



Fernald Preserve Annual Community Meeting

Oct. 19, 2021

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) 24th public meeting on the Fernald Preserve, Ohio, Site was held virtually on October 19, 2021. Approximately 26 participants reviewed a summary of the 2020 Site Environmental Report and received an update on current site activities.



Agenda

- Worker Safety and Health
- COVID-19 Impacts
- CERCLA Five-Year Review
- Comprehensive Legacy Management and Institutional Controls Plan (LMICP)
- 2020 Site Environmental Report (SER)
- Aquifer Restoration
- Ecological Restoration
- Community Engagement
- Natural Resource Trusteeship
- Look Ahead

Community meeting agenda.



U.S. Department of Energy (DOE) Office of Legacy Management (LM)

- **Brian Zimmerman**
 - LM Site Manager

RSI EnTech, LLC (RSI) Legacy Management Support (LMS)

- **Greg Lupton**
 - Site Lead
- **Karen Voisard**
 - Environmental Monitoring, Data Management, and Reporting
- **Ken Broberg**
 - On-Site Disposal Facility (OSDF) and Aquifer Restoration
- **Lisa McHenry**
 - Ecological Restoration
- **Penny Borgman**
 - Interpretive Services

Fernald Preserve site management and LM contractor, RSI EnTech, project leads.



Fernald Preserve

LM Mission



To fulfill the Department's post-closure responsibilities and ensure the future protection of human health and the environment

The LM mission at the Fernald Preserve.

Fernald Preserve

LM Mission

Operable Unit (OU) 1

- Waste pits

OU2

- Other waste units

OU3

- Production area

OU4

- Silos

OU5

- Environmental media
(e.g., soil, groundwater,
surface water)



To fulfill the Department's post-closure responsibilities and ensure the future protection of human health and the environment

Site cleanup was divided into five Operable Units.

Fernald Preserve

LM Mission

- A. Weapons to Wetlands
-0.25 mile
- B. Biowetland
-0.1 mile
- C. Shingle Oak
-0.7 mile
- D. Sycamore
-1.9 miles
- E. Hickory
-3.0 miles
- F. Lodge Pond
-1.4 miles
- G. Overlook
- H. Wildlife Blind



To fulfill the Department's post-closure responsibilities and ensure the future protection of human health and the environment

Approximately 7 miles of trails are available for hiking at the Fernald Preserve.



Worker Safety and Health

Occupational Safety and Health Administration Recordable Rates

Industry (Remediation Services)	DOE Complex	LMS
4.2	0.83	0.0

Fernald Preserve	
Restricted Days	First Aid
0	0

LMS Safe Work Hours: 1,462,226



Safety records at the Fernald Preserve and in the nationwide LM program continue to surpass overall DOE and private-sector standards.



2020-2021 COVID-19 Response

The screenshot shows the website for the Office of Legacy Management at Fernald Preserve, Ohio. The page features a header with navigation links: Leadership, Energy.gov Offices, National Labs, and a search bar. Below the header is a navigation menu with links for ABOUT US, SITES, PROGRAMS, SERVICES, and RESOURCES. The main content area has a large image of a field with yellow flowers and a wooden fence, with the title "Fernald Preserve, Ohio, Site" and the subtitle "Office of Legacy Management". A white text box contains the following information:

Office of Legacy Management & Fernald Preserve, Ohio, Site

Updated on June 25, 2021

The Fernald Preserve Visitors Center remains closed to the public. During this unprecedented COVID-19 crisis, the health and safety of our employees and communities are our highest concerns. To ensure social distancing and comply with direction that non-essential activities be limited, the visitors center will remain closed until further notice.

We will continue to update our communications, if anything changes in the status for our visitors center, and we look forward to the time when we can safely welcome our visitors back inside.

In the meantime, we welcome you to enjoy the available outdoor spaces, trails and online activities.

At Fernald Preserve we encourage you to explore the 7-mile network of trails meandering through the wetland, prairie, and forest landscape. Several overlooks, and a boardwalk are open to visitors. The portable toilet in the visitors center parking lot is available for public use and continues to be cleaned daily.

We ask that guests follow the social distancing guidance, provided by the Ohio Department of Health and Hamilton County Public Health.

Stay safe!
Fernald Preserve

DOE adjusted site activities and public access in response to direction from DOE Headquarters and to State of Ohio guidance regarding the COVID-19 pandemic.



CERCLA Five-Year Review

- Required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Purpose is to determine whether remedy remains protective of human health and the environment
- Draft report submitted to regulators March 31, 2021
- Final report was approved on September 8, 2021



Five-Year Review process:

- *Community involvement*
- *Community notification*
- *Document review*
- *Data review and analysis*
- *Site inspections*
- *Questionnaires and interviews*
- *Assess protectiveness*

The Fifth CERCLA Five-Year Review of the Fernald site was initiated in October 2020. The final report was issued in September 2021.



CERCLA Five-Year Review

Results

Technical Assessment:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?
 - Issue/recommendation on per-fluoroalkyl and poly-fluoroalkyl (PFAS) substances

• www.energy.gov/lm

• **Email requests to:**
fernald@lm.doe.gov

Stakeholder input and technical assessments were an important component of the CERCLA Five-Year Review process. The final report is available at <https://www.energy.gov/lm/fernald-preserve-ohio-cercla-five-year-review>.



Comprehensive Legacy Management and Institutional Controls Plan

LMICP

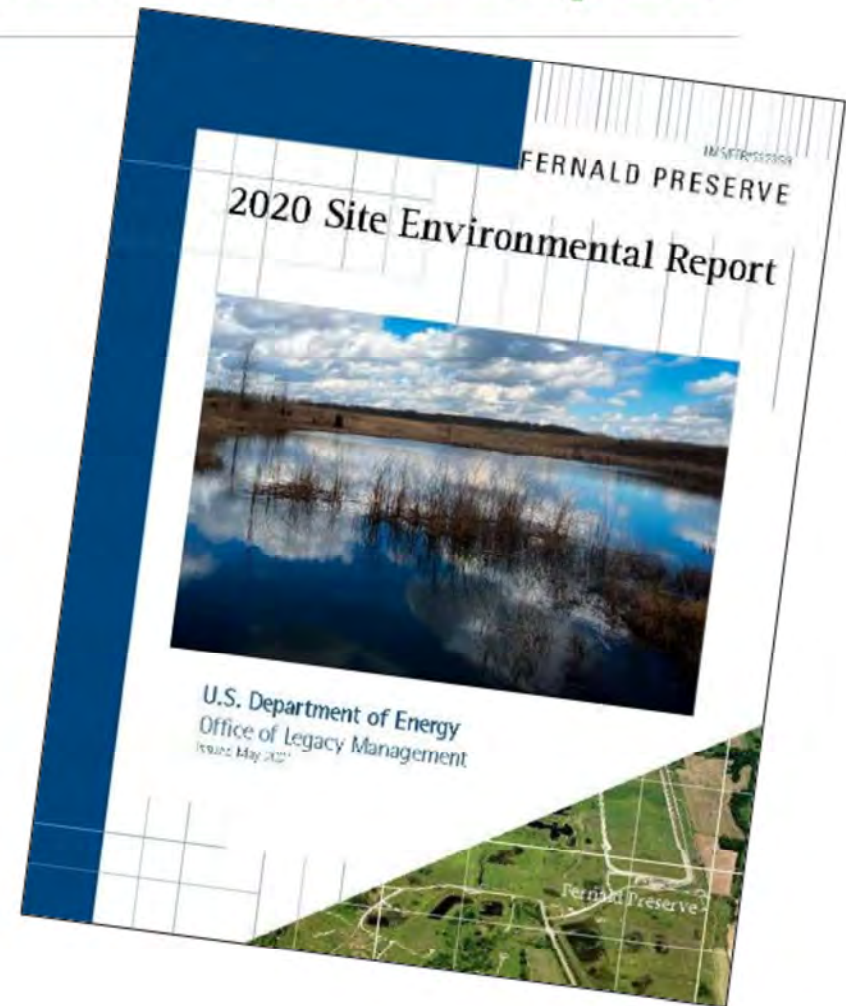
- LMICP describes the requirements for the site's long-term management
- LMICP is reviewed, revised, and submitted annually to the regulatory agencies
- LMICP consists of two volumes:
 - Volume I details site management
 - Volume II is required under the CERCLA remedy and is a legally enforceable document
- A variance process was used for changes in 2020 and 2021
- www.energy.gov/lm

The Comprehensive Legacy Management and Institutional Controls Plan documents the requirements for Fernald Preserve's long-term management and is reviewed annually and updated as necessary. The latest version is available at <https://www.energy.gov/lm/fernal-d-preserve-ohio-site>.



2020 Site Environmental Report

- www.energy.gov/lm
- Email requests to: fernaldd@lm.doe.gov



The 2020 Site Environmental Report contains annual monitoring requirement results and is available at <https://www.energy.gov/lm/fernaldd-preserve-ohio-site>.

Monitoring

2020

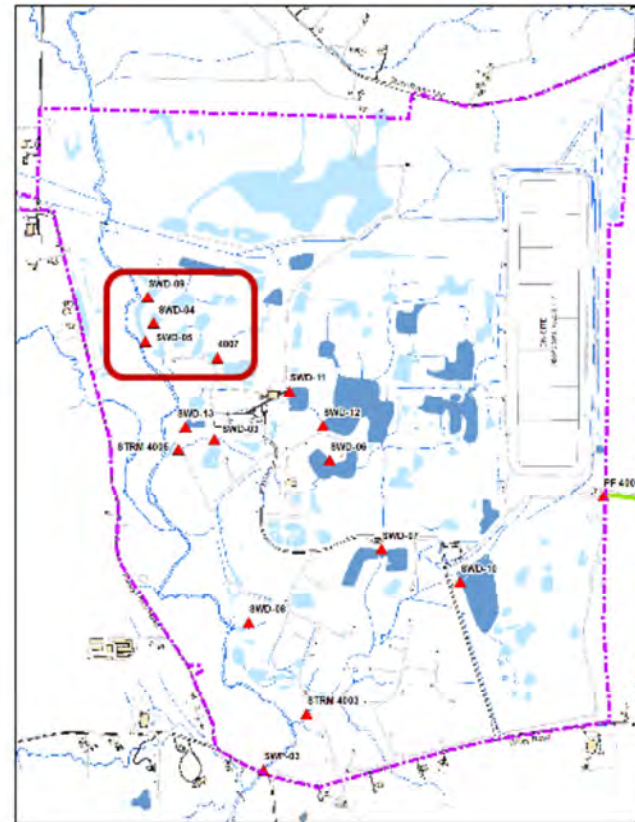
- Surface water sampling at 16 locations
- Site effluent sampling at one location
- OSDF leak-detection monitoring at 42 locations
- Groundwater sampling at 93 monitoring wells
- Water-level monitoring at up to 177 wells



Routine environmental monitoring is conducted to ensure continued effectiveness of the site's cleanup. The 2020 monitoring program included sampling groundwater, surface water, and effluent.

Monitoring

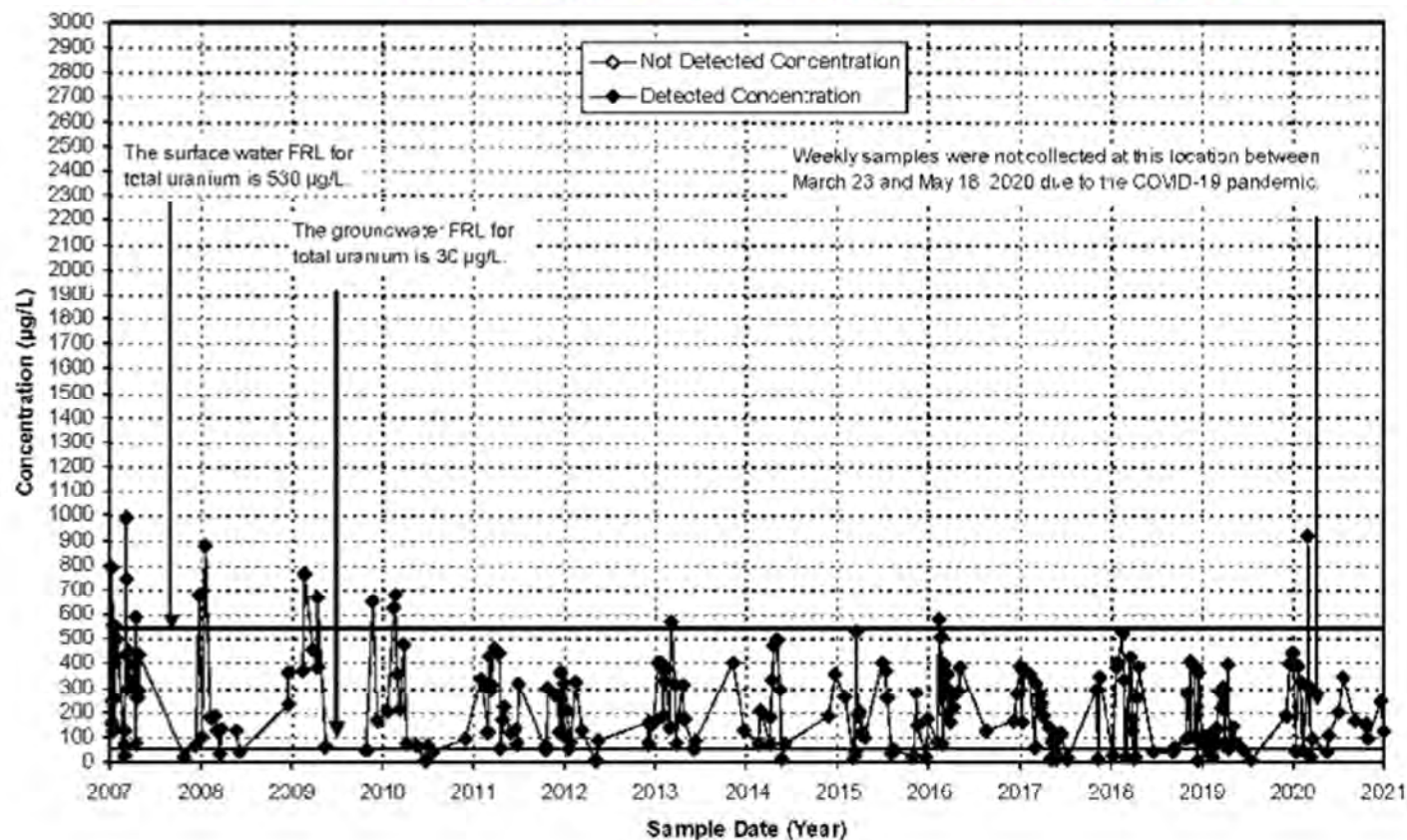
Surface Water and Site Effluent



Surface water continues to be monitored at numerous locations on- and off-site.

Monitoring

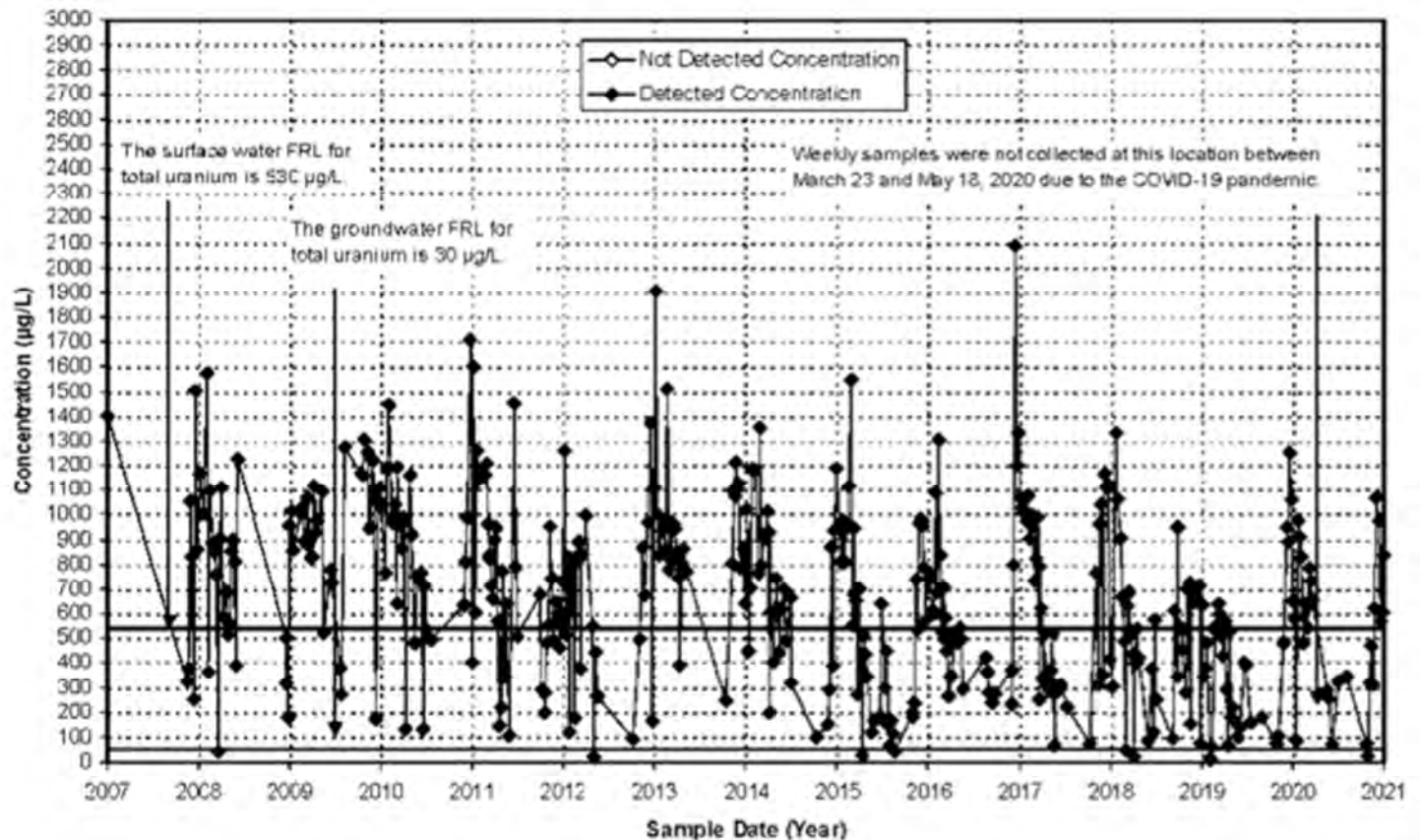
Total Uranium Concentration SWD-05 Surface Water and Site Effluent



SWD-05 total uranium results exceeded the surface water total uranium final remediation level of 530 micrograms per liter on one occasion in 2020.

Monitoring

Total Uranium Concentration SWD-09 Surface Water and Site Effluent



The 530 micrograms per liter final remediation level was exceeded at SWD-09 during 2020. However, levels stayed below the high concentration recorded in late 2016. Sampling locations SWD-09 and SWD-05 are not located in publicly accessible areas of the site.

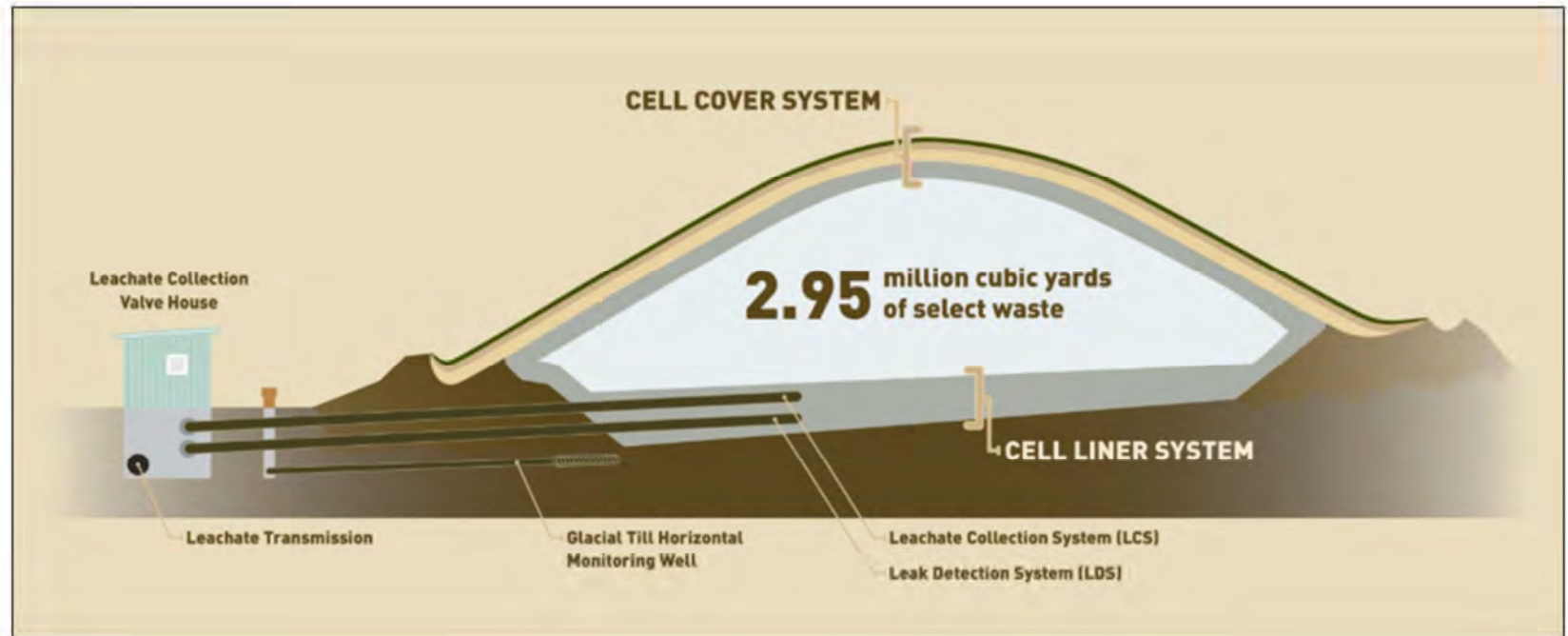
On-Site Disposal Facility



The On-Site Disposal Facility (OSDF) is an engineered waste-storage facility that holds 2.95 million cubic yards of waste (85% soil/soil-like material and 15% demolition debris) that was generated as part of the site cleanup.

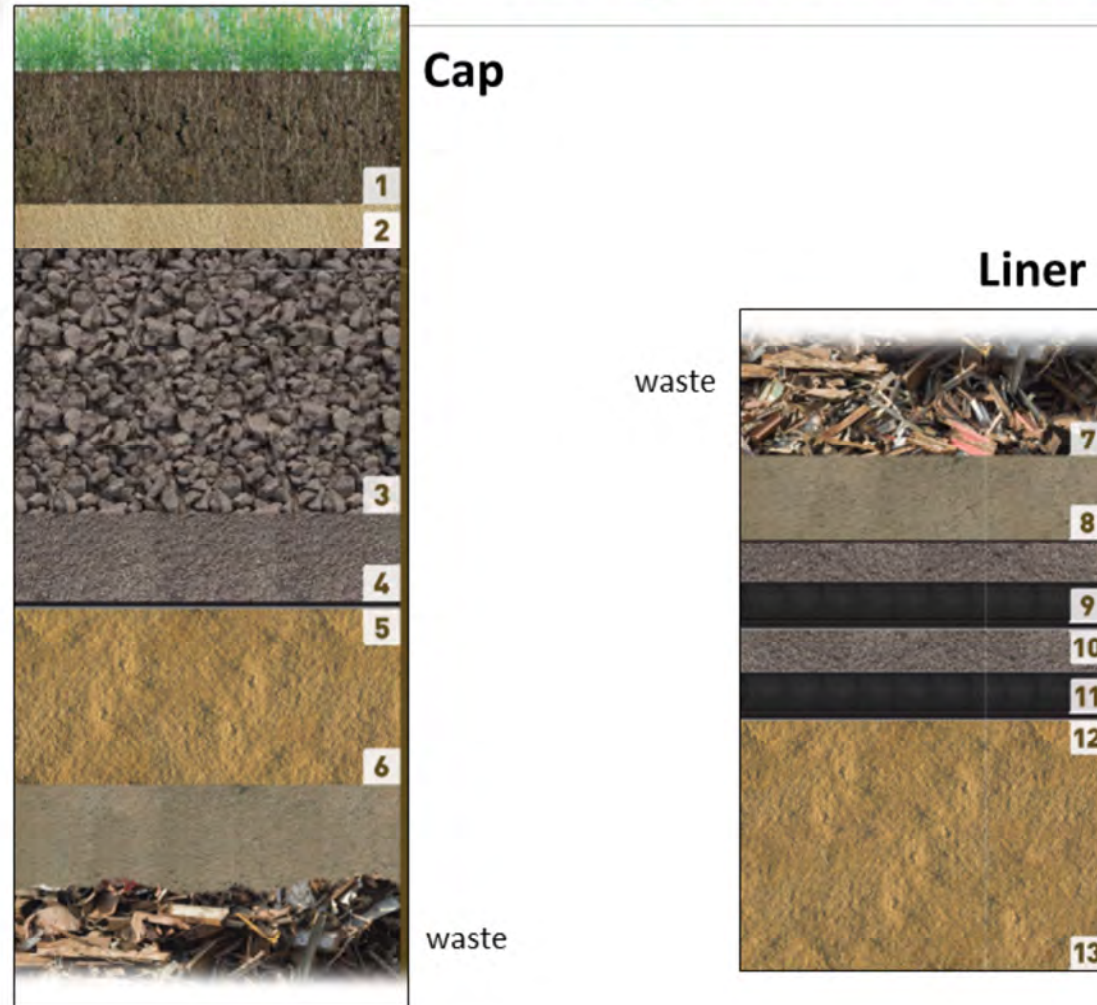
On-Site Disposal Facility

Leachate Collection System



The OSDF was constructed with an engineered liner and cover system that serves to isolate the entombed waste from the environment. Any fluid leaving the facility flows through collection systems into tanks located in the leachate valve houses.

On-Site Disposal Facility

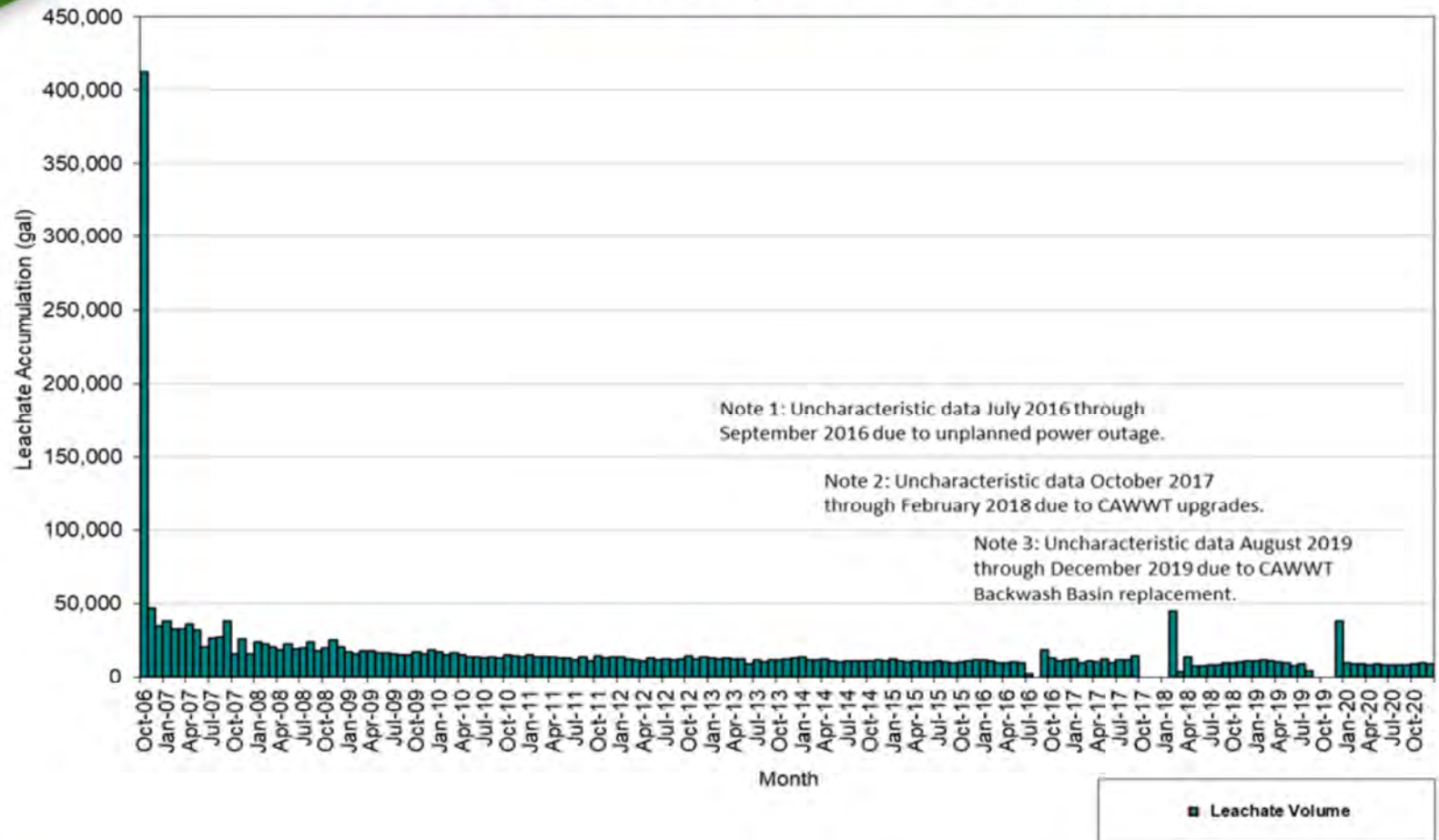


Waste is safely encapsulated between a 9-foot cap and a 6-foot liner within the OSDF.



On-Site Disposal Facility

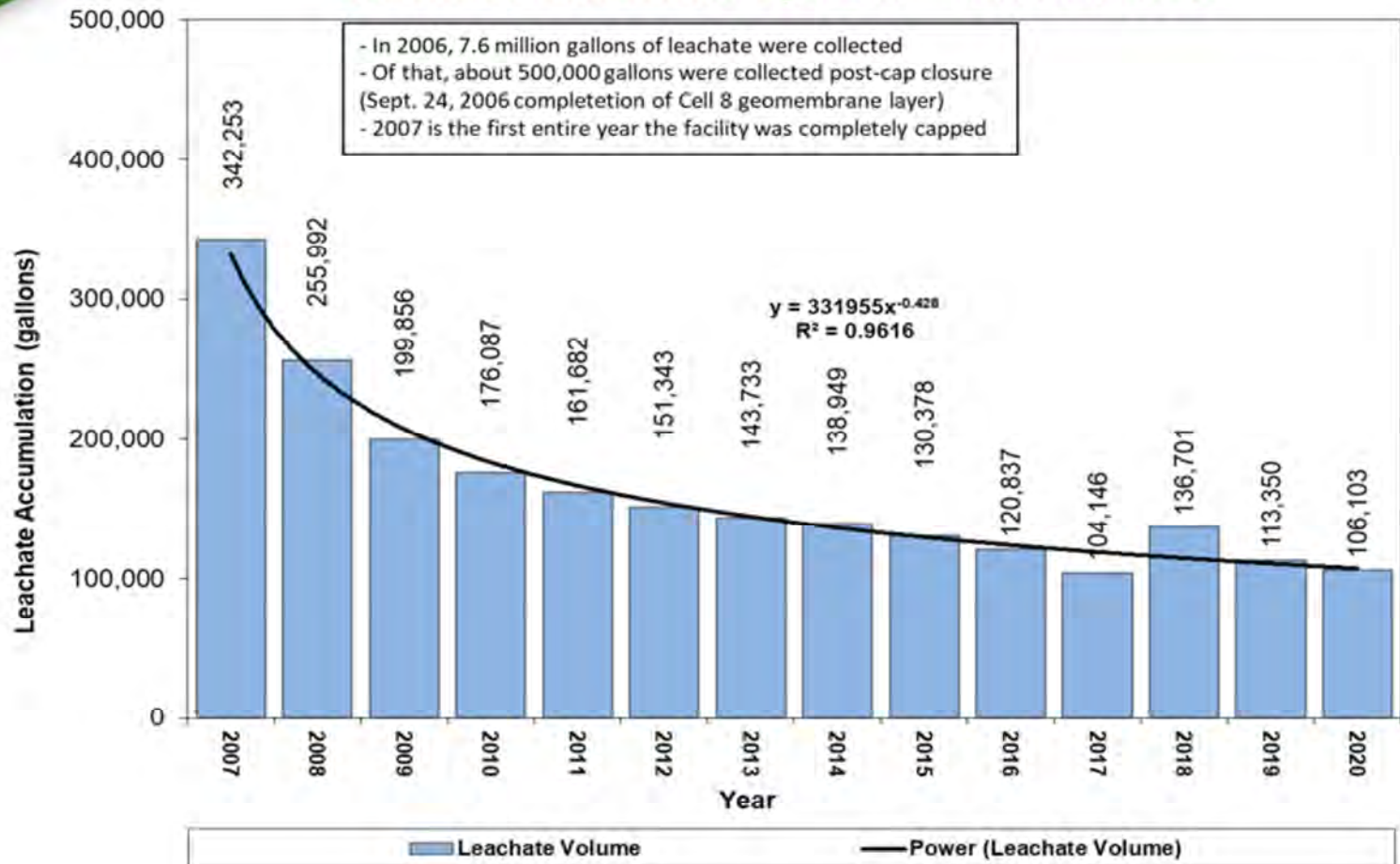
Leachate Collection System – Monthly Flow



Leachate is the moisture in the waste within the OSDF and includes water sprayed on the waste to control dust and rainfall events during remediation and placement in the OSDF. The leachate is collected and transferred to an on-site treatment facility. Before the cover system was completed in October 2006, hundreds of thousands of gallons of leachate were collected each month.

On-Site Disposal Facility

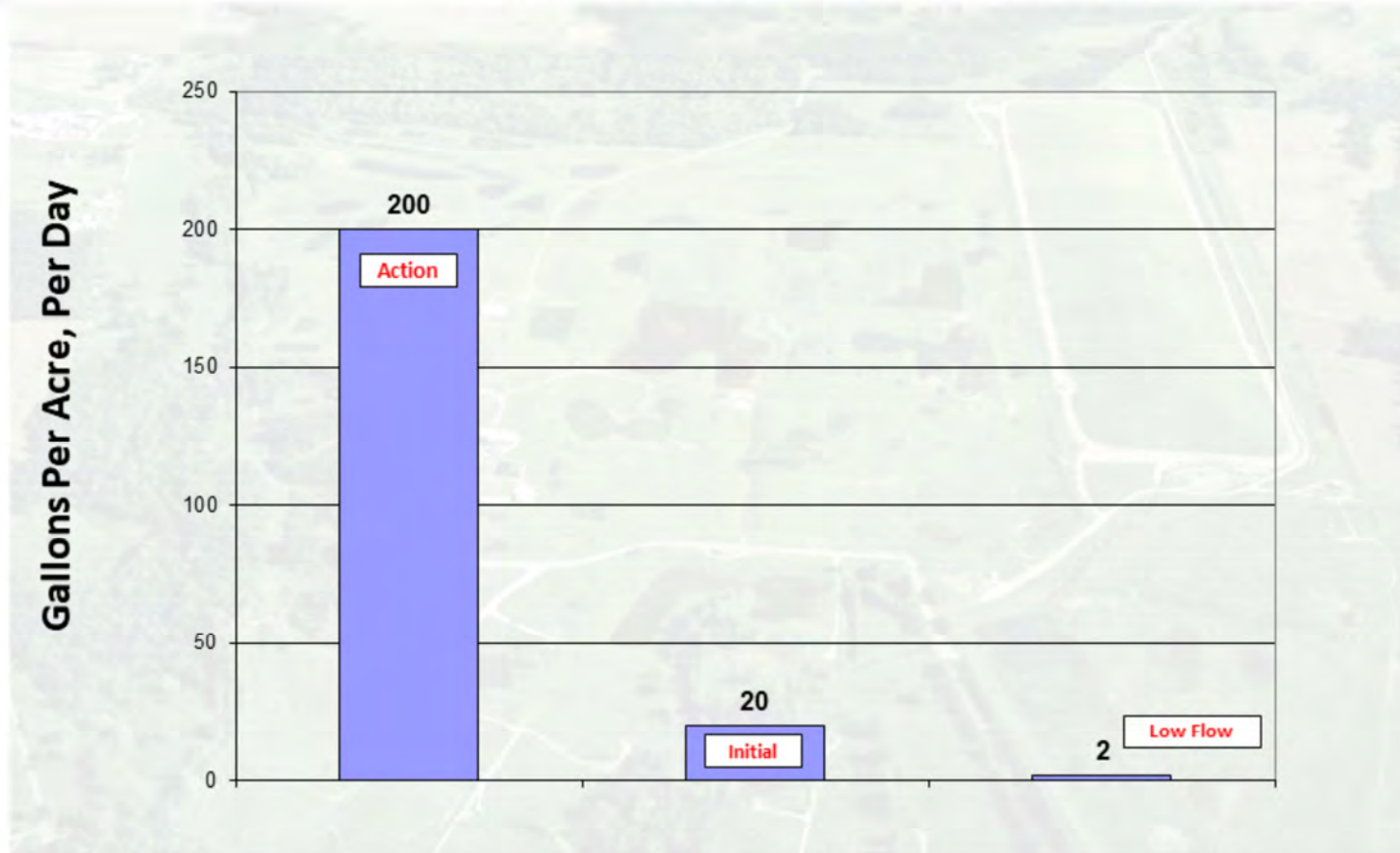
Leachate Collection System – Annual Flow



Leachate is the moisture in the waste within the OSDF. The leachate is collected and transferred to an on-site water treatment facility. As expected, annual leachate flow continues to decline.

On-Site Disposal Facility

Leak Detection System – Flow Rates



By design, monitoring flow from the Leak Detection System (LDS) is one of the main indicators of whether the facility is operating as designed. DOE monitors the volume of liquid collected by the LDS. The action leakage rate (200 gpac) is a design rate. Two lower administrative flow rates (20 and 2 gpac) were established over time as volumes decreased.



On-Site Disposal Facility

Low-Flow Response Leakage Rate Basis

Year	Cell	Maximum Accumulation Rate (gpad)	Maximum Flow Rate (gpd)
2009	5	0.48	3.10
2010	6	0.21	1.30
2011	8	0.38	3.50
2012	6	0.10	0.64
2013	6	0.07	0.45
2014	6	0.06	0.40
2015	6	0.23	1.50
2016	6	0.18	1.20
2017	6	0.05	0.32
2018	6	0.11	0.70
2019	6	0.32	1.60
2020	6	0.32	1.60

Action leakage rate	200 gpad	1,300-1,900 gpd
Initial response leakage rate	20 gpad	130-190 gpd
Low response leakage rate	2 gpad	13-19 gpd

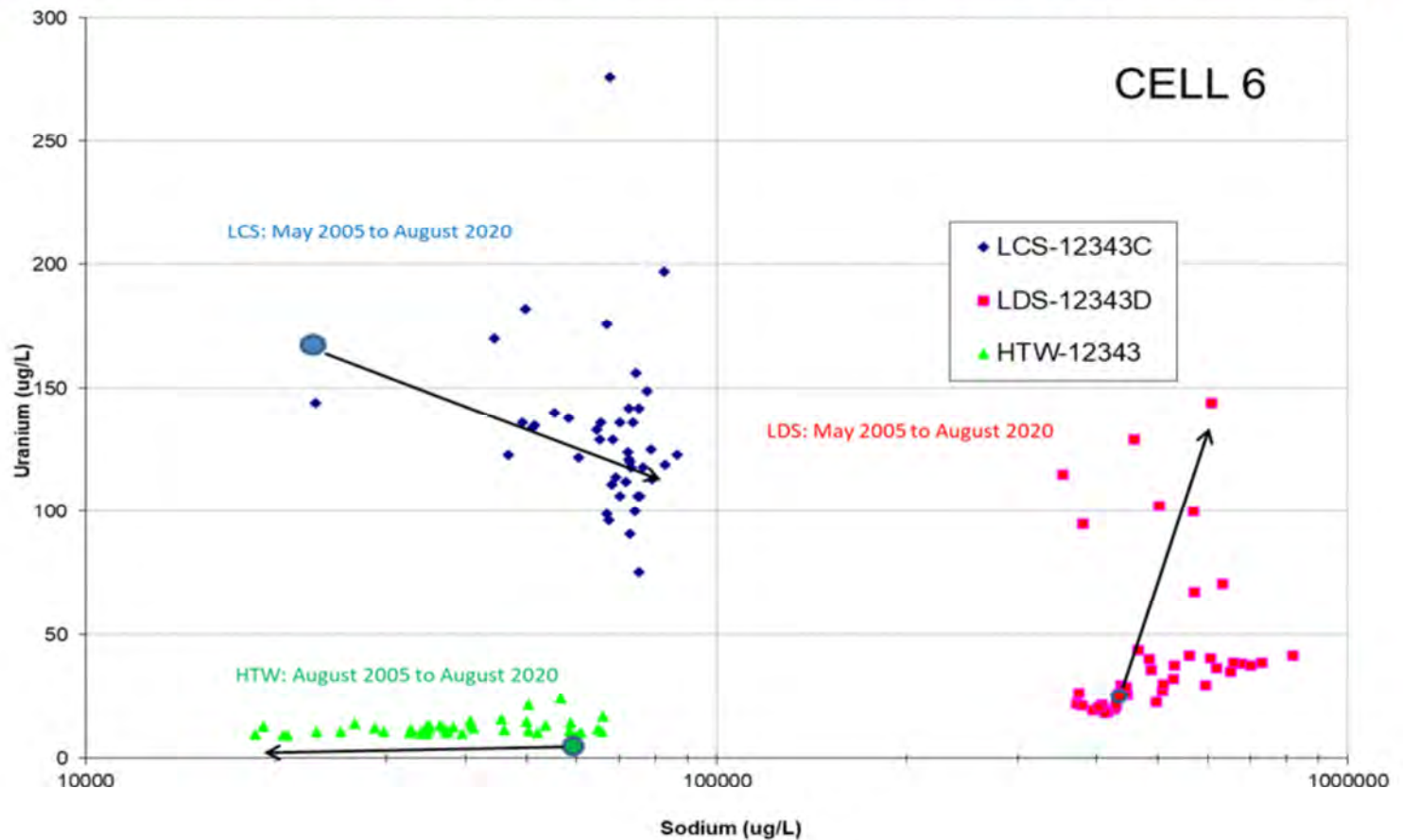
gpad — gallons per acre per day

gpd — gallons per day

LDS accumulation rates in the disposal cells are currently so low that a low-flow response leakage rate of 2 gallons per acre per day has been defined.

On-Site Disposal Facility

Uranium Versus Sodium Concentrations: Cell 6 (Bivariate Plot)



A comparison of uranium and sodium concentrations in and below Cell 6 of the OSDF demonstrates that the liner system in Cell 6 is working as designed.



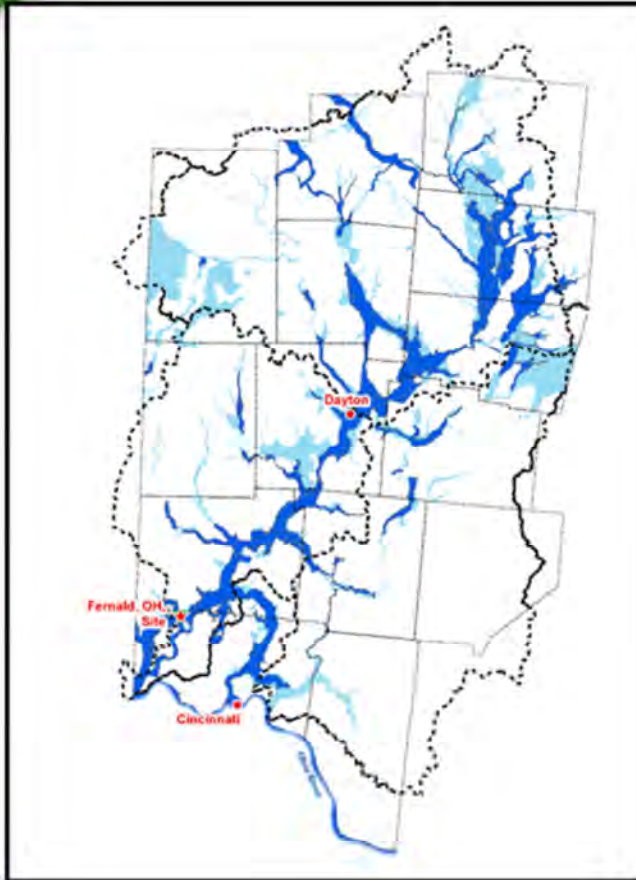
On-Site Disposal Facility

Performance: 2020

- No indication of leaks
- Highest recorded level of leak-detection system (LDS) accumulation was:
 - Cell 6 at 0.32 gpad
 - Low-flow response leakage rate: 2 gpad
 - Initial response leakage rate: 20 gpad
 - Action leakage rate: 200 gpad
- The trend in leachate collection system (LCS) volumes is like the historical trend, indicating the cell cap is functioning as designed
- LCS and LDS accumulation rates indicate the liner systems are performing as designed
- Water-quality trends in the horizontal till wells and Great Miami Aquifer wells indicate concentration fluctuations beneath the facility are not related to facility performance
- No visual signs of compromised cap integrity

The OSDF continues to perform as designed in 2020.

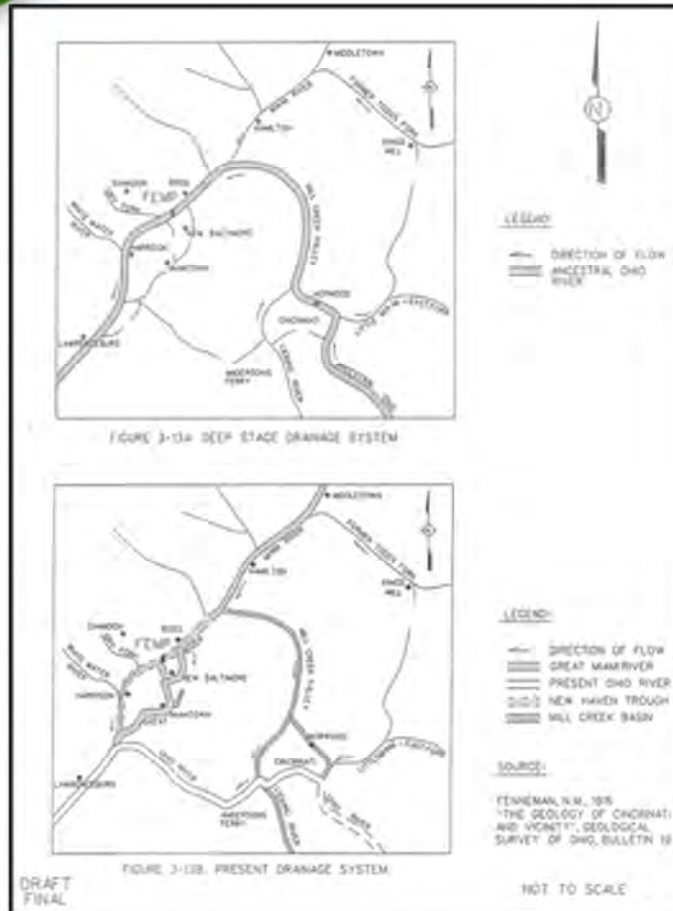
Hydrologic Background



- Fernald is situated above the Great Miami Aquifer (GMA)
- GMA extends from north of Dayton to the Ohio River
- 136 square miles in area
- Created by glaciers when large existing valley was filled with sand and gravel
- GMA is regionally important Sole Source Aquifer in southwest Ohio
- 1.5 trillion gallons of fresh water
- 424 billion gallons flow through it annually
- Sole source of drinking water to about 1.6 million people
- Cincinnati gets 12% of its drinking water from the aquifer

Fernald is situated above the Great Miami Aquifer. A very important large, sole-source aquifer in southwest Ohio.

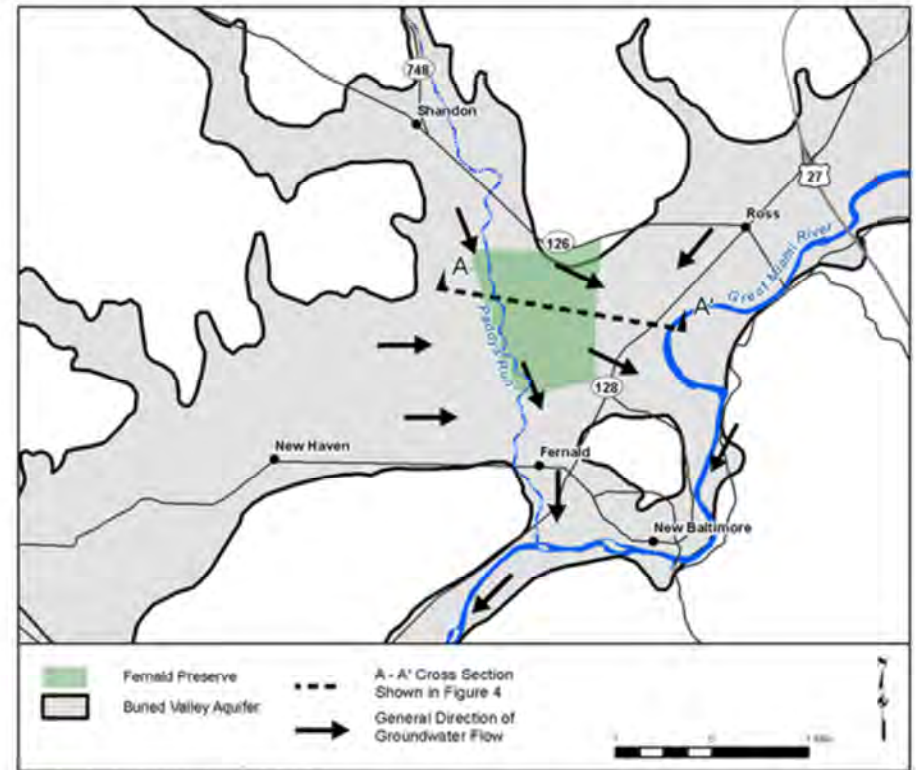
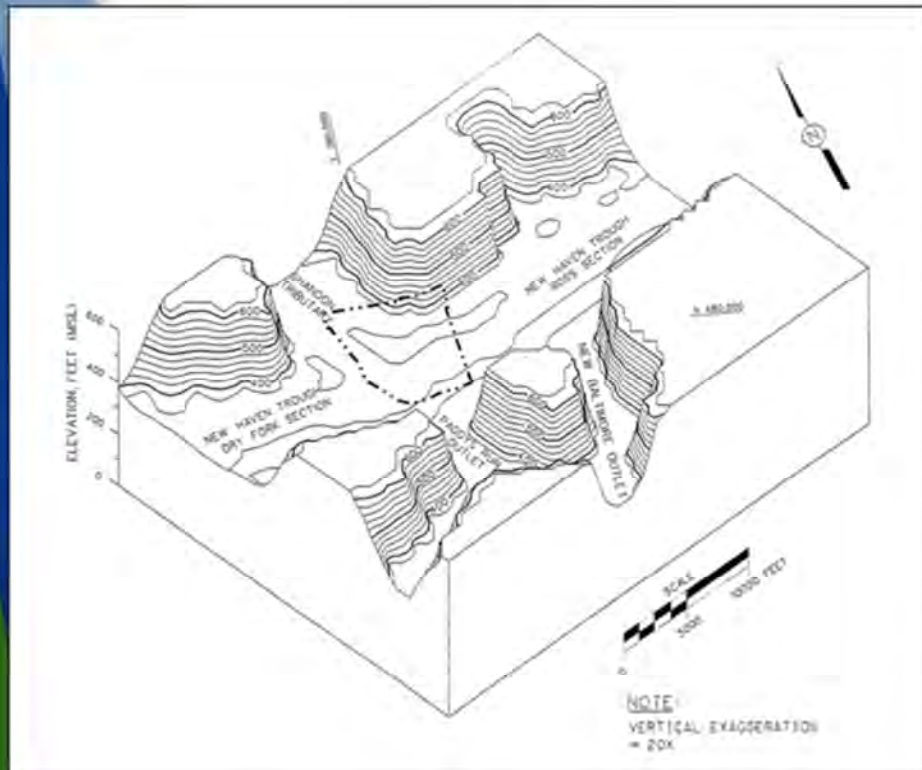
Hydrologic Background



- Ancestral Ohio River flowed north of Cincinnati, then turned south beneath the Fernald site
- Glaciation blocked the northern flow of the ancestral river
- Present-day Ohio River flows south of Cincinnati
- Anderson's Ferry is the crossover point that was breached
- Former valley was then filled in with sand and gravel by glacial events

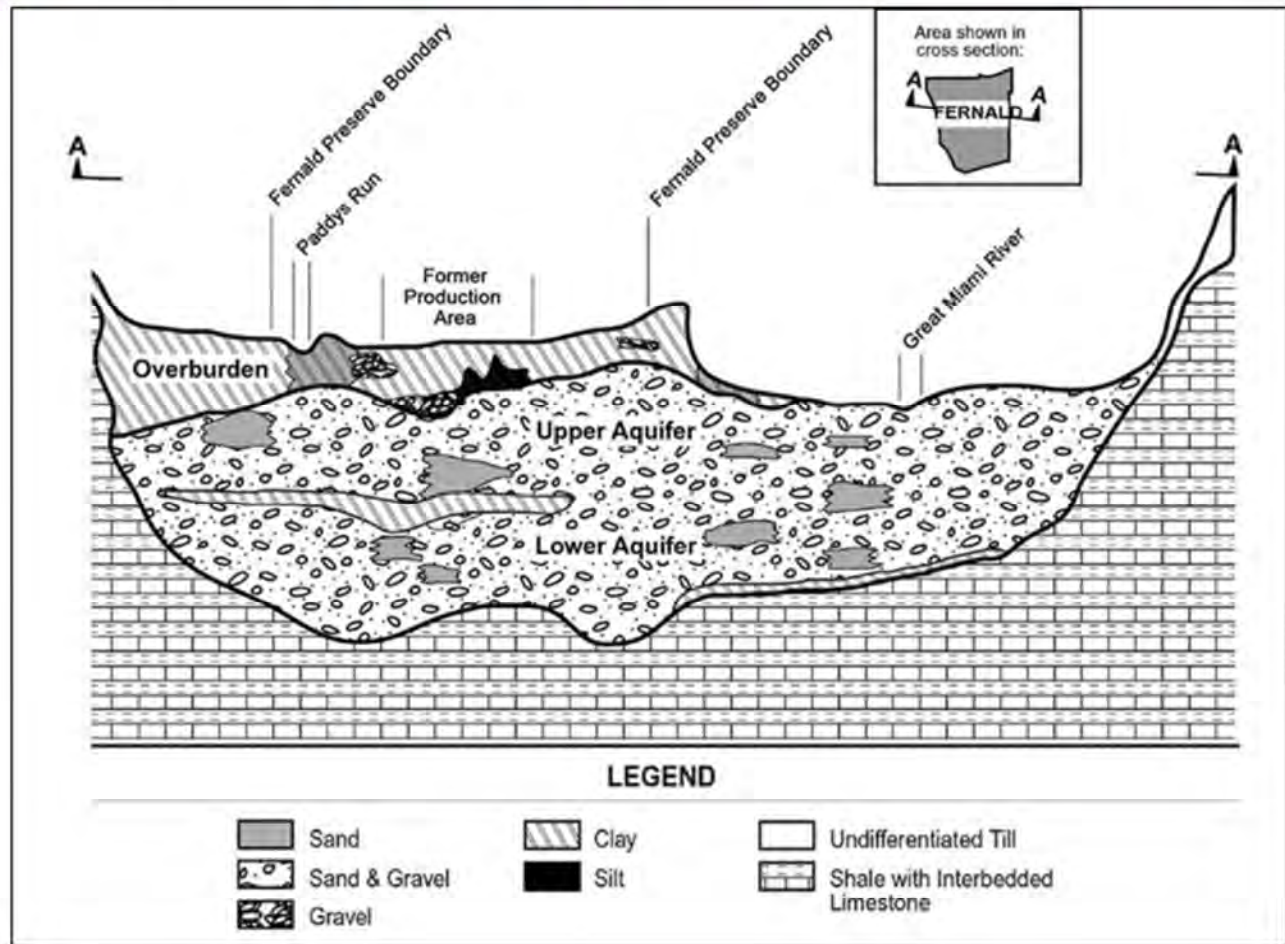
The ancestral Ohio River flowed where the site is situated today. The river changed course and stopped running through the valley.

Hydrologic Background



The abandoned valley was filled in with glacial outwash sediments creating the Great Miami Aquifer.

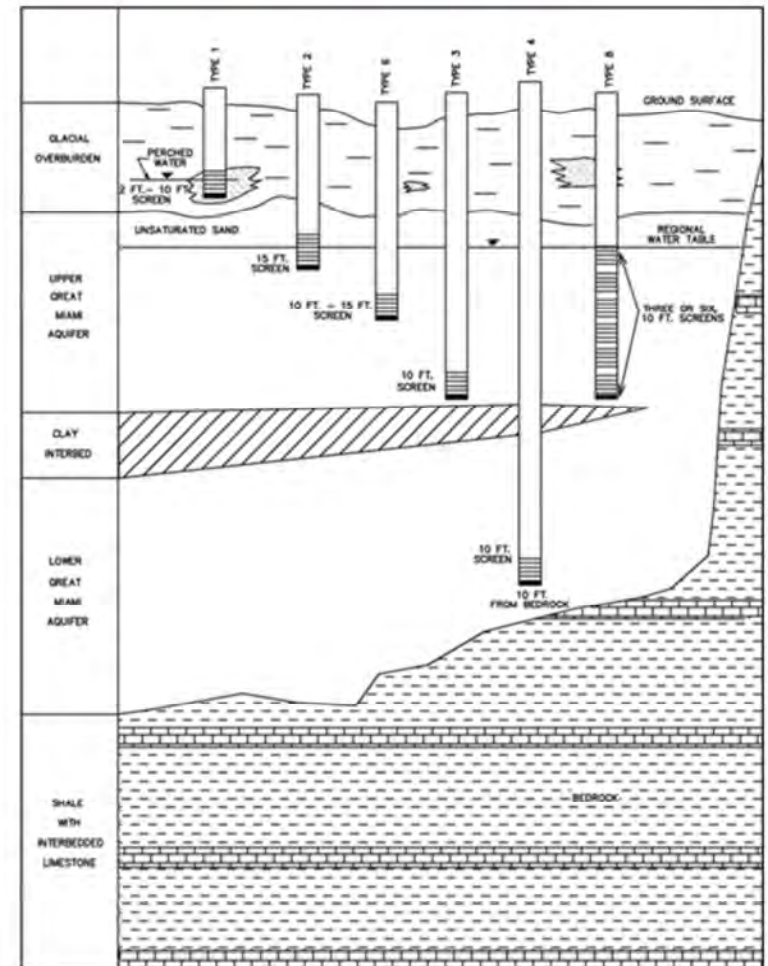
Hydrologic Background



The aquifer consists of a thick sequence of mostly sand and gravel. Beneath the former production area, the aquifer was protected from contamination by a thick layer of glacial overburden consisting mostly of clay.

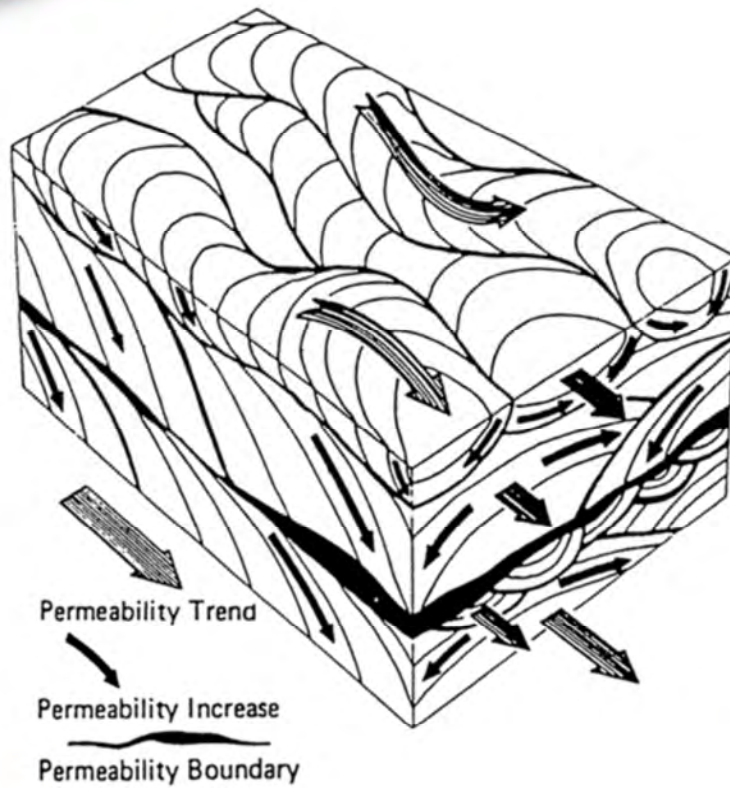
Hydrologic Background

AGE	LITHOLOGIC SYMBOL	THICKNESS, FEET	DESCRIPTION OF DEPOSIT/ROCK UNIT
HOLOCENE	[Cross-hatched symbol]	1-5	SILT AND SILTY SOIL MIXTURES; LAQUSTRINE DEPOSITS ALSO PRESENT IN SOME AREAS.
PLEISTOCENE	[Diagonal hatched symbol]	1+60	GLACIAL OVERBURDEN CONSISTING PRIMORDIANLY OF YELLOWISH TO GRAYISH-BROWN SILTY CLAY WITH SOME GRAVEL; LENSES OF SILTY SAND.
	[Stippled symbol]	40-100	GLACIAL OUTWASH DEPOSITS CONTAINING SAND AND GRAVEL; LENSES OF SAND ALSO PRESENT.
	[Horizontal hatched symbol]	10-20	STIFF OLIVE-GRAY CLAY DIVIDING GLACIAL OUTWASH DEPOSITS, KNOWN AS CLAY INTERBED.
	[Stippled symbol]	40-60	GLACIAL OUTWASH DEPOSITS CONTAINING SAND AND GRAVEL.
ORDOVICIAN	[Brick pattern symbol]	800	UNCONFORMITY
	[Brick pattern symbol]		OLIVE-GRAY SHALE WITH INTERBEDDED LIMESTONE, MEMBER OF THE CINCINNATI SERIES.



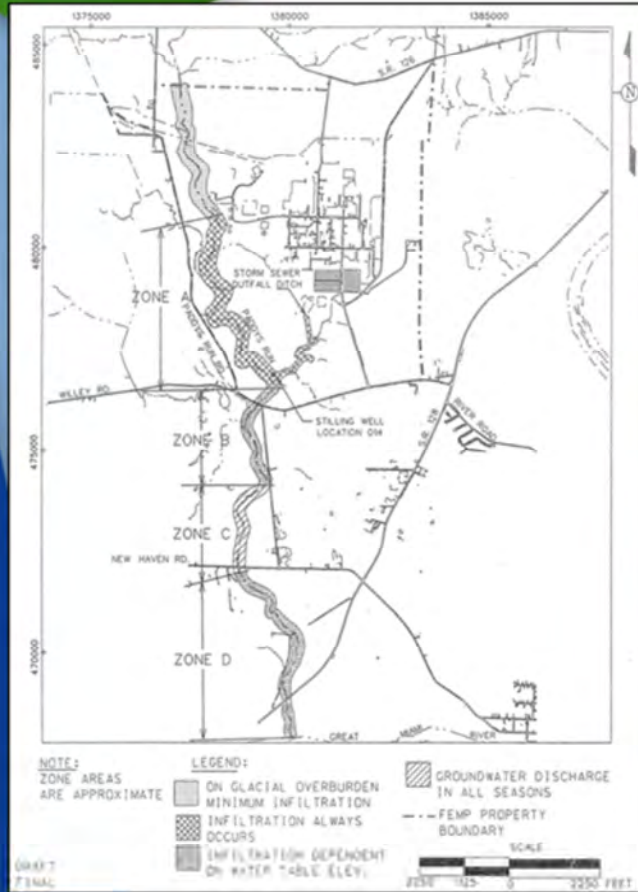
The aquifer is monitored at several different depths.

Hydrologic Background



The Great Miami Aquifer beneath the site was deposited in a braided stream environment, known for large energy changes over time, resulting in large variations of sediment grain sizes being in contact with each other. Uranium tends to sorb to the smaller grain sediments, and water tends to move through the coarser grained sediments. This makes it difficult to flush contamination in the areas of the finer grained-sediments by pumping alone.

Hydrologic Background



Areas where glacial overburden has been removed on DOE property

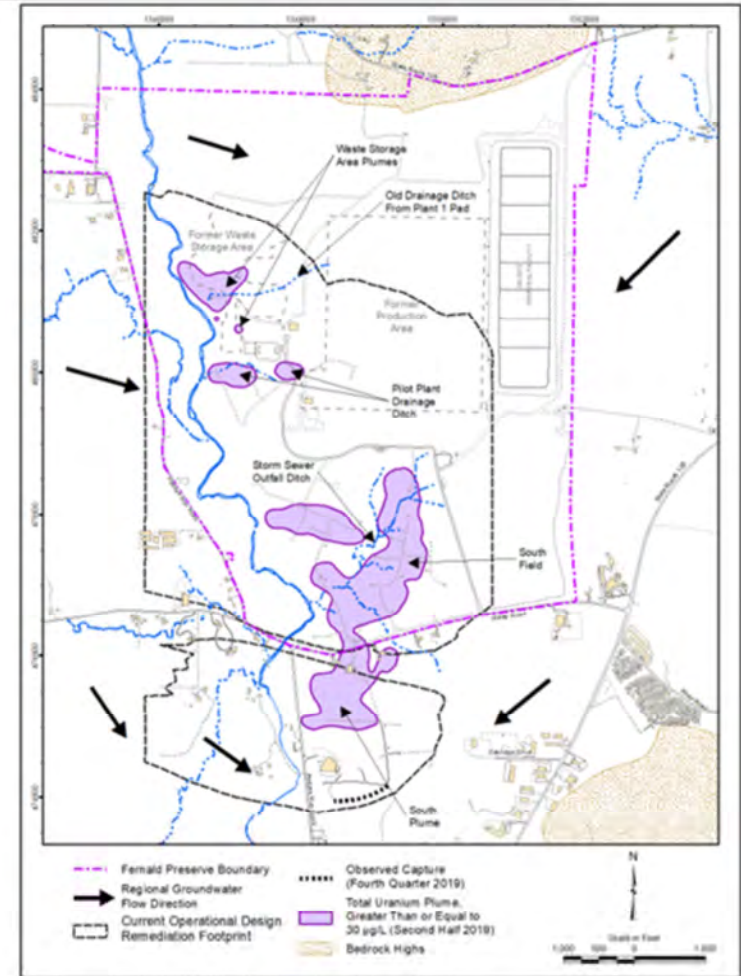


Contamination entered into the aquifer in areas where the glacial overburden was not present. Streams eroded down through the glacial overburden, removing it from areas of the site.

Hydrologic Background



Areas where glacial overburden has been removed on DOE property

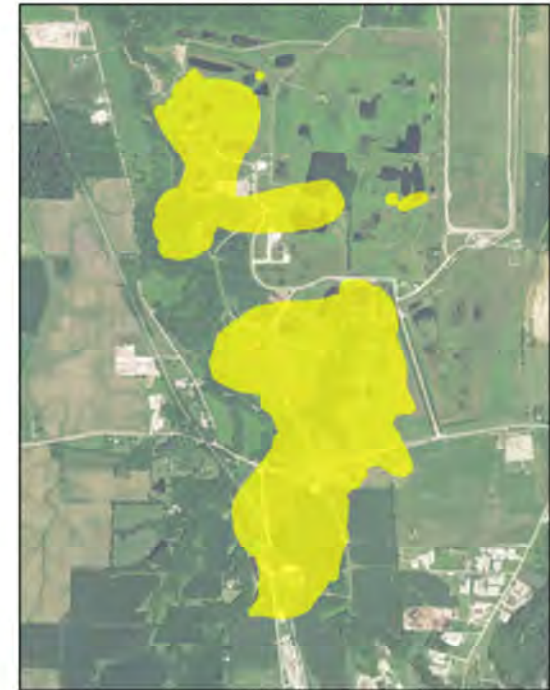


The plume correlates to areas where the glacial overburden had been eroded away.

Groundwater Remedy

OU5 Record of Decision

- OU5 ROD formally defines selected groundwater remedy and establishes final remediation levels (FRLs) for 50 constituents of concern
- **Selected groundwater remedy** – Impacted areas of GMA exceeding FRLs will be restored through extraction methods
- OU5 ROD commits to an ongoing evaluation of innovative remediation technologies so that remedy performance can be improved as such technologies become available
- Final number and configuration of extraction wells will be established during remedial design



■ Impacted Areas
(Target Certification Footprint)
—312.7 acres

The OU5 Record of Decision is to restore all impacted areas of the aquifer through pumping.



Groundwater Remedy

(continued)

Current remedial design evolved through a series of progressive designs:

- **1995** – Feasibility Study (FS) Report for Operable Unit 5
- **1997** – Baseline Remedial Strategy Report (BRSR), Remedial Design for Aquifer Restoration (Task 1)
- **2001** – Design for remediation of the Great Miami Aquifer in the Waste Storage and Plant 6 areas
- **2002** – Design for remediation of the Great Miami Aquifer, South Field (Phase II) Module
- **2003** – Comprehensive Groundwater Strategy Report
- **2005** – Waste Storage Area Phase II Design Report

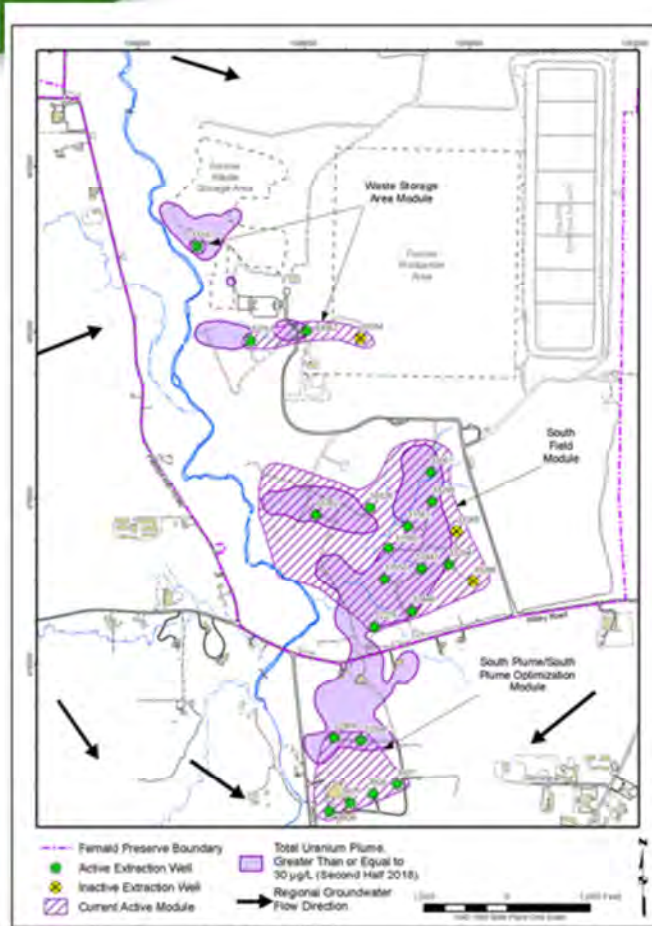
Optimization:

- **2014** – Operational Design Adjustments -1 WSA Phase II Groundwater Remediation Design

The groundwater remedy system evolved through a series of progressive designs between 1995 and 2005. The 2005 design was optimized in 2014.

Groundwater Remedy

(continued)



Remediation system is organized into modules:

- South Plume/South Plume Optimization Module
- South Field Module
- Waste Storage Area Module

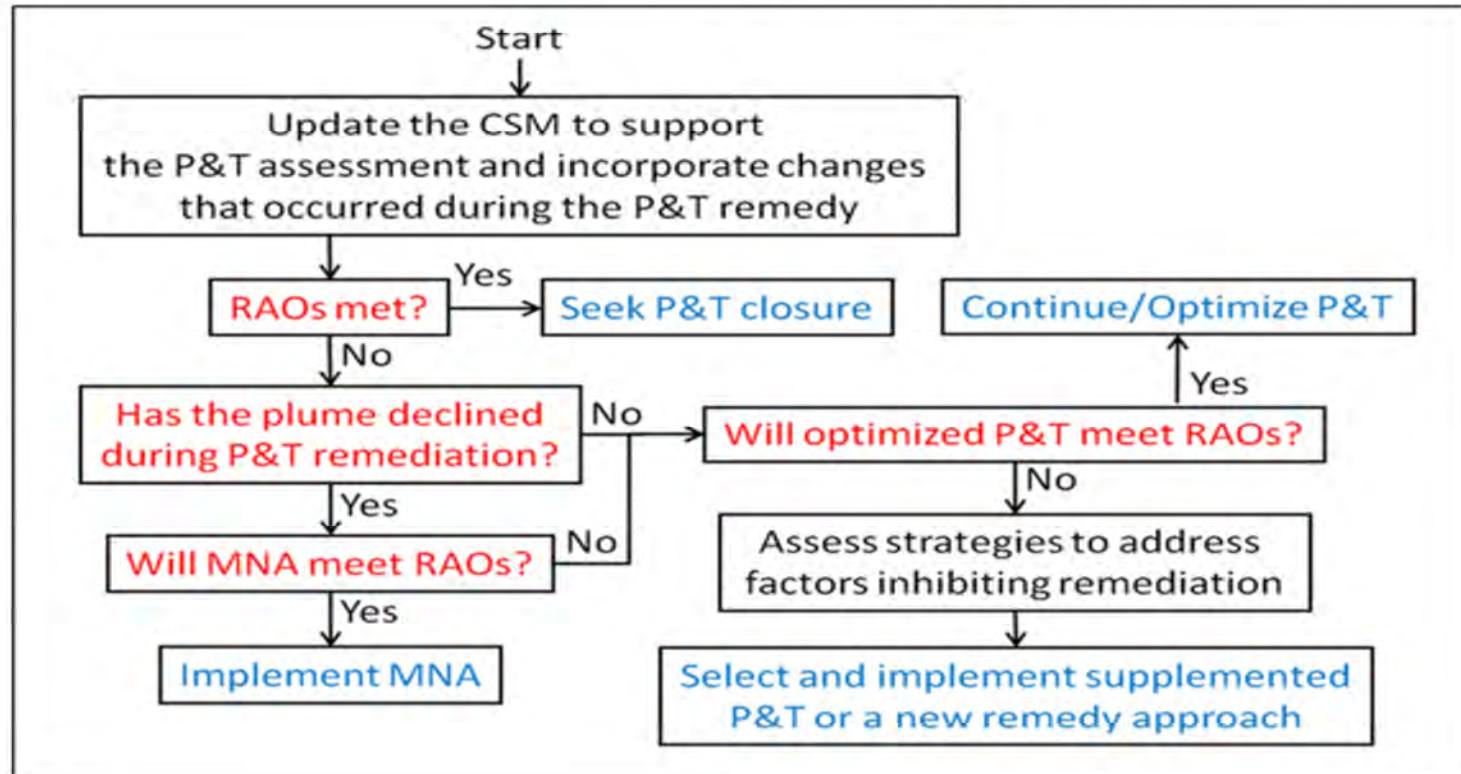
Remediation objectives:

- Concentration-based cleanup to FRLs
- Limit further expansion of the plume
- Prevent undesirable groundwater drawdown beyond the site boundary
- Cleanup off-property portions of the plume first
- Limit impact to private property

The pumping system is organized into modules and operates to achieve remediation objectives.

2014 Optimization

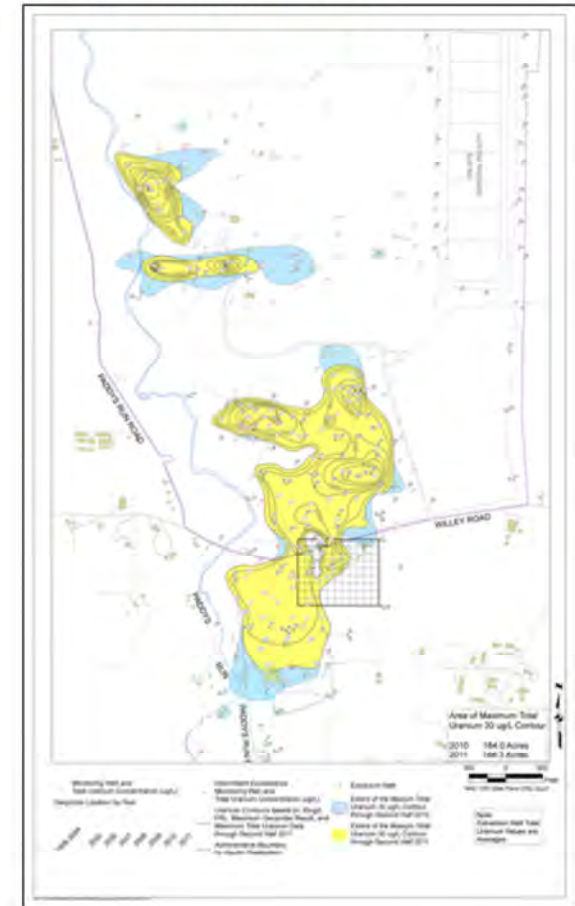
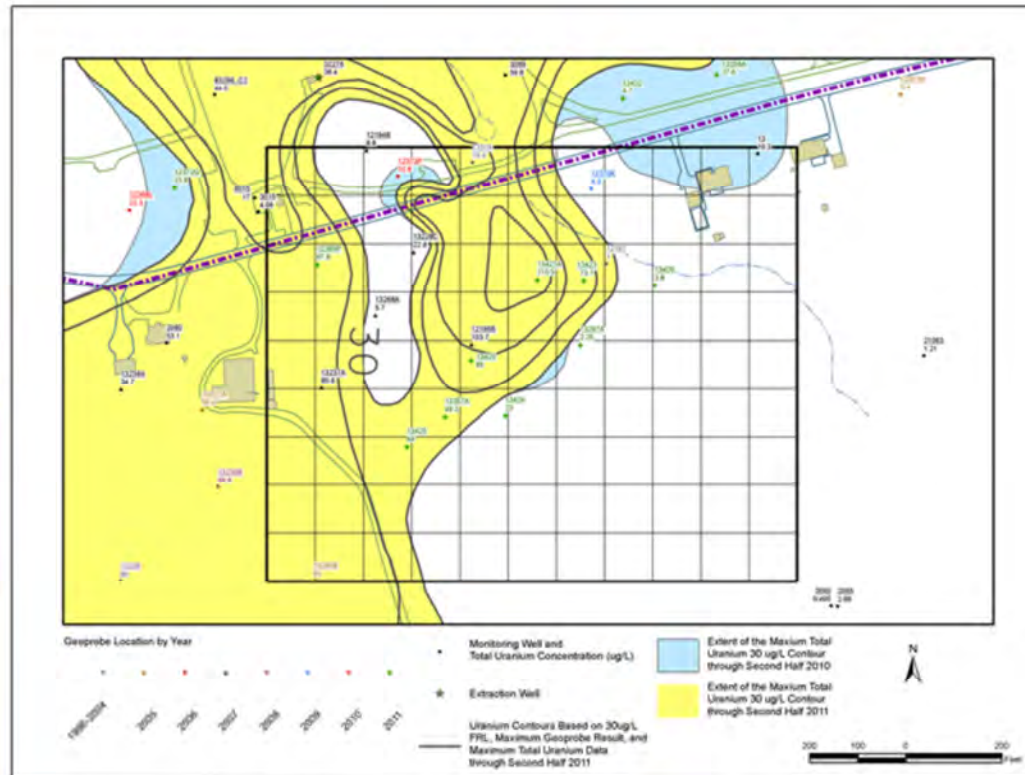
WSA Phase II Groundwater Remediation Design: Performance Assessment of Pump-and-Treat (P&T) Remedies



Operational decisions concerning the aquifer remedy are following guidelines presented by DOE Pacific Northwest Laboratory.

2014 Optimization

Uranium Contamination



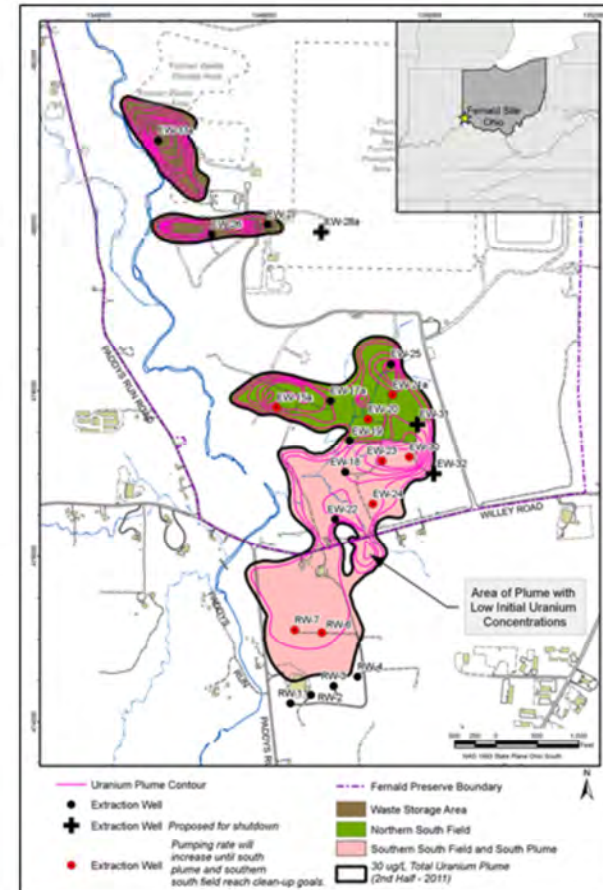
In 2014, additional contamination was discovered, which led to a decision to optimize the pumping.

2014 Optimization

- Three wells shut down
- More pumping focused in the South Plume and southern half of South Field



Wells

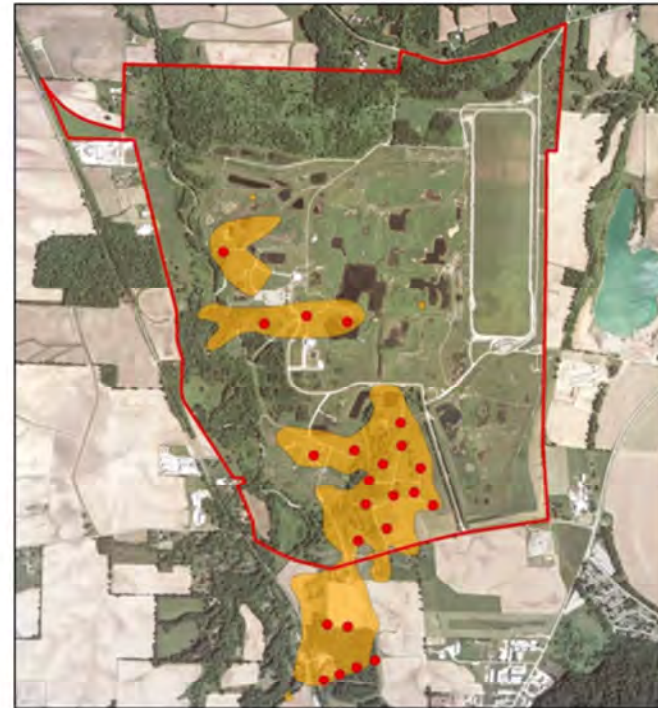


Three wells were shut down and more pumping was focused on the South Plume and southern half of the south field.

2014 Optimization

2005 Remedy Design — Revised Cleanup Evaluation

- 2005 design-predicted cleanup dates
 - South Plume: 2015
 - South Field: 2022
 - WSA: 2023
- Revised cleanup predictions based on 2011 plume
 - South Plume: 2021 (6 years longer)
 - South Field: 2028 (6 years longer)
 - WSA: 2032 (9 years longer)



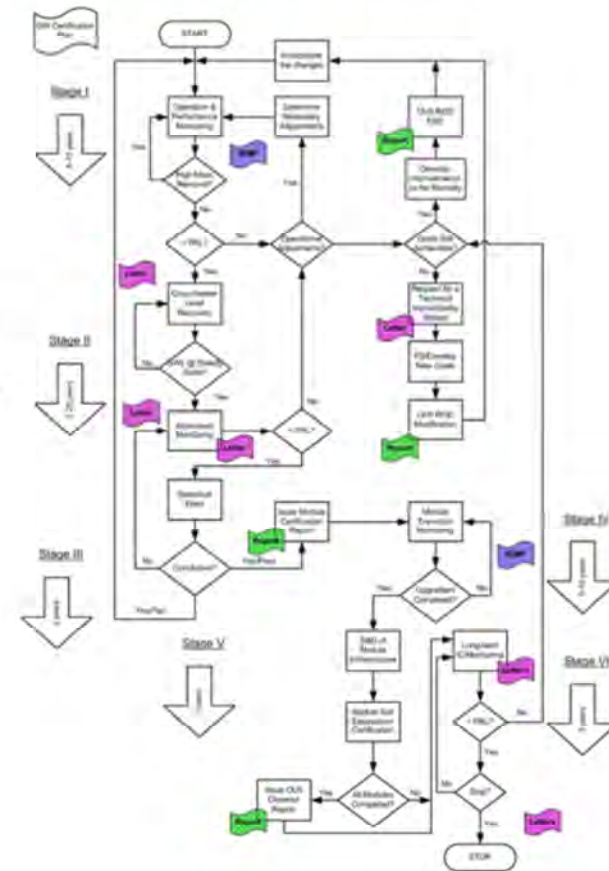
2006 plume footprint

Modeling predicted that cleanup times would be extended by as much as nine years.

Groundwater Remedy

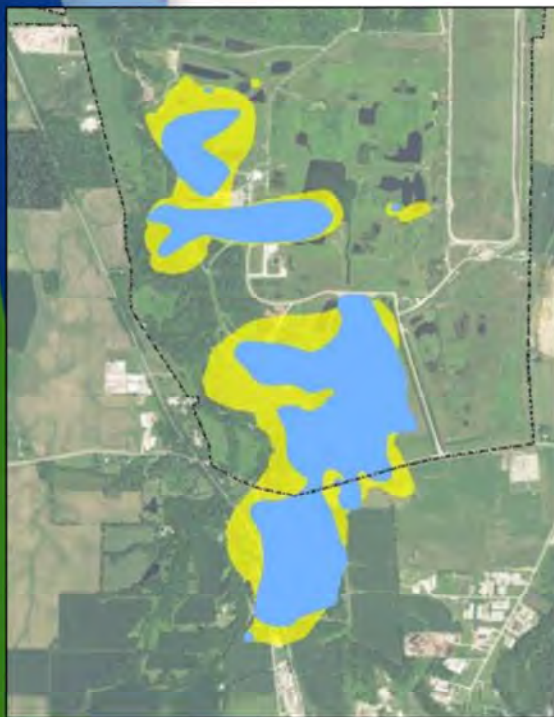
Groundwater Certification Process

- Groundwater Certification Process
 - Stage I: P&T Operations
 - Stage II: Post-P&T Operations/Hydraulic Equilibrium State
 - Stage III: Certification/Attainment Monitoring
 - Stage IV: Declaration and Transition Monitoring
 - Stage V: Demobilization
 - Stage VI: Long-Term Monitoring
-
- *DOE (2006), Fernald Groundwater Certification Plan, Revision 2, Final*

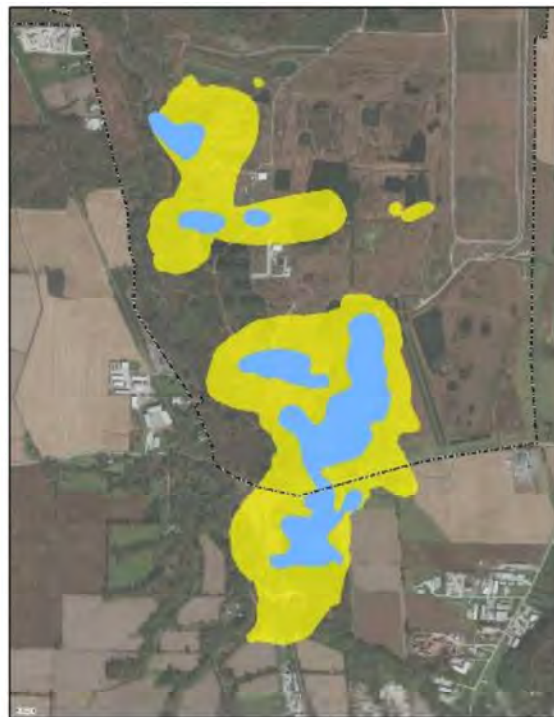


Fernald has an approved Groundwater Certification Plan that outlines how the aquifer will be certified clean.

Current Status of Remediation



■ Target Certification Footprint
■ 2006 Plume Footprint



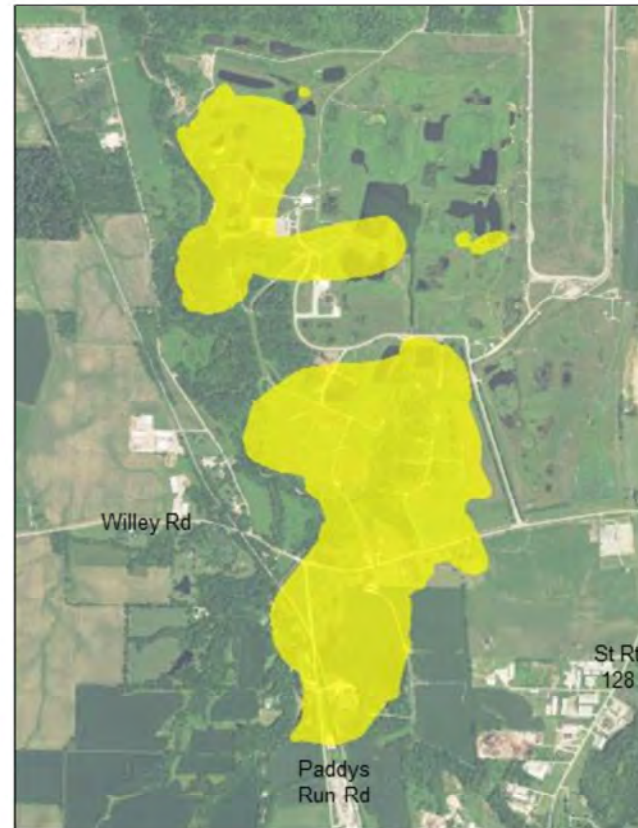
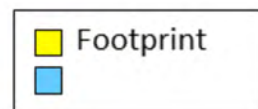
■ Target Certification Footprint
■ 2020 Plume Footprint

Year	Remaining size (acres) of the maximum uranium plume within the target certification footprint
2006	189.3
2007	186.0
2008	186.9
2009	186.0
2010	184.0
2011	144.3
2012	130.3
2013	127.3
2014	110.9
2015	109.5
2016	105.0
2017	94.4
2018	89.3
2019	86.5
2020	81.5

Between 2006 and 2020, the area of the uranium plume has decreased from 189.3 acres to 81.5 acres.

Aquifer Restoration

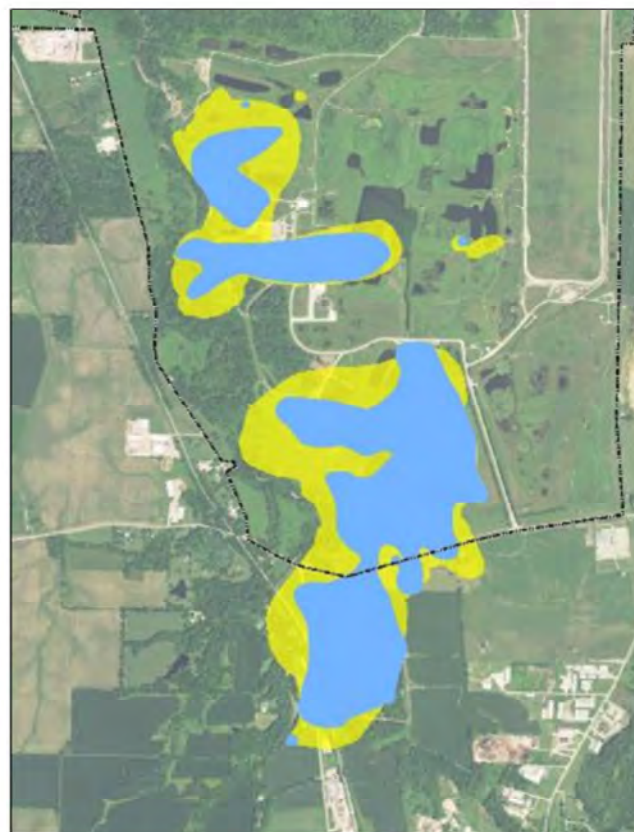
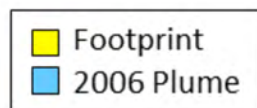
Maximum Plume Acreage: 2006-2020



The target certification footprint is the area of the plume targeted for cleanup (312.697 acres).

Aquifer Restoration

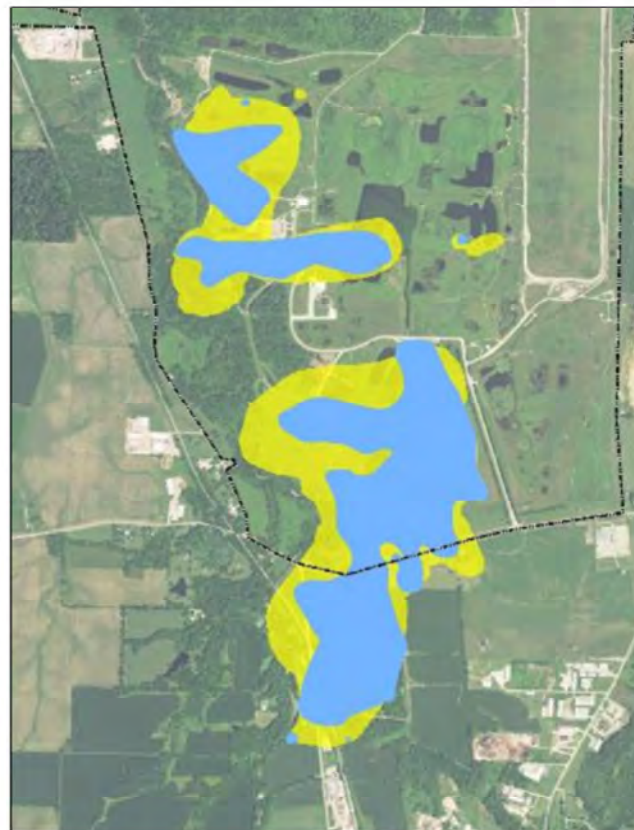
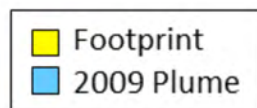
Maximum Plume Acreage: 2006-2020



In 2006, the area of the aquifer left to remediate was 189 acres (shown in blue). The target certification footprint is shown in yellow.

Aquifer Restoration

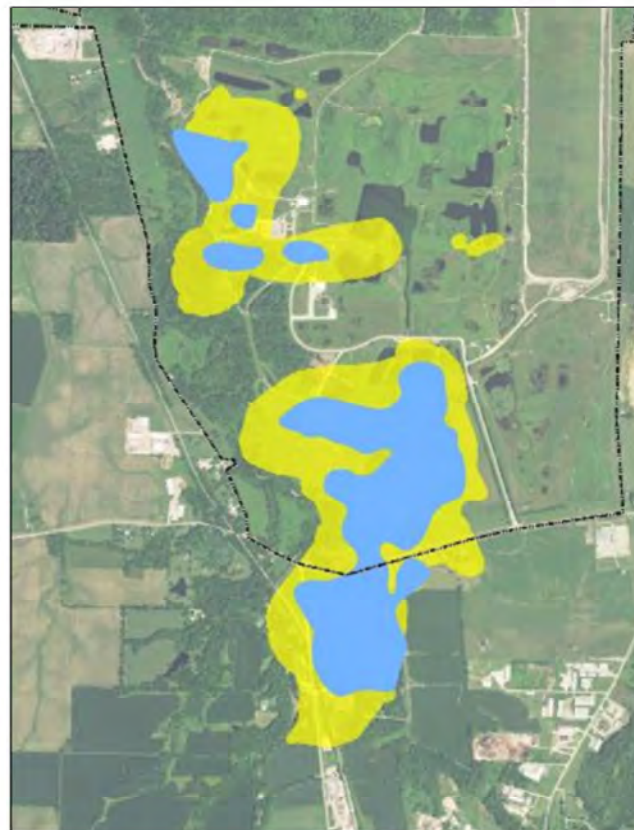
Maximum Plume Acreage: 2006-2020



In 2009, the area of the aquifer left to remediate was 186 acres (shown in blue). The target certification footprint is shown in yellow.

Aquifer Restoration

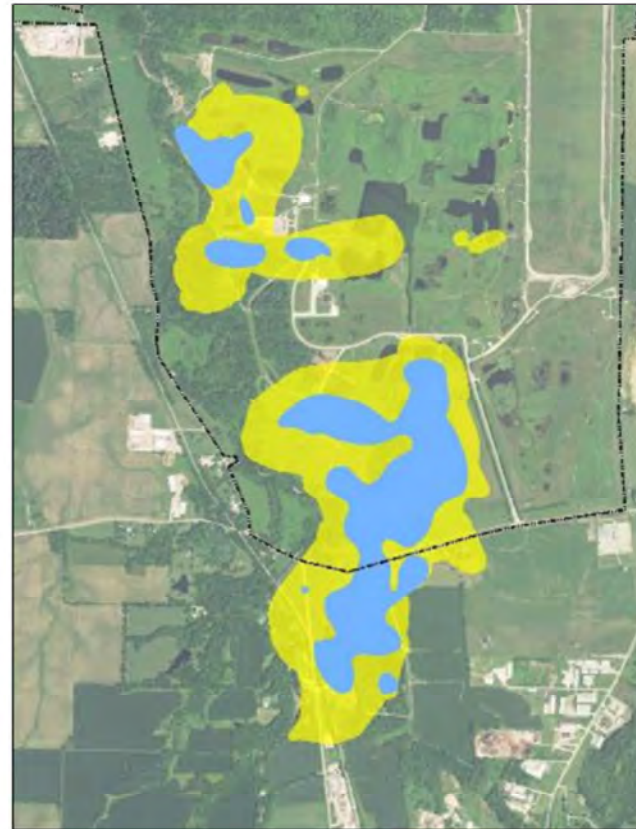
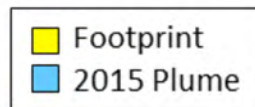
Maximum Plume Acreage: 2006-2020



In 2012, the area of the aquifer left to remediate was 130.3 acres (shown in blue). The target certification footprint is shown in yellow.

Aquifer Restoration

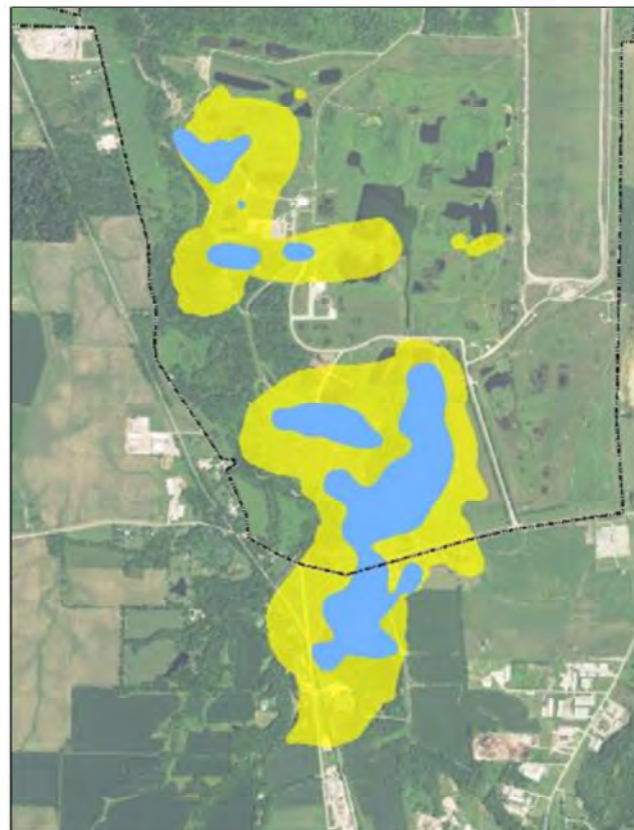
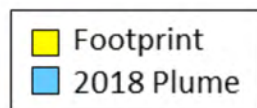
Maximum Plume Acreage: 2006-2020



In 2015, the area of the aquifer left to remediate was 110.9 acres (shown in blue). The target certification footprint is shown in yellow.

Aquifer Restoration

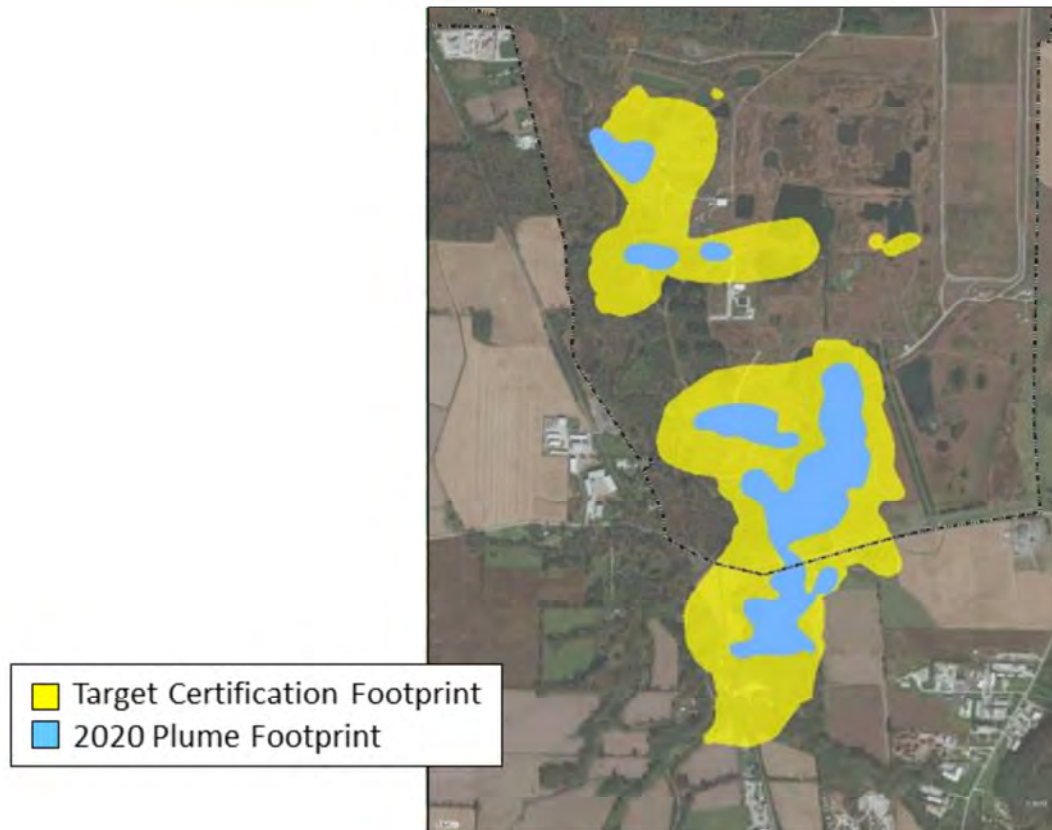
Maximum Plume Acreage: 2006-2020



In 2018, the area of the aquifer left to remediate was 89.3 acres (shown in blue). The target certification footprint is shown in yellow.

Aquifer Restoration

Maximum Plume Acreage: 2006-2020

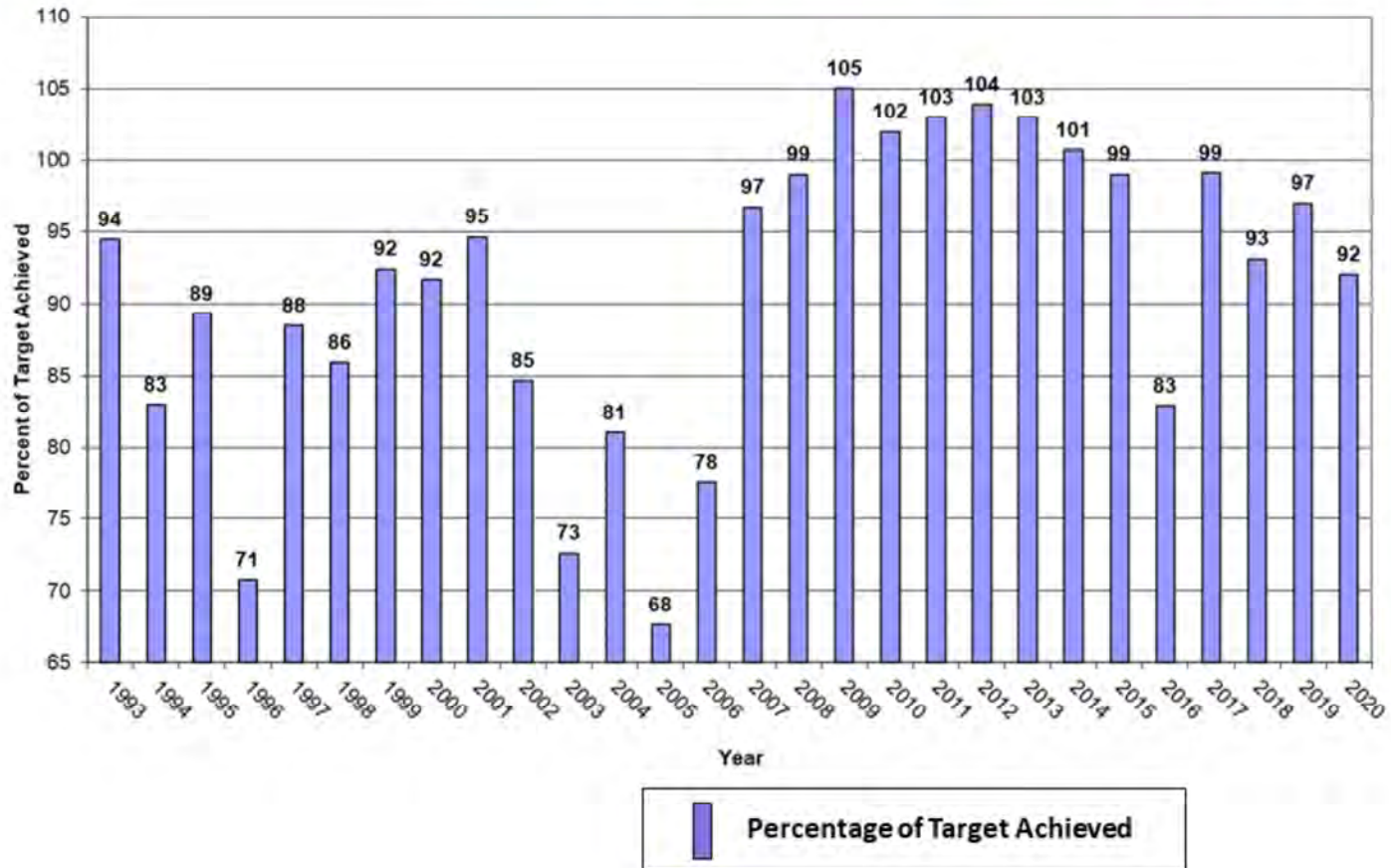


In 2020, the area of the aquifer left to remediate was 81.5 acres (shown in blue). The target certification footprint is shown in yellow. The area of the aquifer left to remediate decreased from 189 acres in 2006 to 81.5 acres in 2020.



Percent of Target Achieved

Actual Versus Target: 1993-2020



Since site closure in 2006, operations have achieved at least 97% of the planned annual target pumping rates, except for: 1) an unplanned well field shutdown that occurred due to site electrical problems in the summer of 2016, 2) several well field shutdowns that occurred during planned demolition and construction to downsize the Converted Advanced Wastewater Treatment (CAWWT) facility in 2018, and 3) reduced operation in 2020 due to COVID-19 operational posture.

Aquifer Restoration



The struggle with iron plugging of wells, pumps, and motors continues. Five wells were rehabilitated in 2020 to address iron plugging. Iron plugging decreases the pumping efficiency of the well.



Aquifer Restoration

Remaining Uranium Estimation

- Uranium dissolved in water (aqueous phase)
- Uranium sorbed to sediment (solid phase)
- 2020 SER (Section A.2)
 - Calculation for present uranium in each phase
- Calculation based on formula in *Groundwater Chemistry* by William J. Deutch
 - Uranium = aqueous + (multiplier x aqueous)
- Fernald Preserve
 - Uranium = aqueous + (19.83 x aqueous)

Calculations are presented that provide an estimate of how many pounds of uranium may be left in the aquifer after concentration-based cleanup goals are achieved.



Aquifer Restoration

Remaining Uranium Estimation

- 2020 aqueous estimation: **158 pounds (lbs)**
 - 2020 SER, Figure A.2-28
- Total Uranium = **aqueous** + (**19.83** X **aqueous**)
- Total Uranium = **158 lbs** + (**19.83** X **158 lbs**)
- Total Uranium = **158 lbs** + 3,133.14 lbs
- Total estimated mass uranium = 3,291.14 lbs

At the end of 2020, an estimate of total mass of uranium remaining in the aquifer is 3,291 pounds.



Aquifer Restoration

Remaining Uranium Estimation After Concentration Cleanup Goals Are Achieved

- Total estimated mass remaining: 3,291.14 lbs
- Two predictors of how much mass needs to be removed to achieve concentration-based cleanup goal of 30 micrograms per liter ($\mu\text{g/L}$)
 - Model prediction: 1,289 lbs
 - Data regression: 2,082 lbs
- Two predictors of how much mass will remain in the aquifer once concentration based cleanup goal of 30 ($\mu\text{g/L}$) is achieved
 - Model prediction
 - $3,291.14 \text{ lbs} - 1,289 \text{ lbs} = 2,002.14 \text{ lbs}$
 - Data regression
 - $3,291.14 \text{ lbs} - 2,082 \text{ lbs} = 1,209.14 \text{ lbs}$

An estimate of how many pounds of uranium may be left in aquifer after concentration-based cleanup goals are achieved is presented.



Aquifer Restoration

Remediation Status

- **Performance (as of 12/31/2020)**
 - 27 years of pumping completed
 - 15,034 pounds of uranium removed
 - 52.9 billion gallons of water pumped
- **Modeling predictions (as of 12/31/2020)**
 - 13 years of pumping to go
 - 1,289 pounds of uranium to remove
 - 22.1 billion gallons of water to pump
- **Remaining 13 years will be less efficient than the first 27 years**
- **DOE is in process of assessing the performance of groundwater remediation and looking for efficiency improvements**



Uranium-concentration data trends and modeling predictions indicate that the pumping operation is becoming less efficient over time. This is typical of groundwater pump-and-treat systems, and DOE continues to look for ways to improve system performance.



National Lab Network Working Group

Priorities for Focus Group 1

- **Keep the aging well system going**
- Recommendations to improve both operations and maintenance
- Criteria to decide when to abandon a well (based on operations)
- Recommendations for types of new wells (focus on maintenance)
 - Horizontal
 - Vertical
 - Cluster wells
- Short-term recommendations (implementable now)
 - What wells should be used for testing new maintenance methods? Wells that are in decent condition in order to maintain them, or wells that are in bad condition to try to recover them?
- Long-term recommendations

In 2021, a DOE National Lab Network (NLN) collaboration focused on the Fernald groundwater remedy. One focus of NLN work was to provide recommendations for keeping an aging extraction wellfield system operating given the iron fouling challenges at Fernald.

NLN Working Group

Priorities for Focus Group 2

- Recommendations to improve the efficiency and success of the existing pumping remedy
 - First priority: off-property plume
 - Second priority: southern south field
 - Third priority: recalcitrant areas in the south field and former WSA
- Recommendations to improve cleanup predictions for planning purposes

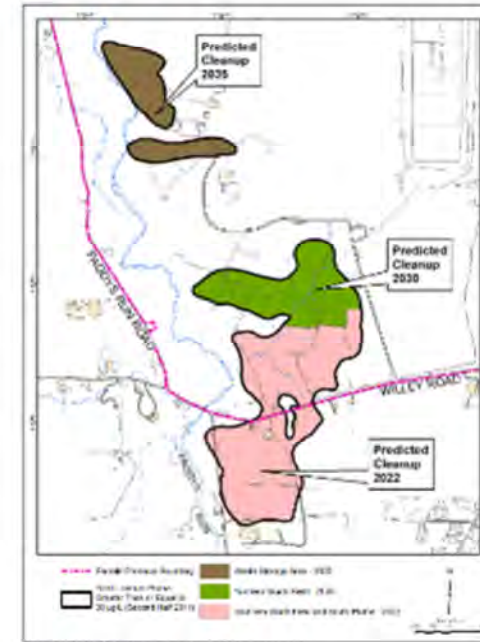
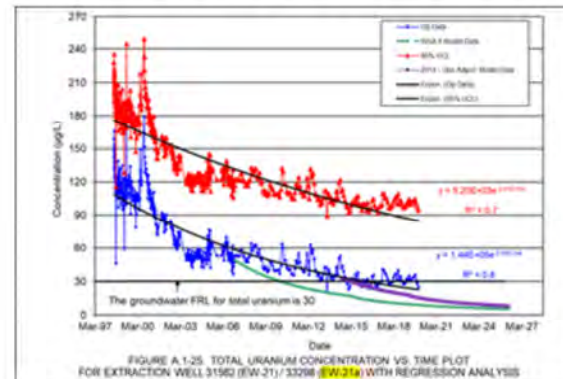


Figure A-1-2. Operational Design 2014

A second focus of NLN collaboration was to improve the efficiency and success of the existing pumping remedy, and to improve cleanup time predictions.



NLN Working Group

Categorization of Recommendations

- Short-listed action items
 - What are we doing that we should keep doing? (**Affirm**)
 - What are we doing that we should stop doing? (**Replace**)
 - What are we NOT doing that we should be doing? (**Supplement**)
- Additional supplementary action items
 - What should we incorporate into our program to strategically prepare for future needs or future stages of remediation? (**Endorse**)
 - Are there potential ideas that might benefit our efforts depending on various criteria or conditions in the future? (**Conditional**)
 - Ideas that were evaluated and deemed inappropriate for use at the Fernald site (**Not recommended**)

NLN collaboration recommendations were categorized into different groups.



NLN Working Group

Short-List Summary

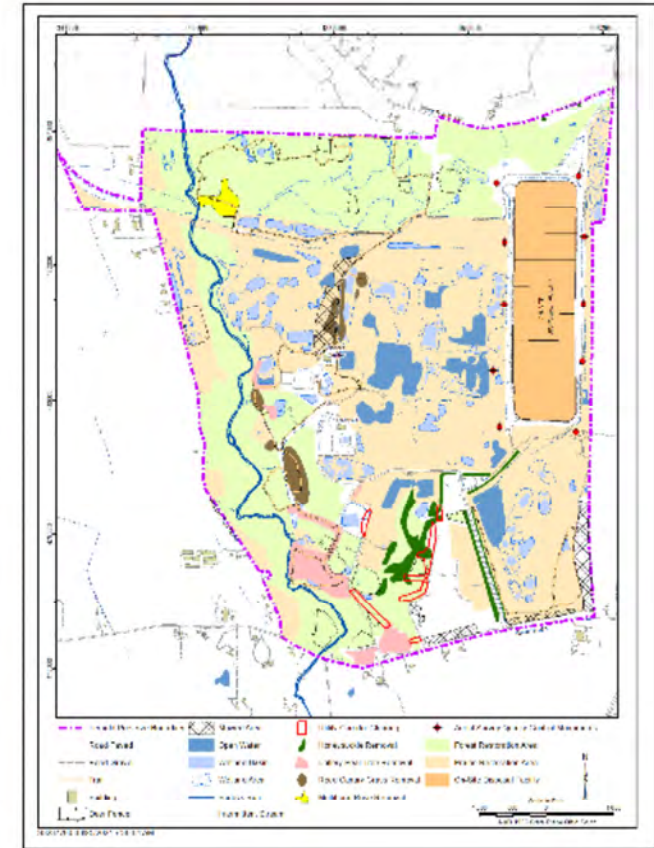
	Concept	Recommendation
Focus Group 1		
	Automatic biofilm and scale control	Supplement
	Liquid CO2 refurbishment	Supplement
	Enhancing rehabilitation contact	Supplement
Focus Group 2		
	Alternative mathematical expressions for projecting remedial timeframe	Supplement
	Targeted data mining	Supplement
	4D mapping and interpretation	Supplement
	Refine interpretations of temporal plume footprints and masses	Affirm+Supplement
	Modern hydrogeologic modeling platform	Affirm+Supplement
	Algorithm-based optimization	Supplement

Short list NLN recommendations are being pursued (pending available budget).

Ecological Restoration

Restoration Projects

- Utility corridor tree and shrub clearing



Larger restoration projects are conducted to maintain or improve restored areas or protect site infrastructure.

Ecological Restoration

Restored Area Maintenance

- Vegetation management
- Inspection follow-up



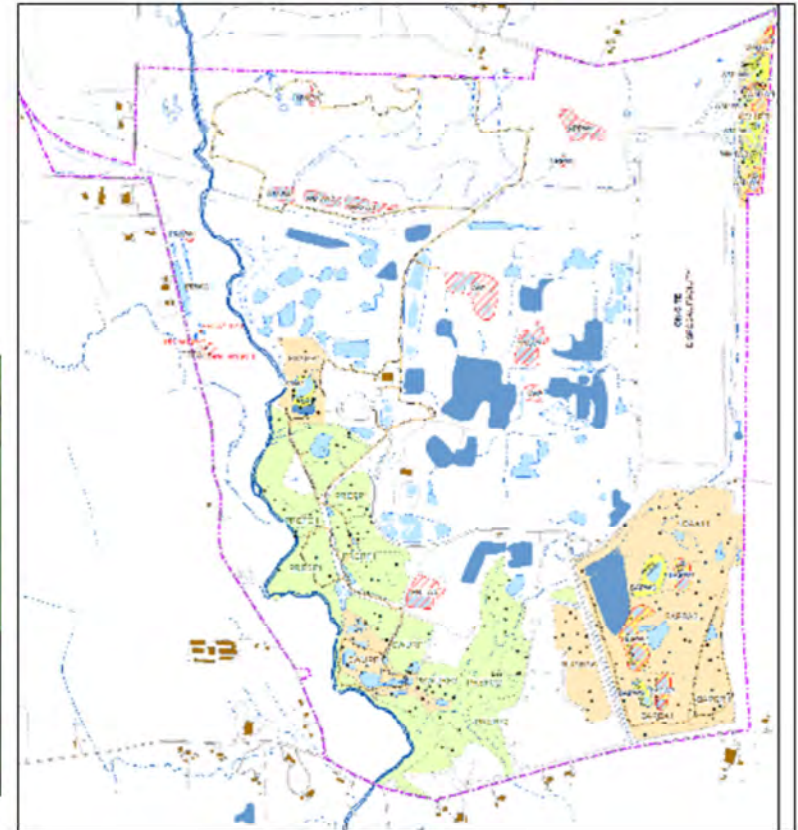
Restored area maintenance includes vegetation management and follow up from site inspections.

Ecological Restoration

- Wetland mitigation
- Functional
- Implementation
- OSDF vegetation cover



Monitoring



Monitoring programs help site personnel evaluate the status of ecologically restored areas at the site, including the health and diversity of amphibian populations.

Ecological Restoration

Inspections



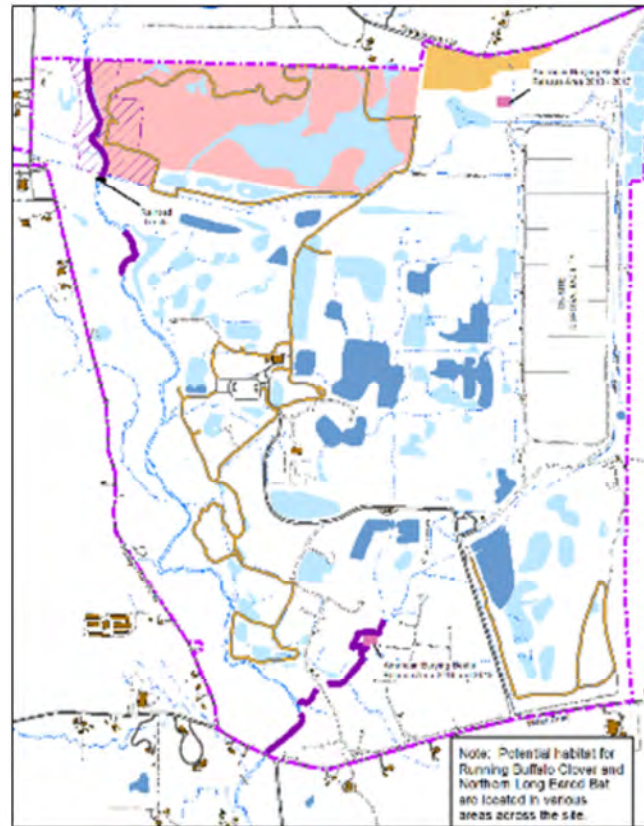
- Site
- OSDF
- Trails



The inspection process continues in compliance with the Fernald Preserve *Comprehensive Legacy Management and Institutional Controls Plan*.

Ecological Restoration

Endangered Species and Cultural Resources Surveys



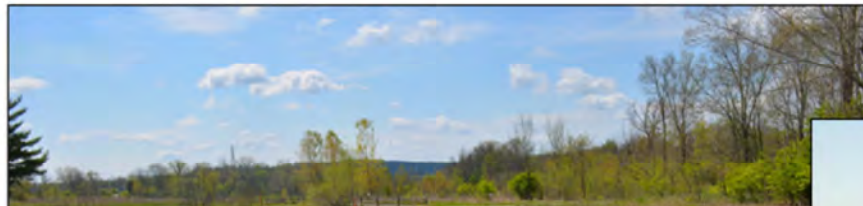
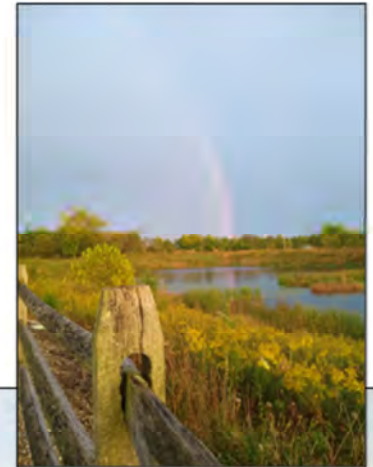
Endangered species and cultural resource surveys are conducted prior to field activities.



Interpretive Services

Public Amenities and Services

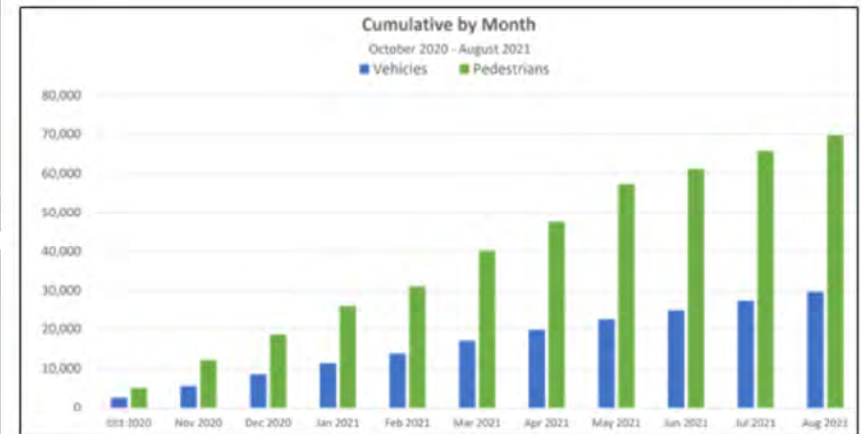
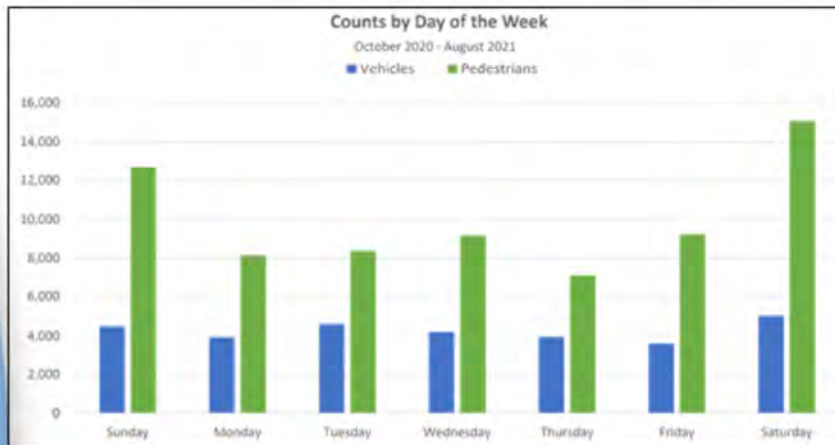
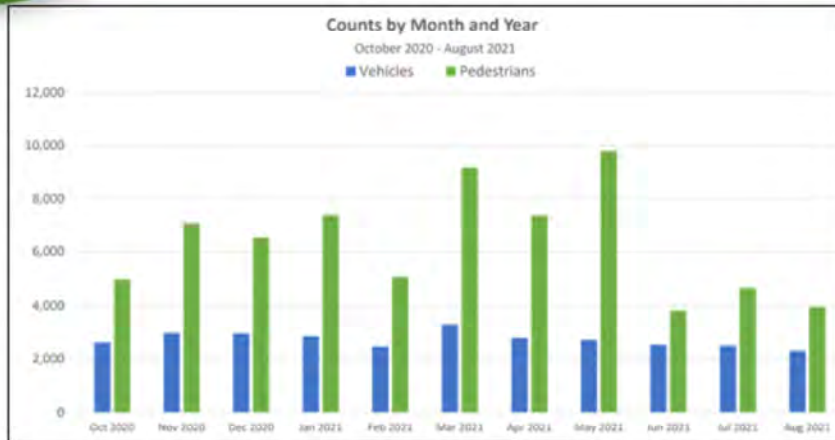
- Site access was closed due to pandemic:
March 24 to June 7, 2020
- Site outdoor spaces have remained open since



Since the site opened to the public in 2008, schools, conservation organizations, former workers, bird watchers, hikers, and many others have used the public amenities at the site, including the visitors center, walking trails, wildlife observation areas, interpretive programs, and reservable meeting spaces. The visitors center remains closed due to COVID-19 restrictions; however, outdoor public amenities are available.

Interpretive Services

Traffic Counters – Site Use



Installed in October of 2020, a site entrance vehicle counter and pedestrian counters located on the hiking trails show positive trends and helpful site-use data.

Interpretive Services

Fernald Community Alliance Support
www.fernaldcommunityalliance.org

- **2020/2021 meetings:**

- 2/4/20 at Visitors Center
- 3/31/20 meeting cancelled
- 5/5/20 meeting cancelled
- 6/9/20 virtual meeting
- 8/18/20 virtual meeting
- 9/30/20 hybrid meeting
- 12/1/20 virtual meeting
- 2/2/21 virtual meeting
- 3/30/21 virtual meeting
- 6/1/21 hybrid meeting
- 8/3/21 hybrid meeting
- 11/30/21 upcoming

- *We lost 2 beloved active members of the FCA this past year*
 - *Earl Corson (Oct. 22, 1936 - Aug. 27, 2020)*
 - *Bob Tabor (March 27, 1940 - Feb 5, 2021)*
 - *We miss them and thank them for their service!*



Supporting community events and stakeholder groups including the Fernald Community Alliance remains a high priority for Fernald Preserve Interpretive Services.



Interpretive Services

- Supported several popular, in-person public programs prior to the pandemic
- Pivoted to virtual for the balance of 2020 and for 2021



Activities

February 2020 **Month-at-a-Glance** 🌞

All programs begin in the Visitors Center. *Online required for virtual programs

1st Supermoons of 2020
Sunday, February 9 • 6:00 p.m. to 8:00 p.m.
 Don't miss the first of four supermoons to occur in 2020; a supermoon happens when the moon is less than 223,000 miles from Earth. That's about 8% closer than the average Earth-moon distance, which is 238,000 miles. Join us as we take an evening stroll on this supermoon-1st night. Moonrise begins at 6:44 p.m.

Salamander Mixer
Saturday, February 15 • 6:00 p.m. to 8:00 p.m.
 Silent and secretive, the robust mole salamanders are creatures of mystery and more abundant than most people realize. They spend the majority of their lives hidden under forest soils and leaf litter. But this time of year, they move from their wintering sites to wetlands, where they mate and lay eggs. We'll explore their habitats in hopes of seeing one! Be sure to wear appropriate shoes for this potentially wet and muddy excursion.

Woodcock Watches
Sunday, February 16 and 23 • 5:30 p.m. to 7:30 p.m.
 It may still be winter but for the American Woodcock, love is in the air! This secretive, well-camouflaged bird puts on a spectacular courtship display. We'll start inside with a short program, followed by a hike to witness the amazing "dance of the timberland!" The hike

Email: Fernald@ohdnc.gov or call (513) 848-3330
 For more information on Fernald Preserve activities, visit www.ohdnc.gov/Fernald

Fernald Preserve
 7400 Willey Road

July 2021 **Month-at-a-Glance** 🌞

Carnival, the Visitors Center reopens doors to COVID-19 restrictions, however, the Fernald Preserve is open for trail walks and wildlife observations.

Mini-moons of the Fernald Preserve Virtual Program
Sunday, July 18 and 25 • 6:00 p.m.
 Join a fun subject to learn how 1 several of the most common moon phases occur at the Fernald Preserve. The subjects will include visible eclipse events coming, we will have interactive Q&A, live time-lapse photos, virtual night-vision observation will be provided in recorded live broadcasts to be viewed on program days. Please include your name, phone number, email address, and preferred date in your registration.

A Leached River Across the Sky by Joel Greenberg
Monday, July 21 • 7:00 to 9:00 p.m.
 About 100 years ago, a devastating amount of the forest of passenger pigeons, which historically numbered 30 million to 40 million, died in 8 days. Join us for a special program featuring the book "A Leached River Across the Sky" by Joel Greenberg. The book tells the story of the passenger pigeon and the impact of its extinction. Virtual registration information will be provided to improve participation prior to each program date.

Self-Guided Mammals of the Fernald Preserve Trail Hike
Sunday, July 25-September, July 25 • 7:00 a.m. to 9:00 a.m.
 Meet at the Visitors Center and walk the 2.5 mile loop to the trail. Trail to learn about 17 of Fernald Preserve's many mammal species. Please bring your own water and snacks. This is a self-guided hike and is not an interpretive program. For more information, please visit www.ohdnc.gov.

Email: Fernald@ohdnc.gov or call (513) 848-3330
 For more information on Fernald Preserve activities, visit www.ohdnc.gov/Fernald

Fernald Preserve
 7400 Willey Road, Hamilton, Ohio 45013

Several virtual public programs and other activities on site-related topics were offered throughout the year.

Interpretive Services

Wildlife Update

- Birders and wildlife photographers remain frequent guests



Ecologically restored habitats, including expansive prairie grasslands at the site, are recognized as regionally important birding areas that attract birds, bird watchers, and photographers.

Interpretive Services

Wildlife & Social Media Update



Annual Community Meeting
October 19, 2021

Community members are encouraged to attend the virtual Fernald Preserve Annual Community Meeting.

Date: Tuesday, October 19, 2021
Time: 6:30 p.m.

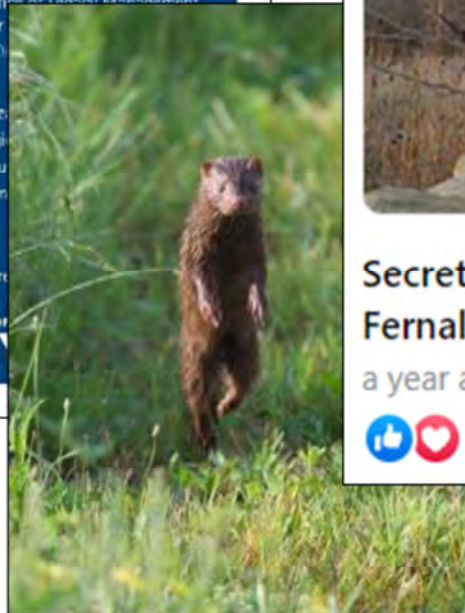
Click here for remote connection details:
<https://www.energy.gov/lm/articles/2021-fernal-preserve-community-meeting>

This year's meeting will focus on the *Fernald Preserve 2020 Site Environmental Report* issued by the U.S. Department of Energy Office of Legacy Management. The report can be found under <https://www.energy.gov/lm/fernal>.

Meeting topics will include:

- Final Fifth CERCLA Five-Year Review
- Environmental and ecological monitoring
- Groundwater remedy status
- On-Site Disposal Facility monitoring
- Other site activities.

Email fernal@ml.doe.gov
Call (513) 648-3330 for more information.



Secret Lives of Wild Creatures at LM's Fernald Preserve, Ohio, Site

a year ago · 5.8K Views

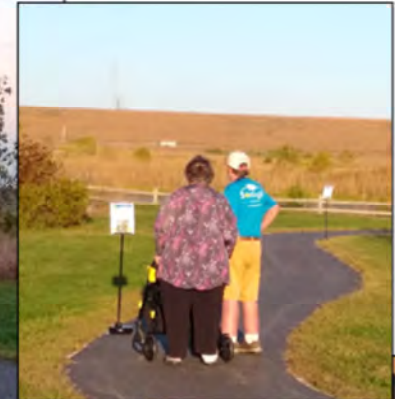


These wildlife images were taken at the site. Many site images are used to develop social media and web-based content.



Interpretive Services

Current Status Update

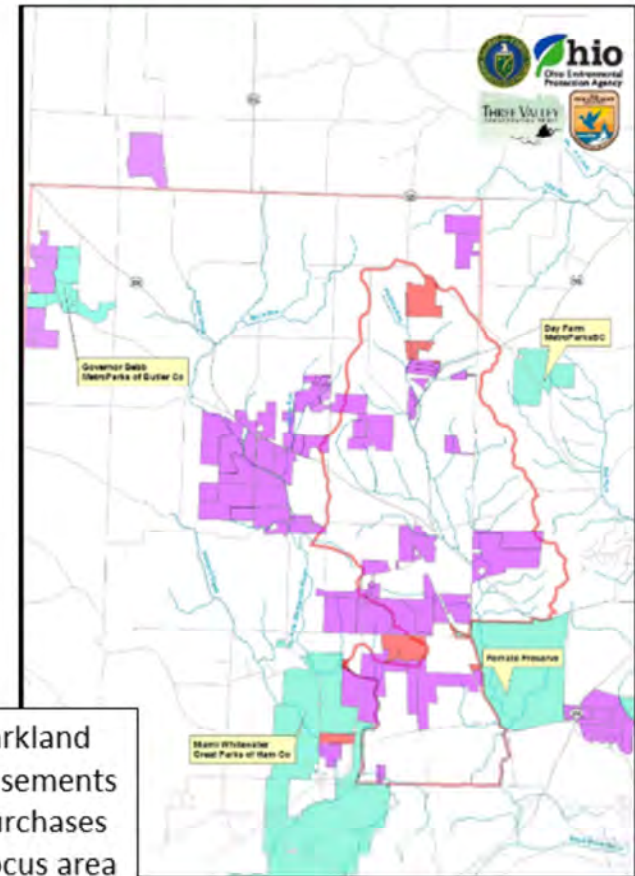
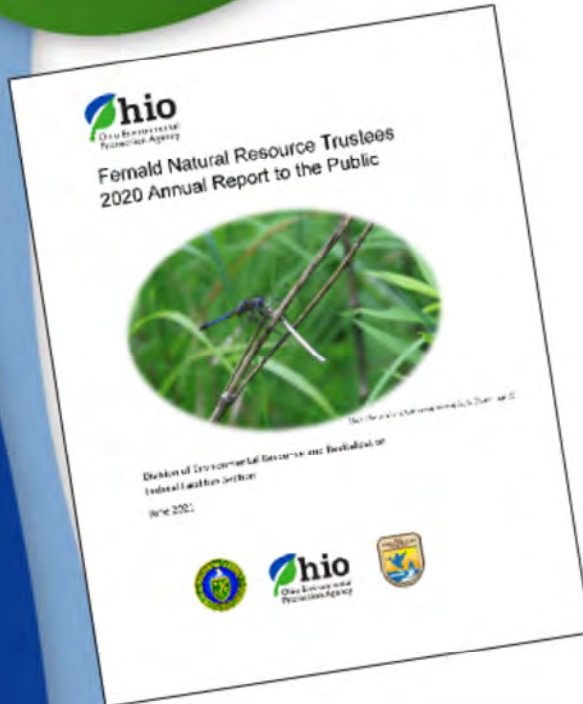


In-person programs featuring wildlife and history topics will be re-instituted after public engagement services restart; dates are undetermined at this time due to COVID-19 closure. Information can be found here: <https://www.energy.gov/lm/fernal-d-preserve-visitors-center>.



Natural Resource Trusteeship

Summer 2021



<https://www.epa.state.oh.us/Portals/30/ffs/docs/doe/fernalid/2020NRTAnnualReportFINAL.pdf>

The Natural Resource Trustees — composed of Ohio Environmental Protection Agency, U.S. Fish and Wildlife Service, and DOE — have partnered with the Three Valley Conservation Trust to purchase conservation and agriculture easements in the Paddys Run watershed and above the associated Great Miami Buried Valley Aquifer.



Look Ahead

- Continue aquifer restoration with pump and treat
 - Groundwater model user interface
 - NLN Working Group recommendations
- Planning staff relocation to onsite
- Environmental monitoring
 - Site and OSDF monitoring and maintenance
- Restored area monitoring and maintenance
 - Finalize the Natural Resource Management Plan
 - Prescribed burns (fall) and OSDF in the spring
- Educational programs

Numerous work activities are planned for 2021.



Questions and Contacts

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The next annual Fernald Preserve community meeting will take place in fall 2022.