US Army Corps of Engineers®
Buffalo District

Niagara Falls Storage Site
Environmental Surveillance Program Enhancements
Fact Sheet

US Army Corps of Engineers, Buffalo District · January 2009

History of the Environmental Surveillance Program at NFSS

The Environmental Surveillance Program (ESP) at the Niagara Falls Storage Site (NFSS) was initiated by the United States Department of Energy (USDOE) in 1981 to monitor radioactive residues and wastes stored in the on-site Interim Waste Containment Structure (IWCS). The program includes the sampling of air, water, and streambed sediments for radiological parameters with the purpose of ensuring that the NFSS does not pose a threat to human health and the environment.

In 1997, the United States (US) Congress authorized the US Army Corps of Engineers (Corps) to take responsibility for maintaining the site and conducting the environmental surveillance program. The Corps' Buffalo District has continued to follow the USDOE program with some revisions over the years. The Corps reports its findings annually in the form of a Technical Memorandum. Environmental data is posted to the Corps website quarterly before the Technical Memorandum is issued.

Over 25 years of environmental monitoring data from the NFSS shows that the measured parameters of the surveillance program satisfy USDOE guidelines for protection of human health. Dose rates of potential off-site radiation exposure to the public satisfy USDOE or US Environmental Protection Agency (USEPA) limits.

Additional information about the NFSS and the Environmental Surveillance Program is available on the Corps' Buffalo District website:
http://www.lrb.usace.army.mil/fusrap/nfss/index.htm

Site Description and History

The Niagara Falls Storage Site (NFSS) is a federally owned, 191-acre property. The NFSS was originally part of a World War II explosives manufacturing plant called the Lake Ontario Ordnance Works (LOOW), which was approximately 7,500 acres in size.

Between 1943 and 1954, the Manhattan Engineer District (MED) and the Atomic Energy Commission (AEC) brought radioactive residues and wastes to the LOOW site.

Throughout the 1970s, the AEC gradually consolidated its operations and sold excess property. In 1974, the USDOE, instituted the Formerly Utilized Sites Remedial Action Program (FUSRAP) to identify, investigate and clean up or control sites that were part of the Nation's early atomic energy and weapons program.

In the 1980s, the United States Department of Energy (USDOE) constructed a 10-acre Interim Waste Containment Structure (IWCS) on the NFSS property to contain the radioactive residues and wastes.

In October 1997, Congress transferred the responsibility for FUSRAP from the USDOE to the Corps. In addition to investigating and remediating site contaminants at the NFSS, the Corps is responsible for maintaining the site and conducting the Environmental Surveillance Program.

NFSS Environmental Surveillance Program (ESP)

Environmental Surveillance activities began on the Niagara Falls Storage Site (NFSS) in 1981. Over the years, the Environmental Surveillance Program (ESP) for the site has evolved to demonstrate the continued containment of wastes and residues buried within the on-site Interim Waste Containment Structure (IWCS) and to ensure that on-site contamination does not pose a threat to human health and the environment.

Media monitored in 2007 at the NFSS included: surface water, groundwater, and streambed sediment for radiological and chemical parameters, and air for radon and external gamma radiation dose.

- Annually 180 radon flux canisters are placed on the IWCS protective cap to measure the release of Radon-222.
- Radon and external gamma radiation monitors are located around the IWCS and the perimeter of the site. These detectors are exchanged twice per year.
- Surface water and sediment samples are taken annually and tested for radium, thorium, and uranium.
- Groundwater wells are sampled annually and tested for the radioactive constituents listed above as well as metals and water quality parameters. Water level measurements are recorded quarterly from 91 wells to determine the groundwater flow directions in the upper and lower water-bearing zones.

The number of wells monitored for water levels on the NFSS has increased from 63 in 1997, to 78 in 2000, to 91 in 2003.

In December 2007, the Corps' Buffalo District completed a Remedial Investigation Report (RIR) that defined the nature and extent of contaminants on the NFSS and assessed their potential long-term risks. Based upon findings from this investigation and public input, the Corps further enhanced the ESP to ensure the protection of human health and the environment. These enhancements are outlined in the next column and the following pages.

As the environmental monitoring and investigations at the NFSS progress, the Corps will continue to assess additional data needs and monitor conditions at the site to ensure that the IWCS continues to function as designed and is fully protective of human health and the environment.

Biannual exchange of radiation monitors by Corps and New York State Department of Environmental Conservation (NYSDEC) personnel to support the ongoing Environmental Surveillance Program at the Niagara Falls Storage Site.

ESP Enhancements for 2008

The Corps continues to enhance the ESP to gather new information and ensure the program is current and protective. The most recent enhancements are summarized below. The results of these enhancements will be reflected in the 2008 Technical Memorandum.

- *The **addition of five streambed surface water and sediment locations** (three of which are located in the West Drainage Ditch) for radiological and chemical parameters*
- *The **addition of ten groundwater-monitoring well locations** for water quality and radiological and/or chemical parameters*
- *The **addition of a fall round** of groundwater, and streambed surface water and sediment sampling*
- *The **addition of six radon and external gamma radiation monitor locations** around the IWCS (1) and perimeter of the site (5)*

Each quarter the Corps posts the available environmental data, reviewed and/or validated as appropriate, to their website at: http://www.lrb.usace.army.mil/fusrap/nfss/index.htm#Documents.

Annual Technical Memoranda that detail the analysis of the ESP results are available on the website listed above as well. The following tables attached to this fact sheet detail the evolution of the ESP for NFSS, list groundwater monitoring well characteristics and provide an overview of the NFSS ESP. A map of the NFSS ESP surveillance sampling points is also attached.

Table 1: Evolution of NFSS Environmental Surveillance Plan

White background: annual sampling frequency, yellow background: quarterly sampling frequency, blue background: biannual sampling frequency

Parameter	1997	2000	2003	2008
Radon Flux (Radon-222 emissions)	180 monitoring locations	180 monitoring locations	180 monitoring locations	180 monitoring locations
TLDs (external gamma dose)	17 locations, all duplicated, 1 background location	17 locations, one duplicate, 3 background locations	17 locations, one duplicate, 3 background locations	23 locations, one duplicate, 3 background locations
Radon-222, -220	17 locations, all duplicated, 1 background location	17 locations, one duplicate, 3 background locations	17 locations, one duplicate, 3 background locations	23 locations, one duplicate, 3 background locations
Groundwater well water levels	63 wells	78 wells	91 wells	91 wells
Groundwater: 8 wells: sampling at BO2W20S, A45, A50, OW04B, OW06B, OW07B (later OW13B), OW15B, OW17B	Radionuclides: radium, thorium, and uranium Metals: Copper, lead, vanadium Water quality analytes: calcium, magnesium, potassium, sodium alkalinity, bicarbonate, carbonate, chloride, nitrate-nitrogen, nitrite-nitrogen, total phosphorous, Total Dissolved Solids, sulfate Field Parameters: Temperature, pH, redox potential, turbidity, dissolved oxygen, specific conductivity	Radionuclides: Same Metals: Same Water quality analytes: Same Field Parameters: Same	Radionuclides: Same Metals: Same Water quality analytes: Same Field Parameters: Same	Radionuclides: Same Metals: Same + Target analyte list (TAL) metals + boron + lithium Water quality analytes: Same Field Parameters: Same
Groundwater wells: 415A, 201A				Volatile Organic Compounds (VOAs) Water quality analytes: Same as above Field Parameters: Same as above
Groundwater wells (9 additional): sampling at 505,BH49A, A42, OW18B, 302A,313, OW11B, OW04A, 415A				Radionuclides: Uranium Water quality analytes: Same as above Field Parameters: Same as above
Surface water: SWSD011, SWSD021, SWSD010, SWSD022, SWSD009	Radionuclides: Radium, thorium, and uranium Field Parameters: Temperature, pH, redox potential, turbidity, dissolved oxygen, specific conductivity	Radionuclides: Same Field Parameters: Same	Radionuclides: Same Field Parameters: Same	Radionuclides: Same Field Parameters: Same Metals: TAL metals, lithium, boron Organics: Poly Chlorinated Biphenyls (PCBs), pesticides, VOAs, Polycyclic Aromatic Hydrocarbons (PAHs)
Surface water: additional locations: WDD1, WDD2, WDD3, SWSD023, SWSD024				Radionuclides: Radium; Thorium ; Uranium Field Parameters: Temperature, pH, redox potential, turbidity, dissolved oxygen, specific conductivity Metals: TAL metals, lithium, boron Organics: PCBs, pesticides, VOAs, PAHs
Sediment: SWSD011, SWSD021, SWSD010, SWSD022, SWSD009	Radionuclides: Radium, thorium, uranium	Radionuclides: Same	Radionuclides: Same	Radionuclides: Same Metals: TAL metals, lithium, boron Organics: PCBs, pesticides, VOAs, PAHs
Sediment: additional locations: WDD1, WDD2, WDD3, SWSD023, SWSD024				Radionuclides: Radium-226, -228; Thorium-230, -232; Uranium-234, -235, -238 Metals: TAL metals, lithium, boron Organics: PCBs, pesticides, VOAs, PAHs

Table 2: Groundwater Monitoring Well Characteristics

Water Bearing Zone (WBZ)
White Background: Wells installed by the US Department of Energy in the 1980s
Yellow Background: Wells installed by the Corps in 2000
Green Background: Wells installed by the Corps in 2003
Wells in **bold print** are sampled, versus those in standard print, which are monitored only for groundwater levels.

Well ID	Well construction	Well Screen Bottom Depth (ft)
A23A	Bedrock	71.30
A42	Upper WBZ	20.5
A43	Upper WBZ	13.0
A45	Upper WBZ	18.0
A50	Upper WBZ	21.00
A51	Upper WBZ	19.00
A52	Upper WBZ	13.00
A54	Lower WBZ	35.80
A55	Lower WBZ	37.00
A56	Lower WBZ	34.60
A57	Bedrock	71.30
BH5	Lower WBZ	44.00
BH12	Bedrock	95.00
BH15	Bedrock	104.50
BH48	Lower WBZ	37.10
BH49	Lower WBZ	47.20
BH49A	Upper WBZ	18.50
BH50	Lower WBZ	38.30
BH51	Lower WBZ	44.10
BH57	Bedrock	101.50
BH59	Lower WBZ	37.70
BH60	Lower WBZ	40.50
BH61	Lower WBZ	41.60
BH62	Bedrock	98.00
BH63	Lower WBZ	48.40
BH64	Lower WBZ	42.10

Well ID	Well construction	Well Screen Bottom Depth (ft)
OW09B	Upper WBZ	13.20
OW10A	Lower WBZ	38.50
OW10B	Upper WBZ	27.60
OW11A	Lower WBZ	35.50
OW11B	Upper WBZ	12.50
OW12A	Lower WBZ	35.90
OW12B	Upper WBZ	10.80
OW13A	Lower WBZ	39.70
OW13B	Upper WBZ	12.20
OW14A	Lower WBZ	43.40
OW14B	Upper WBZ	13.50
OW15A	Lower WBZ	44.00
OW15B	Upper WBZ	10.70
OW16A	Lower WBZ	42.70
OW16B	Upper WBZ	11.90
OW17A	Lower WBZ	40.40
OW17B	Upper WBZ	15.50
OW18A	Lower WBZ	46.00
OW18B	Upper WBZ	15.20
201A	Upper WBZ	14.7
203A	Upper WBZ	14.7
213A	Upper WBZ	14.7
215A	Upper WBZ	9.7
302A	Upper WBZ	14.7
303A	Upper WBZ	14.7
404A	Upper WBZ	24.7

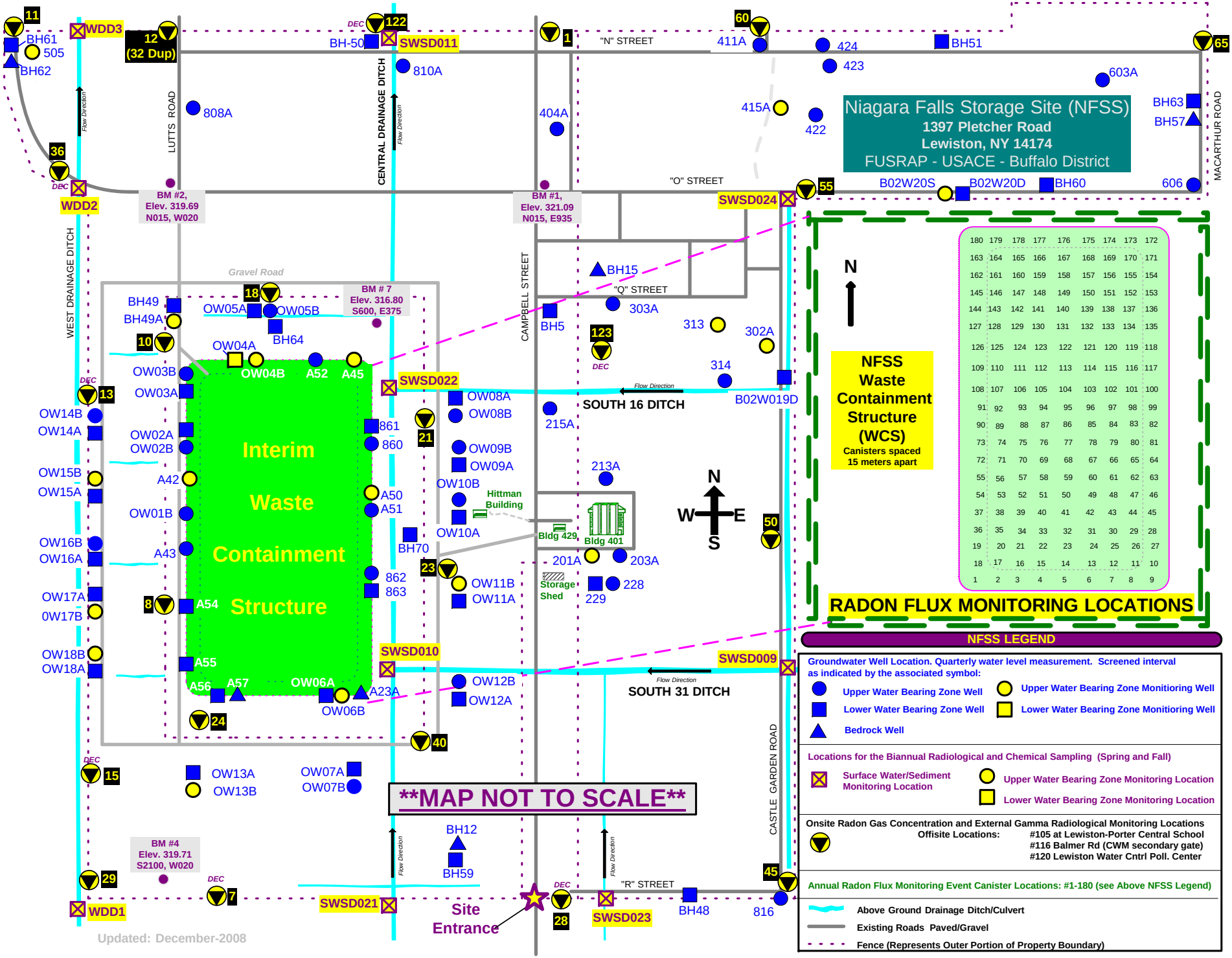
Well ID	Well construction	Well Screen Bottom Depth (ft)
BH70	Lower WBZ	39.50
B02W19D	Lower WBZ	43.60
B02W20D	Lower WBZ	44.50
B02W20S	Upper WBZ	18.10
OW01A	Decommissioned	
OW01B	Upper WBZ	15.30
OW02A	Lower WBZ	44.00
OW02B	Upper WBZ	18.50
OW03A	Lower WBZ	37.40
OW03B	Upper WBZ	14.50
OW04A	Lower WBZ	38.40
OW04B	Upper WBZ	15.20
OW05A	Lower WBZ	42.00
OW05B	Upper WBZ	14.50
OW06A	Lower WBZ	38.40
OW06B	Upper WBZ	15.30
OW07A	Lower WBZ	38.20
OW07B	Upper WBZ	11.30
OW08A	Lower WBZ	43.00
OW08B	Upper WBZ	10.50
OW09A	Lower WBZ	38.90

Well ID	Well construction	Well Screen Bottom Depth (ft)
411A	Upper WBZ	17
415A	Upper WBZ	15.2
505	Upper WBZ	18.2
603A	Upper WBZ	19.7
606	Upper WBZ	18.5
808A	Upper WBZ	16.7
810A	Upper WBZ	14.8
816	Upper WBZ	14.1
MW228	Upper WBZ	18
MW229	Lower WBZ	41
MW313	Upper WBZ	20
MW314	Upper WBZ	20
MW423	Upper WBZ	20
MW424	Upper WBZ	20
MW860	Upper WBZ	23
MW861	Lower WBZ	42.25
MW862	Upper WBZ	20
MW863	Lower WBZ	40
MW422	Upper WBZ	20

Table 3: Overview of NFSS 2008 Environmental Surveillance Program

Surveillance Medium	Required Analysis	Number of Surveillance Locations	Sampling Event CY Quarter
External Gamma Radiation	TLD Monitors, exposure period is typically 6 months. Monitors placed in 23 on-site locations and three (3) off-site locations (background). Hypothetical external gamma radiation doses to members of the public are calculated to fulfill a NESHAPS requirement.	26	Q1, Q3
Atmospheric:			
Radon-222 Radon-220	Monitors exposure period is typically 6 months for combined Radon-220 and Radon-222. Monitors placed in 23 on-site locations and three (3) off-site locations (background).	26	Q1, Q3
Radon-222 Flux	180 activated charcoal canisters measure Radon-222 emissions from the IWCS cap plus three (3) off-site locations (background).	183	Q3
Groundwater:			
Field Parameters	Temp., pH, Specific Conductance, Dissolved Oxygen, Oxidation-Reduction Potential, Turbidity, Volume Purged, Discharge	18	Q2, Q4
Radiological	Radium, Thorium, Uranium	8	Q2, Q4
Radiological	Wells 505, BH49A, A42, OW18B, 302A, 313, OW11B, OW04A, and 415A for Uranium only	9	Q2, Q4
Metals	TAL Metals + Lithium & Boron	8	Q2, Q4
VOA	Wells 415A and 201A , for volatile organic analytes (VOAs)	2	Q2, Q4
Water Quality	Alkalinity (carbonate, bicarbonate), Anions (chloride, nitrate, nitrite, ortho-phosphate, sulfate), and total dissolved solids.	18	Q2, Q4
Water Level	Groundwater level measurements	91	Q1, Q2, Q3, Q4
Surface Water:	Locations: SWSD021. SWSD010, SWSD022, SWSD011, SWSD009, WDD1, WDD2, WDD3, SWSD023, and SWSD024.	10	Q2, Q4
Field Parameters	Temperature, pH, Specific Conductance, Dissolved Oxygen, Oxidation/Reduction Potential, and Turbidity.	10	Q2, Q4
Radiological	Radium, Thorium, Uranium	10	Q2, Q4
Metals	TAL Metals + Lithium & Boron	10	Q2, Q4
Organics	PCBs, pesticides, VOAs, PAHs.	10	Q2, Q4
Sediment:	Locations: SWSD021. SWSD010, SWSD022, SWSD011, SWSD009, WDD1, WDD2, WDD3, SWSD023, and SWSD024.	10	Q2, Q4
Radiological	Radium, Thorium, Uranium	10	Q2, Q4
Metals	TAL Metals + Lithium & Boron	10	Q2, Q4
Organics	PCBs, pesticides, VOAs, PAHs.	10	Q2, Q4

Note: CY is Calendar Year. Q is Quarter of the CY. For example, Q1 is between January and March of the Calendar Year.


Niagara Falls Storage Site (NFSS)
1397 Pletcher Road
Lewiston, NY 14174
FUSRAP - USACE - Buffalo District
Interim Waste Containment Structure
NFSS Waste Containment Structure (WCS)
Canisters spaced 15 meters apart
RADON FLUX MONITORING LOCATIONS
NFSS LEGEND
MAP NOT TO SCALE
Site Entrance
Updated: December-2008
"N" STREET
"O" STREET
"Q" STREET
"R" STREET
LUTTS ROAD
CENTRAL DRAINAGE DITCH
WEST DRAINAGE DITCH
CAMPBELL STREET
CASTLE GARDEN ROAD
MACARTHUR ROAD
SOUTH 16 DITCH
SOUTH 31 DITCH
Gravel Road
Hittman Building
Bldg 429
Bldg 401
Storage Shed
BM #2, Elev. 319.69 N015, W020
BM #1, Elev. 321.09 N015, E935
BM # 7 Elev. 316.80 S600, E375
BM #4 Elev. 319.71 S2100, W020
Groundwater Well Location. Quarterly water level measurement. Screened interval as indicated by the associated symbol:
Upper Water Bearing Zone Well
Upper Water Bearing Zone Monitioring Well
Lower Water Bearing Zone Well
Lower Water Bearing Zone Monitioring Well
Bedrock Well
Locations for the Biannual Radiological and Chemical Sampling (Spring and Fall)
Surface Water/Sediment Monitoring Location
Upper Water Bearing Zone Monitoring Location
Lower Water Bearing Zone Monitoring Location
Onsite Radon Gas Concentration and External Gamma Radiological Monitoring Locations
Offsite Locations: #105 at Lewiston-Porter Central School
#116 Balmer Rd (CWM secondary gate)
#120 Lewiston Water Cntrl Poll. Center
Annual Radon Flux Monitoring Event Canister Locations: #1-180 (see Above NFSS Legend)
Above Ground Drainage Ditch/Culvert
Existing Roads Paved/Gravel
Fence (Represents Outer Portion of Property Boundary)