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Niagara Falls Storage Site Radon Flux Monitoring Lewiston, NY

**U.S. Army Corps of Engineers
Buffalo District
October 2019**

Building Strong ®

Purpose: This fact sheet summarizes the radon flux monitoring measurements from the most recent annual environmental surveillance activities for the Niagara Falls Storage Site (NFSS).

Summary: The 2018 environmental surveillance analytical results confirm that site controls continue to perform as designed; they are fully protective of human health and the environment. Overall results of the 2018 surveillance program are consistent with previous years. Site radon-222 flux measurements taken across the Interim Waste Containment Structure (IWCS) are less than the U.S. Environmental Protection Agency (EPA) flux compliance criterion of 20 picocuries per square meter per second (pCi/m²/s).

The 2018 report describes one sampling location where radon flux was elevated over prior year measurements. Another data point collected in 2019 shows a similar elevated measurement from an adjacent location approximately 50 feet away. The IWCS remains protective of human health and the environment and our team of experts is taking action on site to better understand these new results.

Background: The Formerly Utilized Sites Remedial Action Program (FUSRAP) was initiated in 1974 to identify, investigate, and if necessary, clean up or control sites throughout the United States that were contaminated by activities related to the nation's early atomic energy program. Congress transferred execution of FUSRAP from the U.S. Department of Energy (DOE) to the U.S. Army Corps of Engineers in 1997. When implementing FUSRAP, the Corps of Engineers follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan.

The NFSS is a 191-acre federal property located in Lewiston, New York. The Manhattan Engineer District and Atomic Energy Commission brought radioactive materials to the site during the 1940s and 1950s. During the 1980s, the DOE consolidated the wastes on NFSS and many of the vicinity properties into the structure which is located in the southwest portion of the site (Figure 1). The IWCS is a 10-acre landfill that contains radiologically contaminated materials from cleanup actions the DOE conducted more than 20 years ago.

Materials stored in the IWCS are uranium ore processing residues or "byproduct material" as defined by Section 11e.(2) of the Atomic Energy Act of 1954, as amended. They include the K-65 residues that contain high concentrations of radium-226, which is the main



Figure 1: NFSS Interim Waste Containment Structure

contaminant associated with uranium ore processing residues. Radium-226 undergoes radioactive decay to produce radon gas. The IWCS was engineered to inhibit radon gas emissions (notably radon-222), infiltration of precipitation, and contaminant migration to groundwater.

Overview of the Environmental Surveillance Program

The Corps of Engineers Buffalo District conducts the NFSS Environmental Surveillance Program (ESP); it performs site operations, maintenance, and monitoring to ensure protection of human health and the environment. These activities are ongoing across the site, including at the IWCS. The DOE initiated the ESP at the NFSS in 1979, before the construction of the IWCS, to monitor air, water, and external gamma radiation (and later streambed sediments) to ensure protection of human health and the environment from radioactive residues and wastes later buried in the IWCS. In 1997, when responsibility for FUSRAP transferred to the Corps of Engineers, the Corps of Engineers Buffalo District continued to follow the DOE ESP, with some revisions over the years. The Corps of Engineers reports its findings annually in the form of a technical memorandum, which is posted to the NFSS website at <https://www.lrb.usace.army.mil/Missions/HTRW/FUSRAP/Niagara-Falls-Storage-Site/> in the Environmental Monitoring section.

The surveillance program is designed to achieve the following objectives:

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

Radon Flux Monitoring

The Corps of Engineers measures radon flux at the NFSS once a year between early to late summer. Measurement of radon flux provides an indication of the rate of radon-222 emission from a surface. Radon flux is measured with activated charcoal canisters placed on a grid spaced 15 meters (49.2 feet) on center across the surface of the IWCS for a 24-hour exposure period. A total of 180 canisters are placed on the IWCS for an annual measurement of radon flux. Sample locations are shown on Figure 2 on the last page. The burgundy outlines in Figure 2 depict the outlines of the building foundations buried within the IWCS. Portions of the Building 411 foundation contain the high activity K-65 residues.

The activated charcoal in the canister adsorbs the radon gas emanating from the surface over which the canister is placed. The charcoal holds the radon, which subsequently decays until equilibrium between radon and its short-lived daughters is established (a minimum of 3 hours). The radon flux is calculated in the laboratory through gamma spectroscopy using the area of canister exposed to the radon flux and the time that exposure took place. The average of all 180 radon flux results is compared against the EPA site wide compliance criterion of 20 picocuries per square meter per second ($\text{pCi}/\text{m}^2/\text{s}$) specified in 40 CFR Part 61, Subpart Q.

Radon Flux Observations

The average radon flux measurement for all 180 locations across the IWCS is typically less than 1 $\text{pCi}/\text{m}^2/\text{s}$. In July 2018, the Corps of Engineers performed annual radon flux sampling and a few locations exhibited elevated results compared to past results, but the average of all data from the 180 sampling points ($0.1576 \text{ pCi}/\text{m}^2/\text{s}$) remained below the site-wide limit of 20 $\text{pCi}/\text{m}^2/\text{s}$ specified in 40 CFR Part 61, Subpart Q. The highest sample was at location #62 (Figure 2) and was $19.278 \text{ pCi}/\text{m}^2/\text{s}$. The

Corps of Engineers resampled the area surrounding location #62 in the fall of 2018 at the 16 locations shown in the inset on Figure 2, and all resampling results came back typical of historical levels.

In July 2019, the Corps of Engineers performed the annual radon flux sampling and the results showed an elevated radon flux measurement result at another location (#65), north of the 2018 radon flux sampling location that exhibited elevated results. This time the result was 23.050 pCi/m²/s. The average radon flux measurements for 2019 for the 180 locations over the entire IWCS were still below the compliance limit.

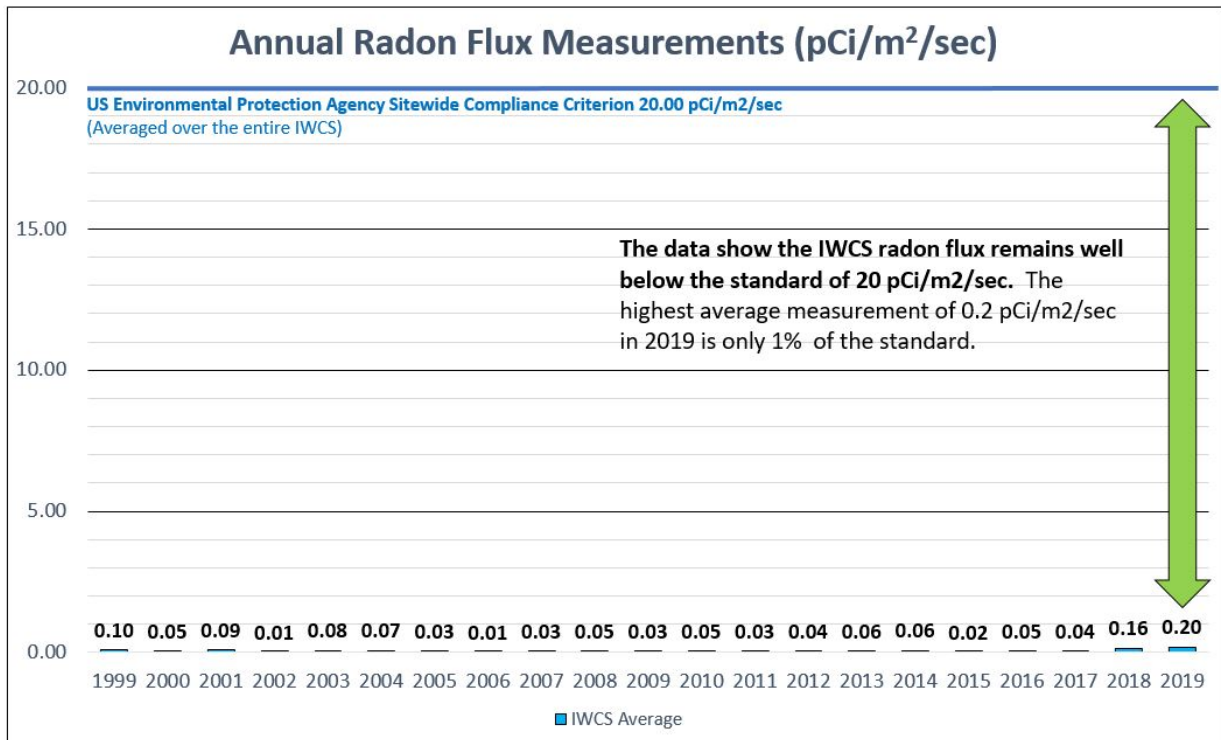
Path Forward

The Corps is collecting and assessing additional data to help us determine the reason for the elevated radon at these two adjacent locations. These data will be used to determine whether we need to make changes to our environmental surveillance program and/or potentially make any improvements to the IWCS cap in this area. As we continue to investigate this area we are committed to keeping you informed.

Corps of Engineers Commitment

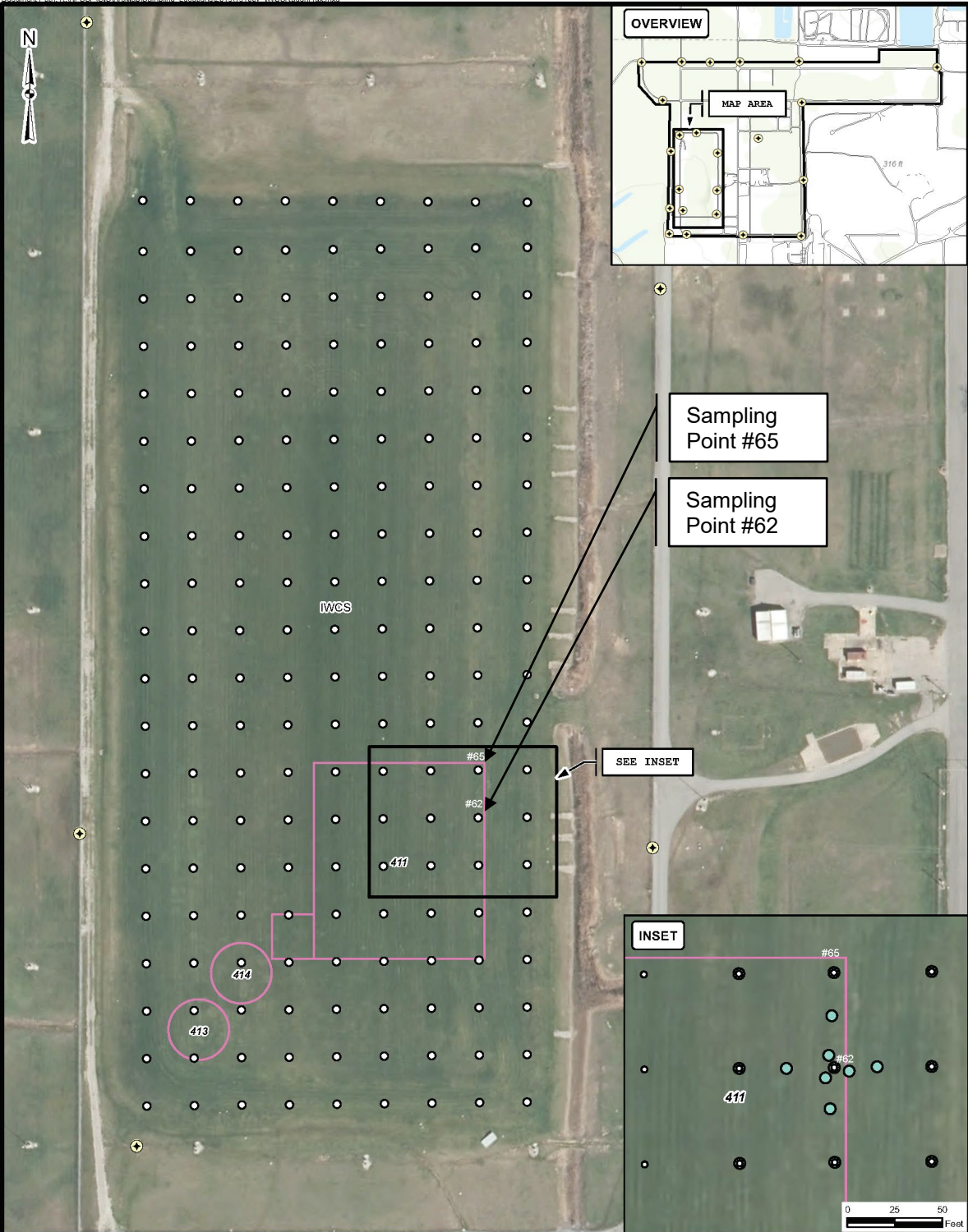
The Corps of Engineers’ highest priority under the authority of FUSRAP at the NFSS is to be protective of human health and the environment, to ensure that work is conducted in a safe and efficient manner, and to prevent the spread of contamination.

The 2018 and 2019 radon-222 monitoring results are well within the radon flux standard specified by the EPA. The IWCS remains protective of human health and the environment.



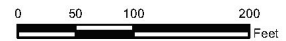
Description: This chart shows the overall radon gas flow (called "radon flux") for the entire Interim Waste Containment Structure (IWCS) and compares it against the US Environmental Protection Agency Sitewide Compliance Criterion of 20 pCi/m²/sec. The chart shows the average values of 180 measurement points across the IWCS over the timeframe 1999-2019.


The IWCS cap remains protective of human health regarding radon flux



Legend

- Annual Radon Flux Sample Location
- Radon Flux Sample (2018 Additional/Resample)
- ⊕ External Gamma Radiation/Radon Monitoring Location
- Inset
- Interim Waste Containment Structure Structures




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EXTERNAL GAMMA RADIATION/RADON MONITORING
AND RADON FLUX SAMPLING LOCATION MAP

FIGURE 2

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NIAGARA FALLS STORAGE SITE
 LEWISTON, NEW YORK