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**Proposed Plan
Balance of Plant and Groundwater Operable Units
Niagara Falls Storage Site
Lewiston, NY**

**U.S. Army Corps of Engineers
Buffalo District
September 2020**

Building Strong ®

Formerly Utilized Sites Remedial Action Program

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 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.



Figure 1: NFSS Interim Waste Containment Structure (IWCS)

Site Description and History

The 191-acre Niagara Falls Storage Site (NFSS) is a federally owned 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 Department of Energy consolidated these materials into the Interim Waste Containment Structure (IWCS), a 10-acre structure in the southwest portion of the site (Figure 1).

Materials stored in the IWCS are uranium ore processing residues or byproduct material. They include the K-65 residues that contain high concentrations of radium-226, the main 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.

To manage CERCLA activities at the NFSS, the Corps of Engineers established three operable units (OUs) for the site: IWCS, Balance of Plant, and Groundwater. The decision making for the IWCS OU is complete. In March 2019 the Corps of Engineers signed a record of decision to completely remove the entire IWCS, process the contaminated materials, and ship the materials out of state for permanent disposal. The Balance of Plant OU includes all of the material at the NFSS not in the IWCS (soils, buildings and building foundations, utilities, roads, and roadbeds). The Groundwater OU refers to contaminated groundwater.

The reasonable future land use for the site is industrial. This was determined based on the current zoning of NFSS (light industrial) and the presence of adjacent municipal and hazardous waste landfills. Under industrial use, the construction worker was selected as the group of individuals reasonably expected to receive the greatest exposure to residual contamination.

Nature and Extent of Contamination

Based on the information gathered from numerous investigations, monitoring events, and studies of the site, the following media outside of the IWCS OU are impacted: soil, road bedding, Building 433, the foundations of former Buildings 401, 430 and 431/432, groundwater, and the former Building 401 drain system.

Eight radionuclides of concern were identified for Balance of Plant soil, road bedding, Building 433, and the foundations of former Buildings 401, 430 and 431/432; these include actinium-227, protactinium-231, lead-210, radium-226, thorium-230, uranium-234, uranium-235, and uranium-238.

Several chemicals of concern, known collectively as polycyclic aromatic hydrocarbons (PAHs), are identified for Balance of Plant soil and building foundations. The PAHs include benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene.

Chlorinated volatile organic compounds (CVOCs), which include tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and vinyl chloride, are chemicals of concern in soil and groundwater in the northeast portion of the site, as well as in a small pocket of soil in the near center of the site.

Polychlorinated biphenyls (PCBs), which include Aroclor-1254 and/or Aroclor-1260, are chemicals of concern in the foundation of former Building 401, as well as utility water and sediment associated with this building.

The upper and lower water-bearing zones at NFSS exhibit significant concentrations of naturally occurring total dissolved solids and therefore cannot be used as a potable water source without treatment. In other words, the NFSS groundwater is a New York State Class GSA water resource (saline groundwater). Groundwater resources underlying the NFSS are consistent with the U.S. Environmental Protection Agency

(EPA) Class IIIB criteria for nonpotable and limited beneficial use water. To be a potable water source, groundwater at the NFSS would require expensive and energy intensive treatment by reverse osmosis (desalination). Since there is a surface water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it is reasonable to assume that no municipality or service would find NFSS groundwater economically viable for use as a potable water source.

Balance of Plant and Groundwater Operable Units Feasibility Study

The feasibility study identifies potential remedial technologies and process options to address site contamination. It then evaluates those alternatives in order to identify those that could achieve the cleanup goals for radionuclides and chemicals of concern which would protect potential construction workers from exposure to site media in the Balance of Plant and Groundwater OUs. Applicable or relevant and appropriate requirements, remedial action objectives, and preliminary remediation goals (PRGs) are established before alternatives are developed.

Applicable or Relevant and Appropriate Requirements

CERCLA requires that any action taken be protective of human health and the environment and comply with applicable or relevant and appropriate requirements. The applicable or relevant and appropriate requirements for the Balance of Plant OU are listed below.

- Title 10 Code of Federal Regulations Part 40 Appendix A, Criterion 6(6) is considered relevant and appropriate for radionuclides in Balance of Plant soil, Manhattan Engineer District-impacted road bedding, Building 433, and the foundations of former Buildings 401, 430 and 431/432.
- The Toxic Substances Control Act, codified under Title 40 Code of Federal Regulation 761, is considered applicable for PCBs in the former Building 401 foundation, and relevant and appropriate for PCBs in former Building 401 utility sediments.
- Title 6 New York Codes, Rules, and Regulations Part 375-6.8(b) for restricted industrial use, is relevant and appropriate for PAHs in Balance of Plant soil and building foundations.

Remedial Action Objectives

Remedial action objectives consist of media-specific goals for protecting human health and the environment. The goals take into consideration contaminants and media of interest, exposure pathways, and associated risk to human health or ecological receptors based on an industrial future land use for the site. Remedial action objectives provide the basis for selecting remedial technologies and developing and evaluating remedial alternatives. The remedial action objectives for the Balance of Plant and Groundwater OUs are as follows:

- Prevent unacceptable exposure of the construction worker to radionuclides of concern and chemicals of concern via incidental ingestion, inhalation, dermal contact (for chemicals of concern) and external gamma (for radionuclides of concern) present within Balance of Plant soils, road bedding, buildings/foundations, and utilities by reducing/removing contaminant concentrations to applicable or relevant and appropriate requirement-based remediation goals.
- Prevent unacceptable exposure of the construction worker to CVOCs and PCBs present within the groundwater and Building 401 utility water, respectively, by reducing/removing contaminant concentrations to risk-based remediation goals.

Preliminary Remediation Goals

Preliminary remediation goals are contaminant concentration goals for various media (e.g., soil, groundwater) that are considered protective of human health and the environment for a site's anticipated future land use. The PRGs are based on applicable or relevant and appropriate requirements or are calculated risk-based values and serve as a target during the initial development, analysis, and selection of cleanup alternatives.

Preliminary remediation goals were developed for uranium-238, thorium-230, and radium-226 in soil, road bedding, Building 433, and the foundations of former Buildings 401, 430 and 431/432. These individual radionuclide PRGs include contributions from long-lived daughter products actinium-227, protactinium-231, uranium-234, and uranium-235 (included in uranium-238 PRG) and lead-210 (included in radium-226 PRG).

Preliminary remediation goals were established for all chemicals of concern (PAHs, CVOCs, and PCBs) in soil, Building 433, the foundations of former Buildings 401, 430 and 431/432, former Building 401 utilities, and groundwater.

Please see Figure 2 on the next page for the areas that need to be addressed.

Summary of Feasibility Study Remedial Alternatives

Five remedial alternatives were retained for detailed evaluation in the feasibility study for the Balance of Plant and Groundwater OUs.

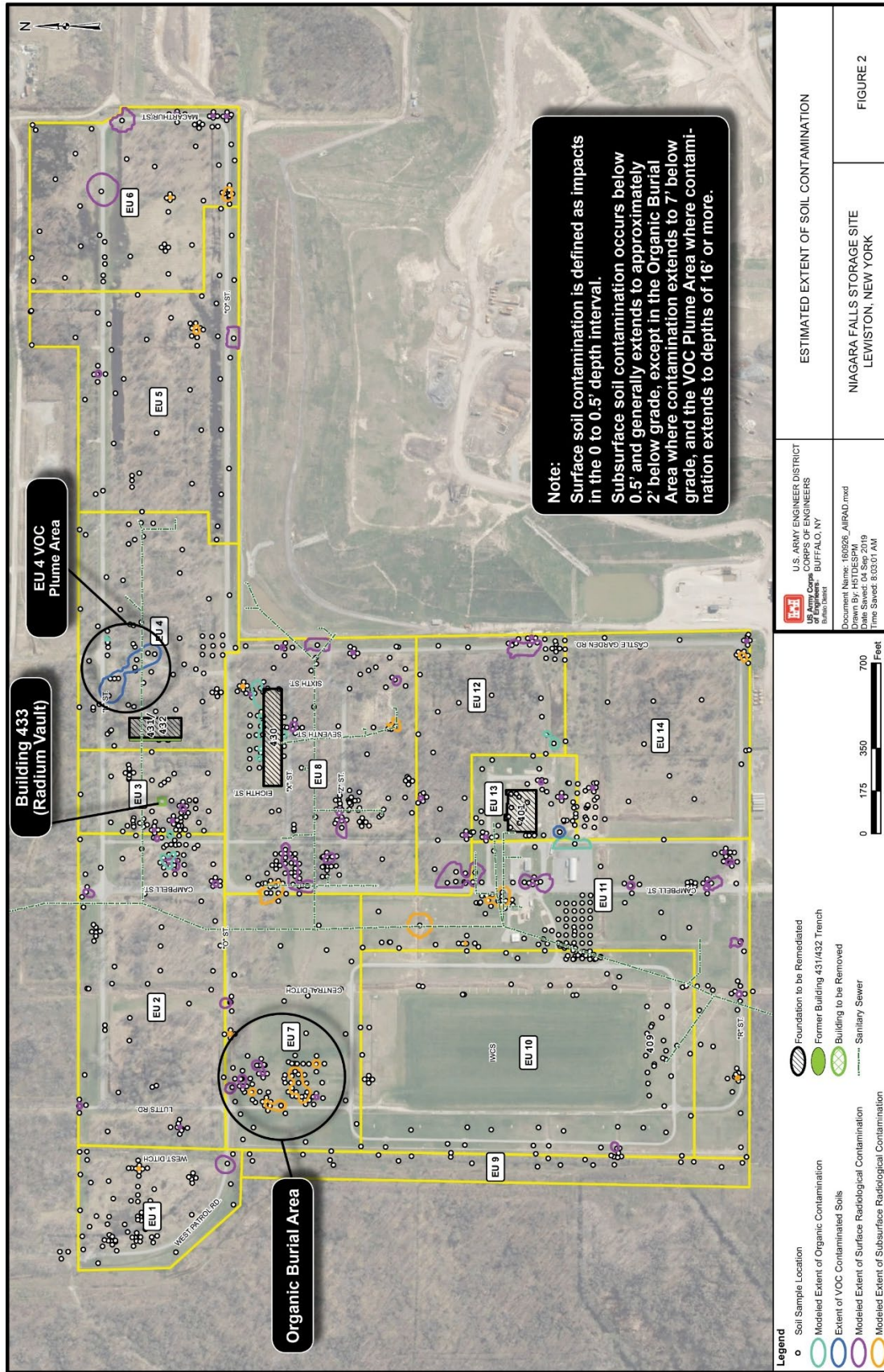
Alternative 1 – No action (required for comparison purposes, but not protective)

Alternative 2 – Complete Removal

Alternative 3 – Removal with Building Decontamination

Alternative 4 – Removal with Building Decontamination and In Situ Remediation

Alternative 5 – Removal with Building Decontamination and Ex Situ Remediation



In accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, the remedial alternatives developed in the feasibility study are evaluated against nine CERCLA evaluation criteria. The first two criteria, overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements, are threshold criteria that must be met. The next five criteria, long-term effectiveness and permanence, short-term effectiveness, reduction of toxicity, mobility or volume through treatment, implementability, and cost, are considered balancing criteria that must be addressed.

To provide the rationale for eventual remedy selection, each remedial alternative is screened against seven of the nine CERCLA evaluation criteria. A comparative analysis of the alternatives is provided in the table on the next page.

The eighth and ninth CERCLA evaluation criteria, state acceptance and community acceptance, are addressed after the public comment period following the release of the proposed plan. The proposed plan presents the preferred alternative for public comment.

Balance of Plant and Groundwater Operable Units Proposed Plan

After evaluating the alternatives in the Balance of Plant and Groundwater Operable Units feasibility study pursuant to the criteria described in the National Oil and Hazardous Substances Pollution Contingency Plan, the Corps of Engineers considers Alternative 3: Removal with Building Decontamination to be the preferred alternative. Under Alternative 3, impacted soil, road bedding, and groundwater are removed; the foundation and utilities for former Building 401 are removed; and Building 433 and the foundations of former Buildings 430 and 431/432 are decontaminated by scarifying (mechanically grinding the surface) and left in place.

An estimated 7,127 cubic yards of *in situ* contaminated soil and concrete (former Building 401 foundation only) and 3,302 gallons of impacted groundwater would be excavated/recovered for off-site disposal under Alternative 3. A nominal amount of impacted concrete dust from scarification (approximately 83 cubic yards) would also require off-site disposal at an appropriately permitted disposal facility.

The total cost of Alternative 3 is \$24,536,468: \$24,093,324 for capital and contingency costs that include among other components, preparation of remedial designs and plans, excavation, confirmatory sampling, transport, off-site disposal, site restoration, and preparation of a remedial action completion report; and, \$414,153 for implementing five-year reviews over a 1,000-year duration (referred to as operations and maintenance costs in the feasibility study). The estimated time to complete remedial work for Alternative 3 is 28.5 months: 24 months to develop remedial designs and plans and 4.5 months for construction.

Following completion of Alternative 3, the site would be remediated to levels suitable for industrial use (i.e., protective of both construction and industrial workers). The Corps of

Niagara Falls Storage Site Balance of Plant and Groundwater Operable Unit

Comparative Analysis of Alternatives

CERCLA Evaluation Criterion	Alternative 1 – No Action	Alternative 2 – Complete Removal	Alternative 3 – Removal with Building Decontamination	Alternative 4 – Removal with Building Decontamination and <i>In Situ</i> Remediation	Alternative 5 – Removal with Building Decontamination and <i>Ex Situ</i> Remediation
Overall protection of human health and the environment	No	Yes	Yes	Yes	Yes
Compliance with ARARs	No	Yes	Yes	Yes	Yes
Long-term effectiveness and permanence	Low	High	High	High	High
Reduction of toxicity, mobility, or volume through treatment	Low	Low	Low	Moderate	Moderate
Short-term effectiveness	High	Low	Low	Low	Low
Implementability	Low	High	High	Moderate	Moderate
Cost (capital)	Zero cost	\$23,814,326	\$17,557,536	\$17,180,164	\$19,784,859
Cost (O&M discounted)	Zero cost	\$414,153	\$414,153	\$414,153	\$414,153
Contingency costs	Zero cost	\$11,440,418	\$6,564,779	\$5,320,836	\$7,066,521
Total Cost	Zero cost	\$35,668,897	\$24,536,468	\$22,915,153	\$27,265,533

ARAR = applicable or relevant and appropriate requirement
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
 O&M = operation and maintenance

Engineers expects the preferred alternative to satisfy the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with applicable or relevant and appropriate requirements; (3) be cost-effective; and (4) utilize permanent solutions that will preclude any future environmental impact.

Next Step

The public is encouraged to review and comment on all the alternatives presented in the proposed plan. The public comment period for the proposed plan begins October 5, 2020, and ends December 5, 2020.

Due to restrictions that are in place in regard to public gatherings, a virtual public meeting will be conducted on October 21, 2020, at 7 p.m. Space is limited, so please email fusrap@usace.army.mil by October 19, 2020, to register for the meeting, and to let us know if you will be providing comments during the meeting. The public meeting presentation is available on the website in the Public Presentations section. The virtual public meeting will be recorded so that oral comments received can be captured. Written comments may be emailed to fusrap@usace.army.mil, or mailed before the close of the comment period to the address in the footer on the next page.

The proposed plan and supporting documents are available in the Balance of Plant subsection of the Reports section on the website listed on the bottom of the page. They are also available in the administrative record file for the NFSS.

The preferred alternative may be modified based on any new information acquired during the designated public comment period. Responses to comments received will be provided in the record of decision, which will identify the selected remedy to be implemented.

The BOP and Groundwater OU remedial activities are integral to a holistic site-wide remediation that includes the logistically complex removal of the IWCS in accordance with the March 2019 IWCS OU record of decision. The Corps of Engineers is pursuing the development of the remedial design contract to remediate the site, which is expected to be awarded in 2021.

Administrative Record File

The administrative record file for the NFSS contains CERCLA-related documentation used in the decision making process for the site. The administrative record file for NFSS is available at the website listed below.