



# Niagara Falls Storage Site

Lewiston, New York

## Feasibility Study Technical Memorandum Overview: Waste Disposal Options and Fernald Lessons Learned

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

**Building Strong®**

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### Purpose of the Waste Disposal Options and Fernald Lessons Learned Technical Memorandum

The U.S. Army Corps of Engineers completed the Waste Disposal Options and Fernald Lessons Learned Technical Memorandum (TM) as part of the development of the Feasibility Study (FS) for the Interim Waste Containment Structure (IWCS) Operable Unit (OU) at the Niagara Falls Storage Site (NFSS). This is the first TM to be released during the IWCS OU FS development. The findings within this TM provide an initial assessment to aid in the evaluation of potential remedial alternatives for the NFSS IWCS.



*Figure 1: Interim Waste Containment Structure at the Niagara Falls Storage Site (looking south).*

This TM presents the following information regarding waste disposal options:

- A waste disposal assessment that evaluates potential off-site waste disposal options for the wastes and residues contained within the IWCS;
- An initial inventory of the various IWCS residues and waste materials currently stored within the IWCS;
- The waste acceptance criteria (WAC) and licensing requirements for the material stored in the IWCS;
- A list of the potential waste disposal facilities in the United States that are licensed and able to accept this material;
- A preliminary estimate of the disposal costs for the residues and waste materials; and,
- The available transportation modes and associated unit rates available for shipment of the residues and waste materials.

The TM also contains an assessment of lessons learned from previous U.S. Department of Energy activities during Silos 1 and 2 Remediation at the Fernald Closure Project Site in Fernald, Ohio. These silos contained high activity radioactive K-65 residues which are similar to those located within the IWCS at the NFSS. Lessons learned are presented related to planning, remedial design, removal, handling, packaging, shipment, and disposal.

## Project Background

The NFSS, a 191-acre Federal property in Lewiston, New York, includes a 10-acre IWCS (Figure 1) in the southwest portion of the site. Radioactive residues and wastes were brought to the site by the Manhattan Engineer District and the Atomic Energy Commission during the 1940s and 1950s. During the 1980s, the U.S. Department of Energy consolidated radioactive residues and wastes into the IWCS. Radioactive wastes stored within the IWCS include K-65 residues containing high concentrations of radium-226. The IWCS was engineered to inhibit radon emissions, infiltration of precipitation, and migration of contamination to groundwater.

The Corps completed the NFSS Remedial Investigation (RI) Report (2007) and RI Report Addendum (2011) and the NFSS is now in the FS phase of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. The site has been divided into three OUs for this phase: IWCS, which is being addressed first, Balance of Plant (BOP), and Groundwater.

## Understanding Waste Disposal Options

In order to identify potential waste disposal facilities, it was first important to compare the characteristics of the waste in the IWCS to the WAC of potential disposal facilities. Disposal facilities must be licensed for each type of waste received. The WAC considered in this study included radionuclide-specific concentration limits, physical waste forms (i.e., solid, liquid, etc.), waste shipping container types, and transportation modes.

The waste materials in the IWCS are not all alike. To assess potential disposal options, the waste materials stored within the IWCS are divided into six major subcategories:

- K-65 residues - The most highly radioactive of the materials present and brought to the site as part of the Manhattan Project.
- R-10 residue and soil - This is a mixture of low radioactivity R-10 residues and contaminated soils from remedial activities conducted in 1972.
- Tower soil - These soils were originally located outside the K-65 storage silo (Building 434) at NFSS and became contaminated during transfer of the K-65 residues to what is now the IWCS and decommissioning of the silo.
- Contaminated rubble/waste - The contaminated rubble/waste includes construction debris, concrete, rebar, etc. from the demolition of Buildings 410, 415, and 434. This material also includes K-65 slurry transfer piping, existing structures prior to the IWCS, the Thaw House Foundation and miscellaneous materials from Building 413 and 414.
- Contaminated soil - The contaminated soil material is comprised of materials placed into the IWCS from several on-site and off-site remedial actions over the years between 1982 and 1991 as well as sand/clay separating layers in Building 411. This material also includes other materials contaminated by proximity to the IWCS wastes.
- Other IWCS residues/wastes - Other wastes stored at the IWCS were designated as L-30, L-50, and F-32 residues. These residues have lower radioactivity than the K-65 residues but higher than the R-10 residues. These were residues resulting from processing of ore at the Linde Ceramics Plant, Tonawanda, NY, (L-30 and L-50 residues) and residues from the Middlesex Metal Refinement Plant (F-32 residues) in Middlesex, NJ.

Based on the waste streams present in the IWCS, the following five viable waste disposal facilities were identified:

- EnergySolutions (Utah);
- U.S. Ecology (Idaho);
- Waste Control Specialists (WCS) (Texas);
- Wayne Disposal, Inc. (WDI) (Michigan); and
- Nevada National Security Site (NNSS) (Nevada).

### Preliminary Waste Volumes and Disposal Costs

In addition to the identification of viable potential future waste disposal facilities, this assessment identified rough order of magnitude disposal waste volumes and cost estimates. These estimates were developed to increase the current understanding of the volume of IWCS wastes which may be removed, the volume of waste created by mixing to meet disposal and shipping requirements, and WAC requirements for the selected disposal facilities. Transport and packaging options were further assessed to determine a range of unit costs for differing modes of transport and the most suitable packaging types for transporting the wastes to each selected disposal facility.

IWCS Waste Category	Estimated Volume in IWCS (cubic yards)	Estimated Treated Volume for Disposal (cubic yards)	Average Unit Cost for Disposal (per cubic yard)	Estimated Cost for Disposal
K-65 Residues	4,030	26,195	\$1,025	\$26,849,875
Other IWCS Residues/Wastes	10,550	10,550	\$1,025	\$10,813,750
R-10 Residues and Soil	59,500	59,500	\$1,025	\$60,987,500
Tower Soil	4,115	4,115	\$1,025	\$4,217,875
Contaminated Rubble/Waste	46,610	46,610	\$1,025	\$47,775,250
Contaminated Soil	248,100	248,100	~\$339*	\$84,172,396
<b>Total Estimated Disposal Cost</b>				<b>\$234,816,646</b>

*\*This is a weighted-average cost based on three waste classifications: 20,746 cubic yards (yds<sup>3</sup>) 11e(2), 204,630 yds<sup>3</sup> low-level radioactive waste, and 22,724 yds<sup>3</sup> low-level mixed waste.*

**Important Note:** *The estimated waste disposal volumes and costs contained within this TM are preliminary since the assumptions used within this TM will be refined during the development and evaluation of remedial alternatives in the IWCS OU FS. Additionally, these are disposal costs only and do not include any costs associated with packaging, treatment, and transport.*

## Fernald Lessons Learned and Applicability to the IWCS

This TM provides background details about the Fernald Closure Project and discusses the project's remediation decisions and actions that are relevant to the IWCS OU FS. The primary focus is on the radium-bearing K-65 residues already addressed at the Fernald Site. The K-65 residues removed from the Fernald Site were sufficiently similar in form, chemical characteristics, and radiological activity as those in the NFSS IWCS such that many of the processing, packaging, environmental controls and waste disposition approaches could be directly applicable to the evaluation of various NFSS remedial alternatives. As a result, the remediation decisions for the Fernald Site K-65 Silos 1 and 2 Remediation Project are discussed and the significant lessons learned from various remediation activities are presented.

Although this TM does not identify or develop specific remedial alternatives for the IWCS, many of the key technical components utilized at Fernald are applicable to the IWCS OU FS evaluation. Specific technical components requiring evaluation in the IWCS OU FS are as follows:

- Radon abatement and control;
- Waste retrieval and removal;
- Waste treatment; and
- Waste packaging, transport, and disposal.

In addition to these key technical components, the Fernald Site K-65 Silos 1 and 2 Remediation Project also provides an opportunity to consider lessons learned in areas such as stakeholder involvement, public participation, and workforce safety and health. Consequently, lessons learned are a valuable resource in evaluating potential remedial alternatives in the IWCS OU FS.

## Public Input Regarding the Waste Disposal Options and Fernald Lessons Learned Technical Memorandum

The Corps is preparing a number of TMs which will be made available to the public prior to the development and release of the IWCS OU FS Report. The Corps encourages input from the public regarding the conclusions of each TM. Public response to this document should be provided to the Corps by October 28, 2011, to allow the Corps to consider the input during development of the IWCS OU FS Report. Responses to public comments on the TM will be made available on the project website. Input can be sent via e-mail to [fusrap@usace.army.mil](mailto:fusrap@usace.army.mil) (please be sure to note "Waste Disposal Options and Fernald Lessons Learned TM" in the subject of the e-mail) or mail your comments to the FUSRAP Team at the address noted below.

## Public Workshop the Waste Disposal Options and Fernald Lessons Learned Technical Memorandum

In addition to the opportunity to provide written comments, the Corps is hosting a public workshop on September 28, 2011, beginning at 6 p.m. to present and discuss the results of this TM with the community. The workshop will be held at the Lewiston Senior Center located at 4361 Lower River Road, Youngstown, NY 14174. The Corps will send out a *News from the Corps* and post a notice in the local newspapers detailing the agenda for this public workshop by the end of August.

## Administrative Record File

The Administrative Record File for the NFSS FUSRAP Site contains the RI Report, RI Report Addendum, Baseline Risk Assessment, Waste Disposal Options and Fernald Lessons Learned Technical Memorandum, and other CERCLA-related documentation for the NFSS. Reports and documents in the Administrative Record may be viewed at the following locations:

### Electronic and Paper Versions

Town of Lewiston Public Library  
305 South 8th Street  
Lewiston, NY 14092  
Phone: (716) 754-4720

US Army Corps of Engineers  
1776 Niagara Street  
Buffalo, New York 14207  
(by appointment only)

### Electronic Version

Youngstown Free Library  
240 Lockport Street  
Youngstown, NY 14174  
Phone: (716) 745-3555

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