218	1.08E-12	8.71E-12
Bi-214	6.16E-05	4.95E-04
Rn-218	6.28E-15	5.04E-14
Po-214	3.41E-09	2.74E-08
Tl-210	2.40E-08	1.93E-07
Pb-210	5.19E-08	4.17E-07
Bi-210	8.39E-07	6.74E-06
Hg-206	6.77E-14	5.44E-13
Po-210	2.17E-10	1.75E-09
Tl-206	1.96E-12	1.57E-11
Th-232	1.54E-05	7.15E-05
Ra-228	3.11E-09	3.74E-08
Ac-228	3.54E-06	2.84E-05
Th-228	2.67E-05	1.20E-04
Ra-224	4.27E-08	7.16E-07
Rn-220	2.58E-09	2.07E-08
Po-216	6.23E-11	5.00E-10
Pb-212	5.67E-07	4.56E-06
Bi-212	6.61E-07	5.31E-06
Po-212	0.00E+00	0.00E+00
Tl-208	4.57E-06	3.67E-05
U-235	3.56E-06	2.12E-05
Th-231	1.06E-07	8.48E-07
Pa-231	1.75E-10	1.41E-09
Ac-227	5.87E-13	4.71E-12
Th-227	2.80E-10	2.25E-09
Fr-223	2.64E-12	2.12E-11
Ra-223	3.13E-10	2.52E-09
Rn-219	1.36E-10	1.09E-09
At-219	0.00E+00	0.00E+00
Bi-215	6.10E-16	4.90E-15
Po-215	4.14E-13	3.33E-12
Pb-211	2.66E-10	2.14E-09
Bi-211	1.10E-10	8.82E-10
Tl-207	1.38E-10	1.11E-09
Po-211	5.28E-14	4.24E-13
TOTAL	3.17E-04	2.36E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	8.69E-13	9.82E-11
Stomach	3.37E-12	3.81E-10
Colon	8.92E-12	1.04E-09
Liver	2.02E-12	3.06E-10
LUNG	2.46E-11	1.88E-09
Bone	1.72E-12	3.44E-10
Skin	1.32E-12	1.38E-10
Breast	4.20E-12	4.53E-10
Ovary	1.23E-12	1.45E-10
Bladder	2.09E-12	2.36E-10
Kidneys	6.10E-13	8.20E-11
Thyroid	2.73E-13	3.05E-11
Leukemia	5.04E-12	5.72E-10
Residual	1.24E-11	1.40E-09
Total	6.87E-11	7.10E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	5.83E-12	1.34E-09
INHALATION	1.67E-11	9.67E-10
AIR IMMERSION	2.36E-17	4.50E-15
GROUND SURFACE	4.61E-11	4.80E-09
INTERNAL	2.26E-11	2.31E-09
EXTERNAL	4.61E-11	4.80E-09
TOTAL	6.87E-11	7.10E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	3.09E-12	1.83E-10
Th-234	3.47E-13	3.61E-11
Pa-234m	1.60E-12	1.67E-10
Pa-234	9.81E-14	1.02E-11
U-234	3.81E-12	2.60E-10
Th-230	4.07E-12	2.55E-10
Ra-226	7.56E-12	1.38E-09
Rn-222	8.80E-15	9.16E-13
Po-218	1.29E-19	1.34E-17
Pb-214	5.64E-12	5.87E-10
At-218	1.34E-19	1.39E-17
Bi-214	3.25E-11	3.38E-09
Rn-218	3.43E-21	3.57E-19
Po-214	1.87E-15	1.95E-13
Tl-210	1.28E-14	1.34E-12
Pb-210	2.32E-14	2.42E-12
Bi-210	9.29E-14	9.67E-12
Hg-206	3.00E-20	3.12E-18
Po-210	1.19E-16	1.24E-14
Tl-206	2.20E-19	2.29E-17
Th-232	9.50E-13	5.50E-11
Ra-228	9.40E-16	9.92E-14
Ac-228	1.88E-12	1.96E-10
Th-228	2.99E-12	1.76E-10
Ra-224	2.27E-14	2.96E-12
Rn-220	1.41E-15	1.47E-13
Po-216	3.42E-17	3.56E-15
Pb-212	3.08E-13	3.21E-11
Bi-212	2.55E-13	2.65E-11
Po-212	0.00E+00	0.00E+00
Tl-208	2.48E-12	2.59E-10
U-235	8.41E-13	7.47E-11
Th-231	4.82E-14	5.01E-12
Pa-231	9.12E-17	9.49E-15
Ac-227	2.19E-19	2.28E-17
Th-227	1.52E-16	1.58E-14
Fr-223	9.84E-19	1.02E-16
Ra-223	1.69E-16	1.76E-14
Rn-219	7.42E-17	7.72E-15
At-219	0.00E+00	0.00E+00
Bi-215	2.72E-22	2.83E-20
Po-215	2.27E-19	2.36E-17
Pb-211	9.52E-17	9.90E-15
Bi-211	5.99E-17	6.24E-15
Tl-207	1.77E-17	1.84E-15
Po-211	2.89E-20	3.01E-18
TOTAL	6.87E-11	7.10E-09

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

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.9E-04	6.2E-05	2.9E-05	1.7E-05	1.2E-05	5.7E-06
NNW	0.0E+00	1.5E-04	3.2E-05	9.2E-06	5.4E-06	3.8E-06	1.8E-06
NW	0.0E+00	1.3E-04	3.7E-05	1.6E-05	9.7E-06	6.7E-06	3.2E-06
WNW	0.0E+00	2.0E-04	5.3E-05	2.1E-05	1.2E-05	8.5E-06	4.0E-06
W	0.0E+00	2.1E-04	7.4E-05	3.7E-05	2.2E-05	1.5E-05	7.0E-06
WSW	0.0E+00	2.2E-04	5.6E-05	2.2E-05	1.3E-05	8.8E-06	4.2E-06
SW	0.0E+00	1.5E-04	4.8E-05	2.2E-05	1.3E-05	8.9E-06	4.2E-06
SSW	0.0E+00	1.6E-04	4.0E-05	1.4E-05	0.0E+00	5.9E-06	2.8E-06
S	0.0E+00	1.6E-04	5.0E-05	2.3E-05	1.4E-05	9.6E-06	4.5E-06
SSE	0.0E+00	2.1E-04	5.4E-05	2.1E-05	1.2E-05	8.6E-06	4.1E-06
SSE	0.0E+00	2.2E-04	7.1E-05	3.3E-05	2.0E-05	1.4E-05	6.4E-06
ESE	0.0E+00	2.6E-04	7.3E-05	3.0E-05	1.8E-05	1.2E-05	5.9E-06
E	0.0E+00	2.6E-04	8.0E-05	3.6E-05	2.1E-05	1.5E-05	7.1E-06
ENE	0.0E+00	3.2E-04	8.5E-05	3.4E-05	2.0E-05	1.4E-05	6.7E-06
NE	0.0E+00	3.1E-04	1.0E-04	0.0E+00	3.0E-05	2.1E-05	9.8E-06
NNE	0.0E+00	3.0E-04	8.1E-05	0.0E+00	1.9E-05	1.3E-05	6.4E-06

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	5.7E-07	4.9E-07	4.7E-07	3.5E-08	1.2E-06	1.0E-06
NNW	0.0E+00	4.4E-07	2.6E-07	7.0E-07	1.0E-07	3.4E-07	3.7E-07
NW	0.0E+00	3.8E-07	3.0E-07	1.8E-06	7.5E-07	6.9E-07	6.8E-06
WNW	0.0E+00	6.0E-07	4.2E-07	6.9E-06	4.3E-06	4.4E-07	2.4E-05
W	0.0E+00	6.4E-07	5.9E-07	3.3E-05	4.4E-06	6.0E-08	2.2E-06
WSW	0.0E+00	6.5E-07	4.5E-07	1.7E-07	1.5E-06	1.5E-06	2.6E-06
SW	0.0E+00	4.6E-07	3.8E-07	4.8E-07	3.6E-06	3.4E-06	2.5E-05
SSW	0.0E+00	4.8E-07	3.2E-07	3.4E-07	0.0E+00	2.5E-07	1.7E-05
S	0.0E+00	4.7E-07	4.0E-07	1.9E-06	1.1E-06	2.1E-06	8.5E-06
SSE	0.0E+00	6.2E-07	4.3E-07	1.3E-06	9.1E-07	6.3E-07	6.0E-06
SSE	0.0E+00	6.7E-07	5.7E-07	1.5E-06	1.2E-06	7.1E-07	4.4E-06
ESE	0.0E+00	7.9E-07	5.8E-07	1.2E-07	5.2E-07	2.0E-06	2.9E-06
E	0.0E+00	7.9E-07	6.4E-07	4.3E-07	6.6E-07	9.0E-07	3.8E-06
ENE	0.0E+00	9.5E-07	6.8E-07	3.7E-07	1.4E-07	8.7E-07	8.1E-06
NE	0.0E+00	9.3E-07	8.2E-07	0.0E+00	4.7E-07	2.1E-06	2.1E-06
NNE	0.0E+00	8.9E-07	6.5E-07	0.0E+00	7.8E-08	9.4E-07	1.7E-06

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	4.1E-11	1.4E-11	6.7E-12	4.0E-12	2.8E-12	1.4E-12
NNW	0.0E+00	3.2E-11	7.1E-12	2.1E-12	1.3E-12	8.9E-13	4.3E-13
NW	0.0E+00	2.7E-11	8.3E-12	3.8E-12	2.3E-12	1.6E-12	7.7E-13
WNW	0.0E+00	4.3E-11	1.2E-11	4.7E-12	2.8E-12	2.0E-12	9.4E-13
W	0.0E+00	4.6E-11	1.6E-11	8.3E-12	5.0E-12	3.5E-12	1.7E-12
WSW	0.0E+00	4.6E-11	1.2E-11	4.9E-12	2.9E-12	2.1E-12	1.0E-12
SW	0.0E+00	3.3E-11	1.1E-11	5.0E-12	3.0E-12	2.1E-12	1.0E-12
SSW	0.0E+00	3.4E-11	8.8E-12	3.3E-12	0.0E+00	1.4E-12	6.8E-13
S	0.0E+00	3.4E-11	1.1E-11	5.4E-12	3.2E-12	2.3E-12	1.1E-12
SSE	0.0E+00	4.5E-11	1.2E-11	4.8E-12	2.9E-12	2.0E-12	9.8E-13
SSE	0.0E+00	4.8E-11	1.6E-11	7.6E-12	4.6E-12	3.2E-12	1.6E-12
ESE	0.0E+00	5.7E-11	1.6E-11	6.8E-12	4.1E-12	2.9E-12	1.4E-12
E	0.0E+00	5.7E-11	1.8E-11	8.2E-12	5.0E-12	3.5E-12	1.7E-12
ENE	0.0E+00	6.9E-11	1.9E-11	7.7E-12	4.7E-12	3.3E-12	1.6E-12
NE	0.0E+00	6.7E-11	2.3E-11	0.0E+00	6.9E-12	4.8E-12	2.4E-12
NNE	0.0E+00	6.4E-11	1.8E-11	0.0E+00	4.5E-12	3.1E-12	1.5E-12

COLLECTIVE FATAL CANCER RISK Per Year (All Radionuclides 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	3.7E-12	3.2E-12
NNW	0.0E+00	1.2E-12	7.4E-13	2.1E-12	3.1E-13	1.0E-12	1.1E-12
NW	0.0E+00	1.1E-12	8.6E-13	5.4E-12	2.3E-12	2.1E-12	2.1E-11
WNW	0.0E+00	1.7E-12	1.2E-12	2.0E-11	1.3E-11	1.3E-12	7.5E-11
W	0.0E+00	1.8E-12	1.7E-12	9.8E-11	1.3E-11	1.8E-13	6.8E-12
WSW	0.0E+00	1.8E-12	1.3E-12	5.1E-13	4.6E-12	4.5E-12	8.0E-12
SW	0.0E+00	1.3E-12	1.1E-12	1.4E-12	1.1E-11	1.0E-11	7.7E-11
SSW	0.0E+00	1.3E-12	9.2E-13	1.0E-12	0.0E+00	7.7E-13	5.3E-11
S	0.0E+00	1.3E-12	1.2E-12	5.6E-12	3.4E-12	6.3E-12	2.7E-11
SSE	0.0E+00	1.7E-12	1.3E-12	3.8E-12	2.8E-12	1.9E-12	1.9E-11
SSE	0.0E+00	1.9E-12	1.6E-12	4.3E-12	3.6E-12	2.2E-12	1.4E-11
ESE	0.0E+00	2.2E-12	1.7E-12	3.5E-13	1.6E-12	6.0E-12	9.0E-12
E	0.0E+00	2.2E-12	1.8E-12	1.3E-12	2.0E-12	2.7E-12	1.2E-11
ENE	0.0E+00	2.7E-12	2.0E-12	1.1E-12	4.3E-13	2.6E-12	2.5E-11
NE	0.0E+00	2.6E-12	2.4E-12	0.0E+00	1.4E-12	6.4E-12	6.5E-12
NNE	0.0E+00	2.5E-12	1.9E-12	0.0E+00	2.3E-13	2.9E-12	5.3E-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
Fri May 29 09:55:24 2020

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

Source Category: Area

Source Type: Area

Emission Year: 2019

DOSE Age Group: Ten

Comments: NFSS Technical Memo 2019 Year
Population Dose

Dataset Name: NFSS2019 Pop Ten

Dataset Date: May 29, 2020 09:55 AM

Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5tderjc\Documents\CAP88\Population Files\NFSS2013.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenal	7.91E-05	6.62E-04
UB_Wall	8.75E-05	7.29E-04
Bone_Sur	2.36E-03	2.74E-02
Brain	8.37E-05	6.99E-04
Breasts	9.18E-05	7.63E-04
St_Wall	8.46E-05	7.07E-04
SI_Wall	8.42E-05	7.07E-04
ULI_Wall	8.84E-05	7.69E-04
LLI_Wall	9.94E-05	9.38E-04
Kidneys	1.44E-04	1.24E-03
Liver	1.23E-04	1.11E-03
Muscle	9.46E-05	7.87E-04
Ovaries	9.21E-05	7.45E-04
Pancreas	7.97E-05	6.67E-04
R_Marrow	2.11E-04	2.27E-03
Skin	1.33E-03	1.07E-02
Spleen	8.67E-05	7.38E-04
Testes	1.05E-04	8.49E-04
Thymus	8.39E-05	7.00E-04
Thyroid	8.76E-05	7.30E-04
GB_Wall	8.04E-05	6.72E-04
Ht_Wall	8.36E-05	6.97E-04
Uterus	8.28E-05	6.91E-04
ET_Reg	5.11E-04	2.59E-03
Lung_66	1.13E-03	5.38E-03
Effectiv	2.68E-04	1.89E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	2.74E-05	4.84E-04
INHALATION	1.47E-04	6.55E-04
AIR IMMERSION	4.45E-11	6.42E-10
GROUND SURFACE	9.40E-05	7.55E-04
INTERNAL	1.74E-04	1.14E-03
EXTERNAL	9.40E-05	7.55E-04
TOTAL	2.68E-04	1.89E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2.41E-05	1.26E-04
Th-234	6.69E-07	5.39E-06
Pa-234m	9.16E-06	7.35E-05
Pa-234	1.80E-07	1.45E-06
U-234	2.78E-05	1.44E-04
Th-230	4.83E-05	2.35E-04
Ra-226	3.69E-05	4.62E-04
Rn-222	1.61E-08	1.30E-07
Po-218	2.88E-13	2.32E-12
Pb-214	1.05E-05	8.46E-05
At-218	1.08E-12	8.71E-12
Bi-214	6.16E-05	4.95E-04
Rn-218	6.28E-15	5.04E-14
Po-214	3.41E-09	2.74E-08
Tl-210	2.40E-08	1.93E-07
Pb-210	5.19E-08	4.17E-07
Bi-210	8.39E-07	6.74E-06
Hg-206	6.77E-14	5.44E-13
Po-210	2.17E-10	1.75E-09
Tl-206	1.96E-12	1.57E-11
Th-232	1.17E-05	5.55E-05
Ra-228	3.11E-09	3.46E-08
Ac-228	3.54E-06	2.84E-05
Th-228	2.39E-05	1.08E-04
Ra-224	4.24E-08	6.50E-07
Rn-220	2.58E-09	2.07E-08
Po-216	6.23E-11	5.00E-10
Pb-212	5.67E-07	4.56E-06
Bi-212	6.61E-07	5.31E-06
Po-212	0.00E+00	0.00E+00
Tl-208	4.57E-06	3.67E-05
U-235	3.22E-06	1.97E-05
Th-231	1.06E-07	8.48E-07
Pa-231	1.75E-10	1.41E-09
Ac-227	5.87E-13	4.71E-12
Th-227	2.80E-10	2.25E-09
Fr-223	2.64E-12	2.12E-11
Ra-223	3.13E-10	2.52E-09
Rn-219	1.36E-10	1.09E-09
At-219	0.00E+00	0.00E+00
Bi-215	6.10E-16	4.90E-15
Po-215	4.14E-13	3.33E-12
Pb-211	2.66E-10	2.14E-09
Bi-211	1.10E-10	8.82E-10
Tl-207	1.38E-10	1.11E-09
Po-211	5.28E-14	4.24E-13
TOTAL	2.68E-04	1.89E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	8.07E-13	8.43E-11
Stomach	3.13E-12	3.27E-10
Colon	8.21E-12	8.73E-10
Liver	1.26E-12	1.34E-10
LUNG	3.08E-11	2.15E-09
Bone	2.61E-13	2.60E-11
Skin	1.32E-12	1.37E-10
Breast	4.08E-12	4.25E-10
Ovary	1.09E-12	1.13E-10
Bladder	1.95E-12	2.04E-10
Kidneys	4.68E-13	5.19E-11
Thyroid	2.56E-13	2.67E-11
Leukemia	4.65E-12	4.84E-10
Residual	1.15E-11	1.20E-09
Total	6.98E-11	6.24E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	4.39E-13	9.67E-11
INHALATION	2.32E-11	1.34E-09
AIR IMMERSION	2.36E-17	4.50E-15
GROUND SURFACE	4.61E-11	4.80E-09
INTERNAL	2.37E-11	1.44E-09
EXTERNAL	4.61E-11	4.80E-09
TOTAL	6.98E-11	6.24E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	4.05E-12	2.35E-10
Th-234	3.47E-13	3.61E-11
Pa-234m	1.60E-12	1.67E-10
Pa-234	9.81E-14	1.02E-11
U-234	5.04E-12	3.48E-10
Th-230	5.90E-12	3.41E-10
Ra-226	2.78E-12	1.68E-10
Rn-222	8.80E-15	9.16E-13
Po-218	1.29E-19	1.34E-17
Pb-214	5.64E-12	5.87E-10
At-218	1.34E-19	1.39E-17
Bi-214	3.25E-11	3.38E-09
Rn-218	3.43E-21	3.57E-19
Po-214	1.87E-15	1.95E-13
Tl-210	1.28E-14	1.34E-12
Pb-210	2.32E-14	2.42E-12
Bi-210	9.29E-14	9.67E-12
Hg-206	3.00E-20	3.12E-18
Po-210	1.19E-16	1.24E-14
Tl-206	2.20E-19	2.29E-17
Th-232	1.25E-12	7.29E-11
Ra-228	9.40E-16	9.86E-14
Ac-228	1.88E-12	1.96E-10
Th-228	4.44E-12	2.66E-10
Ra-224	2.28E-14	3.09E-12
Rn-220	1.41E-15	1.47E-13
Po-216	3.42E-17	3.56E-15
Pb-212	3.08E-13	3.21E-11
Bi-212	2.55E-13	2.65E-11
Po-212	0.00E+00	0.00E+00
Tl-208	2.48E-12	2.59E-10
U-235	9.57E-13	8.60E-11
Th-231	4.82E-14	5.01E-12
Pa-231	9.12E-17	9.49E-15
Ac-227	2.19E-19	2.28E-17
Th-227	1.52E-16	1.58E-14
Fr-223	9.84E-19	1.02E-16
Ra-223	1.69E-16	1.76E-14
Rn-219	7.42E-17	7.72E-15
At-219	0.00E+00	0.00E+00
Bi-215	2.72E-22	2.83E-20
Po-215	2.27E-19	2.36E-17
Pb-211	9.52E-17	9.90E-15
Bi-211	5.99E-17	6.24E-15
Tl-207	1.77E-17	1.84E-15
Po-211	2.89E-20	3.01E-18
TOTAL	6.98E-11	6.24E-09

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

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.6E-04	5.2E-05	2.5E-05	1.5E-05	1.0E-05	4.8E-06
NNW	0.0E+00	1.2E-04	2.7E-05	7.7E-06	4.6E-06	3.2E-06	1.5E-06
NW	0.0E+00	1.1E-04	3.1E-05	1.4E-05	8.2E-06	5.7E-06	2.7E-06
WNW	0.0E+00	1.7E-04	4.5E-05	1.8E-05	1.0E-05	7.2E-06	3.4E-06
W	0.0E+00	1.8E-04	6.2E-05	3.1E-05	1.8E-05	1.3E-05	6.0E-06
WSW	0.0E+00	1.8E-04	4.7E-05	1.8E-05	1.1E-05	7.5E-06	3.5E-06
SW	0.0E+00	1.3E-04	4.0E-05	1.8E-05	1.1E-05	7.6E-06	3.6E-06
SSW	0.0E+00	1.3E-04	3.4E-05	1.2E-05	0.0E+00	5.0E-06	2.4E-06
S	0.0E+00	1.3E-04	4.2E-05	2.0E-05	1.2E-05	8.1E-06	3.8E-06
SSE	0.0E+00	1.7E-04	4.6E-05	1.8E-05	1.0E-05	7.2E-06	3.4E-06
SSE	0.0E+00	1.9E-04	6.0E-05	2.8E-05	1.7E-05	1.2E-05	5.5E-06
ESE	0.0E+00	2.2E-04	6.2E-05	2.5E-05	1.5E-05	1.0E-05	5.0E-06
E	0.0E+00	2.2E-04	6.8E-05	3.0E-05	1.8E-05	1.3E-05	6.0E-06
ENE	0.0E+00	2.7E-04	7.2E-05	2.9E-05	1.7E-05	1.2E-05	5.7E-06
NE	0.0E+00	2.6E-04	8.7E-05	0.0E+00	2.5E-05	1.7E-05	8.3E-06
NNE	0.0E+00	2.5E-04	6.8E-05	0.0E+00	1.6E-05	1.1E-05	5.4E-06

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	4.8E-07	4.2E-07	4.0E-07	3.0E-08	1.0E-06	8.7E-07
NNW	0.0E+00	3.7E-07	2.2E-07	6.0E-07	8.7E-08	2.9E-07	3.1E-07
NW	0.0E+00	3.2E-07	2.5E-07	1.5E-06	6.3E-07	5.9E-07	5.7E-06
WNW	0.0E+00	5.1E-07	3.6E-07	5.9E-06	3.7E-06	3.7E-07	2.1E-05
W	0.0E+00	5.4E-07	5.0E-07	2.8E-05	3.7E-06	5.1E-08	1.9E-06
WSW	0.0E+00	5.5E-07	3.8E-07	1.5E-07	1.3E-06	1.3E-06	2.2E-06
SW	0.0E+00	3.9E-07	3.2E-07	4.0E-07	3.0E-06	2.9E-06	2.1E-05
SSW	0.0E+00	4.0E-07	2.7E-07	2.9E-07	0.0E+00	2.1E-07	1.4E-05
S	0.0E+00	4.0E-07	3.4E-07	1.6E-06	9.5E-07	1.7E-06	7.2E-06
SSE	0.0E+00	5.2E-07	3.7E-07	1.1E-06	7.7E-07	5.4E-07	5.0E-06
SSE	0.0E+00	5.7E-07	4.8E-07	1.2E-06	1.0E-06	6.0E-07	3.7E-06
ESE	0.0E+00	6.7E-07	4.9E-07	1.0E-07	4.4E-07	1.7E-06	2.4E-06
E	0.0E+00	6.7E-07	5.4E-07	3.7E-07	5.6E-07	7.7E-07	3.2E-06
ENE	0.0E+00	8.0E-07	5.8E-07	3.2E-07	1.2E-07	7.4E-07	6.8E-06
NE	0.0E+00	7.8E-07	7.0E-07	0.0E+00	4.0E-07	1.8E-06	1.8E-06
NNE	0.0E+00	7.5E-07	5.5E-07	0.0E+00	6.6E-08	8.0E-07	1.5E-06

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	4.2E-11	1.4E-11	6.7E-12	4.0E-12	2.8E-12	1.3E-12
NNW	0.0E+00	3.2E-11	7.2E-12	2.1E-12	1.3E-12	8.7E-13	4.2E-13
NW	0.0E+00	2.8E-11	8.3E-12	3.8E-12	2.3E-12	1.6E-12	7.5E-13
WNW	0.0E+00	4.4E-11	1.2E-11	4.7E-12	2.8E-12	2.0E-12	9.2E-13
W	0.0E+00	4.7E-11	1.6E-11	8.3E-12	5.0E-12	3.5E-12	1.6E-12
WSW	0.0E+00	4.7E-11	1.3E-11	4.9E-12	2.9E-12	2.0E-12	9.8E-13
SW	0.0E+00	3.4E-11	1.1E-11	4.9E-12	3.0E-12	2.1E-12	9.9E-13
SSW	0.0E+00	3.5E-11	8.9E-12	3.3E-12	0.0E+00	1.4E-12	6.6E-13
S	0.0E+00	3.4E-11	1.1E-11	5.4E-12	3.2E-12	2.2E-12	1.1E-12
SSE	0.0E+00	4.5E-11	1.2E-11	4.8E-12	2.9E-12	2.0E-12	9.6E-13
SSE	0.0E+00	4.9E-11	1.6E-11	7.6E-12	4.5E-12	3.2E-12	1.5E-12
ESE	0.0E+00	5.8E-11	1.6E-11	6.8E-12	4.1E-12	2.9E-12	1.4E-12
E	0.0E+00	5.8E-11	1.8E-11	8.2E-12	4.9E-12	3.4E-12	1.7E-12
ENE	0.0E+00	7.0E-11	1.9E-11	7.7E-12	4.7E-12	3.3E-12	1.6E-12
NE	0.0E+00	6.8E-11	2.3E-11	0.0E+00	6.9E-12	4.8E-12	2.3E-12
NNE	0.0E+00	6.5E-11	1.8E-11	0.0E+00	4.5E-12	3.1E-12	1.5E-12

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides 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	3.7E-12	3.1E-12	
NNW	0.0E+00	1.3E-12	7.4E-13	2.1E-12	3.1E-13	1.0E-12	1.1E-12	
NW	0.0E+00	1.1E-12	8.7E-13	5.4E-12	2.2E-12	2.1E-12	2.1E-11	
WNW	0.0E+00	1.7E-12	1.2E-12	2.0E-11	1.3E-11	1.3E-12	7.3E-11	
W	0.0E+00	1.8E-12	1.7E-12	9.8E-11	1.3E-11	1.8E-13	6.7E-12	
WSW	0.0E+00	1.8E-12	1.3E-12	5.1E-13	4.6E-12	4.4E-12	7.9E-12	
SW	0.0E+00	1.3E-12	1.1E-12	1.4E-12	1.1E-11	1.0E-11	7.5E-11	
SSW	0.0E+00	1.4E-12	9.2E-13	1.0E-12	0.0E+00	7.6E-13	5.2E-11	
S	0.0E+00	1.3E-12	1.2E-12	5.6E-12	3.4E-12	6.2E-12	2.6E-11	
SSE	0.0E+00	1.8E-12	1.3E-12	3.8E-12	2.7E-12	1.9E-12	1.8E-11	
SSE	0.0E+00	1.9E-12	1.6E-12	4.3E-12	3.6E-12	2.1E-12	1.3E-11	
ESE	0.0E+00	2.2E-12	1.7E-12	3.5E-13	1.5E-12	6.0E-12	8.8E-12	
E	0.0E+00	2.3E-12	1.9E-12	1.3E-12	2.0E-12	2.7E-12	1.2E-11	
ENE	0.0E+00	2.7E-12	2.0E-12	1.1E-12	4.2E-13	2.6E-12	2.5E-11	
NE	0.0E+00	2.6E-12	2.4E-12	0.0E+00	1.4E-12	6.3E-12	6.4E-12	
NNE	0.0E+00	2.5E-12	1.9E-12	0.0E+00	2.3E-13	2.8E-12	5.2E-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	6.6E-11	2.0E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-10	2.4E-10	1.2E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-11	3.3E-10	2.0E-10	
WNW	4.1E-12	0.0E+00	0.0E+00	0.0E+00	2.3E-12	1.5E-10	3.1E-11	
W	2.6E-10	1.9E-10	1.7E-11	5.6E-11	2.7E-11	1.4E-10	1.7E-10	
WSW	1.1E-10	1.2E-10	7.9E-12	8.5E-12	4.1E-12	4.0E-12	1.2E-12	
SW	2.3E-10	2.7E-11	9.9E-11	8.0E-12	1.0E-12	2.9E-13	0.0E+00	
SSW	2.0E-10	5.5E-12	4.0E-12	9.4E-12	0.0E+00	0.0E+00	8.8E-13	
S	1.5E-10	3.2E-11	4.8E-11	3.0E-14	1.7E-11	1.0E-11	3.5E-12	
SSE	1.0E-10	3.2E-10	5.0E-10	1.5E-10	5.4E-11	6.6E-12	2.6E-12	
SSE	8.4E-11	1.7E-10	1.9E-10	7.2E-11	1.7E-11	5.0E-12	6.8E-12	
ESE	1.7E-11	1.2E-10	7.5E-12	1.0E-11	7.0E-12	1.8E-11	8.5E-12	
E	1.3E-11	4.1E-11	1.2E-11	2.4E-11	4.2E-12	1.3E-11	7.5E-12	
ENE	1.1E-11	2.6E-11	7.2E-12	4.3E-12	1.3E-12	8.2E-13	4.1E-13	
NE	2.9E-11	9.7E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	3.7E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-11	

D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Fri May 29 09:51:57 2020

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

Source Category: Area

Source Type: Area

Emission Year: 2019

DOSE Age Group: Five

Comments: NFSS Technical Memo 2019 Year
Population Dose

Dataset Name: NFSS2019 Pop Fiv

Dataset Date: May 29, 2020 09:51 AM

Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5tderjc\Documents\CAP88\Population Files\NFSS2013.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenal	8.05E-05	6.90E-04
UB_Wall	8.90E-05	7.58E-04
Bone_Sur	1.64E-03	1.80E-02
Brain	8.51E-05	7.27E-04
Breasts	9.32E-05	7.92E-04
St_Wall	8.62E-05	7.38E-04
SI_Wall	8.59E-05	7.40E-04
ULI_Wall	9.24E-05	8.40E-04
LLI_Wall	1.09E-04	1.11E-03
Kidneys	1.53E-04	1.39E-03
Liver	1.31E-04	1.28E-03
Muscle	9.61E-05	8.15E-04
Ovaries	9.26E-05	7.71E-04
Pancreas	8.12E-05	6.95E-04
R_Marrow	1.91E-04	1.96E-03
Skin	1.33E-03	1.07E-02
Spleen	8.73E-05	7.52E-04
Testes	1.05E-04	8.74E-04
Thymus	8.53E-05	7.28E-04
Thyroid	8.90E-05	7.58E-04
GB_Wall	8.19E-05	7.00E-04
Ht_Wall	8.50E-05	7.26E-04
Uterus	8.42E-05	7.19E-04
ET_Reg	5.13E-04	2.62E-03
Lung_66	1.20E-03	5.73E-03
Effectiv	2.69E-04	1.85E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	2.35E-05	4.13E-04
INHALATION	1.52E-04	6.78E-04
AIR IMMERSION	4.45E-11	6.42E-10
GROUND SURFACE	9.40E-05	7.55E-04
INTERNAL	1.75E-04	1.09E-03
EXTERNAL	9.40E-05	7.55E-04
TOTAL	2.69E-04	1.85E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2.56E-05	1.36E-04
Th-234	6.69E-07	5.39E-06
Pa-234m	9.16E-06	7.35E-05
Pa-234	1.80E-07	1.45E-06
U-234	2.90E-05	1.53E-04
Th-230	5.01E-05	2.48E-04
Ra-226	3.20E-05	3.72E-04
Rn-222	1.61E-08	1.30E-07
Po-218	2.88E-13	2.32E-12
Pb-214	1.05E-05	8.46E-05
At-218	1.08E-12	8.71E-12
Bi-214	6.16E-05	4.95E-04
Rn-218	6.28E-15	5.04E-14
Po-214	3.41E-09	2.74E-08
Tl-210	2.40E-08	1.93E-07
Pb-210	5.19E-08	4.17E-07
Bi-210	8.39E-07	6.74E-06
Hg-206	6.77E-14	5.44E-13
Po-210	2.17E-10	1.75E-09
Tl-206	1.96E-12	1.57E-11
Th-232	1.16E-05	5.58E-05
Ra-228	3.10E-09	3.35E-08
Ac-228	3.54E-06	2.84E-05
Th-228	2.53E-05	1.16E-04
Ra-224	4.23E-08	6.27E-07
Rn-220	2.58E-09	2.07E-08
Po-216	6.23E-11	5.00E-10
Pb-212	5.67E-07	4.56E-06
Bi-212	6.61E-07	5.31E-06
Po-212	0.00E+00	0.00E+00
Tl-208	4.57E-06	3.67E-05
U-235	3.34E-06	2.06E-05
Th-231	1.06E-07	8.48E-07
Pa-231	1.75E-10	1.41E-09
Ac-227	5.87E-13	4.71E-12
Th-227	2.80E-10	2.25E-09
Fr-223	2.64E-12	2.12E-11
Ra-223	3.13E-10	2.52E-09
Rn-219	1.36E-10	1.09E-09
At-219	0.00E+00	0.00E+00
Bi-215	6.10E-16	4.90E-15
Po-215	4.14E-13	3.33E-12
Pb-211	2.66E-10	2.14E-09
Bi-211	1.10E-10	8.82E-10
Tl-207	1.38E-10	1.11E-09
Po-211	5.28E-14	4.24E-13
TOTAL	2.69E-04	1.85E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	8.04E-13	8.40E-11
Stomach	3.12E-12	3.26E-10
Colon	8.14E-12	8.60E-10
Liver	1.24E-12	1.32E-10
LUNG	2.43E-11	1.77E-09
Bone	2.23E-13	2.29E-11
Skin	1.31E-12	1.37E-10
Breast	4.07E-12	4.24E-10
Ovary	1.08E-12	1.13E-10
Bladder	1.95E-12	2.04E-10
Kidneys	4.55E-13	5.03E-11
Thyroid	2.56E-13	2.67E-11
Leukemia	4.64E-12	4.83E-10
Residual	1.15E-11	1.20E-09
Total	6.31E-11	5.83E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	3.29E-13	7.25E-11
INHALATION	1.67E-11	9.63E-10
AIR IMMERSION	2.36E-17	4.50E-15
GROUND SURFACE	4.61E-11	4.80E-09
INTERNAL	1.70E-11	1.04E-09
EXTERNAL	4.61E-11	4.80E-09
TOTAL	6.31E-11	5.83E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	2.91E-12	1.69E-10
Th-234	3.47E-13	3.61E-11
Pa-234m	1.60E-12	1.67E-10
Pa-234	9.81E-14	1.02E-11
U-234	3.63E-12	2.52E-10
Th-230	4.23E-12	2.45E-10
Ra-226	2.04E-12	1.25E-10
Rn-222	8.80E-15	9.16E-13
Po-218	1.29E-19	1.34E-17
Pb-214	5.64E-12	5.87E-10
At-218	1.34E-19	1.39E-17
Bi-214	3.25E-11	3.38E-09
Rn-218	3.43E-21	3.57E-19
Po-214	1.87E-15	1.95E-13
Tl-210	1.28E-14	1.34E-12
Pb-210	2.32E-14	2.42E-12
Bi-210	9.29E-14	9.67E-12
Hg-206	3.00E-20	3.12E-18
Po-210	1.19E-16	1.24E-14
Tl-206	2.20E-19	2.29E-17
Th-232	8.95E-13	5.23E-11
Ra-228	9.40E-16	9.84E-14
Ac-228	1.88E-12	1.96E-10
Th-228	3.19E-12	1.92E-10
Ra-224	2.27E-14	2.88E-12
Rn-220	1.41E-15	1.47E-13
Po-216	3.42E-17	3.56E-15
Pb-212	3.08E-13	3.21E-11
Bi-212	2.55E-13	2.65E-11
Po-212	0.00E+00	0.00E+00
Tl-208	2.48E-12	2.59E-10
U-235	8.46E-13	7.84E-11
Th-231	4.82E-14	5.01E-12
Pa-231	9.12E-17	9.49E-15
Ac-227	2.19E-19	2.28E-17
Th-227	1.52E-16	1.58E-14
Fr-223	9.84E-19	1.02E-16
Ra-223	1.69E-16	1.76E-14
Rn-219	7.42E-17	7.72E-15
At-219	0.00E+00	0.00E+00
Bi-215	2.72E-22	2.83E-20
Po-215	2.27E-19	2.36E-17
Pb-211	9.52E-17	9.90E-15
Bi-211	5.99E-17	6.24E-15
Tl-207	1.77E-17	1.84E-15
Po-211	2.89E-20	3.01E-18
TOTAL	6.31E-11	5.83E-09

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.6E-04	5.2E-05	2.5E-05	1.5E-05	1.0E-05	4.8E-06
NNW	0.0E+00	1.3E-04	2.7E-05	7.7E-06	4.6E-06	3.2E-06	1.5E-06
NW	0.0E+00	1.1E-04	3.2E-05	1.4E-05	8.2E-06	5.7E-06	2.7E-06
WNW	0.0E+00	1.7E-04	4.5E-05	1.8E-05	1.0E-05	7.2E-06	3.3E-06
W	0.0E+00	1.8E-04	6.2E-05	3.1E-05	1.8E-05	1.3E-05	5.9E-06
WSW	0.0E+00	1.8E-04	4.8E-05	1.8E-05	1.1E-05	7.5E-06	3.5E-06
SW	0.0E+00	1.3E-04	4.0E-05	1.8E-05	1.1E-05	7.5E-06	3.6E-06
SSW	0.0E+00	1.4E-04	3.4E-05	1.2E-05	0.0E+00	5.0E-06	2.4E-06
S	0.0E+00	1.3E-04	4.2E-05	2.0E-05	1.2E-05	8.1E-06	3.8E-06
SSE	0.0E+00	1.8E-04	4.6E-05	1.8E-05	1.0E-05	7.2E-06	3.4E-06
SSE	0.0E+00	1.9E-04	6.0E-05	2.8E-05	1.7E-05	1.1E-05	5.4E-06
ESE	0.0E+00	2.2E-04	6.2E-05	2.5E-05	1.5E-05	1.0E-05	5.0E-06
E	0.0E+00	2.2E-04	6.8E-05	3.0E-05	1.8E-05	1.3E-05	6.0E-06
ENE	0.0E+00	2.7E-04	7.2E-05	2.9E-05	1.7E-05	1.2E-05	5.7E-06
NE	0.0E+00	2.6E-04	8.7E-05	0.0E+00	2.5E-05	1.7E-05	8.3E-06
NNE	0.0E+00	2.5E-04	6.9E-05	0.0E+00	1.6E-05	1.1E-05	5.4E-06

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	4.8E-07	4.2E-07	4.0E-07	3.0E-08	1.0E-06	8.6E-07
NNW	0.0E+00	3.8E-07	2.2E-07	6.0E-07	8.7E-08	2.9E-07	3.1E-07
NW	0.0E+00	3.2E-07	2.5E-07	1.5E-06	6.3E-07	5.9E-07	5.7E-06
WNW	0.0E+00	5.1E-07	3.6E-07	5.9E-06	3.7E-06	3.7E-07	2.1E-05
W	0.0E+00	5.4E-07	5.0E-07	2.8E-05	3.7E-06	5.1E-08	1.9E-06
WSW	0.0E+00	5.5E-07	3.8E-07	1.5E-07	1.3E-06	1.3E-06	2.2E-06
SW	0.0E+00	3.9E-07	3.2E-07	4.0E-07	3.0E-06	2.9E-06	2.1E-05
SSW	0.0E+00	4.1E-07	2.7E-07	2.9E-07	0.0E+00	2.1E-07	1.4E-05
S	0.0E+00	4.0E-07	3.4E-07	1.6E-06	9.5E-07	1.7E-06	7.2E-06
SSE	0.0E+00	5.3E-07	3.7E-07	1.1E-06	7.7E-07	5.4E-07	5.0E-06
SSE	0.0E+00	5.7E-07	4.8E-07	1.2E-06	1.0E-06	6.0E-07	3.7E-06
ESE	0.0E+00	6.7E-07	5.0E-07	1.0E-07	4.4E-07	1.7E-06	2.4E-06
E	0.0E+00	6.7E-07	5.4E-07	3.7E-07	5.6E-07	7.7E-07	3.2E-06
ENE	0.0E+00	8.1E-07	5.8E-07	3.2E-07	1.2E-07	7.4E-07	6.8E-06
NE	0.0E+00	7.9E-07	7.0E-07	0.0E+00	4.0E-07	1.8E-06	1.8E-06
NNE	0.0E+00	7.6E-07	5.5E-07	0.0E+00	6.6E-08	8.0E-07	1.5E-06

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

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	3.8E-11	1.3E-11	6.1E-12	3.7E-12	2.6E-12	1.2E-12	
NNW	0.0E+00	2.9E-11	6.5E-12	1.9E-12	1.1E-12	8.0E-13	3.9E-13	
NW	0.0E+00	2.5E-11	7.6E-12	3.4E-12	2.1E-12	1.4E-12	6.9E-13	
WNW	0.0E+00	4.0E-11	1.1E-11	4.3E-12	2.6E-12	1.8E-12	8.5E-13	
W	0.0E+00	4.2E-11	1.5E-11	7.6E-12	4.6E-12	3.2E-12	1.5E-12	
WSW	0.0E+00	4.3E-11	1.1E-11	4.5E-12	2.7E-12	1.9E-12	9.0E-13	
SW	0.0E+00	3.1E-11	9.7E-12	4.5E-12	2.7E-12	1.9E-12	9.2E-13	
SSW	0.0E+00	3.2E-11	8.1E-12	3.0E-12	0.0E+00	1.3E-12	6.1E-13	
S	0.0E+00	3.1E-11	1.0E-11	4.9E-12	3.0E-12	2.1E-12	1.0E-12	
SSE	0.0E+00	4.1E-11	1.1E-11	4.4E-12	2.6E-12	1.8E-12	8.9E-13	
SSE	0.0E+00	4.4E-11	1.4E-11	6.9E-12	4.2E-12	2.9E-12	1.4E-12	
ESE	0.0E+00	5.2E-11	1.5E-11	6.3E-12	3.8E-12	2.6E-12	1.3E-12	
E	0.0E+00	5.3E-11	1.6E-11	7.5E-12	4.5E-12	3.2E-12	1.5E-12	
ENE	0.0E+00	6.3E-11	1.7E-11	7.1E-12	4.3E-12	3.0E-12	1.5E-12	
NE	0.0E+00	6.1E-11	2.1E-11	0.0E+00	6.3E-12	4.4E-12	2.1E-12	
NNE	0.0E+00	5.9E-11	1.7E-11	0.0E+00	4.1E-12	2.9E-12	1.4E-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	5.0E-14	3.9E-14	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-14	1.6E-14	1.3E-14	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.7E-14	2.6E-14	2.0E-14	
WNW	3.3E-13	0.0E+00	0.0E+00	0.0E+00	4.2E-14	2.9E-14	2.2E-14	
W	5.9E-13	2.7E-13	1.7E-13	1.1E-13	7.9E-14	5.4E-14	4.2E-14	
WSW	3.5E-13	1.7E-13	1.0E-13	7.1E-14	5.0E-14	3.5E-14	2.8E-14	
SW	3.6E-13	1.7E-13	1.1E-13	7.3E-14	5.1E-14	3.7E-14	0.0E+00	
SSW	2.4E-13	1.1E-13	7.2E-14	4.9E-14	0.0E+00	0.0E+00	2.0E-14	
S	3.9E-13	1.9E-13	1.2E-13	8.0E-14	5.6E-14	4.0E-14	3.2E-14	
SSE	3.5E-13	1.7E-13	1.1E-13	7.4E-14	5.3E-14	3.8E-14	3.0E-14	
SSE	5.6E-13	2.7E-13	1.7E-13	1.2E-13	8.3E-14	6.0E-14	4.8E-14	
ESE	5.1E-13	2.4E-13	1.5E-13	1.1E-13	7.7E-14	5.6E-14	4.5E-14	
E	6.1E-13	2.9E-13	1.9E-13	1.3E-13	9.2E-14	6.7E-14	5.3E-14	
ENE	5.8E-13	2.8E-13	1.8E-13	1.3E-13	9.1E-14	6.7E-14	5.3E-14	
NE	8.5E-13	4.1E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	5.5E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-14	

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.5E-12	1.3E-12	1.3E-12	9.5E-14	3.4E-12	2.9E-12	
NNW	0.0E+00	1.1E-12	6.7E-13	1.9E-12	2.8E-13	9.4E-13	1.0E-12	
NW	0.0E+00	9.7E-13	7.9E-13	4.9E-12	2.1E-12	1.9E-12	1.9E-11	
WNW	0.0E+00	1.5E-12	1.1E-12	1.9E-11	1.2E-11	1.2E-12	6.8E-11	
W	0.0E+00	1.6E-12	1.5E-12	8.9E-11	1.2E-11	1.6E-13	6.2E-12	
WSW	0.0E+00	1.7E-12	1.2E-12	4.6E-13	4.2E-12	4.1E-12	7.3E-12	
SW	0.0E+00	1.2E-12	1.0E-12	1.3E-12	9.8E-12	9.3E-12	6.9E-11	
SSW	0.0E+00	1.2E-12	8.4E-13	9.3E-13	0.0E+00	7.0E-13	4.8E-11	
S	0.0E+00	1.2E-12	1.1E-12	5.1E-12	3.1E-12	5.7E-12	2.4E-11	
SSE	0.0E+00	1.6E-12	1.1E-12	3.4E-12	2.5E-12	1.8E-12	1.7E-11	
SSE	0.0E+00	1.7E-12	1.5E-12	3.9E-12	3.3E-12	2.0E-12	1.2E-11	
ESE	0.0E+00	2.0E-12	1.5E-12	3.2E-13	1.4E-12	5.5E-12	8.2E-12	
E	0.0E+00	2.0E-12	1.7E-12	1.2E-12	1.8E-12	2.5E-12	1.1E-11	
ENE	0.0E+00	2.5E-12	1.8E-12	1.0E-12	3.9E-13	2.4E-12	2.3E-11	
NE	0.0E+00	2.4E-12	2.2E-12	0.0E+00	1.3E-12	5.8E-12	5.9E-12	
NNE	0.0E+00	2.3E-12	1.7E-12	0.0E+00	2.1E-13	2.6E-12	4.8E-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	6.2E-11	1.9E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-10	2.2E-10	1.1E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-11	3.1E-10	1.9E-10	
WNW	3.8E-12	0.0E+00	0.0E+00	0.0E+00	2.2E-12	1.5E-10	2.9E-11	
W	2.4E-10	1.8E-10	1.6E-11	5.2E-11	2.5E-11	1.3E-10	1.6E-10	
WSW	1.0E-10	1.1E-10	7.4E-12	8.0E-12	3.8E-12	3.8E-12	1.1E-12	
SW	2.2E-10	2.5E-11	9.3E-11	7.5E-12	9.7E-13	2.7E-13	0.0E+00	
SSW	1.9E-10	5.2E-12	3.8E-12	8.8E-12	0.0E+00	0.0E+00	8.3E-13	
S	1.4E-10	3.0E-11	4.5E-11	2.8E-14	1.6E-11	9.8E-12	3.3E-12	
SSE	9.5E-11	3.0E-10	4.7E-10	1.4E-10	5.1E-11	6.3E-12	2.5E-12	
SSE	7.8E-11	1.6E-10	1.8E-10	6.8E-11	1.6E-11	4.8E-12	6.4E-12	
ESE	1.6E-11	1.1E-10	7.0E-12	9.4E-12	6.6E-12	1.7E-11	8.0E-12	
E	1.2E-11	3.9E-11	1.1E-11	2.3E-11	3.9E-12	1.3E-11	7.1E-12	
ENE	1.0E-11	2.4E-11	6.8E-12	4.1E-12	1.3E-12	7.8E-13	3.9E-13	
NE	2.7E-11	9.1E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	3.4E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-11	

D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Fri May 29 09:53:04 2020

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

Source Category: Area

Source Type: Area

Emission Year: 2019

DOSE Age Group: One

Comments: NFSS Technical Memo 2019 Year
Population Dose

Dataset Name: NFSS2019 Pop One

Dataset Date: May 29, 2020 09:53 AM

Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND

Pop File: C:\Users\h5tderjc\Documents\CAP88\Population Files\NFSS2013.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenal	8.23E-05	7.27E-04
UB_Wall	9.07E-05	7.95E-04
Bone_Sur	1.53E-03	1.91E-02
Brain	8.68E-05	7.63E-04
Breasts	9.50E-05	8.29E-04
St_Wall	8.82E-05	7.80E-04
SI_Wall	8.83E-05	7.88E-04
ULI_Wall	9.91E-05	9.64E-04
LLI_Wall	1.28E-04	1.45E-03
Kidneys	1.69E-04	1.66E-03
Liver	1.48E-04	1.61E-03
Muscle	9.78E-05	8.52E-04
Ovaries	9.22E-05	7.97E-04
Pancreas	8.29E-05	7.32E-04
R_Marrow	2.19E-04	2.51E-03
Skin	1.33E-03	1.07E-02
Spleen	8.90E-05	7.90E-04
Testes	1.06E-04	9.05E-04
Thymus	8.71E-05	7.65E-04
Thyroid	9.08E-05	7.95E-04
GB_Wall	8.36E-05	7.38E-04
Ht_Wall	8.68E-05	7.63E-04
Uterus	8.60E-05	7.57E-04
ET_Reg	8.20E-04	4.02E-03
Lung_66	1.30E-03	6.18E-03
Effectiv	2.86E-04	2.04E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	3.18E-05	5.69E-04
INHALATION	1.60E-04	7.15E-04
AIR IMMERSION	4.45E-11	6.42E-10
GROUND SURFACE	9.40E-05	7.55E-04
INTERNAL	1.92E-04	1.28E-03
EXTERNAL	9.40E-05	7.55E-04
TOTAL	2.86E-04	2.04E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
U-238	2.86E-05	1.58E-04
Th-234	6.70E-07	5.40E-06
Pa-234m	9.16E-06	7.35E-05
Pa-234	1.80E-07	1.45E-06
U-234	3.25E-05	1.78E-04
Th-230	4.97E-05	2.51E-04
Ra-226	4.02E-05	5.04E-04
Rn-222	1.61E-08	1.30E-07
Po-218	2.88E-13	2.32E-12
Pb-214	1.05E-05	8.46E-05
At-218	1.08E-12	8.71E-12
Bi-214	6.16E-05	4.95E-04
Rn-218	6.28E-15	5.04E-14
Po-214	3.41E-09	2.74E-08
Tl-210	2.40E-08	1.93E-07
Pb-210	5.19E-08	4.17E-07
Bi-210	8.39E-07	6.74E-06
Hg-206	6.77E-14	5.44E-13
Po-210	2.17E-10	1.75E-09
Tl-206	1.96E-12	1.57E-11
Th-232	1.08E-05	5.27E-05
Ra-228	3.11E-09	3.76E-08
Ac-228	3.54E-06	2.84E-05
Th-228	2.80E-05	1.29E-04
Ra-224	4.25E-08	6.68E-07
Rn-220	2.58E-09	2.07E-08
Po-216	6.23E-11	5.00E-10
Pb-212	5.67E-07	4.56E-06
Bi-212	6.61E-07	5.31E-06
Po-212	0.00E+00	0.00E+00
Tl-208	4.57E-06	3.67E-05
U-235	3.62E-06	2.26E-05
Th-231	1.06E-07	8.48E-07
Pa-231	1.75E-10	1.41E-09
Ac-227	5.87E-13	4.71E-12
Th-227	2.80E-10	2.25E-09
Fr-223	2.64E-12	2.12E-11
Ra-223	3.13E-10	2.52E-09
Rn-219	1.36E-10	1.09E-09
At-219	0.00E+00	0.00E+00
Bi-215	6.10E-16	4.90E-15
Po-215	4.14E-13	3.33E-12
Pb-211	2.66E-10	2.14E-09
Bi-211	1.10E-10	8.82E-10
Tl-207	1.38E-10	1.11E-09
Po-211	5.28E-14	4.24E-13
TOTAL	2.86E-04	2.04E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	8.21E-13	8.84E-11
Stomach	3.18E-12	3.42E-10
Colon	8.74E-12	1.00E-09
Liver	1.36E-12	1.64E-10
LUNG	1.32E-11	1.16E-09
Bone	8.09E-13	1.72E-10
Skin	1.32E-12	1.37E-10
Breast	4.11E-12	4.33E-10
Ovary	1.10E-12	1.18E-10
Bladder	1.99E-12	2.13E-10
Kidneys	4.91E-13	6.10E-11
Thyroid	2.61E-13	2.79E-11
Leukemia	4.77E-12	5.14E-10
Residual	1.23E-11	1.40E-09
Total	5.44E-11	5.83E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	3.14E-12	7.34E-10
INHALATION	5.16E-12	2.98E-10
AIR IMMERSION	2.36E-17	4.50E-15
GROUND SURFACE	4.61E-11	4.80E-09
INTERNAL	8.31E-12	1.03E-09
EXTERNAL	4.61E-11	4.80E-09
TOTAL	5.44E-11	5.83E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	1.20E-12	1.19E-10
Th-234	3.47E-13	3.61E-11
Pa-234m	1.60E-12	1.67E-10
Pa-234	9.81E-14	1.02E-11
U-234	1.35E-12	1.31E-10
Th-230	1.48E-12	1.06E-10
Ra-226	3.07E-12	6.04E-10
Rn-222	8.80E-15	9.16E-13
Po-218	1.29E-19	1.34E-17
Pb-214	5.64E-12	5.86E-10
At-218	1.34E-19	1.39E-17
Bi-214	3.25E-11	3.38E-09
Rn-218	3.43E-21	3.57E-19
Po-214	1.87E-15	1.95E-13
Tl-210	1.28E-14	1.34E-12
Pb-210	2.32E-14	2.42E-12
Bi-210	9.29E-14	9.67E-12
Hg-206	3.00E-20	3.12E-18
Po-210	1.19E-16	1.24E-14
Tl-206	2.20E-19	2.29E-17
Th-232	3.11E-13	2.13E-11
Ra-228	9.40E-16	1.05E-13
Ac-228	1.88E-12	1.96E-10
Th-228	9.82E-13	6.04E-11
Ra-224	2.26E-14	2.51E-12
Rn-220	1.41E-15	1.47E-13
Po-216	3.42E-17	3.56E-15
Pb-212	3.08E-13	3.21E-11
Bi-212	2.55E-13	2.65E-11
Po-212	0.00E+00	0.00E+00
Tl-208	2.48E-12	2.59E-10
U-235	6.68E-13	6.90E-11
Th-231	4.82E-14	5.01E-12
Pa-231	9.12E-17	9.49E-15
Ac-227	2.19E-19	2.28E-17
Th-227	1.52E-16	1.58E-14
Fr-223	9.84E-19	1.02E-16
Ra-223	1.69E-16	1.76E-14
Rn-219	7.42E-17	7.72E-15
At-219	0.00E+00	0.00E+00
Bi-215	2.72E-22	2.83E-20
Po-215	2.27E-19	2.36E-17
Pb-211	9.52E-17	9.90E-15
Bi-211	5.99E-17	6.24E-15
Tl-207	1.77E-17	1.84E-15
Po-211	2.89E-20	3.01E-18
TOTAL	5.44E-11	5.83E-09

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

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.7E-04	5.6E-05	2.6E-05	1.6E-05	1.1E-05	5.1E-06
NNW	0.0E+00	1.3E-04	2.9E-05	8.2E-06	4.9E-06	3.4E-06	1.6E-06
NW	0.0E+00	1.1E-04	3.4E-05	1.5E-05	8.8E-06	6.1E-06	2.9E-06
WNW	0.0E+00	1.8E-04	4.8E-05	1.9E-05	1.1E-05	7.6E-06	3.6E-06
W	0.0E+00	1.9E-04	6.6E-05	3.3E-05	2.0E-05	1.3E-05	6.3E-06
WSW	0.0E+00	1.9E-04	5.1E-05	1.9E-05	1.1E-05	8.0E-06	3.8E-06
SW	0.0E+00	1.4E-04	4.3E-05	2.0E-05	1.2E-05	8.0E-06	3.8E-06
SSW	0.0E+00	1.4E-04	3.6E-05	1.3E-05	0.0E+00	5.3E-06	2.5E-06
S	0.0E+00	1.4E-04	4.5E-05	2.1E-05	1.2E-05	8.6E-06	4.1E-06
SSE	0.0E+00	1.9E-04	4.9E-05	1.9E-05	1.1E-05	7.7E-06	3.7E-06
SSE	0.0E+00	2.0E-04	6.4E-05	3.0E-05	1.8E-05	1.2E-05	5.8E-06
ESE	0.0E+00	2.4E-04	6.6E-05	2.7E-05	1.6E-05	1.1E-05	5.3E-06
E	0.0E+00	2.4E-04	7.2E-05	3.2E-05	1.9E-05	1.3E-05	6.3E-06
ENE	0.0E+00	2.9E-04	7.7E-05	3.1E-05	1.8E-05	1.3E-05	6.0E-06
NE	0.0E+00	2.8E-04	9.3E-05	0.0E+00	2.7E-05	1.9E-05	8.8E-06
NNE	0.0E+00	2.7E-04	7.3E-05	0.0E+00	1.7E-05	1.2E-05	5.8E-06

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

Direction	Distance (m)						
	250	750	1500	2500	3500	4500	7500
N	0.0E+00	5.1E-07	4.4E-07	4.2E-07	3.1E-08	1.1E-06	9.2E-07
NNW	0.0E+00	4.0E-07	2.3E-07	6.3E-07	9.3E-08	3.1E-07	3.3E-07
NW	0.0E+00	3.4E-07	2.7E-07	1.6E-06	6.7E-07	6.2E-07	6.1E-06
WNW	0.0E+00	5.4E-07	3.8E-07	6.2E-06	3.9E-06	4.0E-07	2.2E-05
W	0.0E+00	5.8E-07	5.3E-07	3.0E-05	4.0E-06	5.4E-08	2.0E-06
WSW	0.0E+00	5.8E-07	4.0E-07	1.6E-07	1.4E-06	1.3E-06	2.3E-06
SW	0.0E+00	4.2E-07	3.4E-07	4.3E-07	3.2E-06	3.0E-06	2.2E-05
SSW	0.0E+00	4.3E-07	2.9E-07	3.1E-07	0.0E+00	2.3E-07	1.5E-05
S	0.0E+00	4.2E-07	3.6E-07	1.7E-06	1.0E-06	1.9E-06	7.6E-06
SSE	0.0E+00	5.6E-07	3.9E-07	1.1E-06	8.2E-07	5.7E-07	5.4E-06
SSE	0.0E+00	6.0E-07	5.1E-07	1.3E-06	1.1E-06	6.4E-07	3.9E-06
ESE	0.0E+00	7.1E-07	5.3E-07	1.1E-07	4.6E-07	1.8E-06	2.6E-06
E	0.0E+00	7.2E-07	5.8E-07	3.9E-07	6.0E-07	8.1E-07	3.4E-06
ENE	0.0E+00	8.6E-07	6.2E-07	3.4E-07	1.3E-07	7.8E-07	7.3E-06
NE	0.0E+00	8.3E-07	7.4E-07	0.0E+00	4.3E-07	1.9E-06	1.9E-06
NNE	0.0E+00	8.0E-07	5.8E-07	0.0E+00	7.0E-08	8.5E-07	1.5E-06

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

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	3.2E-11	1.1E-11	5.4E-12	3.3E-12	2.3E-12	1.1E-12	
NNW	0.0E+00	2.5E-11	5.7E-12	1.7E-12	1.0E-12	7.3E-13	3.6E-13	
NW	0.0E+00	2.1E-11	6.7E-12	3.1E-12	1.9E-12	1.3E-12	6.4E-13	
WNW	0.0E+00	3.4E-11	9.4E-12	3.8E-12	2.3E-12	1.6E-12	7.8E-13	
W	0.0E+00	3.6E-11	1.3E-11	6.7E-12	4.1E-12	2.9E-12	1.4E-12	
WSW	0.0E+00	3.7E-11	1.0E-11	4.0E-12	2.4E-12	1.7E-12	8.2E-13	
SW	0.0E+00	2.6E-11	8.5E-12	4.0E-12	2.4E-12	1.7E-12	8.4E-13	
SSW	0.0E+00	2.7E-11	7.1E-12	2.7E-12	0.0E+00	1.1E-12	5.6E-13	
S	0.0E+00	2.7E-11	9.0E-12	4.4E-12	2.7E-12	1.9E-12	9.1E-13	
SSE	0.0E+00	3.5E-11	9.7E-12	3.9E-12	2.4E-12	1.7E-12	8.2E-13	
SSE	0.0E+00	3.8E-11	1.3E-11	6.2E-12	3.8E-12	2.6E-12	1.3E-12	
ESE	0.0E+00	4.5E-11	1.3E-11	5.6E-12	3.4E-12	2.4E-12	1.2E-12	
E	0.0E+00	4.5E-11	1.4E-11	6.7E-12	4.1E-12	2.9E-12	1.4E-12	
ENE	0.0E+00	5.4E-11	1.5E-11	6.3E-12	3.8E-12	2.7E-12	1.3E-12	
NE	0.0E+00	5.3E-11	1.8E-11	0.0E+00	5.6E-12	4.0E-12	2.0E-12	
NNE	0.0E+00	5.1E-11	1.4E-11	0.0E+00	3.7E-12	2.6E-12	1.3E-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	5.1E-14	4.1E-14	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-14	1.9E-14	1.6E-14	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-14	2.9E-14	2.4E-14	
WNW	3.0E-13	0.0E+00	0.0E+00	0.0E+00	4.4E-14	3.1E-14	2.5E-14	
W	5.4E-13	2.6E-13	1.6E-13	1.1E-13	7.8E-14	5.5E-14	4.4E-14	
WSW	3.3E-13	1.6E-13	1.0E-13	7.0E-14	5.1E-14	3.7E-14	3.0E-14	
SW	3.3E-13	1.6E-13	1.0E-13	7.3E-14	5.3E-14	3.9E-14	0.0E+00	
SSW	2.2E-13	1.1E-13	7.2E-14	5.1E-14	0.0E+00	0.0E+00	2.3E-14	
S	3.6E-13	1.8E-13	1.1E-13	7.9E-14	5.7E-14	4.2E-14	3.4E-14	
SSE	3.3E-13	1.6E-13	1.0E-13	7.4E-14	5.4E-14	4.1E-14	3.3E-14	
SSE	5.2E-13	2.5E-13	1.6E-13	1.1E-13	8.3E-14	6.2E-14	5.0E-14	
ESE	4.7E-13	2.3E-13	1.5E-13	1.1E-13	7.7E-14	5.8E-14	4.7E-14	
E	5.6E-13	2.8E-13	1.8E-13	1.2E-13	9.1E-14	6.8E-14	5.5E-14	
ENE	5.4E-13	2.7E-13	1.7E-13	1.2E-13	9.0E-14	6.8E-14	5.5E-14	
NE	7.9E-13	3.9E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	5.1E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.1E-14	

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.3E-12	1.1E-12	1.1E-12	8.5E-14	3.1E-12	2.6E-12	
NNW	0.0E+00	9.8E-13	5.9E-13	1.7E-12	2.5E-13	8.5E-13	9.5E-13	
NW	0.0E+00	8.3E-13	6.9E-13	4.4E-12	1.9E-12	1.7E-12	1.8E-11	
WNW	0.0E+00	1.3E-12	9.8E-13	1.6E-11	1.0E-11	1.1E-12	6.2E-11	
W	0.0E+00	1.4E-12	1.4E-12	7.9E-11	1.1E-11	1.5E-13	5.6E-12	
WSW	0.0E+00	1.4E-12	1.0E-12	4.1E-13	3.8E-12	3.7E-12	6.6E-12	
SW	0.0E+00	1.0E-12	8.8E-13	1.1E-12	8.8E-12	8.4E-12	6.4E-11	
SSW	0.0E+00	1.1E-12	7.4E-13	8.3E-13	0.0E+00	6.4E-13	4.4E-11	
S	0.0E+00	1.0E-12	9.3E-13	4.5E-12	2.8E-12	5.2E-12	2.2E-11	
SSE	0.0E+00	1.4E-12	1.0E-12	3.1E-12	2.3E-12	1.6E-12	1.6E-11	
SSE	0.0E+00	1.5E-12	1.3E-12	3.5E-12	3.0E-12	1.8E-12	1.1E-11	
ESE	0.0E+00	1.8E-12	1.4E-12	2.9E-13	1.3E-12	5.0E-12	7.5E-12	
E	0.0E+00	1.8E-12	1.5E-12	1.0E-12	1.6E-12	2.3E-12	9.9E-12	
ENE	0.0E+00	2.1E-12	1.6E-12	9.0E-13	3.5E-13	2.2E-12	2.1E-11	
NE	0.0E+00	2.1E-12	1.9E-12	0.0E+00	1.2E-12	5.2E-12	5.4E-12	
NNE	0.0E+00	2.0E-12	1.5E-12	0.0E+00	1.9E-13	2.3E-12	4.4E-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	6.4E-11	2.0E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-10	2.7E-10	1.5E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-11	3.4E-10	2.2E-10	
WNW	3.6E-12	0.0E+00	0.0E+00	0.0E+00	2.3E-12	1.6E-10	3.2E-11	
W	2.2E-10	1.7E-10	1.5E-11	5.1E-11	2.5E-11	1.3E-10	1.7E-10	
WSW	9.7E-11	1.0E-10	7.1E-12	7.9E-12	3.9E-12	4.0E-12	1.3E-12	
SW	2.0E-10	2.4E-11	9.1E-11	7.5E-12	1.0E-12	2.9E-13	0.0E+00	
SSW	1.8E-10	5.0E-12	3.8E-12	9.1E-12	0.0E+00	0.0E+00	9.7E-13	
S	1.3E-10	2.8E-11	4.4E-11	2.8E-14	1.7E-11	1.0E-11	3.6E-12	
SSE	8.9E-11	2.9E-10	4.6E-10	1.4E-10	5.2E-11	6.7E-12	2.7E-12	
SSE	7.3E-11	1.5E-10	1.7E-10	6.6E-11	1.6E-11	4.9E-12	6.7E-12	
ESE	1.5E-11	1.1E-10	6.8E-12	9.2E-12	6.6E-12	1.8E-11	8.4E-12	
E	1.1E-11	3.7E-11	1.1E-11	2.2E-11	3.9E-12	1.3E-11	7.3E-12	
ENE	9.4E-12	2.3E-11	6.5E-12	4.0E-12	1.2E-12	7.9E-13	4.0E-13	
NE	2.5E-11	8.5E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	3.2E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-11	

D O S E A N D R I S K S U M M A R I E S

Non-Radon Population Assessment
Fri May 29 09:52:33 2020

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

Source Category: Area
Source Type: Area
Emission Year: 2019
DOSE Age Group: Infant

Comments: NFSS Technical Memo 2019 Year
Population Dose

Dataset Name: NFSS2019 Pop Inf
Dataset Date: May 29, 2020 09:52 AM
Wind File: C:\Users\h5tderjc\Documents\CAP88\Wind Files\IAG0905.WND
Pop File: C:\Users\h5tderjc\Documents\CAP88\Population Files\NFSS2013.POP

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem)	Collective Population (person-rem)
Adrenal	9.34E-05	9.32E-04
UB_Wall	1.02E-04	9.99E-04
Bone_Sur	5.16E-03	8.57E-02
Brain	9.78E-05	9.67E-04
Breasts	1.06E-04	1.03E-03
St_Wall	9.95E-05	9.89E-04
SI_Wall	9.96E-05	9.96E-04
ULI_Wall	1.13E-04	1.23E-03
LLI_Wall	1.50E-04	1.86E-03
Kidneys	2.58E-04	3.25E-03
Liver	2.31E-04	3.11E-03
Muscle	1.09E-04	1.06E-03
Ovaries	1.11E-04	1.13E-03
Pancreas	9.39E-05	9.36E-04
R_Marrow	6.88E-04	1.10E-02
Skin	1.34E-03	1.09E-02
Spleen	1.03E-04	1.04E-03
Testes	1.26E-04	1.26E-03
Thymus	9.81E-05	9.69E-04
Thyroid	1.02E-04	9.99E-04
GB_Wall	9.46E-05	9.41E-04
Ht_Wall	9.77E-05	9.66E-04
Uterus	9.70E-05	9.60E-04
ET_Reg	7.84E-04	4.01E-03
Lung_66	1.17E-03	5.77E-03
Effectiv	3.78E-04	3.94E-03

PATHWAY COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem)	Collective Population (person-rem)
INGESTION	1.42E-04	2.55E-03
INHALATION	1.42E-04	6.34E-04
AIR IMMERSION	4.45E-11	6.42E-10
GROUND SURFACE	9.40E-05	7.55E-04
INTERNAL	2.84E-04	3.18E-03
EXTERNAL	9.40E-05	7.55E-04
TOTAL	3.78E-04	3.94E-03

NUCLIDE COMMITTED EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem)	Collective Population (person-rem)
U-238	3.07E-05	2.13E-04
Th-234	6.70E-07	5.41E-06
Pa-234m	9.16E-06	7.35E-05
Pa-234	1.80E-07	1.45E-06
U-234	3.44E-05	2.34E-04
Th-230	6.18E-05	5.25E-04
Ra-226	1.16E-04	1.95E-03
Rn-222	1.61E-08	1.30E-07
Po-218	2.88E-13	2.32E-12
Pb-214	1.05E-05	8.46E-05
At-218	1.08E-12	8.71E-12
Bi-214	6.16E-05	4.95E-04
Rn-218	6.28E-15	5.04E-14
Po-214	3.41E-09	2.74E-08
Tl-210	2.40E-08	1.93E-07
Pb-210	5.19E-08	4.17E-07
Bi-210	8.39E-07	6.74E-06
Hg-206	6.77E-14	5.44E-13
Po-210	2.17E-10	1.75E-09
Tl-206	1.96E-12	1.57E-11
Th-232	1.17E-05	9.26E-05
Ra-228	3.16E-09	8.20E-08
Ac-228	3.54E-06	2.84E-05
Th-228	2.70E-05	1.54E-04
Ra-224	4.25E-08	7.18E-07
Rn-220	2.58E-09	2.07E-08
Po-216	6.23E-11	5.00E-10
Pb-212	5.67E-07	4.56E-06
Bi-212	6.61E-07	5.31E-06
Po-212	0.00E+00	0.00E+00
Tl-208	4.57E-06	3.67E-05
U-235	3.80E-06	2.74E-05
Th-231	1.06E-07	8.48E-07
Pa-231	1.75E-10	1.41E-09
Ac-227	5.87E-13	4.71E-12
Th-227	2.80E-10	2.25E-09
Fr-223	2.64E-12	2.12E-11
Ra-223	3.13E-10	2.52E-09
Rn-219	1.36E-10	1.09E-09
At-219	0.00E+00	0.00E+00
Bi-215	6.10E-16	4.90E-15
Po-215	4.14E-13	3.33E-12
Pb-211	2.66E-10	2.14E-09
Bi-211	1.10E-10	8.82E-10
Tl-207	1.38E-10	1.11E-09
Po-211	5.28E-14	4.24E-13
TOTAL	3.78E-04	3.94E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
Esophagus	8.14E-13	8.68E-11
Stomach	3.15E-12	3.35E-10
Colon	8.43E-12	9.35E-10
Liver	1.31E-12	1.53E-10
LUNG	1.19E-11	1.07E-09
Bone	5.90E-13	1.24E-10
Skin	1.32E-12	1.37E-10
Breast	4.09E-12	4.29E-10
Ovary	1.09E-12	1.16E-10
Bladder	1.97E-12	2.10E-10
Kidneys	4.68E-13	5.62E-11
Thyroid	2.58E-13	2.74E-11
Leukemia	4.73E-12	5.06E-10
Residual	1.20E-11	1.33E-09
Total	5.21E-11	5.52E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
INGESTION	2.06E-12	4.93E-10
INHALATION	3.90E-12	2.26E-10
AIR IMMERSION	2.36E-17	4.50E-15
GROUND SURFACE	4.61E-11	4.80E-09
INTERNAL	5.97E-12	7.18E-10
EXTERNAL	4.61E-11	4.80E-09
TOTAL	5.21E-11	5.52E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk Per Year
U-238	8.81E-13	8.44E-11
Th-234	3.47E-13	3.61E-11
Pa-234m	1.60E-12	1.67E-10
Pa-234	9.81E-14	1.02E-11
U-234	9.95E-13	9.31E-11
Th-230	1.11E-12	7.76E-11
Ra-226	2.13E-12	4.16E-10
Rn-222	8.80E-15	9.16E-13
Po-218	1.29E-19	1.34E-17
Pb-214	5.64E-12	5.86E-10
At-218	1.34E-19	1.39E-17
Bi-214	3.25E-11	3.38E-09
Rn-218	3.43E-21	3.57E-19
Po-214	1.87E-15	1.95E-13
Tl-210	1.28E-14	1.34E-12
Pb-210	2.32E-14	2.42E-12
Bi-210	9.29E-14	9.67E-12
Hg-206	3.00E-20	3.12E-18
Po-210	1.19E-16	1.24E-14
Tl-206	2.20E-19	2.29E-17
Th-232	2.33E-13	1.56E-11
Ra-228	9.40E-16	1.03E-13
Ac-228	1.88E-12	1.96E-10
Th-228	7.41E-13	4.52E-11
Ra-224	2.26E-14	2.47E-12
Rn-220	1.41E-15	1.47E-13
Po-216	3.42E-17	3.56E-15
Pb-212	3.08E-13	3.21E-11
Bi-212	2.55E-13	2.65E-11
Po-212	0.00E+00	0.00E+00
Tl-208	2.48E-12	2.59E-10
U-235	6.39E-13	6.59E-11
Th-231	4.82E-14	5.01E-12
Pa-231	9.12E-17	9.49E-15
Ac-227	2.19E-19	2.28E-17
Th-227	1.52E-16	1.58E-14
Fr-223	9.84E-19	1.02E-16
Ra-223	1.69E-16	1.76E-14
Rn-219	7.42E-17	7.72E-15
At-219	0.00E+00	0.00E+00
Bi-215	2.72E-22	2.83E-20
Po-215	2.27E-19	2.36E-17
Pb-211	9.52E-17	9.90E-15
Bi-211	5.99E-17	6.24E-15
Tl-207	1.77E-17	1.84E-15
Po-211	2.89E-20	3.01E-18
TOTAL	5.21E-11	5.52E-09

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

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	2.3E-04	7.5E-05	3.6E-05	2.2E-05	1.5E-05	7.4E-06
NNW	0.0E+00	1.8E-04	3.9E-05	1.1E-05	6.9E-06	4.9E-06	2.4E-06
NW	0.0E+00	1.5E-04	4.5E-05	2.0E-05	1.2E-05	8.6E-06	4.2E-06
WNW	0.0E+00	2.4E-04	6.4E-05	2.6E-05	1.5E-05	1.1E-05	5.1E-06
W	0.0E+00	2.5E-04	8.9E-05	4.5E-05	2.7E-05	1.9E-05	9.0E-06
WSW	0.0E+00	2.6E-04	6.8E-05	2.6E-05	1.6E-05	1.1E-05	5.4E-06
SW	0.0E+00	1.8E-04	5.8E-05	2.7E-05	1.6E-05	1.1E-05	5.5E-06
SSW	0.0E+00	1.9E-04	4.8E-05	1.8E-05	0.0E+00	7.5E-06	3.7E-06
S	0.0E+00	1.9E-04	6.1E-05	2.9E-05	1.7E-05	1.2E-05	5.9E-06
SSE	0.0E+00	2.5E-04	6.6E-05	2.6E-05	1.6E-05	1.1E-05	5.3E-06
SSE	0.0E+00	2.7E-04	8.6E-05	4.1E-05	2.5E-05	1.7E-05	8.3E-06
ESE	0.0E+00	3.1E-04	8.9E-05	3.7E-05	2.2E-05	1.6E-05	7.6E-06
E	0.0E+00	3.2E-04	9.7E-05	4.4E-05	2.7E-05	1.9E-05	9.1E-06
ENE	0.0E+00	3.8E-04	1.0E-04	4.2E-05	2.5E-05	1.8E-05	8.6E-06
NE	0.0E+00	3.7E-04	1.2E-04	0.0E+00	3.7E-05	2.6E-05	1.3E-05
NNE	0.0E+00	3.5E-04	9.8E-05	0.0E+00	2.4E-05	1.7E-05	8.2E-06

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

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	6.8E-07	6.0E-07	5.8E-07	4.3E-08	1.5E-06	1.3E-06	
NNW	0.0E+00	5.3E-07	3.1E-07	8.8E-07	1.3E-07	4.4E-07	5.0E-07	
NW	0.0E+00	4.5E-07	3.6E-07	2.2E-06	9.4E-07	8.8E-07	8.9E-06	
WNW	0.0E+00	7.1E-07	5.1E-07	8.5E-06	5.4E-06	5.5E-07	3.1E-05	
W	0.0E+00	7.6E-07	7.1E-07	4.1E-05	5.5E-06	7.5E-08	2.8E-06	
WSW	0.0E+00	7.7E-07	5.4E-07	2.1E-07	1.9E-06	1.9E-06	3.4E-06	
SW	0.0E+00	5.5E-07	4.6E-07	5.9E-07	4.5E-06	4.3E-06	3.2E-05	
SSW	0.0E+00	5.7E-07	3.9E-07	4.3E-07	0.0E+00	3.2E-07	2.3E-05	
S	0.0E+00	5.6E-07	4.9E-07	2.3E-06	1.4E-06	2.6E-06	1.1E-05	
SSE	0.0E+00	7.4E-07	5.3E-07	1.6E-06	1.1E-06	8.0E-07	7.8E-06	
SSE	0.0E+00	8.0E-07	6.9E-07	1.8E-06	1.5E-06	8.9E-07	5.7E-06	
ESE	0.0E+00	9.4E-07	7.1E-07	1.5E-07	6.5E-07	2.5E-06	3.7E-06	
E	0.0E+00	9.5E-07	7.8E-07	5.3E-07	8.3E-07	1.1E-06	4.9E-06	
ENE	0.0E+00	1.1E-06	8.3E-07	4.6E-07	1.8E-07	1.1E-06	1.0E-05	
NE	0.0E+00	1.1E-06	1.0E-06	0.0E+00	5.9E-07	2.6E-06	2.7E-06	
NNE	0.0E+00	1.1E-06	7.8E-07	0.0E+00	9.7E-08	1.2E-06	2.2E-06	
		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	4.5E-05	1.6E-04	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-04	3.1E-04	1.8E-04	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.7E-05	3.1E-04	2.2E-04	
WNW	1.9E-06	0.0E+00	0.0E+00	0.0E+00	1.7E-06	1.4E-04	3.2E-05	
W	1.1E-04	8.8E-05	8.4E-06	3.0E-05	1.6E-05	9.1E-05	1.3E-04	
WSW	5.1E-05	5.7E-05	4.3E-06	5.2E-06	2.8E-06	3.2E-06	1.1E-06	
SW	1.1E-04	1.3E-05	5.4E-05	4.8E-06	7.1E-07	2.3E-07	0.0E+00	
SSW	9.5E-05	2.9E-06	2.4E-06	6.5E-06	0.0E+00	0.0E+00	9.8E-07	
S	6.6E-05	1.5E-05	2.5E-05	1.7E-08	1.1E-05	7.9E-06	3.0E-06	
SSE	4.6E-05	1.6E-04	2.7E-04	8.8E-05	3.6E-05	5.1E-06	2.3E-06	
SSE	3.6E-05	7.8E-05	9.4E-05	3.8E-05	9.6E-06	3.2E-06	4.8E-06	
ESE	7.5E-06	5.6E-05	3.7E-06	5.4E-06	4.1E-06	1.2E-05	6.1E-06	
E	5.5E-06	1.9E-05	5.7E-06	1.3E-05	2.3E-06	8.2E-06	5.0E-06	
ENE	4.7E-06	1.2E-05	3.5E-06	2.2E-06	7.5E-07	5.1E-07	2.7E-07	
NE	1.2E-05	4.3E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	1.6E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.7E-06	

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

Distance (m)							
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	3.1E-11	1.1E-11	5.2E-12	3.2E-12	2.2E-12	1.1E-12
NNW	0.0E+00	2.4E-11	5.5E-12	1.6E-12	9.9E-13	7.0E-13	3.4E-13
NW	0.0E+00	2.1E-11	6.4E-12	2.9E-12	1.8E-12	1.3E-12	6.1E-13
WNW	0.0E+00	3.3E-11	9.0E-12	3.7E-12	2.2E-12	1.5E-12	7.4E-13
W	0.0E+00	3.5E-11	1.3E-11	6.5E-12	3.9E-12	2.7E-12	1.3E-12
WSW	0.0E+00	3.5E-11	9.5E-12	3.8E-12	2.3E-12	1.6E-12	7.9E-13
SW	0.0E+00	2.5E-11	8.1E-12	3.9E-12	2.3E-12	1.6E-12	8.1E-13
SSW	0.0E+00	2.6E-11	6.8E-12	2.6E-12	0.0E+00	1.1E-12	5.4E-13
S	0.0E+00	2.6E-11	8.6E-12	4.2E-12	2.5E-12	1.8E-12	8.8E-13
SSE	0.0E+00	3.4E-11	9.3E-12	3.7E-12	2.3E-12	1.6E-12	7.9E-13
SSE	0.0E+00	3.7E-11	1.2E-11	5.9E-12	3.6E-12	2.5E-12	1.3E-12
ESE	0.0E+00	4.3E-11	1.3E-11	5.3E-12	3.3E-12	2.3E-12	1.1E-12
E	0.0E+00	4.3E-11	1.4E-11	6.4E-12	3.9E-12	2.7E-12	1.4E-12
ENE	0.0E+00	5.2E-11	1.5E-11	6.0E-12	3.7E-12	2.6E-12	1.3E-12
NE	0.0E+00	5.1E-11	1.8E-11	0.0E+00	5.4E-12	3.8E-12	1.9E-12
NNE	0.0E+00	4.9E-11	1.4E-11	0.0E+00	3.5E-12	2.5E-12	1.2E-12

COLLECTIVE FATAL CANCER RISK Per Year
(All Radionuclides and Pathways)

		Distance (m)						
Direction		250	750	1500	2500	3500	4500	7500
N	0.0E+00	1.2E-12	1.1E-12	1.1E-12	8.2E-14	2.9E-12	2.5E-12	
NNW	0.0E+00	9.4E-13	5.7E-13	1.6E-12	2.4E-13	8.2E-13	9.1E-13	
NW	0.0E+00	8.0E-13	6.6E-13	4.2E-12	1.8E-12	1.7E-12	1.7E-11	
WNW	0.0E+00	1.3E-12	9.4E-13	1.6E-11	1.0E-11	1.0E-12	5.9E-11	
W	0.0E+00	1.4E-12	1.3E-12	7.6E-11	1.0E-11	1.4E-13	5.4E-12	
WSW	0.0E+00	1.4E-12	9.9E-13	3.9E-13	3.6E-12	3.5E-12	6.4E-12	
SW	0.0E+00	9.8E-13	8.4E-13	1.1E-12	8.4E-12	8.1E-12	6.1E-11	
SSW	0.0E+00	1.0E-12	7.1E-13	7.9E-13	0.0E+00	6.1E-13	4.3E-11	
S	0.0E+00	1.0E-12	8.9E-13	4.3E-12	2.7E-12	5.0E-12	2.1E-11	
SSE	0.0E+00	1.3E-12	9.6E-13	2.9E-12	2.2E-12	1.5E-12	1.5E-11	
SSE	0.0E+00	1.4E-12	1.3E-12	3.4E-12	2.8E-12	1.7E-12	1.1E-11	
ESE	0.0E+00	1.7E-12	1.3E-12	2.8E-13	1.2E-12	4.8E-12	7.2E-12	
E	0.0E+00	1.7E-12	1.4E-12	9.9E-13	1.6E-12	2.2E-12	9.5E-12	
ENE	0.0E+00	2.0E-12	1.5E-12	8.6E-13	3.3E-13	2.1E-12	2.0E-11	
NE	0.0E+00	2.0E-12	1.8E-12	0.0E+00	1.1E-12	5.0E-12	5.2E-12	
NNE	0.0E+00	1.9E-12	1.4E-12	0.0E+00	1.8E-13	2.3E-12	4.2E-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	6.0E-11	1.9E-10	
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-10	2.4E-10	1.3E-10	
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-11	3.2E-10	2.0E-10	
WNW	3.4E-12	0.0E+00	0.0E+00	0.0E+00	2.1E-12	1.5E-10	3.0E-11	
W	2.1E-10	1.6E-10	1.5E-11	4.8E-11	2.4E-11	1.2E-10	1.6E-10	
WSW	9.3E-11	9.8E-11	6.8E-12	7.5E-12	3.7E-12	3.7E-12	1.2E-12	
SW	2.0E-10	2.3E-11	8.6E-11	7.1E-12	9.4E-13	2.7E-13	0.0E+00	
SSW	1.7E-10	4.8E-12	3.6E-12	8.6E-12	0.0E+00	0.0E+00	8.9E-13	
S	1.2E-10	2.7E-11	4.2E-11	2.6E-14	1.6E-11	9.7E-12	3.4E-12	
SSE	8.6E-11	2.7E-10	4.4E-10	1.3E-10	4.9E-11	6.2E-12	2.5E-12	
SSE	7.0E-11	1.4E-10	1.7E-10	6.3E-11	1.5E-11	4.6E-12	6.4E-12	
ESE	1.4E-11	1.0E-10	6.5E-12	8.8E-12	6.3E-12	1.7E-11	7.9E-12	
E	1.1E-11	3.5E-11	1.0E-11	2.1E-11	3.7E-12	1.2E-11	6.9E-12	
ENE	9.0E-12	2.2E-11	6.3E-12	3.8E-12	1.2E-12	7.5E-13	3.8E-13	
NE	2.4E-11	8.2E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
NNE	3.1E-13	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-11	

ATTACHMENT E

NATIONAL CLIMATIC DATA CENTER, NIAGARA FALLS, NEW YORK

Local Climatological Data

Daily Summary

January 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH						
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees		
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23			
01	54*	22	38	11.9	78	28	32	27	0	0748	1651	RA BR				0.04			29.31	30.02	15.8	60	240	44	240			
02	34	22	28	2.1	76	20	25	37	0	0748	1652	RA				T			29.50	30.20	5.4	13	150	10	160			
03	37	31	34	8.3	74	25	30	31	0	0748	1653	RA SN BR				0.04			29.29	29.96	14.8	34	270	24	280			
04	45	28	37	11.5	71	28	34	28	0	0748	1654					0.00			29.14	29.79	15.4	39	220	31	230			
05	38	25	32	6.6	88	30	32	33	0	0748	1655	BR HZ				0.00			29.06	29.73	7.7	28	230	22	230			
06	38	22	30	4.8	72	23	29	35	0	0748	1656	RA SN BR				0.03			29.47	30.19	11.7	31	310	24	330			
07	42	20	31	6.0	69	18	24	34	0	0747	1657	RA SN UP				0.11			29.57	30.20	13.2	34	200	25	190			
08	47	36	42	17.1	91	39	41	23	0	0747	1658	TS RA FG BR				0.32			29.04	29.69	8.9	36	200	26	280			
09	37	24	31	6.3	74	23	28	34	0	0747	1659	RA SN BR UP				0.04			29.10	29.79	19.7	37	290	30	290			
10	24	17	21	-3.6	72	13	19	44	0	0747	1700	SN BR				T			29.38	30.11	18.3	37	310	26	310			
11	19	12	16	-8.5	65	6	13	49	0	0746	1701	SN UP				T			29.71	30.45	7.9	25	330	22	320			
12	23	17	20	-4.3	67	11	18	45	0	0746	1703					0.00			29.85	30.56	7.6	16	070	14	070			
13	22	14	18	-6.2	73	10	16	47	0	0746	1704	SN				T			29.78	30.48	11.7	26	080	22	070			
14	28	11	20	-4.1	77	14	18	45	0	0745	1705					0.00			29.64	30.32	5.5	16	250	14	260			
15	31	21	26	2.0	77	21	25	39	0	0745	1706	HZ				0.00			29.47	30.14	13.8	38	230	30	230			
16	33	14	24	0.1	70	17	23	41	0	0744	1707	SN BR UP				T			29.41	30.14	17.1	40	250	30	310			
17	25	8	17	-6.8	71	9	15	48	0	0744	1709	SN				T			29.60	30.28	5.0	15	100	12	130			
18	32	17	25	1.2	78	21	25	40	0	0743	1710	SN BR HZ				0.04			29.39	30.10	8.8	25	260	21	260			
19	23	12	18	-5.7	82	11	14	47	0	0743	1711	SN FZFG BR UP FG				0.03			29.51	30.17	15.2	34	060	24	070			
20	12	-3	5	-18.6	80	2	6	60	0	0742	1712	SN FZFG BR HZ BLSN FG				T			29.23	29.97	17.2	33	320	26	320			
21	8	-4	2	-21.6	69			63	0	0741	1714	SN UP BLSN FG				T			29.68		13.1	31	330	24	330			
22	32	-3	15	-8.5	66	5	12	50	0	0741	1715	BR				0.01			29.83	30.50	8.1	31	190	25	180			
23	45	31	38	14.5	86	34	36	27	0	0740	1716	RA FZRA SN BR UP				0.47			29.22	29.84	13.7	34	210	23	200			
24	40	25	33	9.5	82	25	29	32	0	0739	1717	RA SN BR				0.29			28.98	29.67	12.8	26	250	22	250			
25	27	13	20	-3.5	66	10	17	45	0	0738	1719	SN HZ				T			29.26	29.98	20.3	42	270	33	270			
26	16	10	13	-10.5	67	4	11	52	0	0737	1720	SN HZ				T			29.48	30.17	9.0	23	250	18	280			
27	30	8	19	-4.5	69	8	15	46	0	0736	1721	SN FZFG BR UP HZ BLSN FG				0.04			29.27	29.97	16.8	52	240	40	230			
28	27	3	15	-8.5	69	6	12	50	0	0735	1723	SN				T			29.35	30.01	10.4	32	100	24	100			
29	34	8	21	-2.5	77	15	19	44	0	0735	1724	SN FZFG BR UP HZ BLSN FG				0.01			29.08	29.79	19.4	45	220	35	250			
30	8	-4	2	-21.5	67	-6	0	63	0	0734	1725	SN FZFG BR UP HZ BLSN FG				0.01			29.27	30.01	20.1	42	230	35	250			
31	7	-4*	2	-21.6	68	-6	0	63	0	0733	1727	SN HZ BLSN				T			29.57	30.33	21.4	41	230	33	240			
	29.6	14.6	22.1									Monthly Averages Totals				1.48			29.40	30.09	13.2							
	-2.1	-2.2	-2.2									Departure from Normal (1981-2010)				-0.16												

Degree Days

Monthly

Total

Departure

Season-to-date

Total

Departure

Temperature

Max

Min

Number of days with...

Precipitation

Snow

Weather

Heating

Cooling

N/A

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure

Date

Time

24-Hr...

Precip

Snowfall

Snow Depth

Maximum

Minimum

Date

Time

Greatest...

23-24

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data

Daily Summary

February 2019

Generated on 01/16/2020

Local Climatological Data
Daily Summary
March 2019

Generated on 01/16/2020

Date	Temperature (F)								Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH				
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees	
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23		
01	33	5*	19	-9.2	67	12	19	46	0	0652	1805					0.00			29.57	30.26	4.0	13	010	12	020		
02	31	21	26	-2.3	88	24	26	39	0	0651	1806	SN FZFG BR FG				0.07			29.44	30.13	6.0	20	270	16	280		
03	28	14	21	-7.6	79	17	21	44	0	0649	1807	SN BR				T			29.44	30.11	5.6	13	200	12	200		
04	23	10	17	-11.9	71	9	14	48	0	0647	1808	SN BR HZ				0.01			29.33	30.03	13.4	34	240	29	220		
05	17	7	12	-17.1	68	3	10	53	0	0646	1810	SN BR							29.35	30.06	17.7	38	220	32	230		
06	15	7	11	-18.4	64	1	9	54	0	0644	1811	SN BR				T			29.49	30.22	14.3	28	250	23	250		
07	22	9	16	-13.7	66	9	16	49	0	0642	1812	SN BR							29.60	30.29	11.4	30	290	23	270		
08	31	6	19	-11.0	67	8	15	46	0	0641	1813	BR				0.00			29.62	30.32	4.6	15	240	13	230		
09	38	8	23	-7.3	66	15	22	42	0	0639	1815	RA HZ				0.04			29.57	30.22	8.8	27	080	20	100		
10	42	33	38	7.4	79	32	36	27	0	0637	1816	RA BR				0.36			29.10	29.79	25.3	55	240	44	250		
11	37	27	32	1.1	67	23	29	33	0	0635	1817	SN				T			29.44	30.14	18.2	36	240	28	230		
12	35	23	29	-2.2	67	19	26	36	0	0634	1818					0.00			29.65	30.34	12.5	27	280	21	210		
13	47	23	35	3.5	59	23	31	30	0	0632	1819					0.00			29.52	30.17	4.1	12	170	10	220		
14	63*	33	48	16.2	69	38	44	17	0	0630	1821	RA BR				0.30			29.22	29.82	7.6	41	200	30	200		
15	57	34	46	13.8	79	35	39	19	0	0628	1822	RA				T			29.04	29.73	23.1	43	250	33	240		
16	35	26	31	-1.5	65	20	27	34	0	0627	1823	SN BR				0.01			29.40	30.11	18.3	38	280	31	290		
17	35	23	29	-3.9	63	16	24	36	0	0625	1824					0.00			29.59	30.27	11.4	27	240	22	210		
18	38	22	30	-3.2	75	22	26	35	0	0623	1825	SN FZFG BR FG				0.04			29.62	30.32	7.5	25	320	21	320		
19	43	25	34	0.4	73	24	30	31	0	0621	1827	SN BR				0.01			29.72	30.39	8.1	23	240	20	220		
20	50	26	38	4.0	57	25	34	27	0	0620	1828					0.00			29.56	30.21	7.4	27	220	22	200		
21	50	38	44	9.7	70	32	37	21	0	0618	1829	RA							29.24	30.06	7.1	23	290	18	290		
22	38	25	32	-2.7	77	27	31	33	0	0616	1830	RA SN FG FZFG BR				0.04			29.07	29.75	17.3	42	320	32	320		
23	39	19	29	-6.1	63	17	25	36	0	0614	1831					0.00			29.49	30.18	15.5	32	320	24	330		
24	48	27	38	2.5	64	25	32	27	0	0612	1833					0.00			29.46	30.13	12.2	25	230	22	240		
25	37	24	31	-4.9	47	13	26	34	0	0611	1834					0.00			29.54	30.23	8.0	20	030	16	030		
26	38	20	29	-7.3	48	11	24	36	0	0609	1835	RA				T			29.74	30.43	5.4	21	320	14	290		
27	50	30	40	3.2	49	16	28	25	0	0607	1836					0.00			29.72	30.25	4.0	17	240	13	240		
28	53	32	43	5.8	51	28	38	22	0	0605	1837	RA				T			29.44	30.09	14.0	37	220	29	230		
29	52	38	45	7.4	55	28	38	20	0	0604	1838					T			29.42	30.07	5.0	21	020	17	020		
30	57	33	45	7.0	87	40	43	20	0	0602	1840	RA BR HZ				0.82			29.15	29.76	12.2	32	210	26	210		
31	33	25	29	-9.5	83	25	28	36	0	0600	1841	RA SN FG BR UP				0.32			29.23	29.95	16.2	32	270	25	260		
39.2	22.4	30.8										Monthly Averages Totals							29.31	29.97	11.2						
-2.5	-2.2	-2.4										Departure from Normal (1981-2010)															

Degree Days

Monthly		Season-to-date		Temperature				Number of days with...					
Total	Departure	Total	Departure	Max	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"	T-Storms	Heavy Fog
Heating	1058	71	5980		0	7	25	0	11	4			
Cooling	0	0	0		0	7	25	0	11	4			

Date of 5-sec to 3-sec wind equipment change

				Sea Level Pressure				Greatest...			
				Date		Time		24-Hr...		Snow Depth	
N/A				Maximum		30.52		27		0753	
				Minimum		29.50		15		0053	
								1.13		Date	
						30-31					

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data
Daily Summary
April 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH					
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees	
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23		
01	35	20*	28	-10.9	66	17	24	37	0	0558	1842	SN UP HZ				T			29.62	30.32	11.8	30	300	23	290		
02	47	27	37	-2.4	51	22	33	28	0	0556	1843					0.00			29.49	30.14	10.1	28	210	23	220		
03	47	27	37	-2.8	56	24	34	28	0	0555	1844					0.00			29.40	30.10	16.7	47	280	38	270		
04	38	24	31	-9.3	52	17	28	34	0	0553	1845					0.00			29.80	30.49	4.9	17	300	14	300		
05	43	31	37	-3.7	78	31	35	28	0	0551	1847	RA BR				0.05			29.59	30.23	6.8	19	110	15	110		
06	58	41	50	8.8	77	41	45	15	0	0550	1848	BR HZ				0.00			29.54	30.21	4.2	15	330	10	340		
07	65	40	53	11.4	71	42	47	12	0	0548	1849	RA BR HZ				0.13			29.46	30.06	7.3	20	080	16	080		
08	61	41	51	8.9	85	49	51	14	0	0546	1850	TS RA BR				0.21			29.12	29.75	10.2	26	230	21	230		
09	53	40	47	4.4	74	39	43	18	0	0544	1851	RA BR HZ				0.01			29.03	29.68	13.5	35	280	30	270		
10	43	33	38	-5.0	72	28	34	27	0	0543	1852	RA SN BR				0.02			29.31	30.02	7.5	19	350	16	350		
11	40	32	36	-7.5	72	27	32	29	0	0541	1854	SN HZ				0.03			29.52	30.18	14.1	28	070	23	070		
12	72	38	55	11.1	73	44	49	10	0	0539	1855	RA BR				0.05			29.23	29.89	11.4	42	230	32	230		
13	56	37	47	2.6	58	32	40	18	0	0538	1856	HZ				0.00			29.38	30.03	14.0	40	220	32	220		
14	40	35	38	-6.8	83	33	36	27	0	0536	1857	TS RA BR				0.61			29.15	29.74	16.2	39	040	30	030		
15	47	31	39	-6.3	75	30	35	26	0	0534	1858	RA BR UP HZ				0.09			28.94	29.68	14.3	37	290	28	290		
16	46	26	36	-9.7	76	30	35	29	0	0533	1859	RA BR HZ				0.11			29.42	30.10	6.4	22	210	18	220		
17	62	27	45	-1.1	67	36	42	20	0	0531	1901	RA FG FZFG BR				0.01			29.42	30.06	8.6	23	030	17	070		
18	74*	52	63	16.4	61	48	54	2	0	0529	1902					T			29.06	29.66	13.8	33	190	26	210		
19	57	40	49	2.0	95	46	47	16	0	0528	1903	RA FG BR				0.47			28.97	29.61	9.1	26	350	20	050		
20	45	39	42	-5.4	94	41	42	23	0	0526	1904	RA BR				0.50			29.03	29.72	13.5	38	070	30	070		
21	51	40	46	-1.8	89	42	44	19	0	0525	1905	RA FG BR				T			29.34	30.05	6.2	15	220	12	220		
22	64	43	54	5.8	75	44	48	11	0	0523	1906					0.00			29.55	30.20	3.8	14	030	10	020		
23	73	44	59	10.4	71	44	49	6	0	0521	1907	RA				0.01			29.24	29.85	13.7	37	190	28	270		
24	53	38	46	-3.0	69	34	40	19	0	0520	1909					0.00			29.28	29.94	12.6	31	280	25	280		
25	62	33	48	-1.4	69	39	44	17	0	0518	1910	RA BR				0.02			29.24	29.87	5.9	17	080	12	080		
26	61	40	51	1.2	85	45	47	14	0	0517	1911	RA BR				0.45			28.79	29.42	15.2	36	290	26	300		
27	48	33	41	-9.1	72	30	35	24	0	0515	1912	SN				T			29.05	29.75	17.5	39	280	31	290		
28	50	32	41	-9.5	61	27	35	24	0	0514	1913	RA				0.01			29.42	30.14	8.0	23	320	20	320		
29	50	27	39	-11.9	65	28	35	26	0	0513	1914	RA				0.07			29.65	30.29	10.0	28	090	22	070		
30	53	38	46	-5.2	71	36	41	19	0	0511	1916	RA				0.02			29.60	30.31	7.7	17	080	15	080		
	53.1	35.0	44.1									Monthly Averages Totals				2.87			29.32	29.98	10.5						
	-2.6	-0.8	-1.7									Departure from Normal (1981-2010)				-0.04											

Degree Days

Number of days with...

Monthly

Season-to-date

Temperature

Precipitation

Snow

Weather

Total

Departure

Total

Departure

Max

Min

>=0.01"

>=0.1"

>=1"

T-Storms

Heavy Fog

Heating

Cooling

N/A

0

0

11

0

19

7

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure

Date

Time

24-Hr...

Precip

Snowfall

Snow Depth

Maximum

30.56

04

1417

0.79

Minimum

29.25

26

0953

Date

19-20

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data
Daily Summary
May 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH						
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees		
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23			
01	71	42	57	5.4	83	46	49	8	0	0510	1917	TS RA BR				0.71			29.49	30.11	12.1	28	080	22	100			
02	54	43	49	-2.9	90	46	47	16	0	0508	1918	RA FG BR				T			29.47	30.13	5.2	15	080	13	080			
03	53	45	49	-3.2	89	45	47	16	0	0507	1919	RA BR				0.30			29.36	30.01	5.4	16	040	14	060			
04	55	44	50	-2.6	86	45	47	15	0	0506	1920	RA BR				T			29.31	29.96	5.2	14	350	12	080			
05	64	40	52	-0.9	71	42	47	13	0	0504	1921	BR				0.00			29.24	29.88	5.0	16	070	14	040			
06	70	40	55	1.8	66	44	50	10	0	0503	1922	RA BR				0.01			29.33	29.99	8.8	25	210	21	220			
07	53	40	47	-6.5	84	43	46	18	0	0502	1924	RA BR				0.27			29.52	30.20	6.6	20	320	16	310			
08	56	39	48	-5.8	52	30	40	17	0	0500	1925					0.00			29.66	30.31	14.8	30	070	23	070			
09	77	46	62	7.9	69	49	55	3	0	0459	1926	RA BR				1.11			29.35	29.94	11.7	35	170	25	170			
10	62	38	50	-4.4	82	48	51	15	0	0458	1927	RA BR				0.21			29.26	29.93	12.5	29	230	23	240			
11	54	36*	45	-9.7	65	35	41	20	0	0457	1928					0.00			29.47	30.12	7.2	19	070	15	070			
12	49	42	46	-9.0	79	39	43	19	0	0456	1929	RA BR				0.11			29.24	29.90	14.7	29	080	23	070			
13	50	42	46	-9.3	94	42	43	19	0	0455	1930	RA BR				0.21			29.10	29.76	9.4	19	290	16	300			
14	52	39	46	-9.6	83	39	42	19	0	0454	1931	RA BR				0.02			29.24	29.92	8.2	17	350	15	360			
15	63	38	51	-4.9	80	44	47	14	0	0452	1932	TS RA BR				0.48			29.24	29.88	7.7	21	200	17	210			
16	62	39	51	-5.2	70	45	49	14	0	0451	1933	RA FG BR				0.01			29.23	29.85	6.4	21	210	17	210			
17	65	48	57	0.5	66	47	52	8	0	0450	1934	RA				0.01			29.13	7.9	24	220	18	240				
18	65	40	53	-3.8	64	42	48	12	0	0449	1935					0.00			29.36	29.99	6.1	18	050	14	080			
19	86*	52	69	11.9	70	58	62	0	4	0448	1936	RA				0.05			29.18	29.78	12.2	40	260	30	260			
20	65	44	55	-2.4	73	48	52	10	0	0448	1937					T			29.15	29.83	15.0	38	270	30	270			
21	64	39	52	-5.7	62	39	46	13	0	0447	1938					0.00			29.47	30.14	7.9	22	320	16	300			
22	67	40	54	-4.0	64	44	50	11	0	0446	1939	RA				T			29.53	30.16	6.4	24	100	18	110			
23	75	53	64	5.7	74	55	58	1	0	0445	1940	RA BR				0.16			29.28	29.91	12.9	40	240	31	230			
24	67	51	59	0.3	72	49	53	6	0	0444	1941					0.00			29.43	30.09	9.4	22	290	18	290			
25	83	49	66	7.0	83	57	59	0	1	0443	1942	TS RA FG BR				1.00			29.34	29.95	9.7	69	280	48	280			
26	76	52	64	4.7	75	55	59	1	0	0443	1943	FG BR				0.00			29.31	29.95	7.6	23	310	20	320			
27	74	47	61	1.4	63	49	55	4	0	0442	1944	BR				0.00			29.36	29.99	4.6	18	360	14	310			
28	60	51	56	-4.0	90	51	52	9	0	0441	1945	RA BR				0.17			29.11	29.73	7.8	19	060	16	070			
29	59	51	55	-5.3	88	50	52	10	0	0441	1946	RA BR				0.02			29.11	29.76	6.4	19	070	16	070			
30	71	51	61	0.4	85	55	57	4	0	0440	1947	RA BR				T			29.08	29.72	7.7	21	220	14	220			
31	70	48	59	-2.0	68	48	53	6	0	0440	1948	FG BR				0.00			29.17	29.81	5.9	17	200	15	200			
64.3	44.2	54.2										Monthly Averages Totals				4.85			29.31	29.95	8.7							
-3.2	-1.4	-2.4										Departure from Normal (1981-2010)				1.68												

Degree Days

Monthly

Season-to-date

Temperature

Number of days with...

Total	Departure	Total	Departure	Max		Min		Precipitation		Snow		Weather	
Heating	339	59	6947	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"		T-Storms	Heavy Fog
Cooling	5	-13	5	0	0	0	0	17	11				

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure

Date

Time

24-Hr...

Snow Depth

N/A

Precip

Snowfall

Date

09-10

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data
Daily Summary
June 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)	Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH				
	Max	Min	Avg	Dep	ARH	ADP	AWB				Weather Type	TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
01	76	56	66	4.7	78	56	59	0	1	0439	1948	RA BR	0.08			29.12	29.74	9.2	27	280	22	290			
02	67	48	58	-3.7	66	45	52	7	0	0439	1949	RA BR	0.17			29.11	29.76	11.0	29	310	22	310			
03	62	42*	52	-10.0	58	36	44	13	0	0438	1950		0.00			29.35	30.02	12.6	29	290	22	250			
04	68	43	56	-6.4	62	45	51	9	0	0438	1951	RA	T			29.38	29.99	11.3	29	240	21	230			
05	74	57	66	3.3	83	59	61	0	1	0437	1951	RA BR	0.72			29.12	29.74	7.6	28	220	23	220			
06	73	53	63	-0.1	77	53	57	2	0	0437	1952	FG BR	0.00			29.21	29.86	3.9	17	020	10	030			
07	78	51	65	1.6	63	51	57	0	0	0437	1953	FG BR	0.00			29.35	30.00	4.1	15	350	13	360			
08	79	51	65	1.2	53	48	56	0	0	0436	1953		0.00			29.49	30.14	8.4	24	070	21	050			
09	84	54	69	4.9	47	49	59	0	4	0436	1954		0.00			29.52	30.13	7.7	24	120	18	110			
10	74	55	65	0.5	81	58	61	0	0	0436	1954	RA BR	0.71			29.28	29.89	9.3	36	310	26	300			
11	70	50	60	-4.8	66	48	53	5	0	0436	1955		0.00			29.43	30.09	10.0	28	300	21	270			
12	75	46	61	-4.2	60	47	54	4	0	0436	1956	FG BR	0.00			29.42	30.03	5.4	17	160	14	030			
13	65	55	60	-5.5	82	54	57	5	0	0436	1956	RA BR	0.54			29.08	29.68	10.0	29	220	23	220			
14	71	51	61	-4.8	66	49	54	4	0	0436	1957	RA	0.04			29.21	29.89	16.5	37	260	25	230			
15	70	59	65	-1.2	73	54	58	0	0	0436	1957	RA BR	0.23			29.25	29.88	16.4	41	230	32	240			
16	65	51	58	-8.5	82	53	55	7	0	0436	1957	BR	T			29.23	29.88	6.3	17	050	13	070			
17	75	49	62	-4.8	70	53	57	3	0	0436	1958		0.00			29.34	29.98	6.2	20	030	16	030			
18	77	57	67	-0.1	66	55	60	0	2	0436	1958		0.00			29.29	29.91	4.8	16	310	14	310			
19	79	57	68	0.6	70	59	63	0	3	0436	1958		0.00			29.15	29.76	5.3	14	020	13	020			
20	70	60	65	-2.7	87	60	62	0	0	0436	1959	RA BR	0.48			28.97	29.59	8.0	23	010	16	020			
21	75	56	66	-2.0	73	55	59	0	1	0436	1959	RA	0.01			29.18	29.84	8.4	19	320	14	350			
22	75	54	65	-3.3	59	49	56	0	0	0436	1959		0.00			29.41	30.06	6.7	20	300	15	360			
23	78	52	65	-3.5	59	51	58	0	0	0437	1959		0.00			29.40	30.01	4.1	16	330	13	340			
24	84	54	69	0.2	72	60	64	0	4	0437	1959	RA BR	0.29			29.15	29.75	5.1	18	190	14	200			
25	80	66	73	4.0	79	62	65	0	8	0437	1959	RA BR	0.24			29.18	29.80	13.9	30	220	25	220			
26	83	62	73	3.7	66	60	65	0	8	0438	1959		0.00			29.34	29.98	10.2	32	230	25	220			
27	84	61	73	3.5	65	59	64	0	8	0438	1959		0.00			29.51	30.14	4.7	14	260	12	200			
28	86*	62	74	4.3	62	59	65	0	9	0438	1959		0.00			29.50	30.12	5.7	17	220	14	340			
29	83	63	73	3.1	69	63	67	0	8	0439	1959		T			29.37	29.98	8.2	20	310	15	300			
30	75	59	67	-3.1	61	54	60	0	2	0439	1959		0.00			29.31	29.94	9.3	24	320	18	330			
75.2	54.5	64.8								Monthly Averages Totals				3.51			29.29	29.91	8.3						
-1.4	-1.7	-1.6								Departure from Normal (1981-2010)				0.41											

Degree Days Number of days with...

	Monthly		Season-to-date		Temperature				Precipitation		Snow		Weather	
	Total	Departure	Total	Departure	Max	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"	T-Storms	Heavy Fog
Heating	62	-3	7009		0					11	8			
Cooling	57	-49	62		0									

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure

Greatest...

N/A					Date	Time	24-Hr...		Snow Depth							
					Maximum	30.20	09	0814	Precip	Snowfall						
					Minimum	29.55	20	0457	0.72	Date						
									05-05							
Station Augmentation																

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data
Daily Summary
July 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH							
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees			
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23				
01	78	54	66	-4.2	67	56	61	0	1	0440	1959					0.00			29.34	29.96	5.8	19	220	15	220				
02	79	67	73	2.6	77	64	67	0	8	0440	1959	RA BR				0.01			29.21	29.83	6.3	15	230	13	230				
03	85	67	76	5.5	74	62	65	0	11	0441	1959	FG BR				0.00			29.25	29.91	3.4	15	020	12	020				
04	88	64	76	5.3	74	67	70	0	11	0442	1958	HZ				0.00			29.38	30.01	5.8	19	070	15	080				
05	89	71	80	9.2	75	71	73	0	15	0442	1958					0.00			29.38	29.99	8.2	22	220	17	200				
06	84	69	77	6.1	83	71	73	0	12	0443	1958	TS RA BR				0.27			29.30	29.91	6.9	28	040	22	040				
07	78	59	69	-2.0	62	55	61	0	4	0443	1958	RA				T			29.38	30.00	10.0	30	040	22	040				
08	78	55	67	-4.0	58	51	58	0	2	0444	1957					0.00			29.40	30.02	3.4	23	010	15	020				
09	84	53*	69	-2.1	60	53	60	0	4	0445	1957					0.00			29.43	30.06	3.2	16	150	10	010				
10	89	59	74	2.8	66	63	68	0	9	0446	1956					0.00			29.33	29.94	4.8	21	200	15	230				
11	84	63	74	2.8	72	66	69	0	9	0446	1956					0.00			29.16	29.77	13.3	32	230	24	240				
12	73	58	66	-5.3	75	58	62	0	1	0447	1955					0.00			29.23	29.86	8.7	19	310	16	310				
13	84	58	71	-0.3	70	62	66	0	6	0448	1955					T			29.29	29.91	12.5	35	220	28	230				
14	81	58	70	-1.3	62	56	62	0	5	0449	1954	RA				T			29.42	30.04	8.3	24	300	20	290				
15	82	57	70	-1.3	61	56	62	0	5	0450	1953					0.00			29.45	30.07	4.6	18	230	14	210				
16	88	69	79	7.7	71	67	70	0	14	0450	1953	TS RA				0.04			29.34	29.95	10.7	28	210	22	220				
17	84	71	78	6.7	87	70	72	0	13	0451	1952	RA BR				0.08			29.26	29.88	7.2	20	230	16	220				
18	85	69	77	5.7	78	68	71	0	12	0452	1951	FG BR				0.00			29.28	29.89	6.5	16	340	14	320				
19	88	71	80	8.7	81	72	74	0	15	0453	1950	TS RA				0.03			29.21	29.81	12.1	31	240	26	220				
20	92*	71	82	10.7	76	71	74	0	17	0454	1950	TS RA FG BR				0.46			29.21	29.81	12.9	40	310	31	300				
21	84	68	76	4.7	65	62	67	0	11	0455	1949					0.01			29.25	29.86	8.8	20	290	15	310				
22	77	64	71	-0.3	73	60	64	0	6	0456	1948	RA				0.05			29.25	29.87	4.1	18	360	14	360				
23	79	60	70	-1.2	62	55	61	0	5	0457	1947					0.00			29.29	29.91	5.7	20	320	17	330				
24	79	54	67	-4.2	57	53	60	0	2	0458	1946					0.00			29.41	30.03	5.4	21	330	16	340				
25	82	57	70	-1.2	62	57	63	0	5	0459	1945					0.00			29.50	30.14	7.8	23	230	18	210				
26	85	65	75	3.9	64	61	66	0	10	0500	1944	TS				0.00			29.59	30.22	7.5	25	310	20	320				
27	86	62	74	2.9	62	61	66	0	9	0501	1943					T			29.54	30.13	9.4	28	210	22	230				
28	85	69	77	5.9	75	66	70	0	12	0502	1942	TS RA BR				1.53			29.39	30.00	12.1	59	360	31	010				
29	86	69	78	7.0	72	67	71	0	13	0503	1941	TS RA BR				0.34			29.31	29.91	10.4	33	230	25	260				
30	80	69	75	4.0	82	67	69	0	10	0504	1940	TS RA BR				0.16			29.29	29.92	8.2	22	220	17	220				
31	79	65	72	1.0	65	59	64	0	7	0505	1939					T			29.42	30.06	5.1	17	330	14	330				
83.1	63.4	73.2														29.34	29.96	7.8											
2.1	2.2	2.1																											

Departure from Normal (1981-2010)

Degree Days

Monthly

Season-to-date

Temperature

Number of days with...

Total	Departure	Total	Departure	Max		Min		Precipitation		Snow	Weather	
Heating	0	-8	0	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"	T-Storms	Heavy Fog
Cooling	255	58	317	1	0	0	0	11	5			

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure

Time

24-Hr...

Snow Depth

Date

Precip

Snowfall

Date

28-28

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data
Daily Summary
August 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH			
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23
01	80	59	70	-0.9	65	57	63	0	5	0506	1938					0.00			29.51	30.13	4.6	19	010	14	020
02	83	56	70	-0.9	57	54	61	0	5	0507	1936					0.00			29.48	30.10	4.3	18	020	14	030
03	83	59	71	0.2	60	57	63	0	6	0508	1935					0.00			29.39	30.00	6.1	21	220	16	230
04	80	61	71	0.2	63	57	63	0	6	0509	1934	BR				0.00			29.36	29.99	6.1	19	360	15	050
05	84	55	70	-0.8	62	57	63	0	5	0510	1933					0.00			29.32	29.93	6.4	18	210	15	210
06	84	67	76	5.3	83	66	68	0	11	0511	1931	TS RA BR				1.19			29.16	29.76	9.8	35	310	26	310
07	80	68	74	3.3	82	66	68	0	9	0512	1930	RA BR				0.06			29.13	29.75	7.6	17	280	13	290
08	79	61	70	-0.6	78	62	64	0	5	0513	1929	TS RA FG BR				0.46			29.07	29.69	10.5	46	250	33	250
09	78	57	68	-2.6	64	55	60	0	3	0515	1927	RA				0.10			29.16	29.79	11.4	30	290	24	290
10	77	55	66	-4.5	63	52	58	0	1	0516	1926					0.00			29.28	29.92	10.0	28	280	21	280
11	79	53	66	-4.5	67	56	61	0	1	0517	1924					0.00			29.39	30.02	7.7	25	220	18	230
12	83	65	74	3.6	73	63	67	0	9	0518	1923	RA				0.04			29.28	29.89	9.7	27	240	20	240
13	82	64	73	2.7	74	65	68	0	8	0519	1922					0.00			29.16	29.78	4.3	15	360	12	030
14	76	61	69	-1.3	66	57	62	0	4	0520	1920					0.00			29.28	29.92	6.8	23	020	15	020
15	79	59	69	-1.2	67	56	61	0	4	0521	1919					T			29.34	29.97	8.5	21	030	18	050
16	81	60	71	0.9	78	62	65	0	6	0522	1917	TS RA				0.01			29.32	29.94	5.6	31	330	22	330
17	82	63	73	3.0	85	66	68	0	8	0523	1916	TS RA BR				0.42			29.30	29.92	8.5	27	210	23	210
18	83	67	75	5.1	78	67	69	0	10	0524	1914	TS RA BR				0.26			29.29	29.90	8.7	30	220	23	230
19	80	64	72	2.2	79	65	68	0	7	0525	1913	TS RA BR				0.24			29.34	29.98	9.7	27	280	21	280
20	86*	59	73	3.3	70	63	67	0	8	0527	1911					0.00			29.41	30.02	4.7	18	260	14	220
21	82	65	74	4.4	81	68	70	0	9	0528	1909	TS RA BR				1.24			29.24	29.86	10.6	28	150	22	140
22	73	60	67	-2.5	61	53	59	0	2	0529	1908					0.00			29.29	29.93	8.1	23	310	16	340
23	72	55	64	-5.3	66	52	57	1	0	0530	1906					0.00			29.46	30.11	6.5	23	010	15	010
24	72	53	63	-6.2	67	52	57	2	0	0531	1905					0.00			29.62	30.27	6.8	22	360	15	030
25	76	51	64	-5.0	71	54	58	1	0	0532	1903					0.00			29.62	30.25	6.9	20	110	16	070
26	77	54	66	-2.9	64	54	59	0	1	0533	1901					0.00			29.49	30.10	8.1	24	130	18	120
27	74	64	69	0.3	80	62	65	0	4	0534	1900	RA BR				0.02			29.26	29.86	12.0	27	200	21	200
28	81	65	73	4.5	69	61	65	0	8	0535	1858	RA BR				T			29.19	29.82	11.0	33	240	26	240
29	75	55	65	-3.3	64	54	59	0	0	0536	1856					0.00			29.28	29.91	12.6	30	240	24	230
30	77	54	66	-2.1	60	53	60	0	1	0538	1855					0.00			29.34	29.99	11.1	34	220	25	230
31	71	51*	61	-6.9	63	49	55	4	0	0539	1853					0.00			29.63	30.28	4.2	14	350	12	010
	79.0	59.4	69.2									Monthly Averages Totals				4.04			29.34	29.96	8.1				
	-0.4	-0.7	-0.6													0.84									

Degree Days

Monthly

Season-to-date

Temperature

Number of days with...

Total

Departure

Total

Departure

Max

Min

Precipitation

Snow

Weather

Heating

9

-5

9

>=90°

<=32°

<=32°

<=0°

>=0.01"

>=0.1"

>=1"

T-Storms

Heavy Fog

Cooling

139

-23

456

0

0

0

11

7

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure

Greatest...

N/A

Date

Time

24-Hr...

Snow Depth

Maximum

30.32

31

1153

1.25

Minimum

29.63

08

1253

Date

06-07

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data

Daily Summary

September 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH					
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees	
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23		
01	72	54	63	-4.6	80	57	59	2	0	0540	1851	TS RA BR				0.84			29.57	30.18	5.5	17	170	13	170		
02	74	62	68	0.6	82	61	63	0	3	0541	1849	RA BR				0.58			29.38	30.01	5.9	19	230	15	210		
03	77	55	66	-1.1	75	60	63	0	1	0542	1848	FG BR				T			29.35	29.94	7.3	31	210	24	210		
04	75	56	66	-0.9	72	57	61	0	1	0543	1846	TS RA BR				0.13			29.26	29.92	12.6	32	210	24	220		
05	71	50	61	-5.6	75	52	56	4	0	0544	1844					0.00			29.47	30.11	3.0	16	360	12	350		
06	72	50	61	-5.3	81	54	56	4	0	0545	1842	RA				0.02			29.31	29.93	4.5	16	050	13	050		
07	71	50	61	-5.0	78	54	57	4	0	0546	1841	RA FG BR				0.03			29.26	29.90	6.2	20	300	16	340		
08					78	62	64			0547	1839					0.00			29.44	29.69		12	340	12	340		
09					70	52	57			0548	1837					0.00			29.64	29.81	5.9	19	030	16	030		
10	80	49	65	0.0	72	57	61	0	0	0550	1835					0.00			29.56	30.17	8.5	28	210	22	210		
11	82	67	75	10.3	85	68	70	0	10	0551	1833	TS RA BR				1.02			29.46	30.07	5.6	37	320	30	320		
12	68	52	60	-4.3	85	55	57	5	0	0552	1832	RA BR				0.07			29.54	30.21	11.4	23	080	18	070		
13	76	50	63	-0.9	78	56	59	2	0	0553	1830	RA BR				0.22			29.57	30.17	12.6	36	200	26	190		
14	72	60	66	2.4	75	58	61	0	1	0554	1828	RA BR				0.39			29.47	30.11	14.4	31	230	24	240		
15	69	56	63	-0.2	90	59	60	2	0	0555	1826	RA FG BR				0.11			29.51	30.13	4.5	14	050	13	030		
16	72	56	64	1.2	83	58	60	1	0	0556	1824	RA				0.06			29.46	30.10	6.4	16	030	13	030		
17	74	49	62	-0.4	70	51	55	3	0	0557	1823					0.00			29.55	30.20	3.3	16	050	13	030		
18	75	49	62	-0.1	73	52	56	3	0	0558	1821					0.00			29.62	30.26	5.1	20	010	14	050		
19	74	50	62	0.3	72	51	55	3	0	0559	1819					0.00			29.60	30.24	3.8	17	190	14	160		
20	79	50	65	3.7	70	54	58	0	0	0601	1817					0.00			29.54	30.18	3.4	14	190	9	190		
21	82	57	70	9.1	72	60	64	0	5	0602	1815					0.00			29.52	30.15	5.1	17	190	14	190		
22	84*	66	75	14.5	69	63	67	0	10	0603	1814					T			29.36	29.97	11.3	36	240	25	230		
23	76	60	68	7.9	74	59	63	0	3	0604	1812	TS RA BR				0.33			29.15	29.89	13.1	40	250	30	250		
24	69	53	61	1.3	74	52	56	4	0	0605	1810					0.00			29.24	29.88	9.5	25	320	20	320		
25	76	52	64	4.8	69	56	60	1	0	0606	1808	BR				0.00			29.16	29.78	11.8	35	240	29	230		
26	71	49	60	1.2	72	52	56	5	0	0607	1806	TS RA BR				0.25			29.15	29.81	10.5	31	280	26	270		
27	74	45*	60	1.6	63	48	55	5	0	0608	1805					0.00			29.34	29.97	7.8	24	170	18	190		
28	74	55	65	7.0	86	60	62	0	0	0609	1803	RA BR				0.24			29.35	30.03	8.6	25	230	17	230		
29	62	51	57	-0.6	75	48	52	8	0	0611	1801					0.00			29.69	30.35	11.0	24	070	20	070		
30	70	51	61	3.8	81	54	56	4	0	0612	1759	RA BR				0.08			29.54	30.15	5.7	19	080	14	080		
												Monthly Averages Totals				4.37			29.44	30.07	7.8						
1.9	0.9	1.4														0.70											

Degree Days

Monthly		Season-to-date		Temperature				Precipitation		Snow		Weather	
Total	Departure	Total	Departure	Max		Min		>=0.01"		>=0.1"		>=1"	
Heating	65	-57	74	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"		T-Storms	Heavy Fog
Cooling	33	-12	489	0	0	0	0	15	10				

Date of 5-sec to 3-sec wind equipment change

N/A		Sea Level Pressure				Greatest...			
						Date	Time	24-Hr...	
		Maximum	30.42	29	0950	Precip	Snowfall	Snow Depth	
		Minimum	29.68	26	0453		1.42	Date	01-02

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Local Climatological Data

Daily Summary

October 2019

Generated on 01/16/2020

Date	Temperature (F)							Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH					
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees	
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23		
01	83*	66	75	18.2	84	66	68	0	10	0613	1757	TS RA BR				0.42			29.31	29.91	12.9	44	260	32	270		
02	68	50	59	2.5	92	57	58	6	0	0614	1756	RA BR				0.54			29.29	29.95	10.5	27	050	20	060		
03	55	49	52	-4.1	89	49	50	13	0	0615	1754	RA BR				0.04			29.36	30.00	9.3	22	080	17	080		
04	55	42	49	-6.7	78	42	45	16	0	0616	1752	RA				0.02			29.60	30.30	7.3	24	030	18	030		
05	58	39	49	-6.3	71	41	46	16	0	0617	1750					0.00			29.66	30.29	9.0	22	110	18	110		
06	69	52	61	6.1	80	54	57	4	0	0618	1749	RA BR				0.15			29.39	30.03	11.7	34	250	25	240		
07	63	48	56	1.5	80	50	53	9	0	0620	1747	RA				0.03			29.46	30.12	7.4	24	250	18	240		
08	66	41	54	-0.2	78	45	49	11	0	0621	1745					0.00			29.64	30.30	4.8	15	050	13	030		
09	65	36	51	-2.8	74	42	47	14	0	0622	1743					0.00			29.65	30.31	6.4	20	050	15	060		
10	66	41	54	0.6	74	43	47	11	0	0623	1742					0.00			29.64	30.28	6.7	20	050	15	070		
11	73	43	58	4.9	61	41	49	7	0	0624	1740					0.00			29.51	30.12	6.9	22	110	16	110		
12	60	38	49	-3.7	73	42	47	16	0	0626	1738	RA				0.04			29.31	29.96	12.3	34	250	28	250		
13	65	37	51	-1.3	60	37	45	14	0	0627	1737					0.00			29.30	29.93	10.9	32	280	25	300		
14	53	38	46	-6.0	65	36	42	19	0	0628	1735					T			29.32	30.00	8.1	25	290	20	290		
15	60	34	47	-4.6	72	38	43	18	0	0629	1733					0.00			29.41	30.04	5.1	21	160	16	180		
16	60	45	53	1.7	82	45	48	12	0	0630	1732	TS RA BR				0.64			28.95	29.57	10.3	26	170	21	170		
17	47	45	46	-4.9	80	40	43	19	0	0632	1730	RA				0.17			28.95	29.70	20.4	41	330	32	320		
18	51	35	43	-7.6	74	36	40	22	0	0633	1728					0.00			29.33	30.01	8.3	26	310	18	330		
19	58	30*	44	-6.3	79	40	44	21	0	0634	1727	FZFG BR FG				0.00			29.38	30.08	3.0	13	030	10	030		
20	66	36	51	1.1	79	43	46	14	0	0635	1725	BR				0.00			29.26	29.93	2.7	11	190	8	200		
21	69	39	54	4.4	66	44	50	11	0	0636	1724	BR				0.00			29.34	29.96	8.6	22	100	17	100		
22	63	49	56	6.8	70	59	63	9	0	0638	1722	RA BR				0.40			29.10	29.96	10.1	28	240	20	240		
23	56	44	50	1.1	66	43	48	15	0	0639	1721					T			29.26	29.94	15.2	44	250	35	240		
24	57	40	49	0.5	68	43	49	16	0	0640	1719	RA				T			29.49	30.08	12.6	34	220	26	230		
25	51	40	46	-2.2	77	43	46	19	0	0641	1718	RA BR				0.02			29.62	30.19	2.2	14	130	12	130		
26	55	34	45	-2.8	79	41	44	20	0	0643	1716	RA BR				0.16			29.53	30.16	7.9	18	100	15	080		
27	62	50	56	8.5	86	50	52	9	0	0644	1715	RA BR				0.89			29.10	29.77	15.4	47	260	38	250		
28	63	41	52	4.9	78	44	47	13	0	0645	1713	BR				0.00			29.44	30.10	4.6	17	200	14	210		
29	68	39	54	7.2	80	47	50	11	0	0646	1712					0.01			29.46	30.11	8.2	28	230	22	240		
30	55	49	52	5.6	86	47	49	13	0	0648	1711	RA BR				0.09			29.52	30.14	8.0	21	060	17	060		
31	57	40	49	2.9	69	42	47	16	0	0649	1709	RA FG BR HZ				0.83			28.97	29.57	11.9	62	220	45	220		
61.2	42.3	51.7										Monthly Averages Totals				4.45			29.38	30.02	8.9						
1.1	0.4	0.7														1.36											

Degree Days		Season-to-date				Temperature				Precipitation				Number of days with...									
Total	Monthly	Total	Departure	Max	Min	Date	Time	>=0.01"	>=0.1"	>=1"	T-Storms	Heavy Fog	Weather										
Heating	421	-18	495	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"													
Cooling	9	4	498	0	0	1	0	16	9														
Date of 5-sec to 3-sec wind equipment change				Sea Level Pressure				Greatest...															
N/A				Maximum				Precip				Snow Depth											
				Minimum				Snowfall															

Local Climatological Data

Daily Summary

November 2019

Generated on 01/16/2020

Local Climatological Data
Daily Summary
December 2019

Generated on 01/16/2020

Date	Temperature (F)								Degree Days (base 65F)		Sun (LST)		Weather				Precipitation (in)			Pressure (inHg)		Wind	Maximum Wind Speed = MPH						
	Max	Min	Avg	Dep	ARH	ADP	AWB	Heat	Cool	Rise	Set	Weather Type				TLC	Snow Fall	Snow Depth	Avg Stn	Avg SL	Avg Speed	Peak Speed	Peak Dir	Sust. Speed	Sust. Dir	Direction = Degrees			
1	2	3	4	5	6	7	8	9	10	11	12	13				14	15	16	17	18	19	20	21	22	23				
01	32	24	28	-6.5				37	0	0727	1642	FZRA SN BR UP				0.57			28.96		14.1	32	080	26	080				
02	32	25	29	-5.2				36	0	0728	1642	SN BR UP				0.14			29.03		10.3	26	040	21	040				
03	34	15	25	-8.8				40	0	0730	1641	SN BR				0.03			29.06		6.8	20	260	17	270				
04	35	32	34	0.5				31	0	0731	1641	SN BR UP HZ				0.01			28.83		11.1	23	280	20	280				
05	33	30	32	-1.2				33	0	0732	1641	SN FZFG BR FG				0.05			29.23		13.9	27	290	22	280				
06	35	24	30	-2.8				35	0	0733	1641	RA SN BR				0.16			29.36		8.4	24	310	18	310				
07	30	20	25	-7.5				40	0	0734	1641	SN				T			29.73		6.6	18	320	15	310				
08	46	22	34	1.8				31	0	0734	1641					0.00			29.47		13.4	30	210	23	210				
09	51	44	48	16.1				17	0	0735	1641	RA BR				0.17			29.03		14.0	31	220	24	220				
10	51	24	38	6.4				27	0	0736	1641	SN				T					15.0	34	230	26	240				
11	26	10	18	-13.3				47	0	0737	1641	SN FZFG BR UP HZ BLSN FG				0.03			29.60		12.7	43	250	32	260				
12	32	7*	20	-11.0				45	0	0738	1641					0.00					7.5	22	190	16	200				
13	41	30	36	5.3				29	0	0739	1641					0.00			29.47		9.2	25	190	20	180				
14	37	32	35	4.5				30	0	0740	1641	RA SN FG BR				0.93			28.90		12.1	26	310	21	270				
15	34	18	26	-4.2				39	0	0740	1641	SN FG FZFG BR UP HZ				0.09			29.17		14.1	35s	280s	28	280				
16	36	22	29	-0.9				36	0	0741	1642					0.00			29.53		3.7	9	160	7	060				
17	31	23	27	-2.7				38	0	0742	1642	SN BR				0.10			29.26		8.7	21	260	16	260				
18	28	12	20	-9.4				45	0	0742	1642	SN FZFG BR UP HZ BLSN FG				T			29.28		18.6	38	310	31	280				
19	20	8	14	-15.1				51	0	0743	1643	SN BR				0.01			29.70		5.9	22	260	18	270				
20	23	11	17	-11.9				48	0	0744	1643	SN BR				T			29.93		6.6	13	130	12	120				
21	36	13	25	-3.6				40	0	0744	1644					0.00			29.77		6.3	18	200	16	200				
22	41	33	37	8.6				28	0	0745	1644					0.00			29.57		15.9	28	220	24	220				
23	47	33	40	11.8				25	0	0745	1645	BR				0.00			29.39		14.6	34	220	30	230				
24	37	27	32	4.1				33	0	0746	1645					0.00			29.52		8.6	21	080	17	080				
25	46	23	35	7.3				30	0	0746	1646	FG FZFG BR HZ				0.00			29.40		7.6	18	210	15	210				
26	48	31	40	12.5				25	0	0746	1646	FG BR				T			29.46		4.9	15	060	13	070				
27	53*	37	45	17.7				20	0	0747	1647	RA BR				0.03			29.42		11.9	27	320	22	300				
28	39	30	35	7.9				30	0	0747	1648	BR				0.00			29.60		7.3	19	260	15	250				
29	38	28	33	6.1				32	0	0747	1649	RA BR HZ				0.41			29.38		11.3	21	080	18	070				
30	50	34	42	15.3				23	0	0747	1649	RA BR				0.48			28.95		15.4	44	220	30	240				
31	37	29	33	6.5				32	0	0747	1650					0.12			28.94		16.7	41	250	28	250				
	37.4	24.2	30.8									Monthly Averages Totals				3.33s			29.36	30.02	10.5								
	0.9	1.0	0.9									Departure from Normal (1981-2010)				0.34s													

Degree Days

Monthly		Season-to-date		Temperature				Number of days with...					
Total	Departure	Total	Departure	Max	>=90°	<=32°	<=32°	<=0°	>=0.01"	>=0.1"	>=1"	T-Storms	Heavy Fog
Heating	1025	-64	2444			0	9	26					
Cooling	0	0	498		0	9	26	0	16	9			

Date of 5-sec to 3-sec wind equipment change

Sea Level Pressure				Date	Time	24-Hr...		Greatest...	
						Precip	Snowfall	Snow Depth	
N/A				Maximum		30.72		20	
				Minimum		29.36		14	
								1433	
						0.96s			
						Date			
						14-15			

Station Augmentation

Name:N/A Lat: N/A Lon: N/A Elevation: N/A Distance: N/A Elements: N/A Equipment: N/A

Attachment F

2019 NIAGARA FALLS STORAGE SITE

- **Radon Flux Results**
- **Site Map**
- **Heterogeneous Region Results**
- **Heterogeneous Region Map**
- **Weighted Mean Annual Flux Calculation**
- **Census Data**

Table 6a
2019 Radon Flux Monitoring Results^a
Niagara Falls Storage Site

NFSS Sample ID	Qualifier ^d	Radon-222 Flux			NFSS Sample ID	Qualifier ^d	Radon-222 Flux		
		(pCi/m ² /s)		MDA			(pCi/m ² /s)		MDA
		1	0.0737 ± 0.0126	0.0382	51	U	0.1104 ± 0.0210	0.0289	
2		0.0601 ± 0.0118	0.0244	52			0.0469 ± 0.0108	0.0362	
3		0.0673 ± 0.0120	0.0205	53			0.0809 ± 0.0144	0.0407	
4	U	0.0496 ± 0.0329	0.1239	54	U	0.0970 ± 0.0250	0.1015		
5	U	0.0367 ± 0.0110	0.0404	55			0.1749 ± 0.0217	0.0408	
6		0.1616 ± 0.0195	0.0256	56			0.1077 ± 0.0183	0.0527	
7		0.0696 ± 0.0118	0.0122	57			0.0600 ± 0.0109	0.0122	
8		0.1623 ± 0.0282	0.0940	58			0.1382 ± 0.0267	0.0839	
9		0.1110 ± 0.0157	0.0064	59			0.0881 ± 0.0152	0.0295	
10		0.1330 ± 0.0176	0.0180	60			0.0822 ± 0.0156	0.0624	
10-DUP		0.1409 ± 0.0180	0.0242	60-DUP			0.0926 ± 0.0145	0.0258	
11		0.1035 ± 0.0160	0.0203	61			0.0851 ± 0.0147	0.0356	
12		0.2017 ± 0.0309	0.0288	62 ^g			0.2249 ± 0.0270	0.0434	
13		0.1322 ± 0.0165	0.0064	63			0.0903 ± 0.0149	0.0414	
14		0.1191 ± 0.0168	0.0201	64			0.8252 ± 0.0862	0.0959	
15		0.1509 ± 0.0254	0.0288	65 ^g			23.0501 ± 1.9272	0.6387	
16		0.1076 ± 0.0142	0.0170	66			0.0890 ± 0.0152	0.0184	
17		0.0794 ± 0.0158	0.0567	67	U	0.0369 ± 0.0130	0.0470		
18		0.1049 ± 0.0140	0.0121	68	U	0.0310 ± 0.0268	0.1159		
19		0.1435 ± 0.0287	0.0900	69			0.0738 ± 0.0120	0.0531	
20		0.0736 ± 0.0117	0.0065	70			0.0882 ± 0.0141	0.0183	
20-DUP		0.0839 ± 0.0113	0.0065	70-DUP			0.0701 ± 0.0135	0.0414	
21		0.0969 ± 0.0133	0.0092	71			0.0779 ± 0.0142	0.0207	
22		0.1884 ± 0.0233	0.0549	72			0.1198 ± 0.0211	0.0282	
23		0.0615 ± 0.0110	0.0122	73			0.1149 ± 0.0177	0.0468	
24		0.1502 ± 0.0264	0.0289	74			0.0683 ± 0.0130	0.0445	
25		0.0507 ± 0.0123	0.0483	75			0.1371 ± 0.0264	0.0295	
26		0.0978 ± 0.0160	0.0243	76	U	0.0329 ± 0.0239	0.0614		
27		0.1066 ± 0.0185	0.0462	77			0.1268 ± 0.0176	0.0247	
28		0.1318 ± 0.0266	0.0718	78			0.1142 ± 0.0154	0.0124	
29		0.0717 ± 0.0125	0.0171	79			0.1958 ± 0.0305	0.0295	
30		0.1248 ± 0.0185	0.0242	80	U	0.0366 ± 0.0204	0.0657		
30-DUP		0.1454 ± 0.0221	0.0522	80-DUP			0.0560 ± 0.0124	0.0469	
31		0.1228 ± 0.0164	0.0203	81			0.0461 ± 0.0117	0.0365	
32		0.1905 ± 0.0283	0.0288	82	U	0.0283 ± 0.0177	0.0525		
33		0.0891 ± 0.0131	0.0352	83			0.0534 ± 0.0120	0.0409	
34		0.0427 ± 0.0105	0.0399	84			0.1164 ± 0.0248	0.0296	
35		0.1339 ± 0.0245	0.0277	85	U	0.0322 ± 0.0229	0.0659		
36		0.0629 ± 0.0131	0.0359	86			0.0694 ± 0.0137	0.0446	
37		0.0964 ± 0.0166	0.0301	87			0.0513 ± 0.0102	0.0123	
38		0.0568 ± 0.0126	0.0329	88			0.0826 ± 0.0186	0.0295	
39		0.0890 ± 0.0184	0.0253	89			0.0703 ± 0.0140	0.0410	
40		0.0460 ± 0.0099	0.0264	90			0.1698 ± 0.0215	0.0249	
40-DUP		0.0594 ± 0.0123	0.0358	90-DUP			0.1611 ± 0.0227	0.0448	
41		0.1034 ± 0.0158	0.0182	91			0.1086 ± 0.0159	0.0209	
42		0.0757 ± 0.0137	0.0469	92			0.0889 ± 0.0224	0.0295	
43	U	0.0688 ± 0.0203	0.0697	93			0.0514 ± 0.0115	0.0094	
44		0.0342 ± 0.0088	0.0172	94			0.0848 ± 0.0142	0.0331	
45		0.0443 ± 0.0098	0.0181	95	U	0.0708 ± 0.0337	0.1207		
46	U	0.0219 ± 0.0079	0.0396	96	U	-0.0070 ± 0.0065	0.0523		
47	U	0.0437 ± 0.0304	0.1097	97			0.0726 ± 0.0126	0.0186	
48		0.0533 ± 0.0110	0.0362	98			0.1046 ± 0.0172	0.0547	
49		0.0483 ± 0.0109	0.0348	99	U	0.0201 ± 0.0268	0.1074		
50		0.0673 ± 0.0115	0.0205	100	U	0.0140 ± 0.0089	0.0404		
50-DUP		0.0686 ± 0.0121	0.0205	100-DUP			0.0192 ± 0.0138	0.0441	

Table 6a (cont.)
2019 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		0.0780	± 0.0169	0.0644	151	0.0417	± 0.0095	0.0138	
102	U	0.0350	± 0.0127	0.0485	152	0.1544	± 0.0283	0.0287	
103	U	0.0427	± 0.0123	0.0460	153	U	0.0428	± 0.0135	0.0492
104		0.1073	± 0.0257	0.0913	154	0.0404	± 0.0097	0.0138	
105		0.1512	± 0.0230	0.0197	155	0.0703	± 0.0192	0.0328	
106	U	0.0123	± 0.0171	0.0691	156	0.0516	± 0.0123	0.0194	
107		0.0687	± 0.0134	0.0140	157	0.0695	± 0.0188	0.0551	
108		0.2351	± 0.0393	0.0335	158	0.0343	± 0.0100	0.0230	
109		0.0589	± 0.0215	0.0566	159	U	-0.0394	± 0.0528	0.1185
110		0.1630	± 0.0257	0.0281	160	0.0698	± 0.0233	0.0628	
110-DUP		0.1333	± 0.0229	0.0526	160-DUP		0.0398	± 0.0134	0.0458
111		0.0407	± 0.0113	0.0380	161	U	0.0494	± 0.0145	0.0592
112		0.1269	± 0.0253	0.0321	162		0.0467	± 0.0107	0.0207
113	U	0.0421	± 0.0114	0.0631	163		0.0471	± 0.0123	0.0233
114		0.0605	± 0.0117	0.0139	164	U	0.0697	± 0.0279	0.1336
115		0.1086	± 0.0231	0.0291	165	U	0.0019	± 0.0103	0.0648
116		0.0595	± 0.0151	0.0414	166	U	0.0490	± 0.0129	0.0498
117	U	0.0342	± 0.0112	0.0404	167		0.0387	± 0.0106	0.0234
118	U	0.0516	± 0.0288	0.0871	168		0.2327	± 0.0390	0.0290
119	U	0.0451	± 0.0381	0.1113	169		0.0749	± 0.0163	0.0560
120		0.0576	± 0.0137	0.0393	170		0.1508	± 0.0243	0.0474
120-DUP		0.0414	± 0.0171	0.0760	170-DUP		0.1202	± 0.0219	0.0515
121		0.0820	± 0.0186	0.0510	171		0.0375	± 0.0103	0.0236
122		0.0732	± 0.0150	0.0278	172		0.1902	± 0.0341	0.0319
123	U	0.0058	± 0.0189	0.0636	173		0.1089	± 0.0199	0.0569
124	U	0.0547	± 0.0204	0.0674	174		0.0917	± 0.0169	0.0235
125		0.0675	± 0.0150	0.0322	175	U	0.0702	± 0.0281	0.1506
126		0.0467	± 0.0135	0.0400	176	U	0.0109	± 0.0208	0.0556
127	U	0.0434	± 0.0147	0.0489	177		0.0449	± 0.0129	0.0280
128	U	0.0428	± 0.0388	0.1493	178	U	-0.0068	± 0.0220	0.0488
129	U	0.0315	± 0.0127	0.0509	179	U	0.0000	± 0.0000	0.1309
130		0.0626	± 0.0141	0.0207	180	U	-0.0020	± 0.0096	0.0532
130-DUP		0.0598	± 0.0157	0.0520	180-DUP		0.0275	± 0.0150	0.0476
131		0.0523	± 0.0116	0.0235	181 ^c		0.0263	± 0.0092	0.0247
132		0.1014	± 0.0234	0.0290	182 ^c		0.0928	± 0.0215	0.0335
133		0.0752	± 0.0151	0.0378	183 ^c		0.0354	± 0.0092	0.0218
134		0.0896	± 0.0158	0.0140	Average background	0.05148 (pCi/m ² /s)			
135		0.1571	± 0.0337	0.0898		IWCS	Value	Units	
136	U	0.0234	± 0.0176	0.0544		Average ^e	0.2109	(pCi/m ² /s)	
137		0.1018	± 0.0186	0.0464		Adj. Mean ^h	0.0825	(pCi/m ² /s)	
138		0.0580	± 0.0127	0.0139		High ^f	23.0501	(pCi/m ² /s)	
139		0.1469	± 0.0326	0.0992		Low ^g	-0.0394	(pCi/m ² /s)	
140	U	0.0149	± 0.0168	0.0523					
140-DUP		0.0100	± 0.0197	0.0630					
141	U	0.0279	± 0.0137	0.0767					
142		0.0537	± 0.0131	0.0468					
143	U	0.0377	± 0.0192	0.0510					
144	U	0.0768	± 0.0408	0.1695					
145	U	0.0189	± 0.0240	0.0523					
146	U	0.0298	± 0.0172	0.0772					
147		0.0777	± 0.0147	0.0139					
148		0.0954	± 0.0229	0.0289					
149	U	0.0482	± 0.0238	0.0627					
150		0.1044	± 0.0190	0.0277					
150-DUP		0.0985	± 0.0183	0.0478					

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

a. Radon-222 flux was performed on July 8-9, 2019 (24 hour exposure).

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

c. Background:

181-Lewiston-Porter Central School

182-Lewiston Water Pollution Control Center

183-Balmer Rd. (CWM Secondary Gate)

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

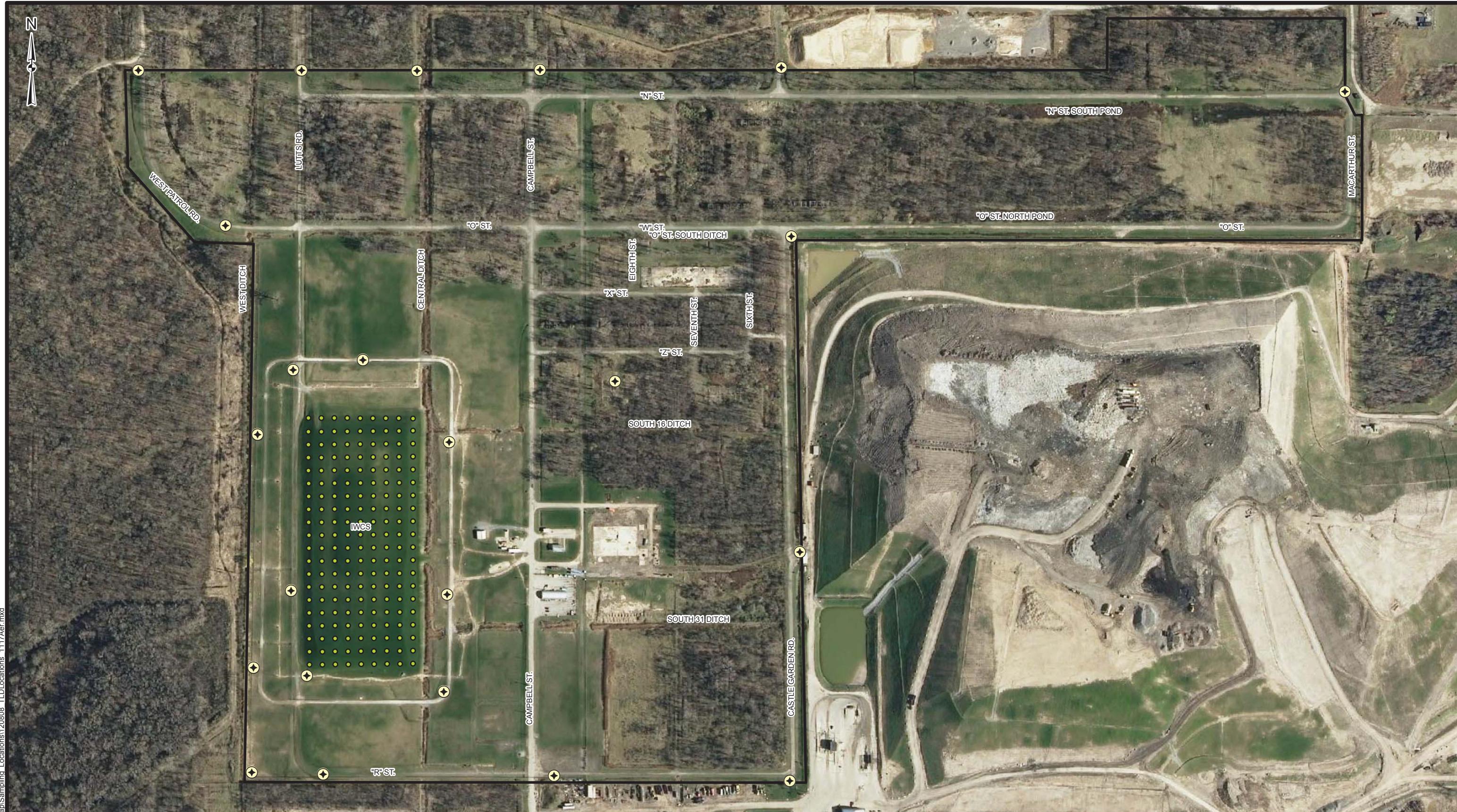
J - indicates a estimated value when relative percent difference > 30% and Z-score > 1.96 between the primary finding and duplicate (-DUP).

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

f. Highest detectable finding.

g. This result represents the area of elevated flux which has been studied for its spatial and temporal variation and it's correct influence on the annual average flux calculation

g. This adjusted value excludes location 62 and 65 for the weighted regional mean calculation in Table 6c



Document Path: K:\NFSS\GIS\Map\Sampling Locations\120808_TLDLocations_1117Aer.mxd

Legend

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

0 175 350 700
Feet



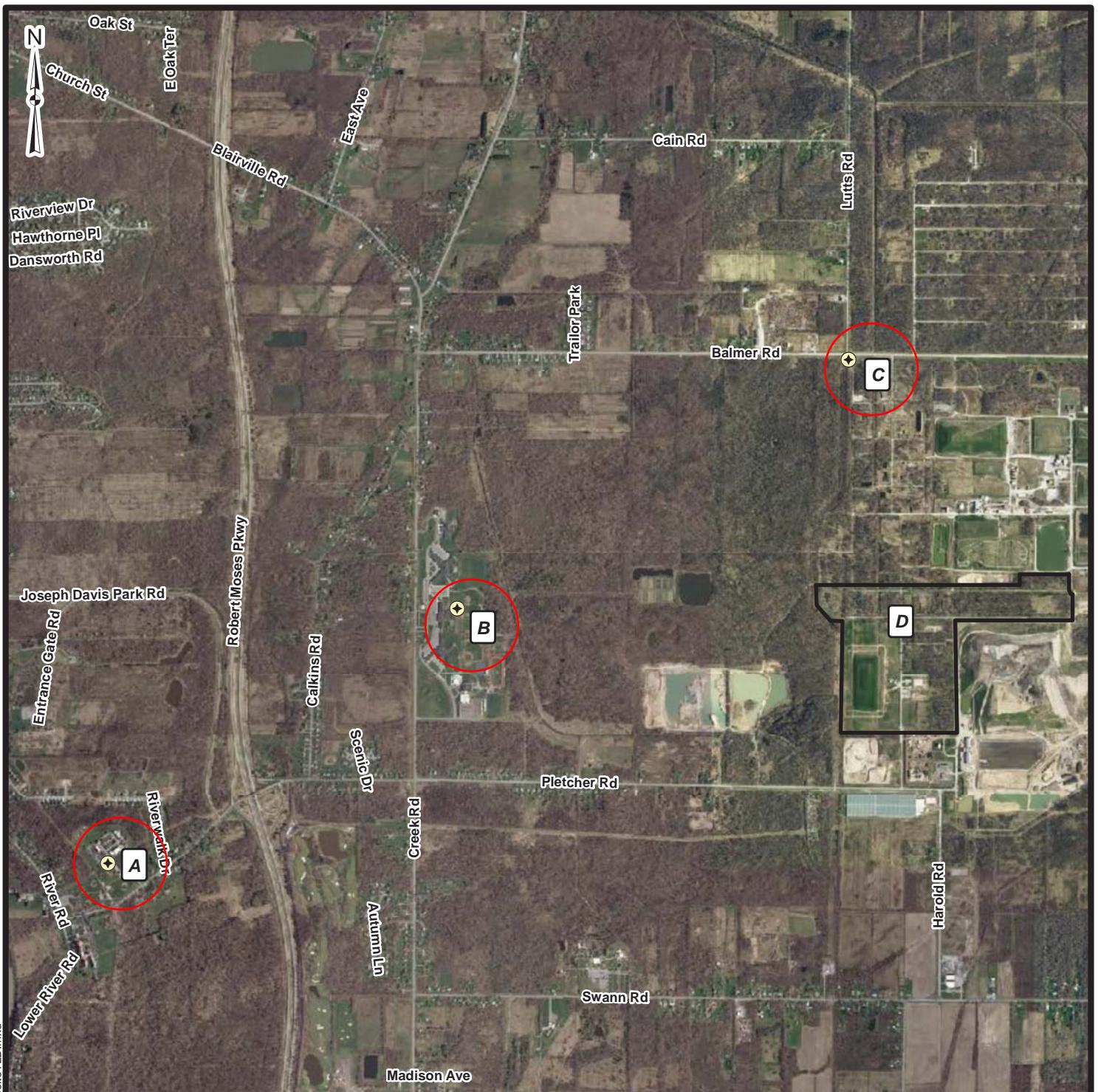
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
of Engineers® BUFFALO, NY
Buffalo District

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.



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OFF-SITE EXTERNAL GAMMA RADIATION/RADON MONITORING AND RADON FLUX SAMPLING LOCATION MAP

Table 6b
2019 Heterogeneous Regional Radon Flux Monitoring Results^a
Niagara Falls Storage Site

NFSS Sample ID	Date	Qualifier ^d	Radon-222 Flux			NFSS Sample ID	Date	Qualifier ^d	Radon-222 Flux			
			(pCi/m ² /s)		MDA				(pCi/m ² /s)		MDA	
47 ^g	10/11/2019		0.1177	±	0.0302	0.0207	B4	10/25/2019	83.7565	±	9.1729	0.9531
62	7/10/2019		0.2249	±	0.0270	0.0434	B5 ^b	10/22/2019	167.5266	±	49.1145	2.1485
62	10/11/2019		0.3781	±	0.0603	0.0207	B5	10/25/2019	11.0872	±	1.2035	0.3790
65	7/10/2019		23.0501	±	1.9272	0.6387	B5-DUP ^b	10/22/2019	168.7768	±	49.3911	2.1644
65	10/11/2019		0.1145	±	0.0294	0.0487	B6 ^b	10/22/2019	0.6798	±	0.2026	0.0327
B1	10/11/2019		1.2801	±	0.1565	0.0691	B7	10/25/2019	243.0714	±	28.1311	1.5976
B1-DUP	10/11/2019		1.3213	±	0.1633	0.0691	B7-DUP	10/25/2019	237.8208	±	24.8769	1.5994
B2	10/11/2019		66.8727	±	7.0762	1.2301	B8	10/25/2019	6.8274	±	0.7457	0.2916
B2	10/25/2019		41.0868	±	4.3460	0.4642	B9	10/25/2019	18.3382	±	2.3235	0.6677
B3	10/11/2019		23.2846	±	2.4593	0.2397	B10	10/25/2019	3.5635	±	0.4068	0.0458
B3	10/25/2019		72.9996	±	8.4318	1.4330	B11	10/25/2019	115.2764	±	12.2845	1.5597
B4	10/11/2019		64.8823	±	6.8642	1.0638	B12	10/25/2019	75.4845	±	8.7238	1.4556
			183 ^c		10/11/2019			0.1247	±	0.0312	0.0218	

NOTE: This sub-region of the IWCS is approximately 225 m²

a. Radon-222 flux was performed over 24 hour exposure except where noted

b. Radon-222 flux was performed over 96 hour exposure

c. Background: 183-Balmer Rd. (CWM Secondary Gate)

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

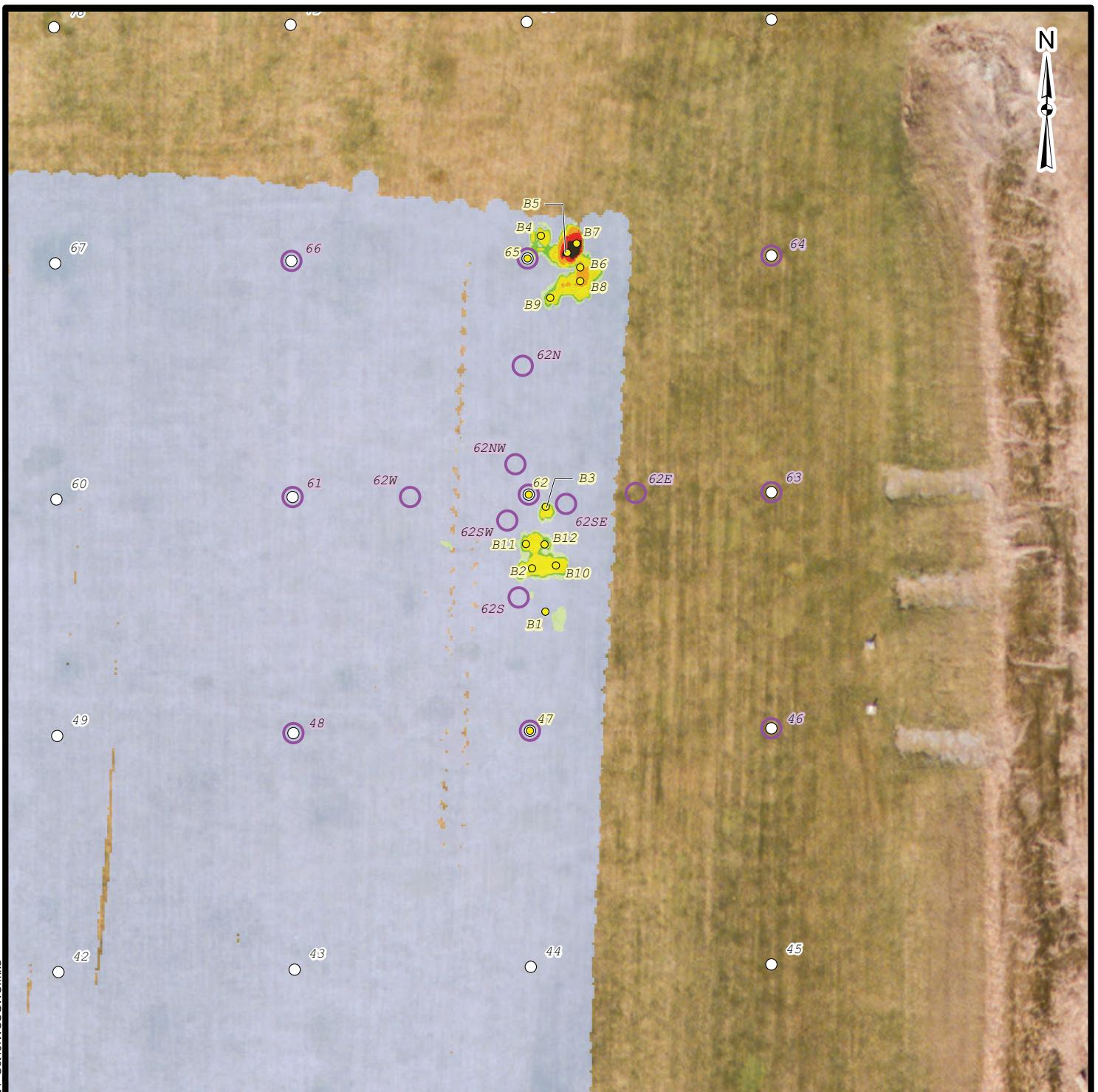
J - indicates a estimated value when relative percent difference > 30% and Z-score > 1.96 between the primary finding and duplicate (-DUP).

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

f. Highest detectable finding.

g. Measurement performed as reference; not included in region mean

Region	Value	Units
Average ^c	50.9892	(pCi/m ² /s)
High ^f	243.0714	(pCi/m ² /s)
Low	0.1145	(pCi/m ² /s)



Legend

- 2019 Additional/Resample Radon Flux Samples
- 2018 Additional/Resample Radon Flux Samples
- Radon Flux Location

Gamma Walkover Survey (Sept 20 & Oct 18, 2019)

- | | | | |
|--|---------------------|--|---------------------|
| | < 13,000 CPM | | 30,000 - 60,000 CPM |
| | 13,000 - 16,000 CPM | | 60,000 - 90,000 CPM |
| | 16,000 - 18,000 CPM | | > 90,000 CPM |
| | 18,000 - 30,000 CPM | | |

0 15 30 60
Feet



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LOCATION OF 2018 ADDITIONAL AND RESAMPLED RADON FLUX LOCATIONS AND 2019 GAMMA WALKOVER SURVEY DATA

Document Path: K:\NFSSP\GIS\AcMap\Sampling_Locations\2019\191024_Oct19IWCSGWS.mxd
Name: 191024_Oct19IWCSGWS.mxd
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Date Saved: 24 Oct 2019
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NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

FIGURE 1

Table 6c
2019 IWCS Radon-222 Annual Weighted Mean Flux^a
Niagara Falls Storage Site

IWCS Region	Area (m ²)	Radon-222 Flux	
		Local Mean (pCi/m ² /s)	Standard Deviation
Heterogeneous Region ^b	225	50.9892	64.2551
Remainder of IWCS ^c	39775	0.0825	0.0735
Total IWCS	40000	0.3689	pCi/m ² /s

a. The mean annual flux is the weighted mean of the heterogeneous region and the remainder of the IWCS, and is calculated as follows:

$$J_s = \frac{J_1 A_1 + J_2 A_2}{A_t}$$

J_s = Mean flux for the total IWCS (pCi/m²/s)

J₁ = Mean flux for the heterogeneous region (pCi/m²/s)

A₁ = Area of the heterogeneous region (m²)

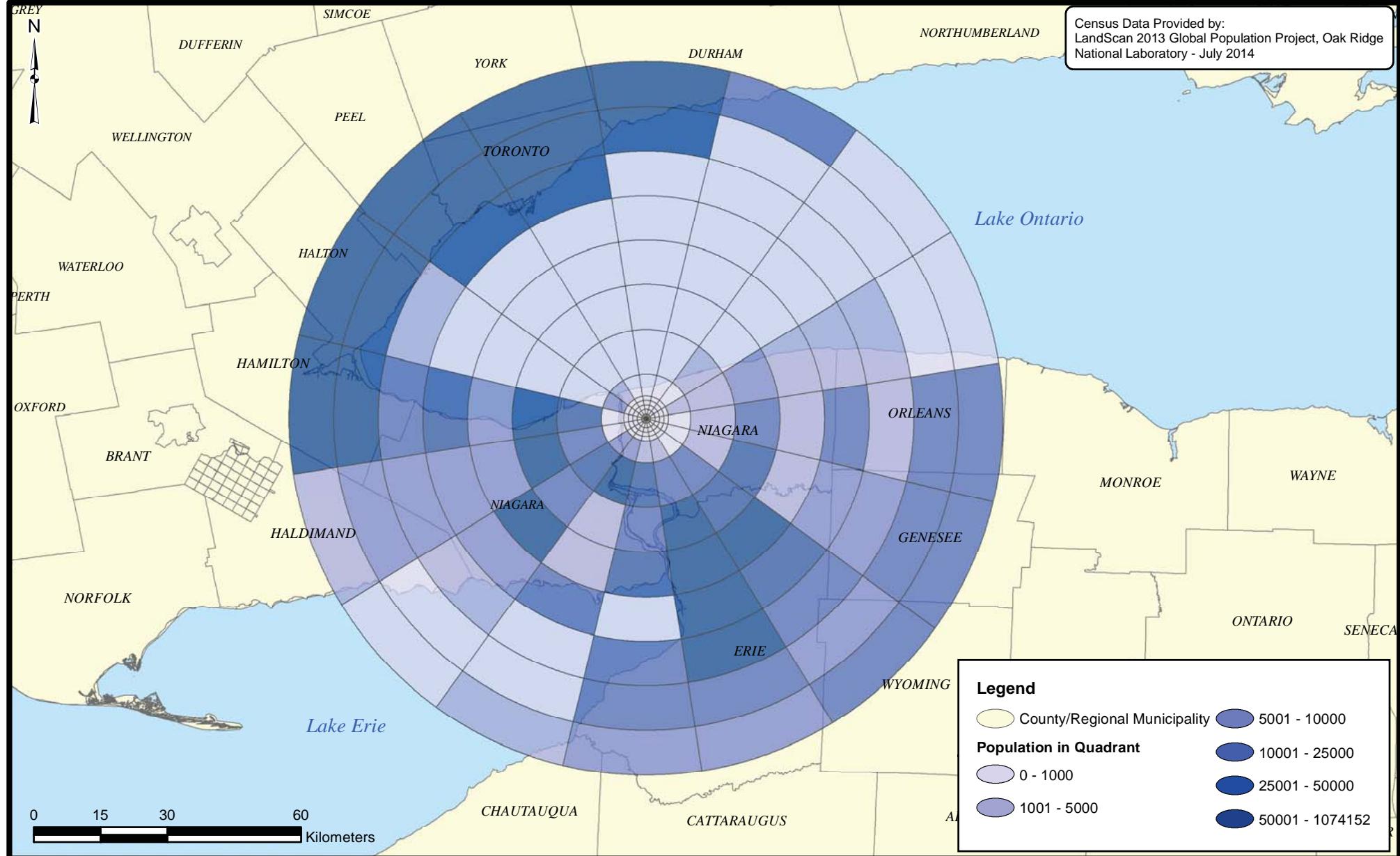
J₂ = Mean flux for the remainder of the IWCS (pCi/m²/s)

A₂ = Area of the remainder of the IWCS (m²)

A_t = Total IWCS area (m²)

b. Table 6b

c. Table 6a



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CENSUS DATA

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