Former Harshaw Chemical Company Site

Cleveland, Ohio

U.S. Army Corps of Engineers
Buffalo District

Building Strong ®

June 2014

Formerly Utilized Sites Remedial Action Program

The Formerly Utilized Sites Remedial Action Program (FUSRAP) was initiated in 1974 to identify, investigate, and clean up or control sites throughout the United States that were contaminated by activities conducted as part of the nation's early atomic weapons and energy programs during the 1940s, 1950s, and 1960s. Congress transferred the execution of FUSRAP from the U.S. Department of Energy (DOE) to the U.S. Army Corps of Engineers in 1997. The Corps of Engineers implements FUSRAP in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan, Title 40 of the Code of Federal Regulations (CFR), Part 300.

Former Harshaw Chemical Company Site

Site Description and Site History

The 55-acre former Harshaw Chemical Company Site is located at 1000 Harvard Avenue, approximately five miles southwest of downtown Cleveland in Cuyahoga County, Ohio. The site is in a low-lying area adjacent to the Cuyahoga River and Big Creek and is surrounded on three sides by industries. The main portion of the facility at one time included over 30 buildings on about 16 acres of land.

The former Harshaw Chemical Company was contracted by the Manhattan Engineer District (MED) and later the Atomic Energy Commission (AEC) to support the nation's early atomic weapons program. From 1944 to 1959, various forms of uranium were processed in Building G-1 (formerly known as Plant C) at the Harshaw Site and sent to Oak Ridge, Tennessee, for further processing.

Previous investigations that addressed residual radiological contamination at the site were conducted from 1976 to 1979. The current property owners conducted additional investigations in the 1990s and numerous buildings were demolished. The former Harshaw Chemical Company Site was included in FUSRAP in spring 2001 for further characterization of FUSRAP-related contaminants.

Corps Investigations

In accordance with the phased process required in CERCLA, the Corps has completed a preliminary assessment, a remedial investigation (RI) report (released in 2009) and a feasibility study for the Harshaw Site.

Remedial Investigation (RI)

The Corps completed the RI phase of the CERCLA process in 2009 to determine the nature and extent of FUSRAP-related materials and assess current and long-term risks.

Nature and Extent of Contamination: Environmental samples collected during the RI to determine nature and extent of contamination focused on the following:

- Buildings,
- Soil,
- Groundwater,
- Surface water,
- Sediment, and
- Sewers and Drains.

FUSRAP-related radioactive contaminants of concern identified at the site were radium, uranium, and thorium. The most significant concentrations of radioactive materials were identified in Building G-1 and in the soil surrounding Building G-1.

Surface water and sediment in Big Creek and the Cuyahoga River did not show impacts from FUSRAP-related contaminants that would pose an unacceptable risk to human health or the environment.

Groundwater Model: The groundwater model investigated the fate and transport of groundwater and contaminants at the site. The findings include the following:

- Groundwater is not used as a drinking water source,
- The site groundwater is currently being treated for nickel contamination by another party,
- A plume of uranium impacted groundwater, located under and near Building G-1, is not expected to impact the river with concentrations of uranium above background levels within a 1,000 year period, and
- The soil removal alternatives would not promote additional groundwater contamination and migration.

Human Health Risk Assessment (HHRA): The HHRA described the potential for site-related risks to humans. The HHRA modeled human health risks from exposure to FUSRAP constituents in site media, projected for 1,000 years into the future. The assessment modeled risks to different human receptors including trespassers, recreational visitors, maintenance workers, construction workers, industrial workers, residential adults/children, and subsistence farmers/children.

Unacceptable risks were noted for the industrial worker, maintenance worker, resident, and subsistence farmer receptors when exposed to contaminated soil, especially in and around Building G-1. Radiological doses above 25 mrem/yr (the dose limit used to establish cleanup goals) could potentially occur for all receptors exposed to soil except the recreational users (trespassers). These unacceptable risks and radiological doses indicate a need for remedial action, and a Feasibility Study to evaluate remedial action alternatives has been conducted.

Ecological Risk Assessment: The ecological risk assessment evaluated the risks to the ecological receptors (plants and animals) from FUSRAP-related contamination in the environment. The findings include the following:

- There are no sensitive habitats within the project area and the available habitat is currently limited,
- There are no records for rare or endangered species within the project site, and
- The site would be developed in the future for human use and not ecosystem or habitat restoration.

All of these findings support the conclusion that no further action is warranted with respect to ecological receptors.

Investigative Area IA-06

During the RI, the Corps divided the site into Investigative Areas (IAs). IA-06, a six-acre parcel located east of the Cuyahoga River, was found to be the least impacted portion of the site. No known process activities were conducted in IA-06 and, results from Corps' investigations concluded that there was no FUSRAP contamination in IA-06 that would pose a risk to human health or the environment. As a result, a record of decision (ROD) for IA-06 was released in April 2011, indicating that no further remedial action is required under FUSRAP for the current and reasonably anticipated future land use of IA-06, which is recreational.

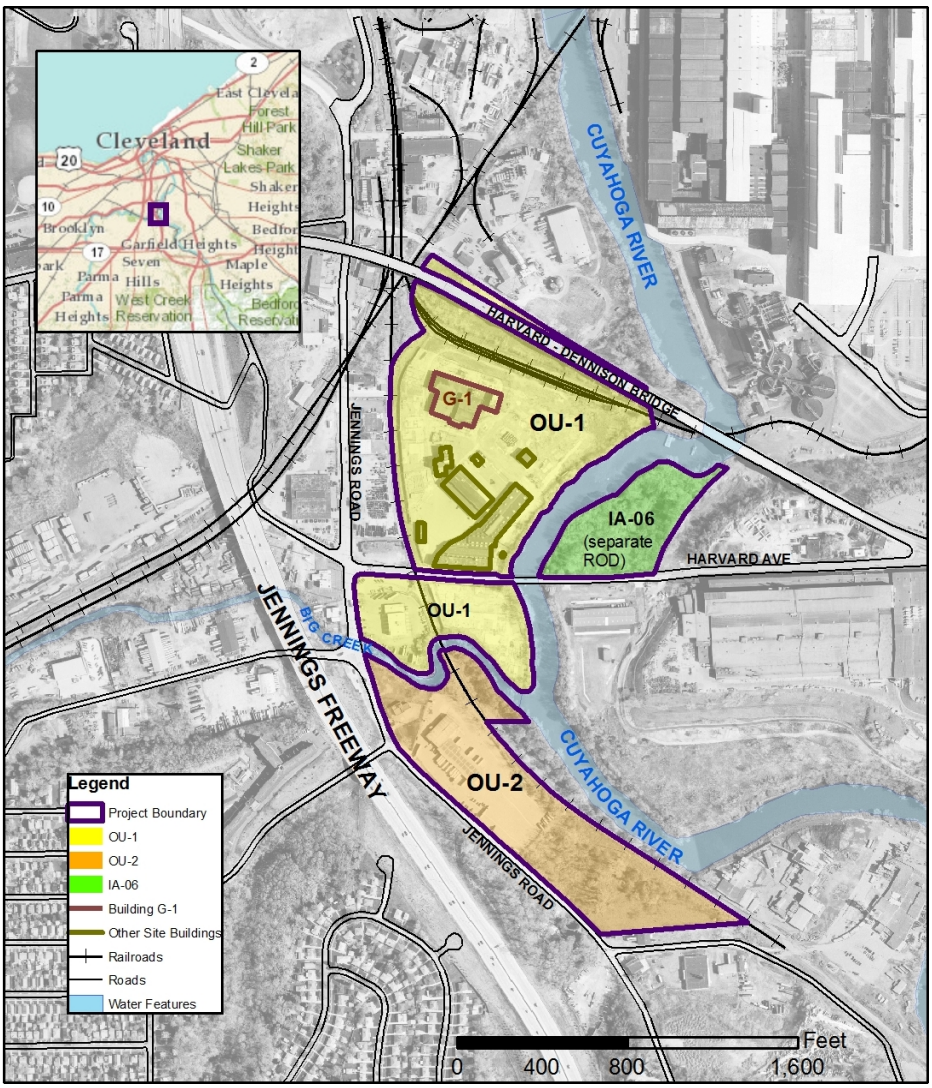

Figure 1. Site Location and Layout

Feasibility Study

The Corps of Engineers prepared the feasibility study (FS) report to identify and evaluate potential remedial alternatives to eliminate unacceptable risks to human health and the environment due to the presence of FUSRAP-related contamination.

Based on planned land uses for different areas of the site, the Harshaw Site was divided into two separate operable units (OUs). As shown in Figure 1 on the previous page, OU-1 is the portion of the site that is north of Big Creek and west of the Cuyahoga River. OU-2 is the portion of the site that is south of Big Creek and to the west of the Cuyahoga River. The planned future land use for OU-1 is industrial with the construction worker being defined as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances. The planned future land use for OU-2 is residential with the adult resident being defined as the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances.

Based on the RI report and baseline risk assessment, constituents of concern (COC) in OU-1 and OU-2 are radium-226, thorium-230, thorium-232, and total uranium (U-234, U-235, U-238) for both soil and buildings.

The following steps were followed in the Feasibility Study to develop remedial alternatives for the site:

Establishment of Remedial Action Objectives (RAOs): RAOs are general cleanup objectives designed to provide long-term protection of human health and the environment. The RAOs developed for soil and building material in OU-1 and soil in OU-2 are as follows:

- To prevent exposure to impacted soil containing concentrations of COCs and ensure the critical group does not receive a total dose equivalent exceeding 25 mrem/year above background.
- To prevent exposure to impacted building materials containing concentrations of COCs and ensure the critical group does not receive a total dose equivalent exceeding 25 mrem/year above background. (This RAO only applies to OU-1.)

RAOs were not developed for groundwater at this time because groundwater is not a current exposure medium. Groundwater on and near the site is not usable as a drinking water source because groundwater quality and yield are not suitable for use by industries or residents. All current and future residents and industry in the area are required by city ordinance to be connected to municipal water supplies.

Identification of Applicable or Relevant and Appropriate Requirements (ARARs): ARARs are standards or requirements under federal environmental or state environmental or facility siting laws. These standards are designed to be protective and are used to assess whether a particular alternative can meet those standards.

The Corps identified 10 CFR 20 Subpart E, Radiological Criteria for License Termination, as the ARAR for remedial activities for OU-1 and OU-2. Specifically,

- 10 CFR 20.1402, Unrestricted Use: Total effective dose equivalent (TEDE) limited to 25 mrem/yr above background to the average member of the critical exposure group and demonstrated to be as low as reasonably achievable (ALARA).

- 10 CFR 20.1403, Restricted use: 25 mrem/yr above background TEDE to the average member of the critical group and demonstrated to be ALARA relying on durable land-use controls and 100 mrem/yr to the average member of the critical exposure group if land-use controls fail.

Development of Alternatives: Remedial action alternatives for soil and buildings were identified. The development of alternatives was based on expected future land use where industrial use is likely for the OU-1 area and residential redevelopment is a plausible future land use at the OU-2 area. CERCLA requires that alternatives ensure adequate protection of human health and the environment, achieve RAOs, meet ARARs, and permanently and significantly reduce the volume, toxicity, and/or mobility of FUSRAP-related contaminants. The following alternatives were identified in the FS to be carried forward for consideration:

- Alternative 1 - No Action (OU-1)
- Alternative 2 - Limited Action and Land-Use Controls (OU-1)
- Alternative 3 - Complete Removal with Off-Site Disposal (OU-1)
- Alternative 4 - Complete Removal with Ex Situ Treatment and Off-Site Disposal (OU-1)
- Alternative 5 - No Action (OU-2)
- Alternative 6 - Limited Action and Land-Use Controls (OU-2)
- Alternative 7 - Complete Removal with Off-Site Disposal (OU-2)
- Alternative 8 - Complete Removal with Ex Situ Treatment and Off-Site Disposal (OU-2)

Alternative 1 - No Action (OU-1): leaves the site “as is” with no actions taken regarding access or land-use controls beyond those already in place. This alternative provides no additional protection to human health and the environment over current conditions. This alternative also assumes existing controls and monitoring will not be maintained. The no action alternative is required under the NCP as a baseline against which other alternatives can be compared.

Alternative 2 - Limited Action and Land-Use Controls (OU-1): is a limited action alternative consisting of the dismantlement of Building G-1, the off-site disposal of the Building G-1 debris, bank stabilization, land-use controls, site monitoring, and five-year reviews. Under this alternative, Building G-1 would be removed, but the remaining impacted media at OU-1 would be left in place, and no other active remedial measures would be implemented. Under this alternative, several forms of land-use controls, access controls, and informational tools would be used to restrict or limit future uses and activities at the site. The only allowable use of the property would be for passive recreation. Land-use controls would include environmental covenants applied to the land to restrict future uses of the site where concentrations of radionuclides remain that prevent unrestricted use of the property.

Alternative 3 - Complete Removal with Off-Site Disposal (OU-1): consists of excavation of impacted soil that would result in an unacceptable exposure to radioactivity for a person performing construction or industrial activity (construction worker clean up standard) at OU-1 and subsequent off-site disposal of the contaminated soil. Building G-1 would be dismantled and disposed of off-site and impacted soil beneath the building slab/foundation removed and disposed of off-site. Contaminated building material above the construction worker cleanup standard at the remaining buildings would be removed, and the buildings would be returned to a safe condition. These buildings would not be dismantled, as there is not impacted soil above the construction worker cleanup standard under the remaining buildings. This alternative would require close coordination of remediation and monitoring activities with the land owner(s) and/or tenants.

Alternative 4 - Complete Removal with Ex Situ Treatment and Off-Site Disposal (OU-1): consists of excavation of impacted soil exceeding the construction worker cleanup standard in OU-1, ex situ (removed from the site of contamination) treatment by solidification/stabilization (S/S), and subsequent off-site disposal. Building G-1 would be dismantled and disposed of off site and impacted soil beneath

the building slab/foundation removed and disposed of off site. Contaminated building material above the construction worker cleanup standard at the remaining buildings would be removed, and the buildings would be returned to a safe condition. These buildings would not be dismantled, as there is not impacted soil above the construction worker cleanup standard under the remaining buildings. This alternative would require close coordination of remediation and monitoring activities with the land owner(s) and/or tenants.

Alternative 5 - No Action (OU-2): leaves the site “as is” with no actions taken regarding access or land-use controls beyond those already in place. This alternative provides no additional protection to human health and the environment over current conditions. This alternative also assumes existing controls and monitoring will not be maintained. The no action alternative is required under the NCP as a baseline against which other alternatives can be compared.

Alternative 6 - Limited Action and Land-Use Controls (OU-2): several forms of land-use controls, access controls, and informational tools would be used to restrict or limit future uses and activities at the site. The only allowable use of the property would be for passive recreation. Land-use controls would include environmental covenants applied to the land to restrict future uses of the site where concentrations of radionuclides remain that prevent unrestricted use of the property.

Alternative 7 - Complete Removal with Off-Site Disposal (OU-2): consists of excavation of impacted soil that would result in an unacceptable exposure to radioactivity for a resident (residential clean up standard) at OU-2 and subsequent off-site disposal of the contaminated soil. This alternative would require close coordination of remediation with the land owner(s) and/or tenants in an effort to minimize health and safety risks to on-site personnel.

Alternative 8 - Complete Removal with Ex Situ Treatment and Off-Site Disposal (OU-2): consists of excavation of impacted soil exceeding the residential cleanup standard in OU-2, ex situ treatment using S/S, and subsequent off-site disposal. This alternative would require close coordination of remediation with the land owner(s) and/or tenants in an effort to minimize health and safety risks to on-site personnel.

Comparative Analysis of Alternatives: The FS presents a detailed comparative analysis between the remedial alternatives. Each alternative is assessed against the following seven of the nine CERCLA evaluation criteria in the FS.

- Overall protection of human health and the environment,
- Compliance with ARARs,
- Long-term effectiveness and permanence,
- Reduction in toxicity, mobility, or volume through treatment,
- Short-term effectiveness,
- Implementability, and
- Cost.

The eighth and ninth 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 proposed alternative for public comment.

The tables on the next page briefly summarize which alternatives best satisfy each criteria for OU-1 and OU-2.

Table 1. Summary of Comparative Analysis of Remedial Alternatives for OU-1

CERCLA Criteria	**Alternative 1: No Action (OU-1)**	**Alternative 2: Limited Action and Land-Use Controls (OU-1)**	**Alternative 3: Complete Removal with Off-Site Disposal (OU-1)**	**Alternative 4: Complete Removal with Ex Situ Treatment and Off-Site Disposal (OU-1)**
Overall Protection of Human Health and the Environment	Not Protective	Protective	Protective	Protective
Compliance with ARARs	Not Compliant	Compliant	Compliant	Compliant
Long-Term Effectiveness and Permanence	Low	Moderate	High	High
Reduction of contaminant toxicity, mobility, or volume through treatment	None	None	None[a]	Moderate (Mobility reduction through S/S treatment but increase in disposal volumes)
Short-Term Effectiveness	High	High	Moderate	Low
Implementability[b]	Not Applicable	Low	High	High
Cost Present Worth (Non-Discounted)[c]	$0 ($0)	$12,406,557 ($56,604,601)	$55,185,927 ($61,829,592)	$76,410,747 ($83,139,588)

Table 2. Summary of Comparative Analysis of Remedial Alternatives for OU-2

CERCLA Criteria	**Alternative 5: No Action (OU-2)**	**Alternative 6: Limited Action and Land-Use Controls (OU-2)**	**Alternative 7: Complete Removal with Off-Site Disposal (OU-2)**	**Alternative 8: Complete Removal with Ex Situ Treatment and Off-Site Disposal (OU-2)**
Overall Protection of Human Health and the Environment	Not Protective	Protective	Protective	Protective
Compliance with ARARs	Not Compliant	Compliant	Compliant	Compliant
Long-Term Effectiveness and Permanence	Low	Moderate	High	High
Reduction of contaminant toxicity, mobility, or volume through treatment	None	None	None[a]	Moderate (Mobility reduction through S/S treatment but increase in disposal volumes)
Short-Term Effectiveness	High	High	Moderate	Low
Implementability[b]	Not Applicable	Low	High	High
Cost Present Worth (Non-Discounted)[c]	$0 ($0)	$2,228,575 ($36,047,405)	$6,617,430 ($6,617,430)	$9,562,520 ($9,562,520)

[a]Waste minimization practices proposed under this alternative, such as radiological scanning and soil sorting, may reduce the volume of contaminated soil requiring disposal.
[b]The overall implementability is based on the lower of the rankings for technical and administrative implementability.
[c]Non-discount values do not consider the time value of money. In other words, each dollar earned in the future is assumed to have the same value as each dollar that was invested many years earlier.
S/S = Solidification/Stabilization

What's Next

The next step for the Harshaw Site in the CERCLA process is for the Corps to prepare a proposed plan. The proposed plan will evaluate the remedial alternatives discussed in the feasibility study and recommend the preferred remedial alternative. However, before a proposed plan can be developed, additional hydrogeologic information is required to analyze long-term groundwater risks to human health and the environment, and to incorporate the results in a feasibility study addendum. To facilitate the required data collection Building G-1, the source of a site FUSRAP groundwater contaminant plume that was proposed for dismantlement in the feasibility study, will be removed to enable safe access to investigate the underlying contaminated groundwater. The data collected will then be analyzed to evaluate future groundwater behavior associated with each of the remedial alternatives proposed in the feasibility study. The feasibility study addendum will resolve long-term groundwater concerns and reassess required actions as part of the preferred remedial alternative to be presented to the public in the proposed plan. The public will be notified of the availability of the proposed plan and associated public comment period. Lastly, a record of decision will be issued selecting the remedy to be implemented. The record of decision will include a written response to comments received on the proposed plan.

Administrative Record

The administrative record for the former Harshaw Chemical Company Site contains documents that support the CERCLA process for the site. It is available for review at the following locations:

Electronic and Paper Versions

Cleveland Public Library
Public Administration Library
325 Superior Avenue, N.E.
Cleveland, OH 44114

U.S. Army Corps of Engineers
(by appointment)
1776 Niagara Street
Buffalo, New York 14207

Electronic Version Only

Cuyahoga County Library (Brooklyn Branch)
4480 Ridge Road
Brooklyn, OH 44144-3353