
Tour of Department of Energy
Environmental Management Projects
OREM
Oak Ridge Office of Environmental Management
July 2019

Table of Contents

Acronyms

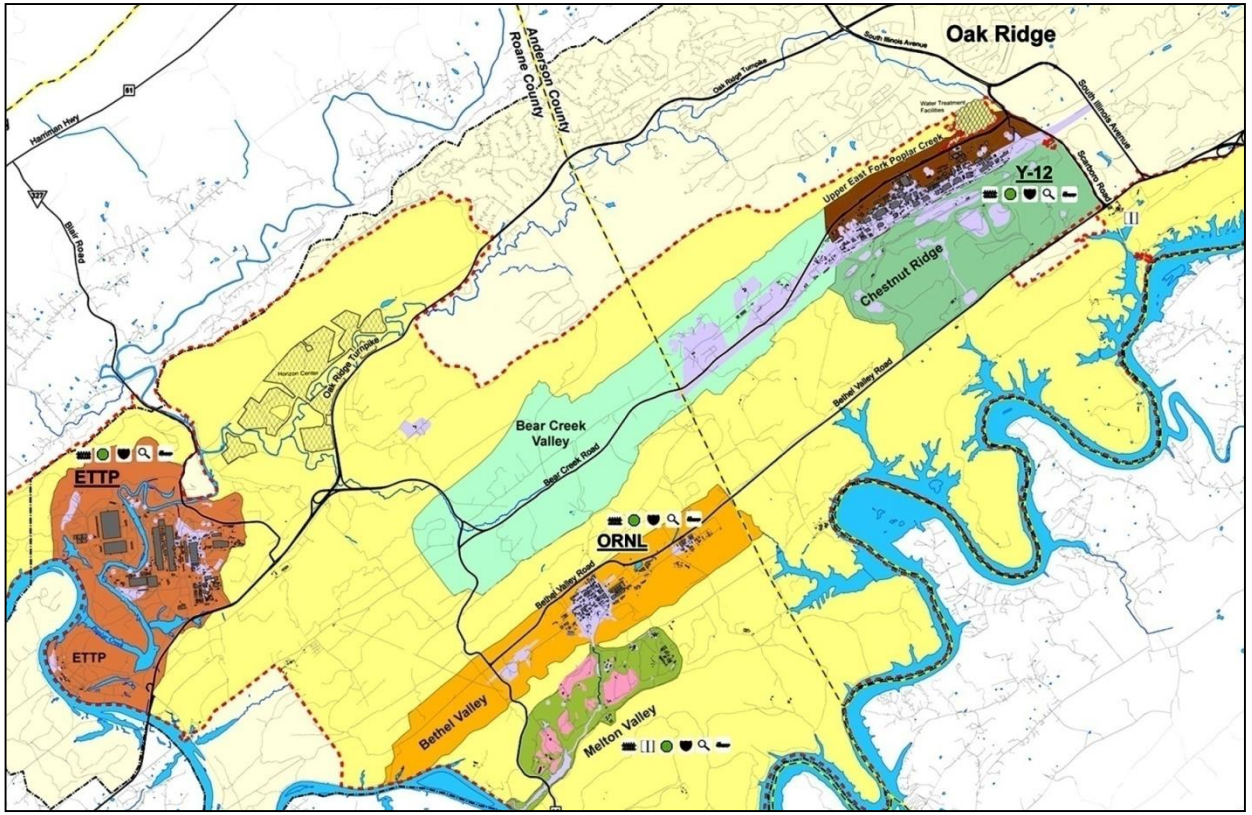
ARRA	American Recovery and Reinvestment Act
BYBY	Boneyard/Burnyard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH	contact-handled
COLEX	column exchange
D&D	deactivation and decommissioning
DARA	Disposal Area Remedial Action
DOE	Department of Energy
EFPC	East Fork Poplar Creek
EM	Office of Environmental Management
EMDF	Environmental Management Disposal Facility
EMWMF	Environmental Management Waste Management Facility
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
f^2	square feet
FY	fiscal year
GAAT	Gunite and Associated Tanks
gpm	gallons per minute
GW	Gaseous Waste
LEFPC	Lower East Fork Poplar Creek
LGWO	Liquid/Gaseous Waste Operations
LLLW	Liquid Low-Level Waste
MOA	memorandum of agreement
MSRE	Molten Salt Reactor Experiment
MTF	Mercury Treatment Facility
NNSS	Nevada National Security Site
OF200	Outfall 200
ORNL	Oak Ridge National Laboratory
OREM	Oak Ridge Office of Environmental Management
ORSSAB	Oak Ridge Site Specific Advisory Board
PCB	polychlorinated biphenyl
pH	potential of hydrogen
ppm	parts per million
PW	Process Waste
RH	remote-handled
ROD	Record of Decision
SIOU	Surface Impoundments Operable Unit
SNS	Spallation Neutron Source
SWSA	Solid Waste Storage Area
TDEC	Tennessee Department of Environment and Conservation
TRU	transuranic
TSCAI	Toxic Substances Control Act Incinerator
TWPC	Transuranic Waste Processing Center
U-233	uranium-233
UEFPC	Upper East Fork Poplar Creek
UF_6	uranium hexafluoride
VOC	Volatile organic compound
WIPP	Waste Isolation Pilot Plant
Y^3	cubic yards
Y-12	Y-12 National Security Complex

Introduction and Background

In 1989, the Oak Ridge Reservation was placed on the National Priorities List to be cleaned up under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The reservation is an area of about 32,400 acres that straddles Anderson and Roane Counties and is within the city limits of Oak Ridge. As a result of decades of operations in nuclear research and weapons development, about 10,500 acres of land and related buildings may have been impacted by previous operations at the site.

The tour and this book will identify many individual projects associated with the cleanup objectives and will explain what has been finished to date, what is currently underway, and what is planned for the future.



NOTES:

Introduction and Background

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KEY DATES

1980	CERCLA enacted
1989	Oak Ridge Reservation placed on National Priorities List
1989	The Department of Energy (DOE) establishes the Office of Environmental Management (EM)
1992	Federal Facility Agreement implemented
1995	Oak Ridge Site Specific Advisory Board (ORSSAB) established
2003	First waste disposed at the EM Waste Management Facility (EMWMF)
2006	Melton Valley remediation completed
2008	First shipment of contact-handled (CH) transuranic (TRU) waste sent to the Waste Isolation Pilot Plant (WIPP) in New Mexico; Demolition begins on the K-25 Building at East Tennessee Technology Park (ETTP)
2009	First shipment of remote-handled TRU waste sent to WIPP in New Mexico
2011	First shipment of uranium-233 (U-233) material sent from Oak Ridge
2013	Demolition of K-25 Building completed
2015	Demolition of K-31 Building completed; Manhattan Project National Historical Park established
2016	Completed Vision 2016—demolition of all gaseous diffusion buildings
2017	Began reshipping CH TRU waste to WIPP after reopening; Started construction of Outfall 200 (OF200) Mercury Treatment Facility (MTF); U-233 direct disposition campaign was completed
2018	Removal of West Column Exchange (COLEX) equipment completed; Toxic Substances Control Act Incinerator (TSCAI) demolished

Introduction and Background

MAJOR RECORDS OF DECISION (RODs)

1995	Lower East Fork Poplar Creek, Watts Bar
1997	Gunite Tanks, Clinch River/Poplar Creek, Union Valley
1999	EMWMF
2000	Melton Valley, Bear Creek Valley
2002	Bethel Valley, Upper East Fork Poplar Creek (UEFPC) (Soils & Sediment)
2003	ETTP - Zone 1
2005	ETTP - Zone 2

NOTES:

The Cleanup Challenge

The location and history of the Oak Ridge Reservation present some of the greatest challenges to cleanup activities at any DOE site in the country.

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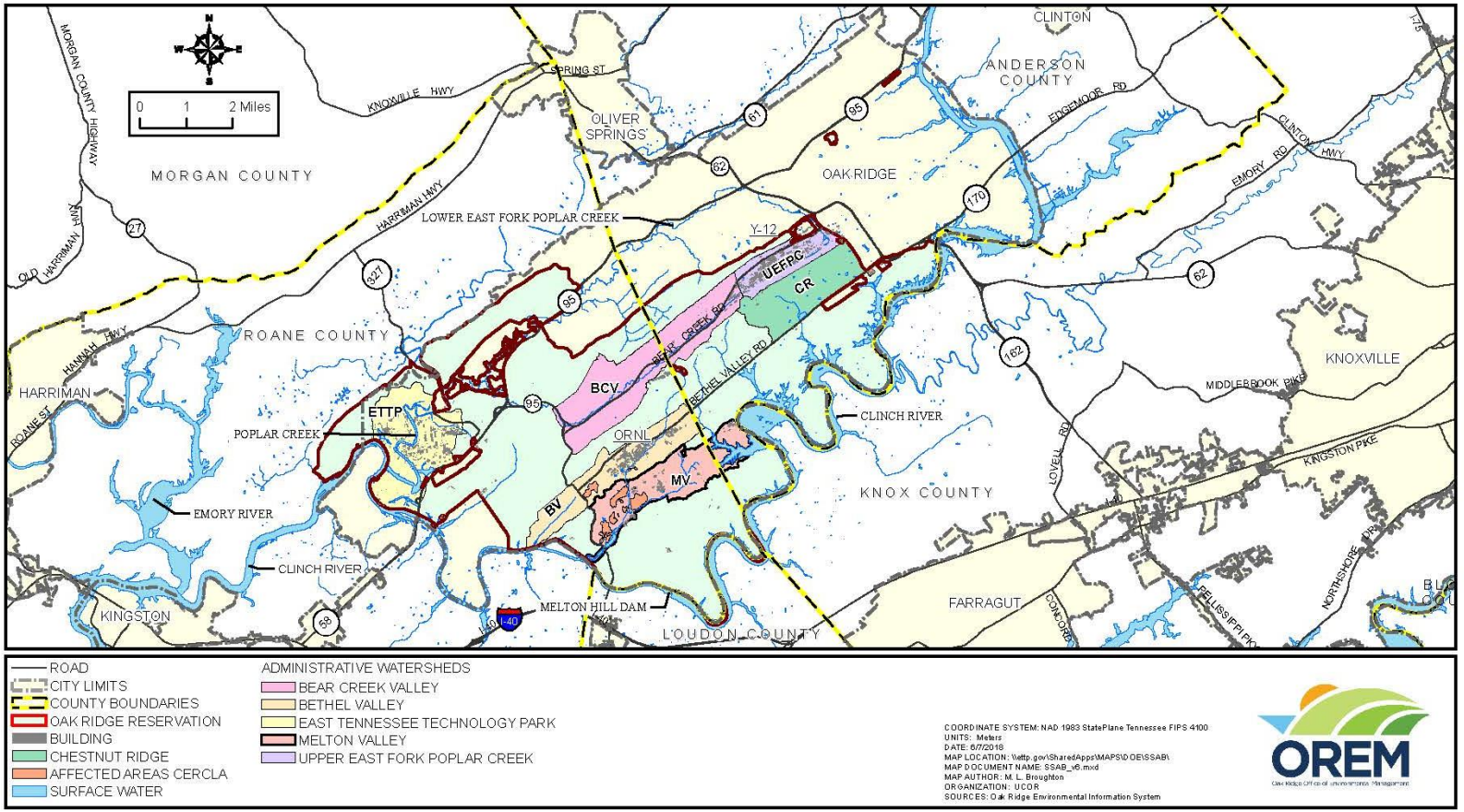


Great Diversity of Contaminants
Fission Products – strontium, cesium, etc.
Transuranics – plutonium
Metals – mercury, uranium
Organics – polychlorinated biphenyls (PCBs)
Others – nitrates, etc.

Surface and Groundwater Flow
Abundant rainfall in the area (55 inches annually) enhances transport of contaminants.

Groundwater and surface water are interconnected enhancing movement of contaminants.

Geology
Because underlying rocks are fractured, predicting groundwater flow is difficult. Some rock units contain caves and cavities that allow wide-ranging groundwater flow.

Population Centers
The entire Reservation is in the Oak Ridge city limits, and many people live near our cleanup sites.

Y-12 National Security Complex (Y-12)

NOTES:

The Y-12 Plant (now known as the Y-12 National Security Complex) began as a uranium enrichment facility during World War II. Wastes were buried in many areas around the plant, and thousands of pounds of mercury were released into the environment from 1950 to 1982 during the production of radioactive materials used in hydrogen bombs.

Today, the plant is used primarily for disassembly of nuclear weapons and storage of uranium. It is also the site for a CERCLA Waste Management Facility (known as the Environmental Management Waste Management Facility [EMWMF]), which is being used for disposal of much of DOE's environmental cleanup program wastes.

Y-12 comprises approximately 800 acres and is situated over a ridge, about 400 yards from the nearest Oak Ridge resident. The site is operated by Consolidated Nuclear Security.

High-priority risk-reduction actions at Y-12 are directed initially to mitigate mercury migration into surface water. Future actions at Y-12 include demolition of process buildings and other unnecessary Manhattan Project and Cold War facilities, remediation of Chestnut Ridge, completion of soil remediation at the Y-12 complex, and completion of remediation in Bear Creek Valley, including the Bear Creek Burial Grounds.

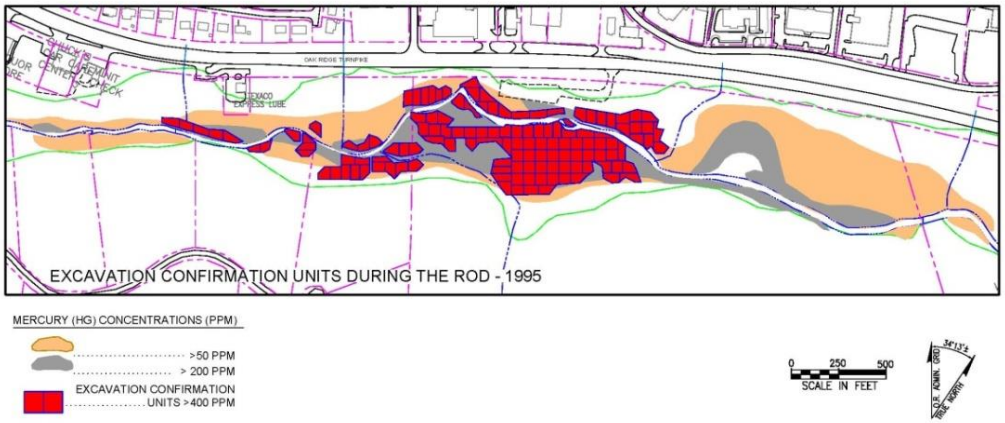
Lower East Fork Poplar Creek

NOTES:

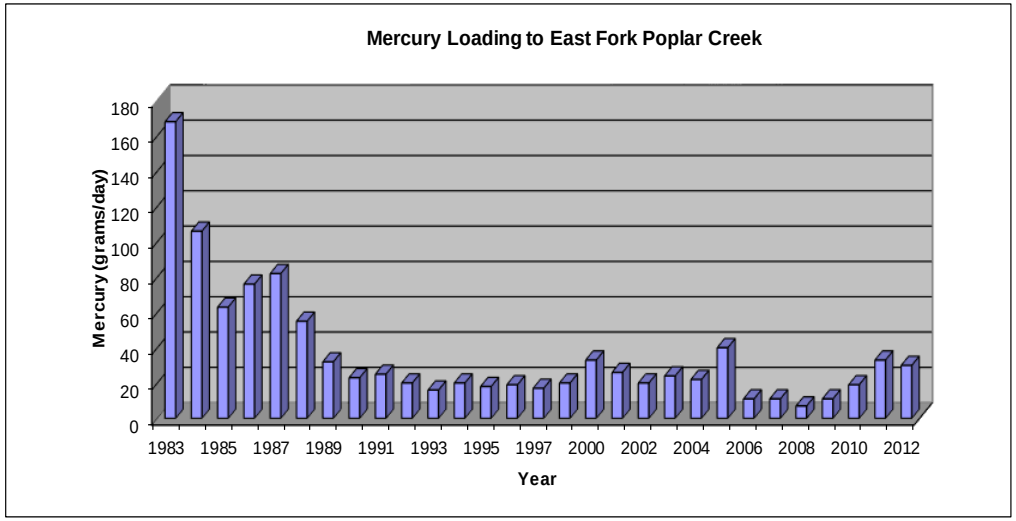
The Lower East Fork Poplar Creek (LEFPC) flows through the residential and business portions of the City of Oak Ridge. The creek is downstream of Y-12 and the flood plains became contaminated with mercury and other contaminant releases that occurred from the 1950s to 1982.

The remedial investigation and proposed plan for the area identified two primary areas of the floodplain that required excavation. A third area currently covered by asphalt will be dealt with later.

An assessment process to define a 400-ppm mercury cleanup level for the floodplain soils was proposed and supported by the public. The remedial action was accomplished in 1997. A final remediation alternative for the creek surface waters and creek bed sediments will be decided after the UEFPC soils remediation and mercury mitigation activities within the Y-12 site are completed.



Mercury release to Lower East Fork Poplar Creek (grams/day)



Upper East Fork Poplar Creek

NOTES:

An estimated 700,000 pounds of mercury were either lost into the environment or were otherwise unaccounted for at Y-12 during production of materials used in nuclear weapons from 1950 to 1982. Thousands of pounds of mercury found its way to UEFPC. Mercury levels in the creek have been reduced significantly, but still exceed Clean Water Act established levels. Mercury remaining in the soils, sediments, and surface water is still a concern, especially in contributing to the buildup of mercury in fish and aquatic life.

Sampling fish for mercury

Treatment alternatives were evaluated giving consideration to their ability to capture and treat the anticipated waste volume and meet regulatory goals. Construction of the Outfall 200 Mercury Treatment Facility with a capacity to capture and treat up to 3,000 gallons of water per minute from UEFPC was part of the resolution.

During fiscal year (FY) 2006, the U.S. Environmental Protection Agency (EPA) and the State of Tennessee provided comments on the draft Record of Decision (ROD) for Phase 2 interim remedial actions for accessible soil, buried waste, or subsurface structures that contribute significantly to contamination above acceptable risk levels in UEFPC. The Phase 2 ROD was finalized and approved by all parties in April 2006. Future projects are planned to complete the remediation.

Mercury Technology Development and the Aquatic Ecology Laboratory

NOTES:

The Oak Ridge National Laboratory is home to the Aquatic Ecology Laboratory. This facility is being upgraded as part of the Y-12 Mercury Technology Development work to allow for extensive mercury testing of actual creek water in various situations – including those involving biological, ecological, and chemical aspects of mercury in the environment.

Research and technology development activities to date have focused on understanding mercury transport and fate in the East Fork Poplar Creek (EFPC) system. Monitoring sites from upstream to downstream EFPC were established to measure flow, water chemistry, groundwater, and biota. Field studies have pointed to the importance of bank soil erosion as a source of mercury to the creek, especially in the upstream section. Instream factors, such as water chemistry and flow characteristics, also influence mercury concentration including the production of methylmercury. Research studies have highlighted the importance of methylmercury and its bioaccumulation in the food chain. The early efforts to understand the watershed have added significantly to our understanding of key mercury source areas and mercury transformations and processes. The watershed-scale mercury information is informing conceptual and dynamic models that can be used for future technology development and remedial decision making in LEFPC.

Column Exchange (COLEX) Equipment Removal (completed)

NOTES:

Removal of the West COLEX equipment, which was connected to the side of Alpha 4, was completed in an 18-month project that ended in 2018. Nearly 6,500 pounds of mercury were recovered from the rusted and structurally degraded equipment. More than 10,000 feet of mercury-contaminated piping were removed and disposed. Tanks, condensers, heat exchangers, and a 1.6-million-pound mezzanine structure were removed and disposed as well.

Completed West COLEX area stabilization outside of Alpha 4

Testing of field methods to manage mercury contamination were completed in the East COLEX area of Alpha 4. Several methods for mechanical removal of piping scale were tested along with a fogging demonstration. The demonstration involved a full-scale test where a fogging process was used to blow a fixative material into a container filled with debris and high mercury vapors; the impact on mercury vapor generation was monitored.

Mercury Removal Project (completed)

NOTES:

In 2009, the American Recovery and Reinvestment Act (ARRA) of 2009 made it possible to address some of the mercury contamination problems at Y-12, primarily for the West End Mercury Area. The current primary source of mercury to UEFPC is via old storm sewer pipes emptying into the creek. More than 20,000 linear feet of storm sewer pipe pathway was inspected with a video camera to determine blockage and the extent of remediation necessary.

By September 2011, more than 8,000 feet of pipe were cleaned and 1,200 feet were lined.

West End Mercury Area storm sewer work site

One of the five mercury tanks is excavated for disposal in 2013

Other mercury reduction, characterization, and planning efforts included characterization of an area known as Exposure Unit 9, the Mercury Reduction Planning and Remediation Projects, the OF200 Conceptual Design Project, and the Five Tank Remediation Project. These tanks, which were removed from service in the 1980s, were excavated and disposed early in 2013.

Disposal Area Remedial Action (DARA) Soils Project

NOTES:

The Disposal Area Remedial Action (DARA) facility was used historically to store mixed waste soils from remediation activities. The DARA soils are a legacy waste that was placed in the facility in 1989. All of the soils contain Toxic Substances Control Act PCBs and mixed hazardous waste with Resource Conservation and Recovery Act spent solvent codes F001, F002, and F005. The remaining 21 cubic yards (y^3) of soil has an additional hazardous waste code of F039.

Approximately 4,000 y^3 of soil were removed from the DARA facility in early 2019. All of this waste was shipped to the EMWMF. Approximately 21 y^3 of soil remain in the DARA facility. This remaining waste will also be shipped to the Nevada National Security Site (NNSS) in FY 2019 .

Outfall 200 Mercury Treatment Facility

NOTES:

The Oak Ridge Office of Environmental Management (OREM) will construct the OF200 MTF to reduce mercury discharges from Y-12 into EFPC. Construction and operation of the OF200 MTF is a CERCLA Interim Action.

A ROD amendment establishing specific design parameters for the OF200 MTF was approved May 2016. These design parameters include a treatment capacity of 3,000 gallons per minute (gpm), a stormwater capture rate of 40,000 gpm, and 2 million gallons of stormwater storage capacity.

The Final Design was completed July 2017. The MTF design includes a headworks facility located immediately downstream of OF200 and a treatment plant located near the east end of Y-12.

The "Headworks" component of the Outfall 200 Mercury Treatment Facility

The headworks will capture, store, and pump stormwater to the treatment plant via a pipeline. The treatment plant will remove mercury from the stormwater and discharge treated water into EFPC. The treatment train includes grit removal at the headworks, flow equalization, pH adjustment, chlorine removal, chemical flocculation and precipitation, media filtration, sludge thickening, and sludge dewatering at the treatment plant.

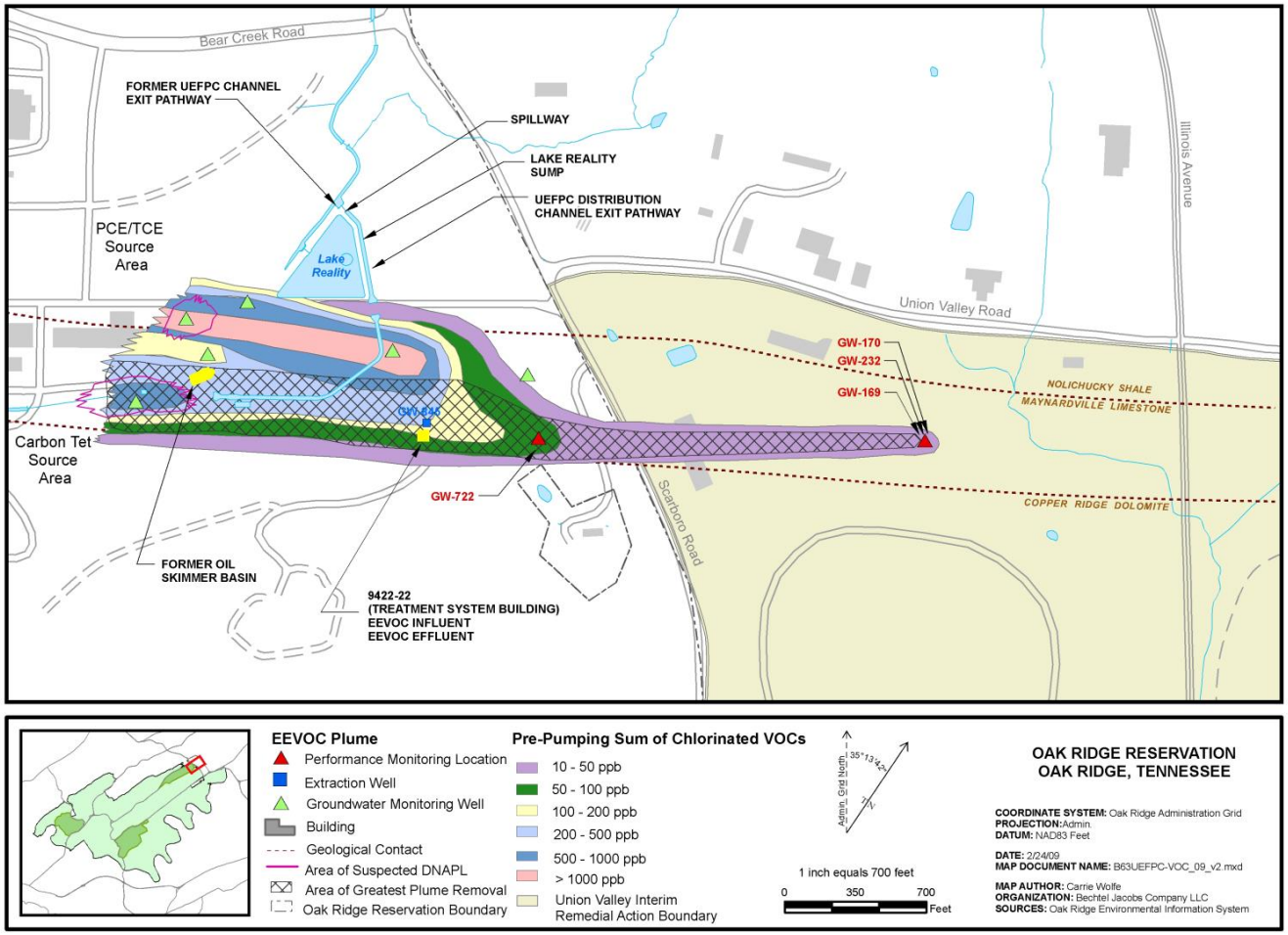
Early site preparation began in December 2017 and was completed in January 2019. The balance of construction began in June 2019 and is planned to be complete by December 2022.

The "Treatment Plant" component of the OF200 MTF

East End Volatile Organic Compound (VOC) Plume

The scope of this project is to mitigate the migration of the VOC groundwater plume beyond the Y-12 boundary to reduce risk to off-site groundwater. The plume extends from the east end of Y-12 to a spring approximately 2,400 feet east of the Oak Ridge Reservation boundary. This VOC plume has been greatly reduced in size by an ongoing groundwater pump and treat system, and a groundwater use restriction through the Union Valley ROD has been placed on the private industrial lands east of the Y-12 site.

NOTES:



Biology Complex

A major step toward changing the Y-12 skyline and reducing worker risk was the demolition of four buildings that comprised a significant portion of the former Biology Complex. That project eliminated 135,812 ft^2 of deteriorated buildings in 2010.

The remaining Biology buildings, including 9207 and 9210, are undergoing pre-demolition activities. Pre-demolition activities include addressing structural concerns and hazardous waste abatement, such as asbestos removal and disposal.

9207 Radiological Surveillance

Planning is underway for final demolition, to be completed in the early 2020s. Remediation of the remaining slabs and surrounding soil will be undertaken as needed following demolition of the facilities. Characterization efforts for the soil are ongoing.

This cleanup effort will make way for a proposed future National Nuclear Security Administration Lithium Production facility.

NOTES:

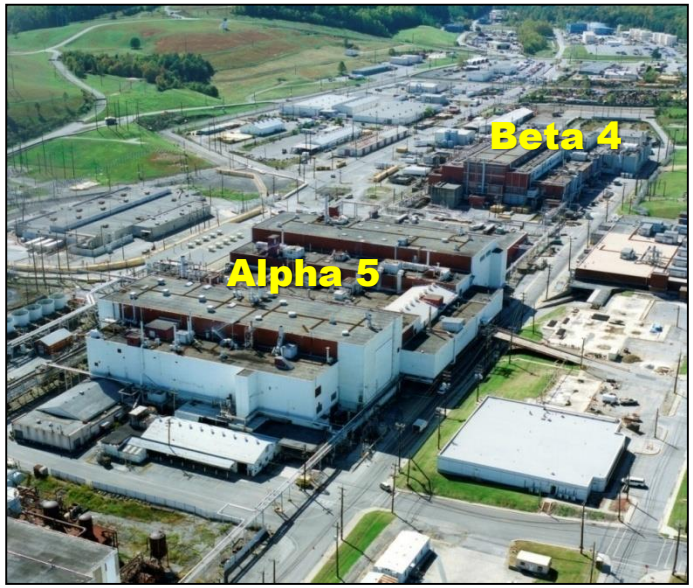
Alpha 5 and Beta 4 Legacy Material Disposition (completed)

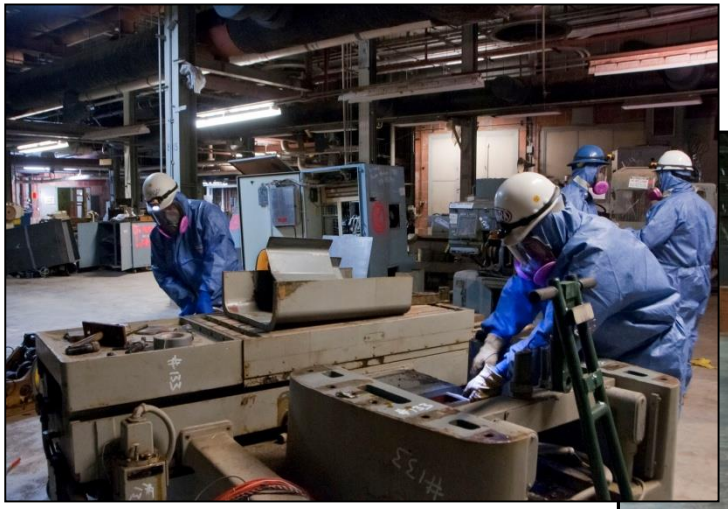
Alpha 5 and Beta 4 date to the 1940s and have been used recently for storing legacy material from past plant operations.

Recovery Act funding was used to clear 3,438 cubic meters of material from Beta 4.

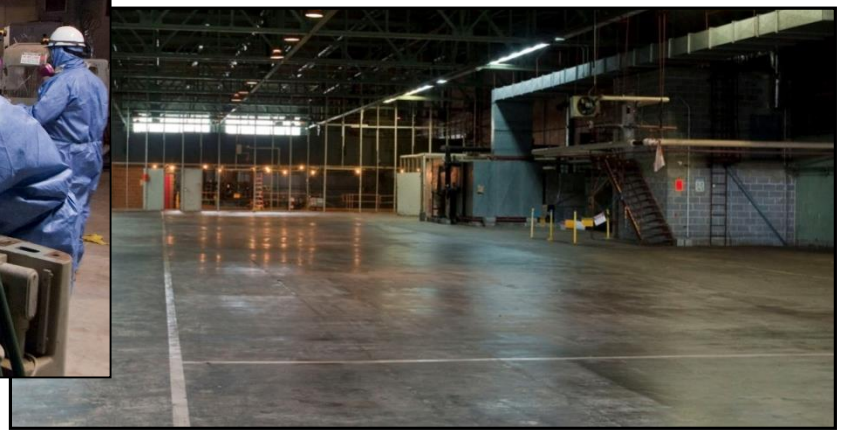
In Alpha 5, 613,000 ft^2 of floor space was cleared of legacy materials.

The total cost for both projects was $122 million.





Cleaning out the interior of Alpha 5



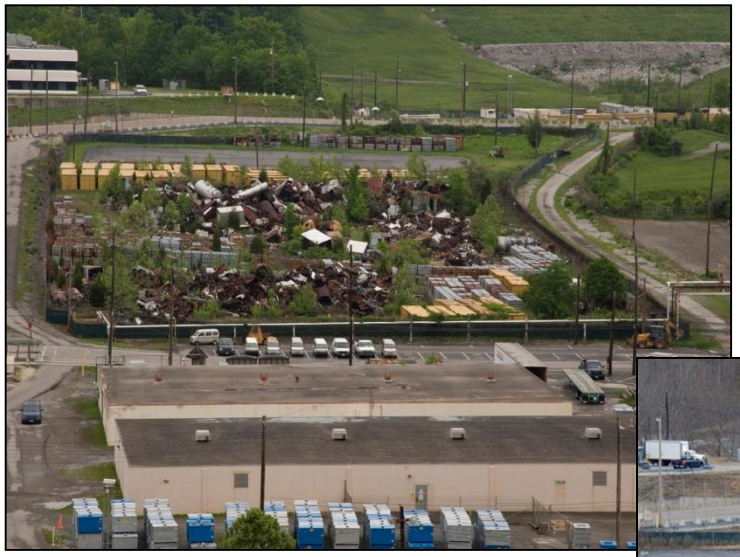
Interior of Alpha 5 after cleanout

NOTES:

Y-12 Salvage Yard (completed)

Scrap removal in the Old Salvage Yard at Y-12 began in 2010 and was completed in 2011. Approximately 31,000 y^3 of radioactively contaminated scrap metal, 1,087 containers of radioactive scrap, and several large pieces of machinery were removed from the site.

NOTES:



Y-12 Salvage Yard at the beginning of the project

Scrap removal allowed access to subsurface soil, and a remedial action was taken to remove contaminated soil that could contribute to groundwater contamination.

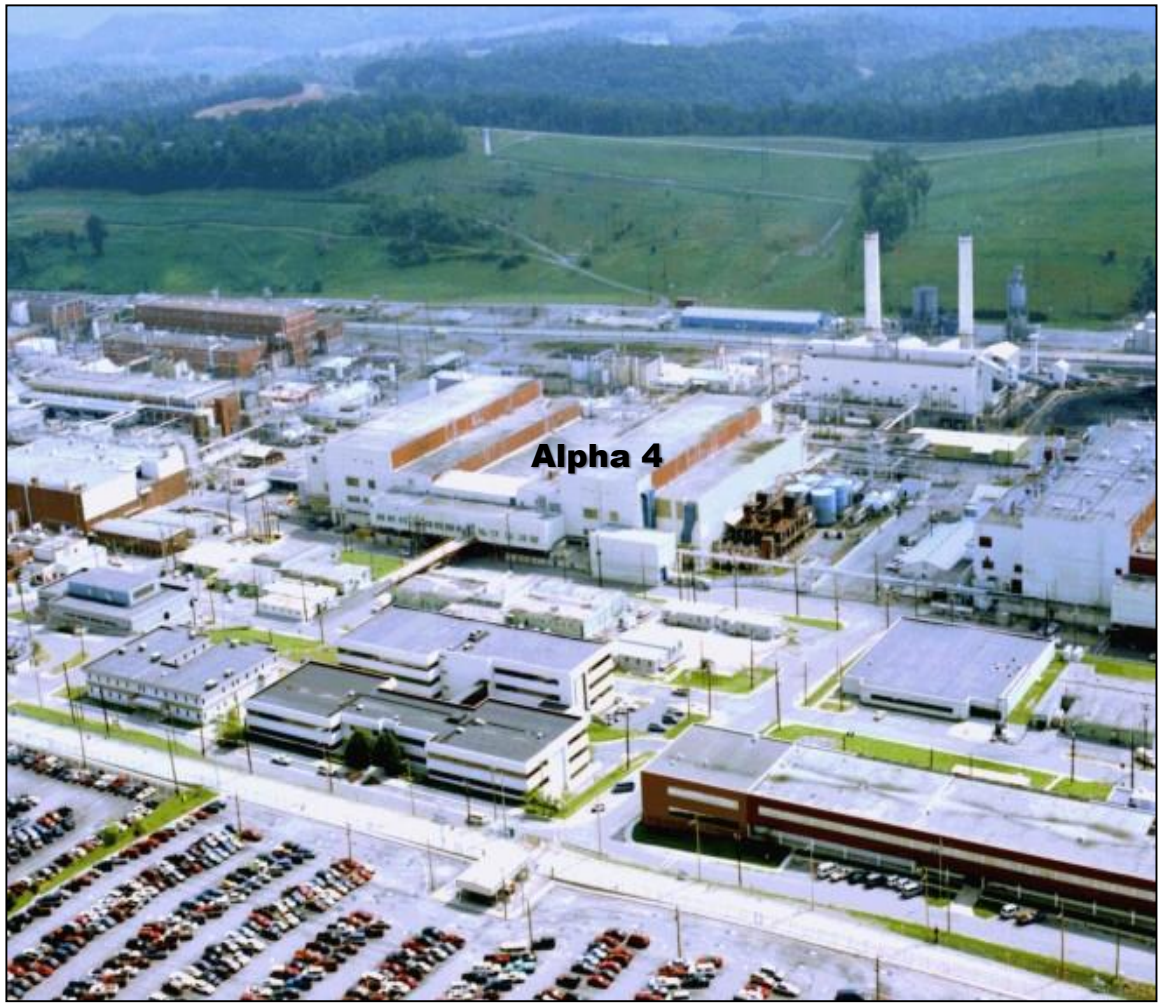
The excavated soil from the salvage yard was characterized and about 988 y^3 of contaminated soil and miscellaneous debris were disposed at the EMWMF in Bear Creek Valley.

Y-12 Salvage Yard as cleanup neared completion

Alpha 4 Project

NOTES:

Alpha 4 is a 600,000 ft^2 transite-covered, structural steel-and-concrete facility with three floors and a sub-basement, located in the protected area of the Y-12 site.



The scope of the remediation project will be to demolish the Alpha 4 facility. Work includes eliminating classification concerns during building demolition, gathering additional building characterization data to support a well-defined scope of work for prospective bidders on the various deactivation and decommissioning (D&D) subcontracts, completing hazardous materials abatement to remove asbestos, deactivating utilities, removing equipment, and demolishing the structure.

S-3 Ponds (partially completed)

NOTES:

The S-3 Ponds site consisted of four unlined ponds constructed in 1951 to manage liquid waste. The ponds received various liquid wastes containing uranium and nitrates from Y-12 operations. The water was treated in 1983 and released. Coarse rock and gravel were added to the remaining sludge, and a cap was used to seal the contents. Asphalt was applied, and the area is now a parking lot. Ongoing monitoring is being performed to evaluate remaining environmental impacts. Future actions will be needed for continued contaminant pathways releases.

S-3 Ponds prior to remediation

A parking lot now covers the old S-3 Ponds site

BYBY/Oil Landfarm Area (completed)

NOTES:

The Boneyard/Burnyard (BYBY) was one of the original (1940s) waste disposal areas in Bear Creek Valley, where uranium and other wastes were disposed in unlined trenches or burned. Approximately one million gallons of waste oils and machine coolants were disposed at Oil Landfarm between 1973 and 1982. The Sanitary Landfill was used from 1968 to 1983 for sanitary solid waste disposal.

View of the restored North Tributary 3 looking south in fall 2004

Same view as above in summer 2006

The "Phased Construction Completion Report for the Oil Landfarm Soil Containment Pad" was issued in 2001 to document actions taken to remove and dispose of all soil from the pad.

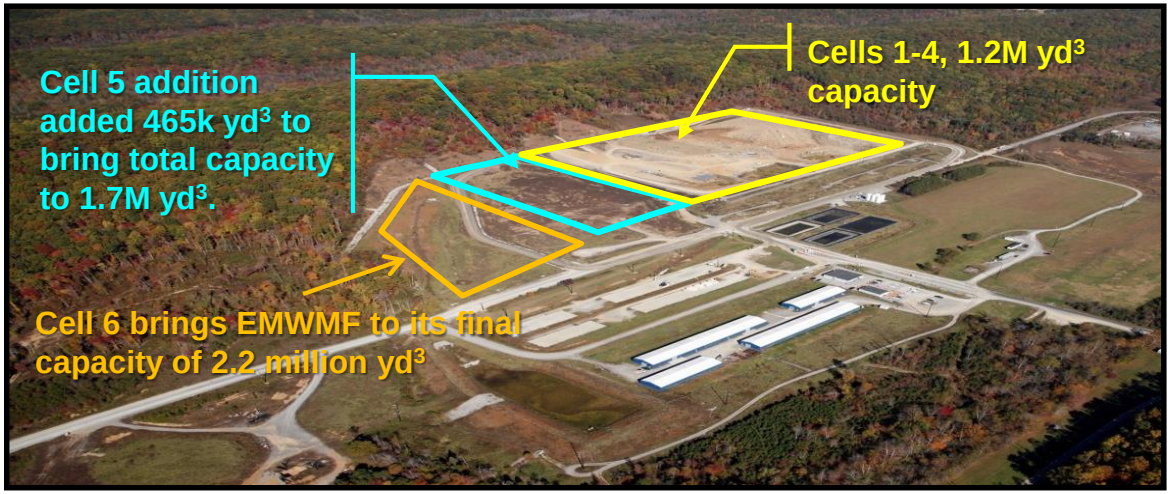
Field construction activities at BYBY began in May 2002 and were completed in FY 2004, eliminating a major source of uranium to Bear Creek. Of the 80,000 y^3 of contaminated debris, 63,000 y^3 were disposed in the EMWMF, and 17,000 y^3 were capped on site. Post-construction monitoring in nearby streams has shown that this significant source of uranium has been eliminated, but that other release sites are contributing more.

Existing CERCLA Waste Disposal Facility

aka Environmental Management Waste Management Facility (EMWMF)

NOTES:

EMWMF is an above-grade disposal facility with multiple layers of protective geotextiles and low-permeability clays above and below disposed waste to prevent contaminants from leaching into the groundwater.



EMWMF accepts low-level radioactive and hazardous wastes that meet specific waste acceptance criteria developed in accordance with EPA and state regulations. Waste types that qualify for disposal include soil, dried sludge and sediment, solidified wastes, stabilized waste, building debris, scrap equipment, and secondary waste such as personal protective equipment.

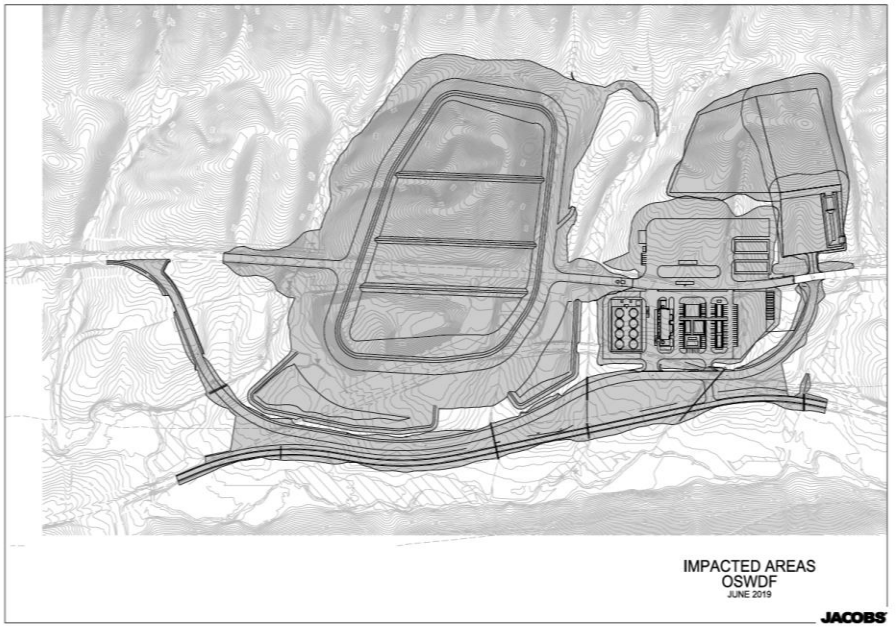
The facility consists of six disposal cells. The completion of the construction of Cell 6, funded by ARRA, brought the facility to its final capacity of 2.2 million y^3. That should be sufficient to handle waste disposition from work in Oak Ridge until the mid-2020s. Plans are being considered to construct a second on-site disposal facility to handle waste generated by additional cleanup activities.

Proposed CERCLA Waste Disposal Facility # 2

aka Environmental Management Disposal Facility (EMDF)

NOTES:

EMDF is a proposed, second above-grade disposal facility with multiple layers of protective geotextiles and low-permeability clays above and below disposed waste to prevent contaminants from leaching into the groundwater. The facility is planned as a CERCLA remedy for disposal of future Y-12 and ORNL waste.



EMDF Site Characterization

EMDF will accept low-level radioactive and hazardous wastes that meet specific waste acceptance criteria developed in accordance with EPA and state regulations. Waste types that will be disposed include soil, dried sludge and sediment, solidified wastes, stabilized waste, building debris, scrap equipment, and secondary waste such as personal protective equipment.

The facility will consist of four disposal cells with a proposed final capacity of 2.2 million y^3. EMDF will provide disposal capacity through the end of the OREM program.

Haul Road from ETTP to EMWMF

In May 2005, construction began on a haul road to transport waste generated from cleanup activities at ETTP to EMWMF without using public roadways.

Construction was finished in January 2006, at a cost of about $20 million. Over the years, the haul road will eliminate 60,000-70,000 truck trips from state Highways 58 and 95.

NOTES:

Bear Creek Valley Burial Grounds

The burial grounds are located approximately two miles west of Y-12 and were operated from about 1955 to 1993. Their primary use was for disposal of uranium turnings and industrial waste contaminated with uranium from nuclear weapons production.

The burial grounds comprise walk-in pits, uranium vaults, and several waste disposal units known as BCBG-A, -B, -C, -D, -E, and -J. Each disposal unit contains a series of trenches that are 14 to 25 feet deep. A concrete blanket covers the burial grounds to mitigate risk posed by shock sensitive materials that are buried there. Remediation of the burial grounds could involve hydrologically isolating the units through a system of caps and trenches. Selected portions may be treated in situ through grouting or vitrification to limit contaminant releases to groundwater.

In 2008, DOE submitted initial drafts of the "Focused Feasibility Study and Proposed Plan for Remediation of the Bear Creek Burial Grounds" to EPA and the State of Tennessee. This document develops and evaluates alternatives for remediation of buried waste and contaminated soils at the burial grounds, and builds upon the "Remedial Investigation and Feasibility Study for Bear Creek Valley", which was issued in 1997. Once a final Proposed Plan is agreed upon, a Record of Decision will be written.

NOTES:

Oak Ridge National Laboratory (ORNL)

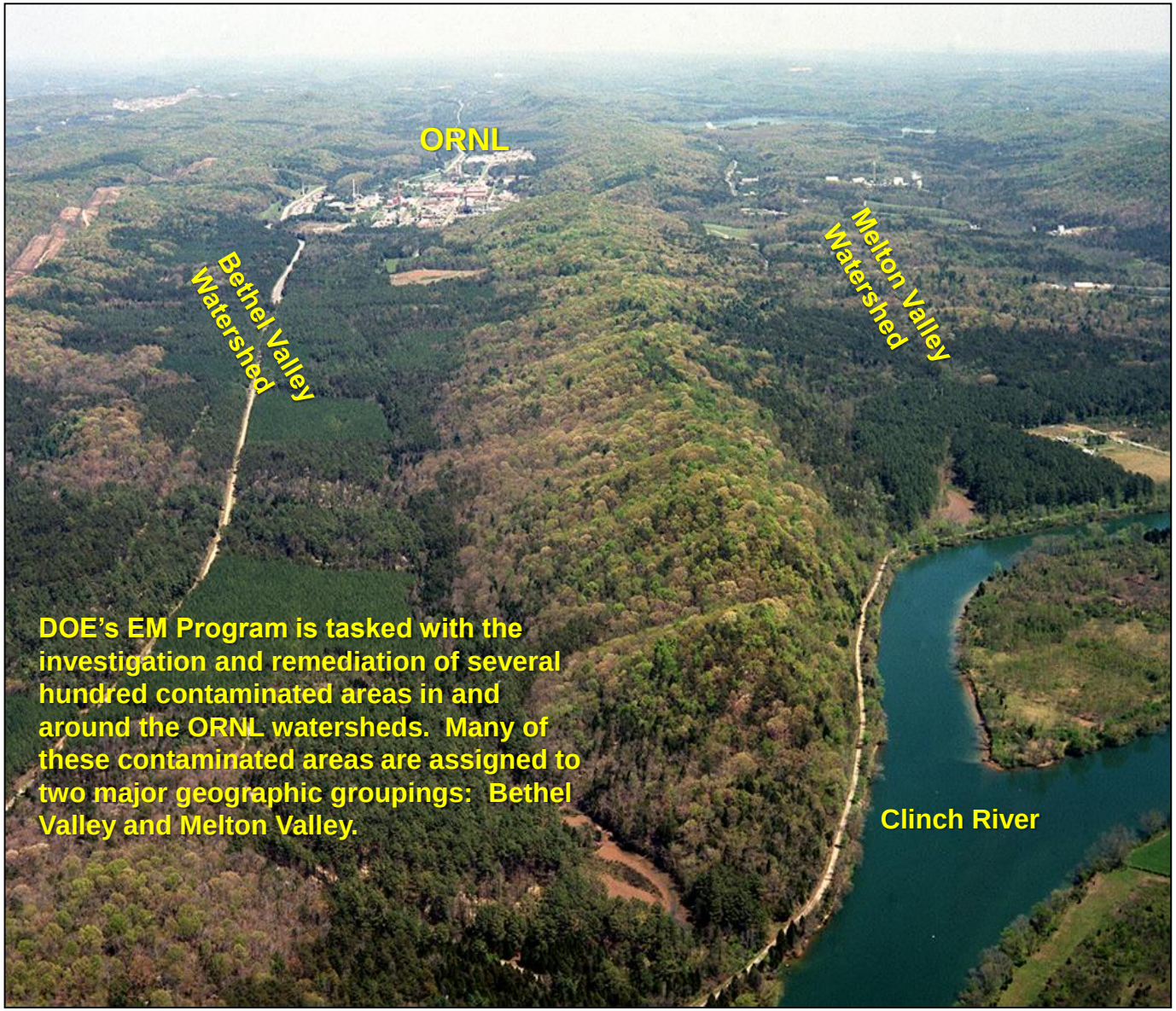
The lab was constructed as part of the Manhattan Project during World War II and was where the first gram quantities of plutonium were produced. The lab is now an internationally renowned research facility with ongoing missions in areas such as energy and biological research for both government and civilian applications. The 2,900-acre site is located approximately 10 miles southwest of downtown Oak Ridge and is managed for DOE by UT-Battelle.

Remediation efforts at the lab focus on its two watershed divisions: Bethel Valley (which includes the main lab area) and Melton Valley (see photo next page). Some remediation in Melton Valley, which posed the highest environmental risk, was completed in 2006. Cleanup work in Bethel Valley includes a variety of challenges: contaminated soil and groundwater, buried inactive process tanks and transfer pipelines, inactive radiochemical processing facilities, and inactive nuclear reactors, totaling over 250 facilities.

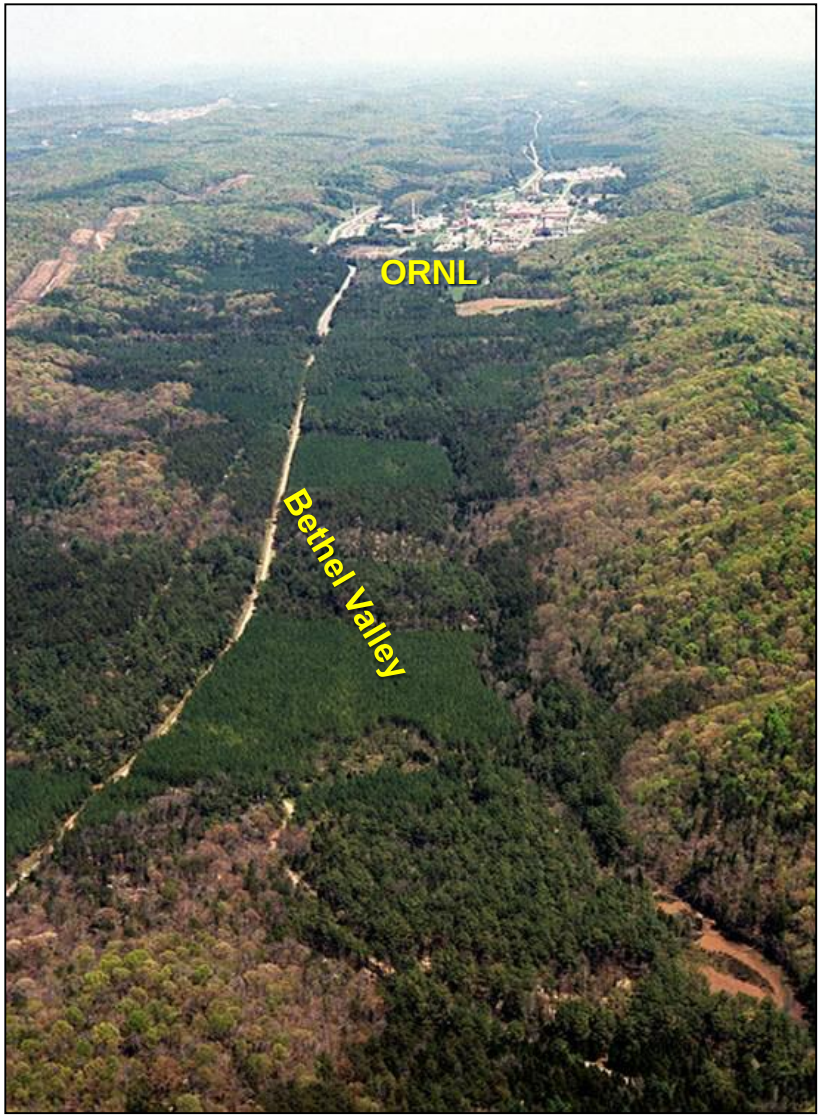
NOTES:

ORNL Watersheds

NOTES:



Bethel Valley Watershed



Bethel Valley encompasses about 1,700 acres of land, including the main area of ORNL. The watershed has approximately 150 sites and buildings that are included in the OREM Cleanup Program.

The types of remediation sites are diverse and include contaminated soil and groundwater, buried process tanks and transfer pipelines, inactive radiochemical processing facilities, and inactive nuclear reactors.

Because of this diversity, the valley has been divided into four regions, based on area hydrology, the level and type of environmental management activities, and the knowledge that the end use of the regions may vary.

The "Record of Decision for Interim Actions in Bethel Valley" was issued in May 2002 and presents the remedies for selected inactive units, accessible sources of contamination, and contaminated media.

High-priority actions have included facility demolition, soil and sediment remediation, burial ground capping, and groundwater. Current missions are focused on disposition of legacy materials and wastes, operation of on-site treatment facilities, and management of excess facilities awaiting D&D.

NOTES:

Liquid/Gaseous Waste Operations (LGWO)

NOTES:

DOE operates three waste treatment systems on a 24/7 continuous operation: the Liquid Low-Level Waste (LLLW) System; the Process Waste (PW) System; and the Gaseous Waste (GW) System. These systems are comprised of 16 Category 2 Nuclear, 8 Radiological, and 34 Industrial facilities, and over 20 miles of underground piping and ductwork at ORNL.

LLLW Evaporator Facility

LLLW System Description

The LLLW System is comprised of 16 Category 2 Nuclear facilities. It consists of a series of dedicated tanks and underground piping used to collect LLLW from generating facilities at ORNL and transfer the waste to Building 2531, the LLLW Evaporator Facility, for volume reduction. The concentrated LLLW is then transferred to storage tanks in Bethel Valley and Melton Valley for long-term storage.

PW 3608 Facility

PW System Description

The Process Waste System includes 7 facilities categorized as Radiological facilities and 16 Industrial facilities. It collects wastewater from generators throughout Bethel Valley and Melton Valley using a series of single-contained hard-piped connections to pumping stations. Pumping stations transfer the wastewater to a tank farm in each valley, where wastewater is stored until transferred to the Process Waste Treatment Complex. The PW system also receives over 4.3 million gallons of leachate from the EMWMF each year by tanker for treatment.

GW 3039 Stack

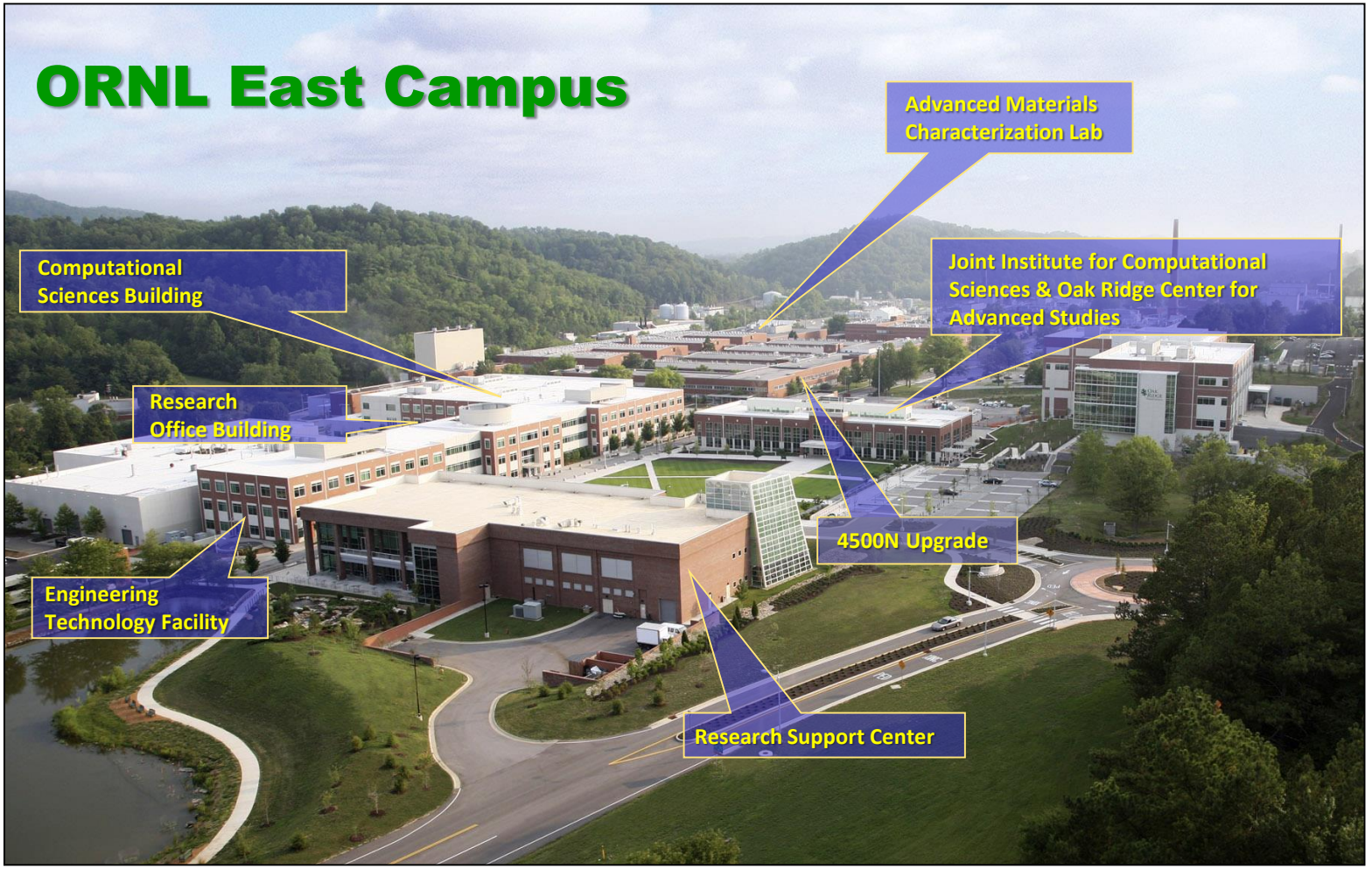
GW System Description

The 3039 Stack Ventilation System includes 5 Industrial facilities that provides off-gas and cell ventilation services to generators throughout the main ORNL Complex in Bethel Valley.

Besides the three systems listed here, LGWO also has 14 support facilities, including a contaminated equipment maintenance facility, a change house, and a centralized monitoring facility.

ORNL Facilities Revitalization Project

NOTES:



ORNL is DOE's largest multipurpose science laboratory and the nation's largest energy Research and Development laboratory, with an $850 million budget, 18 user facilities, and 3,000 guest scientists and engineers annually. Because 80 percent of the facilities are at least 30 years old, the Facilities Revitalization Project was established to provide new and/or refurbished research and support facilities for the lab's science mission. The completed project provides ORNL staff with world-class facilities.

Building 3019 U-233 Disposition Project

Building 3019 is one of the nation's few repositories for U-233. It is also the oldest operating Hazard Category 2 facility in the United States.

The U-233 Disposition Project was required by Congress to resolve safety and security issues associated with the continued storage of U-233. The objective of the project is to dispose of the U-233 inventory by identifying uses for it, completing disposition of containers that can be directly disposed, and treating the remaining inventory prior to disposal.

In August 2017, the direct disposition campaign was completed, with 126 items sent to the NNSS Device Assembly Facility for disposal, 10 items transferred to ORNL for programmatic re-use, and 403 items directly disposed as waste. Current operations are focused on design and preparation for the processing campaign, which will involve down-blending, solidification, and disposal of the remaining material.

NOTES:

Core Hole 8 Plume/Tank W1-A (complete)

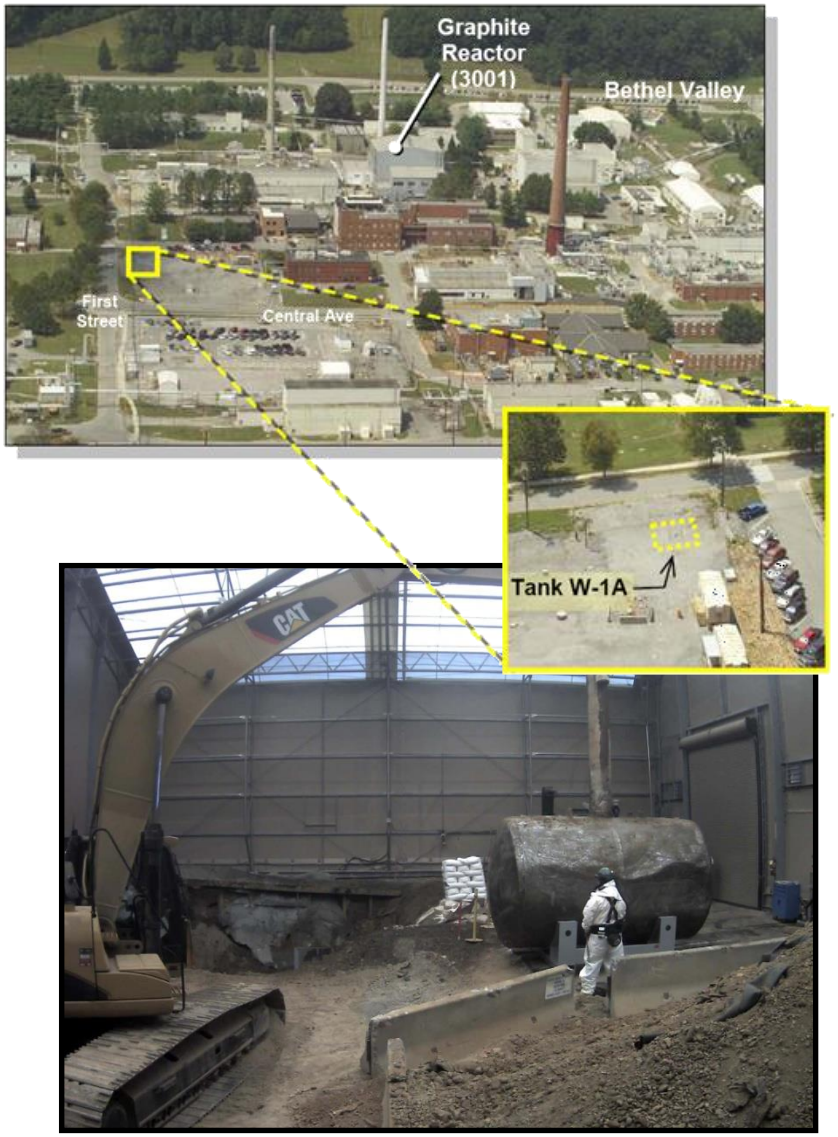
NOTES:

Core Hole 8 is an area of groundwater contamination located in the central portion of ORNL. The plume emanates from contaminated soil surrounding the old Tank W-1A in the North Tank Farm and migrates west to First Creek. The soil became contaminated through a leak at the inlet to Tank W-1A and other leaks from the pipe.

In FY 2011 and FY 2012, two bedrock wells were installed to extract contaminated groundwater and send it to the on-site wastewater treatment system. Older system components were replaced and new wells and a refurbished pumping system began operation in March 2012.

Monitoring in First Creek shows the plume has been contained.

Excavation began in September 2011 to remove Tank W-1A. The tank was successfully removed in January 2012 and was sent to be cut up and disposed off site. Soil and secondary waste disposals were completed in May 2012.



Tank W-1A was removed from the Core Hole 8 area in January 2012

ORNL Reactor and Hot Cell D&D

NOTES:

Most of the facilities at ORNL in the current EM baseline slated for D&D are reactors, laboratory facilities with hot cells, and their associated support facilities. Many of these facilities have high levels of radiation and contain equipment that has been contaminated as well. They might also contain shock-sensitive, pyrophoric materials and other biological and chemical hazards. Several facilities have confined spaces that are unsafe for human entry, and are in close proximity to other operating facilities.

Additionally, there are many facilities at ORNL that are structurally unsound. Structural deterioration of abandoned facilities has occurred, some to the point that it is potentially unsafe for workers to access the facilities for surveillance and maintenance or demolition.

Deactivation activities have been initiated at the reactor facilities in the Central Campus of ORNL, and are being planned for isotope facilities.

Significant safety hazards include failure of upper floors and ceilings; falling debris; asbestos; PCBs; lead paint; bats, fleas, roaches, molds, and other biological hazards from bird and rodent infestation; high radiation activity; chemical hazards; and facility instability.

Building 3026 C&D Hot Cell D&D Project

NOTES:

Constructed in 1943-45, Building 3026 was one of the original Clinton Laboratory buildings built to support the war effort. It was later used for a variety of processing and research activities. The facility had been restricted from entry since 1998 and had fallen into severe disrepair.

The project objective was to remove any remaining legacy materials, abate hazardous materials, characterize hot cells and process equipment, decontaminate as needed, remove the hot cell concrete to slab or grade, and decontaminate the slab.

Building 3026 before demolition in 2010

The structure was demolished in early 2010 and the hot cells were encased in a heavy epoxy fixative.

In April 2012, four cells were demolished and removed from the 'C' side of the building. The remaining two on the 'D' side are more contaminated than originally thought, and will be addressed at final demolition.

D&D activities have been initiated for the remaining surface structures and the inter-connecting tunnel.

Building 3026 Hot Cells and Storage Facility

The Graphite Reactor

The Graphite Reactor was built in 1943 to test the feasibility of producing plutonium for use in atomic weapons on a scale larger than laboratory experiments. It was the pilot for the larger Hanford B Reactor in Washington.

Built in just 11 months, the reactor went critical at 5 a.m. on November 4, 1943. It produced the first few grams of plutonium about four months later.

After World War II, the Graphite Reactor was the first facility to produce radioactive isotopes for peacetime use. The first isotope intended for medical use was produced in August 1946. Subsequent shipments of radioisotopes were intended for scientific, industrial, and agricultural uses.

The Graphite Reactor was shut down in 1963 after twenty years of use. It was designated a National Historic Landmark in 1966, and is now a part of the Manhattan Project National Historical Park, established November 10, 2015.

Current plans include additional decontamination and structural maintenance to support public visits by the National Park Service.

NOTES:

Spallation Neutron Source (SNS)

NOTES:

The Spallation Neutron Source (SNS) is a one-of-a-kind accelerator-based neutron source that provides the most intense pulsed neutron beams in the world for scientific research and industrial development. SNS was built by a partnership of six laboratories.

Neutron scattering research has a lot to do with our everyday lives. For example, things like jets, credit cards, pocket calculators, compact discs and magnetic recording tapes, shatter-proof windshields, adjustable seats, and satellite weather information for forecasts have all been improved by neutron-scattering research.

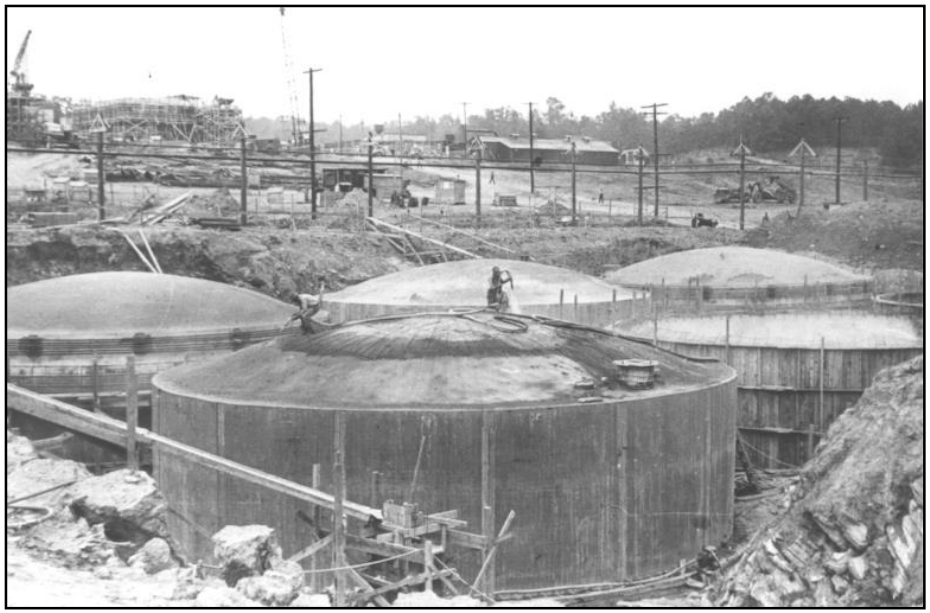
Neutron research also helps researchers improve materials used in high-temperature superconductors, powerful lightweight magnets, aluminum bridge decks, and stronger, lighter plastic products.

Gunite and Associated Tanks (GAAT) (complete)

NOTES:

The GAAT project, completed in August 2001, was charged with remediation of eight underground storage tanks (W-3 through W-10) constructed during the Manhattan Project in 1943. These tanks stored radioactive liquid waste until the early 1970s, when they were taken out of service. The original design life of the tanks was five years.

The GAAT project was the first of its kind completed in the United States. Integrated, remotely-operated robotic equipment was used to clean the tanks.



GAAT construction, 1943

Parking area at former GAAT site

Twenty-eight technologies were used to perform tank characterization, plus waste characterization, removal, mixing, and transfer activities. Retrieved supernate and sludge were transferred to the Melton Valley Storage Tanks for final waste treatment and disposal. The empty tanks were filled with grout and left in place. The removal action report was issued in January 2002.

Surface Impoundments Operable Unit (SIOU) (complete)

SIOU consisted of four impoundments constructed in 1943-44. Until 1989, they received liquid waste containing radiological and hazardous constituents generated at ORNL.

A 1996 study indicated that the continuing releases to White Oak Creek would pose an unacceptable risk. A ROD for remediating the ponds was signed in 1997 to address sediment and surface water. Groundwater remediation will be addressed in the future.

Impoundments C & D were remediated and backfilled in 1998. A sediment treatment plant was constructed in 2000 to treat sediments and sub-impoundment soil. Treatment began in 2001 and was finished in August 2003. Impoundments A & B were then filled with rock and flowable grout to fill voids. The treatment facility was then dismantled and removed from the site.

ORNL has built a parking lot on the site to accommodate the needs of the lab's ongoing revitalization.

NOTES:

Melton Valley Watershed

More than 50 years of operation, production, and research activities at ORNL left a legacy of release sites, contaminated facilities, and areas of secondary contamination on 160 acres of the watershed's 1,062 acres. In the 1950s, the area was also used as the Atomic Energy Commission's Southeastern Regional Burial Ground. During this time, largely uncharacterized radioactive wastes from more than 50 other facilities or federal programs were disposed here. The watershed has approximately 100 sites and buildings, which are included in the OREM Cleanup Program.

NOTES:

Melton Valley Burial Grounds

The Melton Valley Burial Grounds posed the highest risks to human health and the environment on the Oak Ridge Reservation, so this project provided an opportunity for early and significant risk reduction. Remediation was completed in 2006. Cleanup actions included hydrological isolation through installation of multilayer caps; retrievable TRU waste removal, treatment, and disposal; soil and sediment excavation and disposal; small facilities demolition; in-situ grouting; hydrofracture well plugging/ abandonment; and legacy waste and spent nuclear fuel disposition.

NOTES:

Solid Waste Storage Area (SWSA) 4 Burial Grounds (complete)

NOTES:

SWSA 4 during operation in the 1950s

Solid Waste Storage Area (SWSA) 4 was used from 1951 to 1959 for disposal of various liquid and solid radioactive wastes in unlined trenches and auger holes. In Spring 2001, DOE released the "Remedial Design Report/Remedial Action Work Plan for the SWSA 4 Area and the Intermediate Holding Pond", which outlined remediation of the area.

The SWSA 4 project included construction of a 32-acre, multi-layer cap over the area to minimize infiltration during precipitation, thereby protecting workers and wildlife. Approximately 2,400 linear feet of upgradient diversion trench and 1,200 linear feet of downgradient collection trench were installed. A groundwater treatment plant was constructed, and Lagoon Road was relocated as part of the project. Work was completed in September 2006.

SWSA 5 Burial Grounds (complete)

NOTES:

SWSA 5 was used to store or dispose of a variety of waste types, including low-level wastes, TRU wastes, and spent nuclear fuel. During the 1970s, TRU wastes were stored in trenches in retrievable containers. After the 1970s, newly-generated TRU wastes were stored in constructed facilities. The SWSA 5 trenches contained 204 concrete casks, 18 boxes, and 12 drums of TRU waste.

Waste disposal practices at SWSA 5, 1950s through 1970s

During remediation activities, all retrievable TRU waste containers from 22 trenches were removed and taken to the Transuranic Waste Processing Center (TWPC), where they are being segregated and prepared for disposal at WIPP in New Mexico. The exception is the retrievable waste in Trench 13, where work was suspended because of a flame-up incident. The remediation of Trench 13 will be addressed at a later date.

TRU waste retrieval operations

Soil exceeding remediation levels (as designated in the Melton Valley ROD) and debris waste associated with excavation were disposed at the EMWMF and other appropriate facilities. Spent nuclear fuel stored in SWSA 5 was retrieved, repackaged, and shipped to DOE's Idaho National Laboratory and Savannah River Site in 2004. Waste management facilities in SWSA 5 were demolished in 2005.

Multi-layer caps were installed in SWSA 5 to minimize water infiltration and protect workers and wildlife. Capping activities were completed in 2006.

SWSA 6 Burial Grounds (complete)

SWSA 6 was used for the disposal of solid low-level and mixed radioactive waste in trenches, auger holes, silos, and storage pads called tumuli. Only low-level waste was disposed in SWSA 6 after May 1986. Trenches and auger holes that received hazardous and/or mixed waste after November 8, 1980, were designated as "Resource Conservation and Recovery Act-Regulated Sites" that require a closure plan.

Remediation activities included demolition of surplus waste management facilities in 2005 and installation of multi-layer caps to minimize infiltration during precipitation, thereby protecting workers and wildlife. Spent nuclear fuel stored in SWSA 6 has been retrieved, repackaged, and shipped to off-site disposal facilities.

NOTES:

Transuranic Waste Processing Center (TWPC)

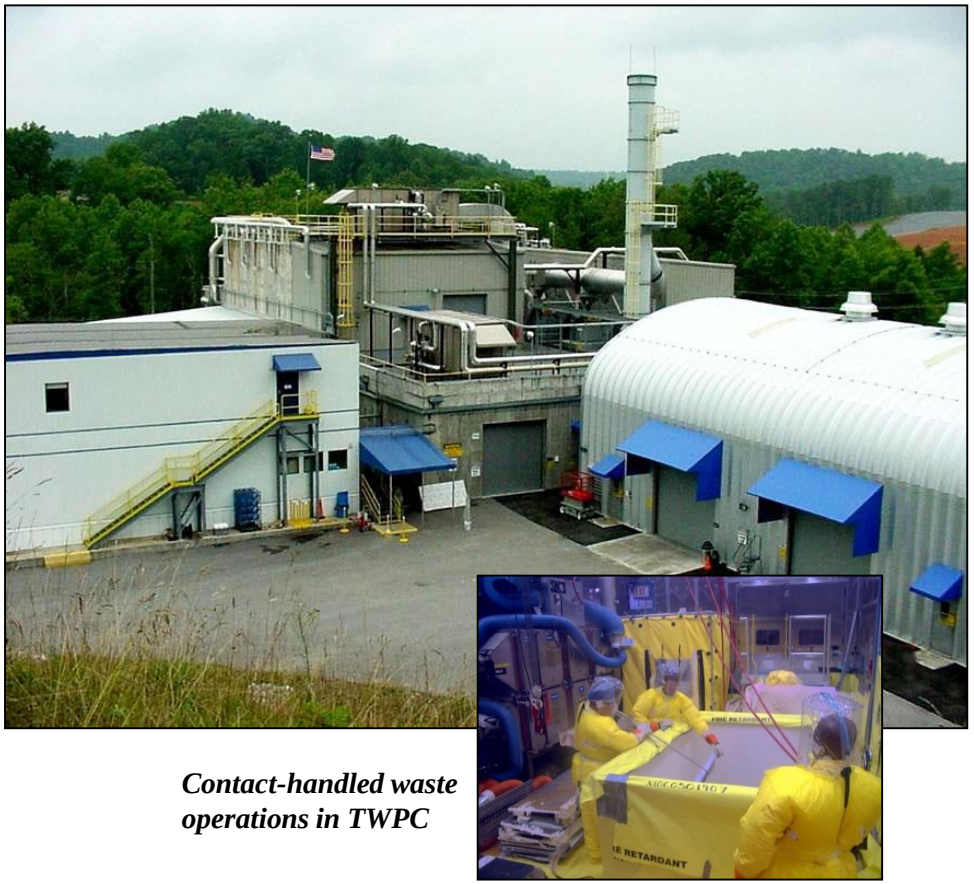
NOTES:

Two incidents in early 2014 caused the temporary shutdown of WIPP. WIPP reopened in December 2016, and TWPC began shipment of CH TRU waste to WIPP in August 2017. Once WIPP's ventilation system is modified, RH TRU waste shipments are expected to begin (Fiscal Year 2021).

The TRU Waste Processing Center is located next to the Melton Valley Storage Tanks, which contain liquid TRU wastes. Solid TRU wastes are stored in engineered bunkers and metal buildings at ORNL. Waste types include contact-handled (CH) and remote-handled (RH) TRU waste.

Storage tank supernate processing operations began in January 2004 and was completed in 10 months, disposing of more than 400,000 gallons of highly radioactive liquids containing approximately 30,000 curies.

CH TRU operations began in February 2006, and the first TRU waste shipment left Oak Ridge on September 28, 2008, for final disposal at WIPP in New Mexico. Of the 1,588 cubic meters of CH waste, 98 percent has been processed and 75 percent has been shipped for disposal.



Contact-handled waste operations in TWPC

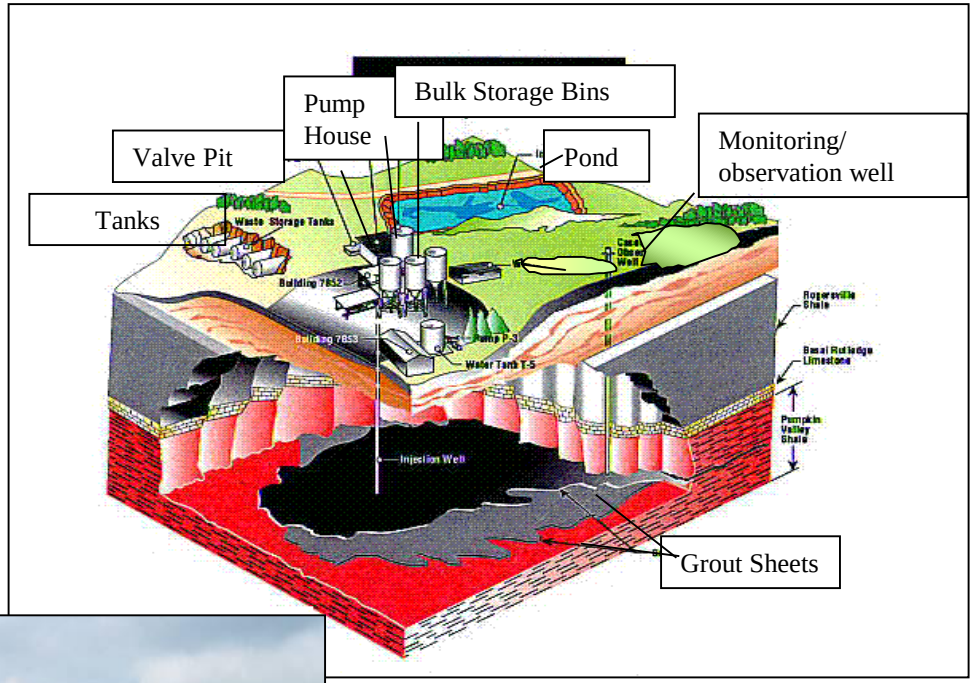
Of the 691 cubic meters of RH waste, approximately 98 percent have been processed and approximately 53 percent has shipped. A facility to be used for processing RH TRU sludge is under design, with construction planned in the late 2020s.

Hydrofracture Facilities and Wells (complete)

NOTES:

The technique of waste disposal by hydrofracture was pilot tested at ORNL to meet the need for permanent disposal of low-level radioactive waste. From 1959 to 1984, 43 injections were made in four wells at the Old Hydrofracture and New Hydrofracture Facilities. More than 5 million gallons of waste grout were injected into the wells.

Research has shown that a contaminated filtrate plume surrounds the grout, and that observation wells are contaminated and provide a potential pathway for contaminant migration.



Remediation activities at the New Hydrofracture Facility

The 107 monitoring wells and four injection wells have been plugged to prevent migration of contaminated fluids to more shallow groundwater zones. The Old Hydrofracture Facility was demolished in 2003. The New Hydrofracture Facility was demolished and waste removed, with the exception of three hot cells. Site restoration was completed in 2006. Groundwater contamination associated with the hydrofracture facilities continues.

Melton Valley Off-Site Monitoring Wells

NOTES:

There are concerns that contamination from the Melton Valley Burial Grounds could be migrating via groundwater off site, under the Clinch River, and into groundwater under private property on the west side of the Clinch.

To determine if that is happening, a line of monitoring wells were placed on private property to detect any migration of contaminants.

Multiple rounds of sampling in wells installed by DOE and other private wells indicate minimal, if any, ongoing migration of contaminants from the Melton Valley Burial Grounds to off-site wells.

Property owners who have wells on the west side of the Clinch have had their wells taken out of service; they have been connected to public water systems at no charge while DOE continues to monitor groundwater for evidence of contamination.

In 2014, DOE completed a study of off-site, privately-owned wells to look for evidence of off-site migration. The study found no definite evidence of off-site migration; however, DOE will continue to monitor these wells.

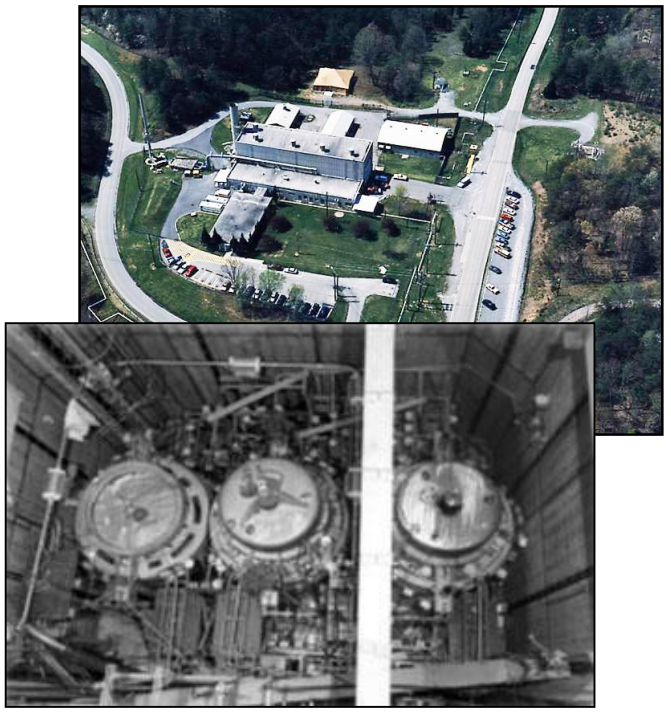
Three additional wells are planned to be installed to monitor the exit pathway from Bethel Valley and Melton Valley sources.

Molten Salt Reactor Experiment (MSRE)

NOTES:

The Molten Salt Reactor Experiment (MSRE) operated from 1965 to 1969. Unlike most reactors that use fuel rods, MSRE was fueled by molten salt that flowed through the reactor chamber. When MSRE was shut down, the salt was drained into two storage tanks, where it solidified. A flush salt was circulated through the reactor, drained into a third tank, and solidified. All three storage tanks are located in an underground, concrete-shielded cell.

From 1987 to 1994, surveillance activities detected a migration of radioactivity from the tanks to other process lines. A 2- to 3-kilogram uranium deposit in the charcoal bed that filtered the off-gas from the tanks was also detected. Because of concerns about a release of contamination or nuclear criticality, all staff at the facility were relocated and a remediation project was begun in 1994.



MSRE tanks

Removal of the uranium, as uranium hexafluoride (UF_6) gas, was essentially completed in 1997 although small amounts of UF_6 are still being generated in the tanks and require periodic removal. In 2001, a majority of the uranium, sufficient to preclude criticality, was removed from the charcoal bed.

Processing of the initial flush salt tank was initiated in December 2004 and completed in June 2005. The last of the U-233 was removed from the drain tanks in March 2008. The uranium was separated from the salts and then transferred to sodium fluoride traps, which were sent to Building 3019 at ORNL for interim storage. A final disposition path for the uranium is to be determined.

An engineering evaluation was completed to determine actions that can be taken to reduce risks at MSRE until D&D can occur. As a result of the recommendations from that evaluation, DOE is pursuing projects to provide continuous ventilation of the fuel salt drain and flush tanks, and charcoal bed, as well as actions to upgrade the facility electrical systems for critical equipment. The facility will then be placed in warm standby until future D&D.

East Tennessee Technology Park (ETTP)

NOTES:

ETTP prior to major demolition work

The K-25 Gaseous Diffusion Plant, now known as ETTP, was constructed in 1943 to produce enriched uranium for defense purposes and later for nuclear power reactors. Operations were permanently shut down in 1987. Located 13 miles west of downtown Oak Ridge, the site originally contained nearly 500 facilities.

Primary remediation concerns include uranium and VOC-contaminated groundwater plumes and surface water, solid low-level waste (uranium) burial grounds, and D&D of radioactive-contaminated buildings. Cleanup actions include demolition of all facilities not transferred to private entities by 2020, removal of depleted UF_6 cylinders (complete), excavation of most burial grounds and contaminated soils, reaching remediation decisions on groundwater, and disposal of legacy waste (complete).

ETTP Zone 1 Record of Decision

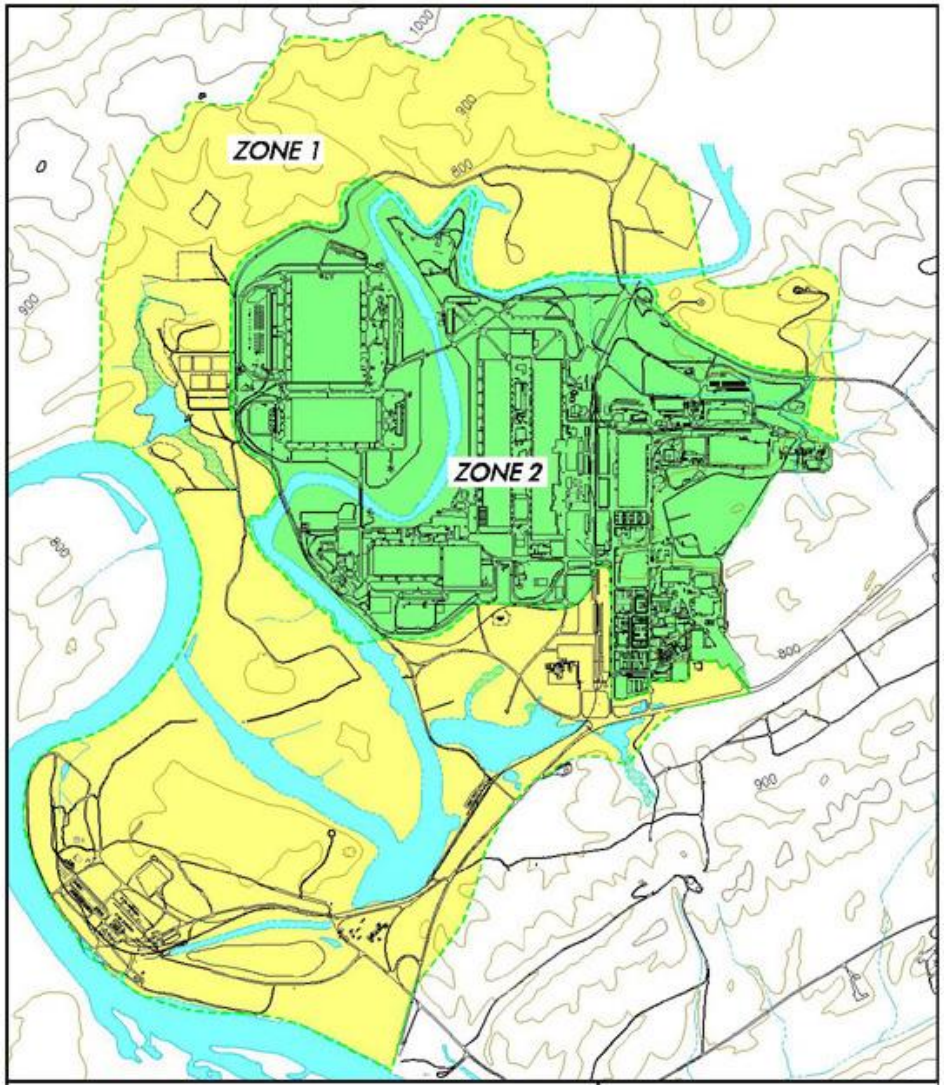
NOTES:

Zone 1 encompasses approximately 1,400 acres wrapping around the site's northern, western, and southwestern boundaries.

In September 2000, DOE, EPA, and the Tennessee Department of Environment and Conservation (TDEC) agreed to a path forward for the cleanup of ETTP. This agreement includes an interim decision on soil remediation in Zone 1. DOE, EPA, and TDEC signed the ROD for Zone 1 in November 2002.

Two notable remediation projects in Zone 1 have been completed: Blair Quarry characterization and excavation, and the K-770 scrap removal project. In addition, over 1,000 acres have been cleared, surveyed, characterized, and remediated as necessary, so that these areas have been approved now for no further action.

A final Zone 1 soils ROD is being prepared to finalize the appropriate end-use goals. RODs will be developed to address the terrestrial ecological, surface water, and groundwater for both Zone 1 and Zone 2.



ETTP Zone 2 Record of Decision

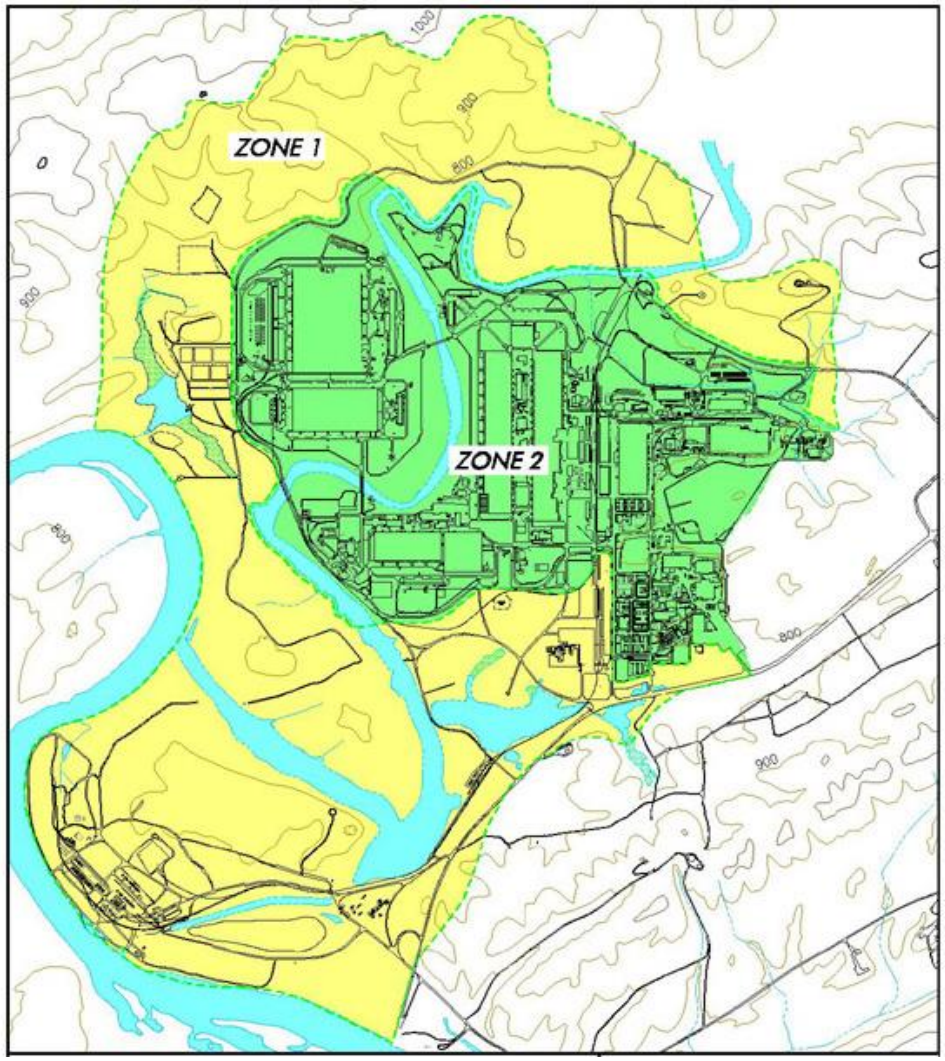
NOTES:

Zone 2 encompasses approximately 800 acres within the former main industrial area of ETTP. Risk assessment work shows shallow soil contamination, primarily radionuclides, in several locations throughout Zone 2 that could pose a risk to future industrial workers. Additionally, deeper soil in a few locations could either pose a future industrial risk or could be a source of continuing groundwater contamination.

The "Record of Decision for Soil, Buried Waste, and Subsurface Structures in Zone 2 at the DOE East Tennessee Technology Park" was signed in April 2005.

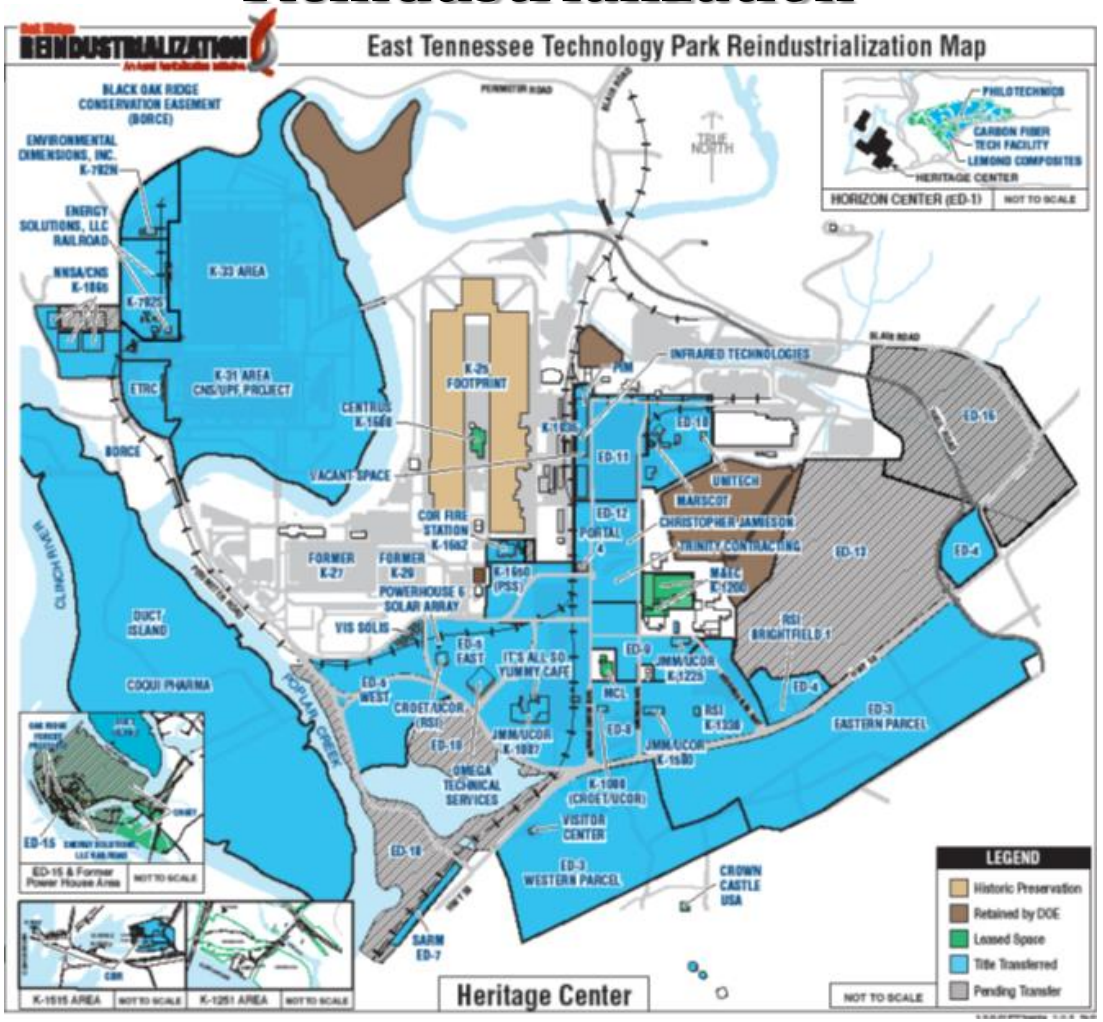
The selected alternative identified in the ROD calls for removal of contaminated soil to a depth of 10 feet, buried waste removal from K-1070-B regardless of depth, and partial removal of the K-1070-C/D classified burial ground.

Ongoing groundwater treatability studies in Zone 2 will provide data and support decisions made through the CERCLA process in a sitewide final ROD.



Reindustrialization

NOTES:



DOE established the Reindustrialization Program, which helps promote economic development by making DOE assets such as land, buildings, and infrastructure available to the private sector. The map shows areas at ETTP that are transferred, leased, and currently available for transfer.

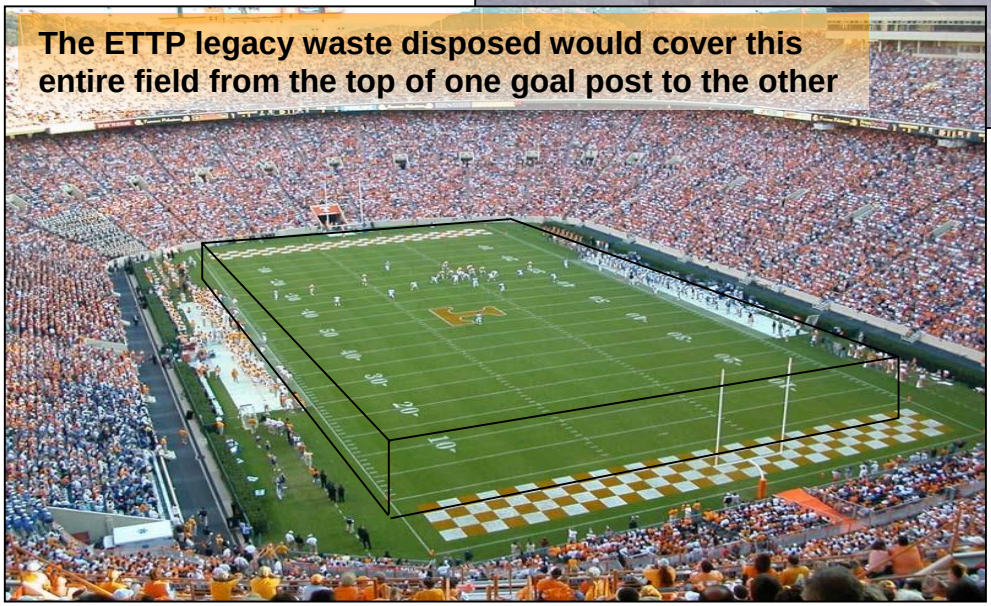
DOE has also turned over portions of water, sewer, and electrical lines to the City of Oak Ridge and plans to transfer additional interior roadways and utility infrastructure.

Legacy Waste Milestone

The legacy waste milestone was completed in September 2005.

As part of the milestone, 22,000 containers of low-level and 4,000 containers of mixed low-level waste were sorted, segregated, treated, and disposed. The total amount disposed was 1,250,000 cubic feet.

Completion of this milestone required more than 3,000 shipments covering over 2.5 million miles of travel. This activity was accomplished with zero transportation accidents.



NOTES:

Building D&D

NOTES:

As part of cleanup efforts at ETTP, buildings have been razed at the site at a steady pace and work has been finished on many that were selected for demolition for a variety of reasons: contamination, poor physical condition, proximity to surface water, and surveillance and maintenance costs. These facilities include buildings, tanks, sheds, and other structures. Demolition is accomplished by grouping like facilities into demolition packages to achieve subcontract economies.

K-25/K-27 Building D&D (complete) (1 of 4)

NOTES:

The K-25 and K-27 buildings were constructed for enriching uranium for defense purposes and later nuclear power reactors. Operations were permanently shut down in 1987. In August 2001, DOE issued the "Engineering Evaluation/Cost Analysis for the D&D of the K-25 and K-27 Buildings at ETTP", which addressed the non-time-critical removal of the buildings and their contents. The scope of the project included actions to abate hazardous materials, remove process and support equipment and piping, demolish the two building structures, and dispose of all wastes. The buildings had a combined footprint of approximately 2 million ft^2 and contained more than 3,500 converters, 6,700 compressor motors, and 400 miles of process pipe.

The first demolition activity on K-25 was completed in 2008 with removal of the northwest bridge that connected the west wing to the base of the U-shaped structure. A major milestone was reached in December 2008 when demolition began on the south end of the west 'leg' of K-25.

The final portion of the west wing demolition was completed on January 20, 2010. Demolition of the East Wing began in 2011. The south end units of the east wing were contaminated with technetium, and those sections were isolated from the rest of the east wing. Demolition of the northern run of the East Wing and North Tower that connected the two wings was completed in January 2013. Final demolition of the East Wing was completed in December 2013.

Demolition of Building K-27, the last remaining gaseous diffusion plant building at ETTP, began in February 2016 and was complete six months later in August 2016.

K-25/K-27 Building D&D (complete) (2 of 4)

NOTES:

Converter prep for shipment for disposal

Uranium hexafluoride vent, purge, and drain operations

Right: asbestos removal

Miscellaneous equipment removal

Left: sampling process systems in K-25

K-25/K-27 Building D&D (complete) (3 of 4)

NOTES:

Primary demolition of K-25 began on December 1, 2008

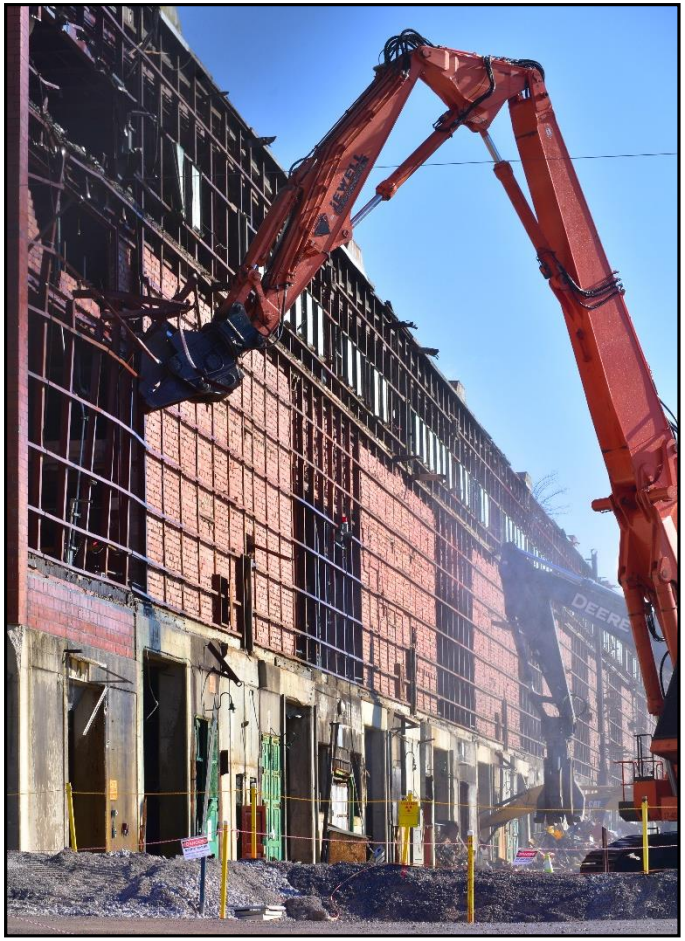
Final demolition of west 'leg' of K-25 was completed in January 2010

The last part of the North Tower that connected the two 'legs' of K-25 came down on January 23, 2013

The last section of K-25 came down in December 2013

K-25/K-27 Building D&D (complete) (4 of 4)

NOTES:



In FY 2012, DOE and cleanup contractor URS | CH2M Oak Ridge LLC developed a plan to accelerate demolition of K-27. The building had deteriorated rapidly requiring timely attention to ensure safe and efficient demolition.

Pre-demolition work included non-destructive assay of process piping, vent/purge/drain activities, installation of safety controls, and removal of high-hazard sodium fluoride traps.

After completing deactivation and demolition activities, building demolition began in February 2016 and was complete in August 2016. The building slab was removed and remedial actions will be completed as necessary to reduce potential hazards associated with contaminated soil.

K-25 Historic Preservation

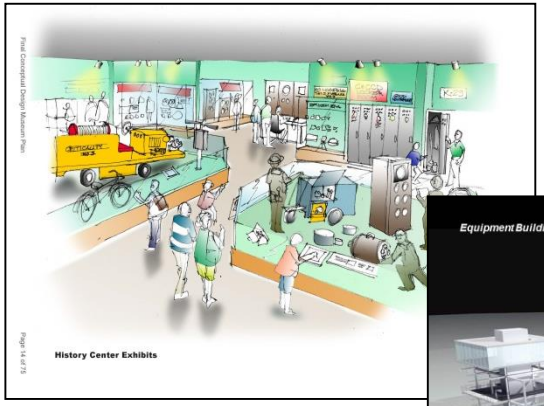
K-25 played such an important role in the Manhattan Project that efforts have been underway for many years to commemorate its place in history.

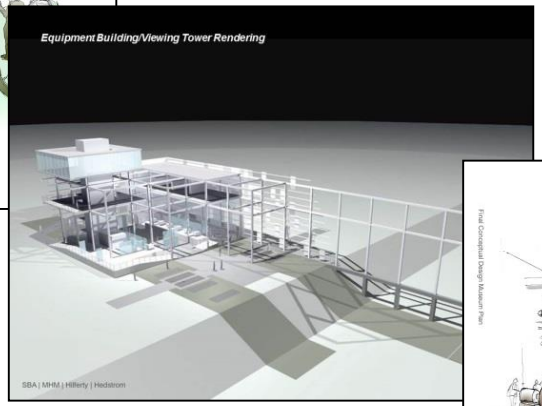
After months of work to develop and evaluate many alternatives, a memorandum of agreement (MOA) was signed among a number of parties laying out plans for historic preservation. The Oak Ridge Site Specific Advisory Board is a consulting party to the MOA.

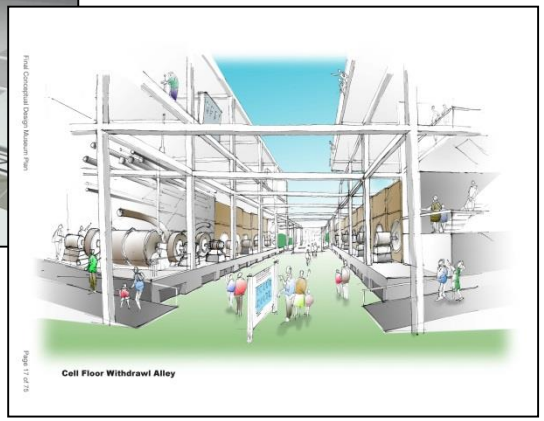
The second floor of the ETTP fire station will house a theater and museum to display Manhattan Project and K-25 artifacts and exhibits of life in the early years of Oak Ridge.

The historic preservation plan includes a number of wayside markers around the K-25 site and a virtual museum.

In 2015, the National Park Service established a Manhattan Project National Historical Park in three states, and the K-25 site is one of those locations.







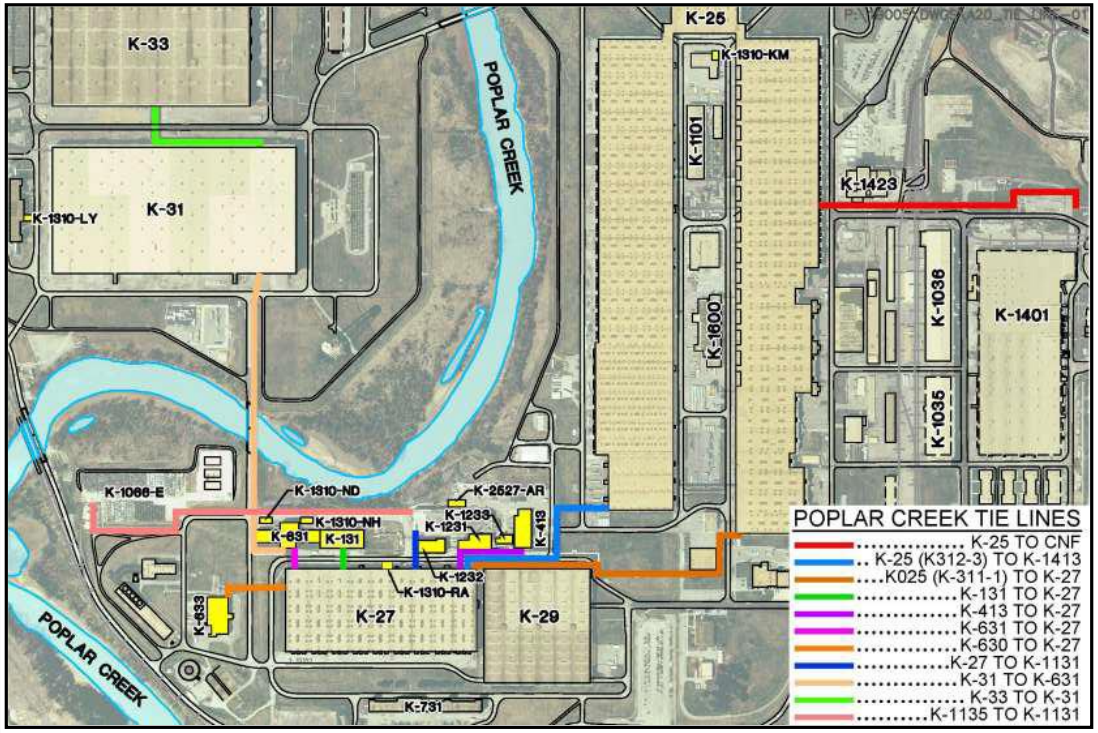
Conceptual design drawings of museum exhibits, Equipment Building and Viewing Tower, and Withdrawal Alley

The MOA calls for retention of the iconic U-shaped footprint of the building. An Equipment Building will be a scaled replica of the gaseous diffusion technology with an accompanying viewing tower so visitors can get an elevated view of the footprint of the huge building.

NOTES:

Poplar Creek Building D&D (1 of 2)

NOTES:



Poplar Creek facilities were located north and west of Building K-27 and primarily supported operations in Buildings K-27 and K-29. The demolition project also included removal of approximately 12,000 linear feet of process gas and utility tie lines associated with the Gaseous Diffusion Plant Facilities.

The project began in July 2008 is scheduled to be complete before the end of FY19.

Major Poplar Creek facilities include:

Building K-131: 83,000 ft^2 Feed Vaporization and Field Maintenance Facility - demolished in 2019
Building K-413: 15,300 ft^2 Product Withdrawal Facility - demolished in 2009
Building K-631: 19,000 ft^2 Process Tails Facility - demolished in 2019
Building K-633: 19,000 ft^2 Test Loop Facility - demolished in 2018
Building K-1231: 21,000 ft^2 Process Building - demolished in 2009
Building K-1232: Chemical Recovery Facility - demolished in 2018
Building K-1233: 6,000 ft^2 Collection Facility - demolished in 2009

Poplar Creek Building D&D (2 of 2)

NOTES:

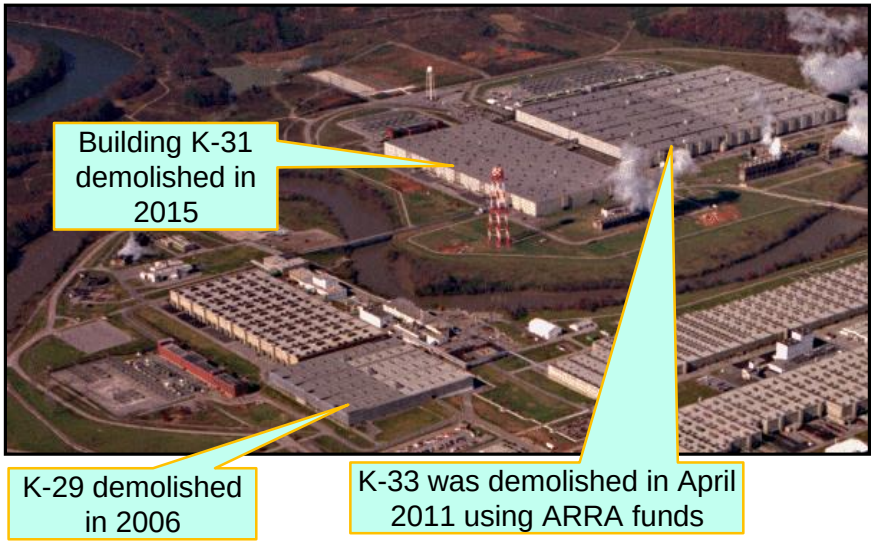
Building K-131 demolition

BCS supporting Deactivation

Process gas line demolition

Building K-633 demolition

K-29, K-31, K-33 D&D (complete)



Buildings K-29, K-31, and K-33 contamination removal was substantially completed in September 2005. These cavernous gaseous diffusion buildings comprised almost 5 million ft^2 of floor space. More than 159,000 tons of material were dismantled, removed, and dispositioned from the buildings during the D&D project performed by BNG America.

The original plan was to clean up all three and convert them into usable facilities for private industrial tenants. However, DOE later decided that the three buildings were not structurally sound or suitable for reindustrialization.

In July 2005, the K-29 building was transferred to Bechtel Jacobs, Co. for demolition, which was completed in 2006.

Buildings K-31 and K-33 were transferred to Bechtel Jacobs for surveillance and maintenance in anticipation of finding private companies to lease them. However, a decision was made to use ARRA funds to demolish the K-33 Building at an estimated cost of $51 million. Demolition was completed in April 2011.

K-31 demolition was completed in June 2015.

K-33 demolition

NOTES:

Environmental Contamination Addressed at ETTP

NOTES:

Releases to Mitchell Branch

Operation of the chromium Water Treatment System began in FY 2012 to capture hexavalent chromium that would otherwise enter Mitchell Branch. This improves the water quality in Mitchell Branch and Poplar Creek.

K-1070-B Burial Ground

Chromium Water Treatment System at ETTP

K-1070-B Burial Ground

Excavation of six trenches and two hot spots was completed at the 6.5-acre landfill near the K-25 Building site.

Debris and soil were excavated down to 10 feet for protection of groundwater. More than 100,000 y^3 of soil and debris were disposed.

After excavation, the site was graded and contoured, covered with topsoil, and re-seeded.

Toxic Substances Control Act Incinerator (TSCAI) (complete) (1 of 2)

NOTES:

For many years, TSCAI was the only U.S. facility permitted to incinerate certain radioactive or hazardous wastes.

TSCAI began operations in 1991 and it burned more than 35 million pounds of solid and liquid waste. It was shut down permanently on the morning of December 2, 2009.

Actions were taken to encapsulate remaining PCB and radioactive contamination. This helped fix potential contaminants and reduce the cost of ongoing surveillance and maintenance, until the facility was demolished.

Demolition was completed in 2018.

Roy Finchum, left, and Mike Meridith, were employees at TSCAI during its entire operational period and were on hand for both startup and shutdown of the incinerator

Toxic Substances Control Act Incinerator (TSCAI) (complete) (2 of 2)

NOTES:


TSCAI Pre-demolition


TSCAI Demolition


TSCAI Post-demolition

Blair Quarry (complete)

NOTES:

Located on Blair Road, Blair Quarry was created in the early 1940s by excavating into McKinney Ridge, forming a U-shaped amphitheater with exposed rock on three sides. The rock material was used for construction of the K-25 Site. The quarry operated until 1945 and was then used for open burning of trash and debris through the late 1950s.

Excavation activities


Aerial shot of excavation

More than 12,000 y^3 of contaminated soil and debris were removed from the quarry as part of the DOE remediation project for ETTP. During the project, which began in November 2004 and was completed in early February 2005, more than 700 truck shipments of contaminated soil and debris were made for disposal at the EMWMF in Bear Creek Valley.

UF_6 Cylinder Program (complete)

NOTES:

During gaseous diffusion activities at ETTP, UF_6 was stored in cylinders located in six outdoor storage yards. Continued deterioration of the cylinders posed a potential threat of release of radioactive and toxic contaminants to the environment and a risk to on-site workers and off-site public. In addition, surveillance and maintenance (inspections, radiological surveys, breach repair, etc.) contributed to ETTP's high overhead costs. Of the approximately 7,000 cylinders, about 4,700 were full of depleted UF_6. The rest contained non-depleted UF_6, were partially full, contained heel amounts of UF_6, or were empty. Shipments began in FY 2004 and by December 2006 all cylinders had been shipped off site.

K-1006-K yard before removal was completed

K-1006-K yard in December 2006

K-1007 Ponds Remediation (complete)

In 2007, an action memorandum for a non-time-critical removal was signed to remediate the K-1007 Pond at ETTP. The pond had been contaminated with PCBs from operations at ETTP.

The project was to restore the pond to more natural conditions that are less conducive to the uptake of PCBs in fish. The pond was drained, undesirable fish that bio-accumulate PCBs were removed, clean fill was placed over contaminated sediment, and new vegetation was planted.

The pond was re-filled and stocked primarily with sunfish, which are not bottom feeders and are less likely to disturb and ingest the PCBs. This provides the opportunity for contamination to be covered with additional sediment over time.

Removing grass carp and other undesirable fish

Planting new vegetation around the pond

Clean fill being placed over PCB-contaminated sediment

NOTES:

Building K-1037 (1 of 2)

NOTES:

Building K-1037 is a rectangular building that contains approximately 380,000 ft^2 of floor space, and is composed of a series of additions and extensions that are now covered under one roof. The K-1037 Facility was originally a warehouse that was later used for production of barrier material for the gaseous diffusion plant operations at the site. The building was most recently used for office space and document storage. Building K-1037 has a large amount of legacy material and process equipment to be disposed.

The facility underwent extensive deactivation before it was demolished. During deactivation, classified equipment and materials were removed along with hazardous and universal waste. Demolition began in January 2019 and was completed three months ahead of schedule in June 2019.

The building slab will be removed and the area will be graded to ensure a safe, stable site until remedial actions are completed.

North Aerial View of K-1037

Materials Removed from K-1037

Building K-1037 (2 of 2)

NOTES:

Transite removal from the north-east roof section

Loading Building K-1037 demolition debris

Final stages of Building K-1037 demolition

Excess Facilities

NOTES:

Biology Complex at Y-12

The Office of Environmental Management (EM) and National Nuclear Security Administration programs in Oak Ridge each received funding in FY 2016 to begin addressing the concerns cited in the Office of Inspector General's January 2015 audit report titled, "The Department of Energy's Management of High-Risk Excess Facilities". The report noted that delays in the cleanup of those facilities are increasing the Department's risks and liabilities.

Oak Ridge has one fourth of the Department's high-priority excess facilities, including some named as the "worst of the worst". This new line of funding provides each program the much-needed ability to reduce risks and stabilize the Manhattan Project and Cold War-era structures on site until they can be removed.

OREM received $28 million to begin addressing these excess facilities at Y-12 and ORNL in FY16. Oak Ridge will utilize this funding to assess the near-term hazards of these excess facilities and conduct activities to reduce the condition risk of excess facilities while they await funding for demolition.

At Y-12, we began planning and characterization work on the Biology Complex, are addressing structural integrity concerns and potential mercury contamination with Alpha 4 equipment, and performed roof repairs to Alpha 4. At ORNL, we will begin work on several buildings to address risk of potential for migration of contamination and worker safety.

Alpha 4 Building at Y-12