

## BACKGROUND

Sites in Oak Ridge became contaminated with radioactive and hazardous materials resulting from national security and energy research operations dating to the Manhattan Project in 1942. The EM Program is responsible for environmental restoration of the contaminated sites on the approximate 35,000-acre Oak Ridge Reservation—listed on the Environmental Protection Agency’s (EPA) National Priorities List. In addition, the EM Program is addressing several privately owned sites contaminated by DOE materials.

### OAK RIDGE NATIONAL LABORATORY

The Oak Ridge National Laboratory (ORNL) was built in 1943 to produce and chemically separate the first gram quantities of plutonium as part of the national effort to produce the atomic bomb. As its role in the development of nuclear weapons decreased, the work at ORNL expanded to include fuel processing research; production of radioisotopes; construction and operation of various nuclear reactor designs; fundamental research in a variety of sciences; research involving hazardous and radioactive materials; environmental research; and radioactive waste disposal. Unlike ETTP, ORNL has a continuing mission and is currently embarking on a revitalization program.



The primary cleanup challenges include elevated concentrations of cesium, strontium, and tritium in surface water and sediment; five shutdown reactors requiring demolition; 140 acres of burial grounds; waste seepage pits, trenches, tanks, and impoundments containing high activity wastes; 2 million curies of radioactivity in a water-rich environment and migrating to the Clinch River; cleanup of soils and demolition of facilities in an operating laboratory environment; and over 6,000 cubic yards of legacy waste to be disposed.

### EAST TENNESSEE TECHNOLOGY PARK



ETTP, formerly the Oak Ridge Gaseous Diffusion Plant (K-25), was built during World War II to supply enriched uranium for nuclear weapons production. The EM Program became the landlord for the site after operations were finally shut down in 1987. Degrading, contaminated, 50-year-old gaseous diffusion and support buildings are the principal threat. Unstable structures, roof integrity failures, intense rainfall events, and other natural phenomena increase the risk of uncontrolled releases of uranium and other contaminants to Poplar Creek, which feeds the Clinch River. Coupled with these risks are the burdensome “mortgage costs,” e.g., utilities, security, surveillance and maintenance, and fire protection, required to maintain the site in a stable configuration. Every year that closure is delayed, these non-closure landlord activities require EM funding that otherwise could be used for cleanup. To facilitate building demolition and site closure, approximately 27,000 cubic yards of low-level waste

must be disposed. Contaminated soil and groundwater at the ETTP will be addressed as the facilities are demolished.

## Y-12 NATIONAL SECURITY COMPLEX



Built in 1943, the original purpose of the Y-12 National Security Complex (Y-12) was uranium enrichment and nuclear weapons production. Uranium enrichment using the electromagnetic separation process was discontinued in 1947, but other aspects of weapons production continued until 1993. Y-12's role has evolved into providing capabilities for highly sophisticated manufacturing; producing, fabricating, and dismantling nuclear weapons components; and serving as the national repository for enriched uranium. Unlike ETTP, Y-12 has a continuing mission and is currently embarking on a modernization program.

The primary cleanup challenges include elevated levels of mercury in soil, sediment, and surface water; offsite migration of volatile organic compounds in groundwater; uranium burial grounds; roughly 9,000 cubic yards of low-level waste to be disposed; and contaminated buildings with no further use for national defense.

## OFFSITE LOCATIONS

Historical practices on the Oak Ridge Reservation include property sales of surplus materials to privately operating scrap metal dealers with State radiological licenses. These surplus materials included but were not limited to transformers, scrap metal, and chemicals. Independent scrap dealers within the greater Knoxville (David Witherspoon Inc. 901 and 1630 Sites) and Oak Ridge area (Atomic City Auto Parts) purchased large volumes of materials for over five decades.

The management of these radiological materials over the last 25 years has resulted in environmental contamination of soil, groundwater, and surface water as well as contaminated materials (debris), structures, and buildings. The primary contaminants of concern at these three sites include polychlorinated biphenyls, heavy metals, uranium, and its daughter products.

In the early 1990s, DOE entered into cleanup negotiations with the Tennessee Department of Environment and Conservation, Division of Superfund, since DOE was considered a potentially responsible party. DOE negotiated Consent Agreements with the State of Tennessee, which resulted in DOE undertaking cleanup actions at these sites.

## LEGACY WASTE

Historical operations at all three Oak Ridge Reservation sites also have left roughly 47,000 cubic yards of low-level waste, 10,000 cubic yards of mixed low-level waste, and 3,000 cubic yards of transuranic (TRU) waste that currently require significant funding just to ensure safe storage. This waste resides in various indoor and outdoor storage locations across the Reservation and must be characterized, packaged, transported, treated, and disposed to facilitate demolition and cleanup.

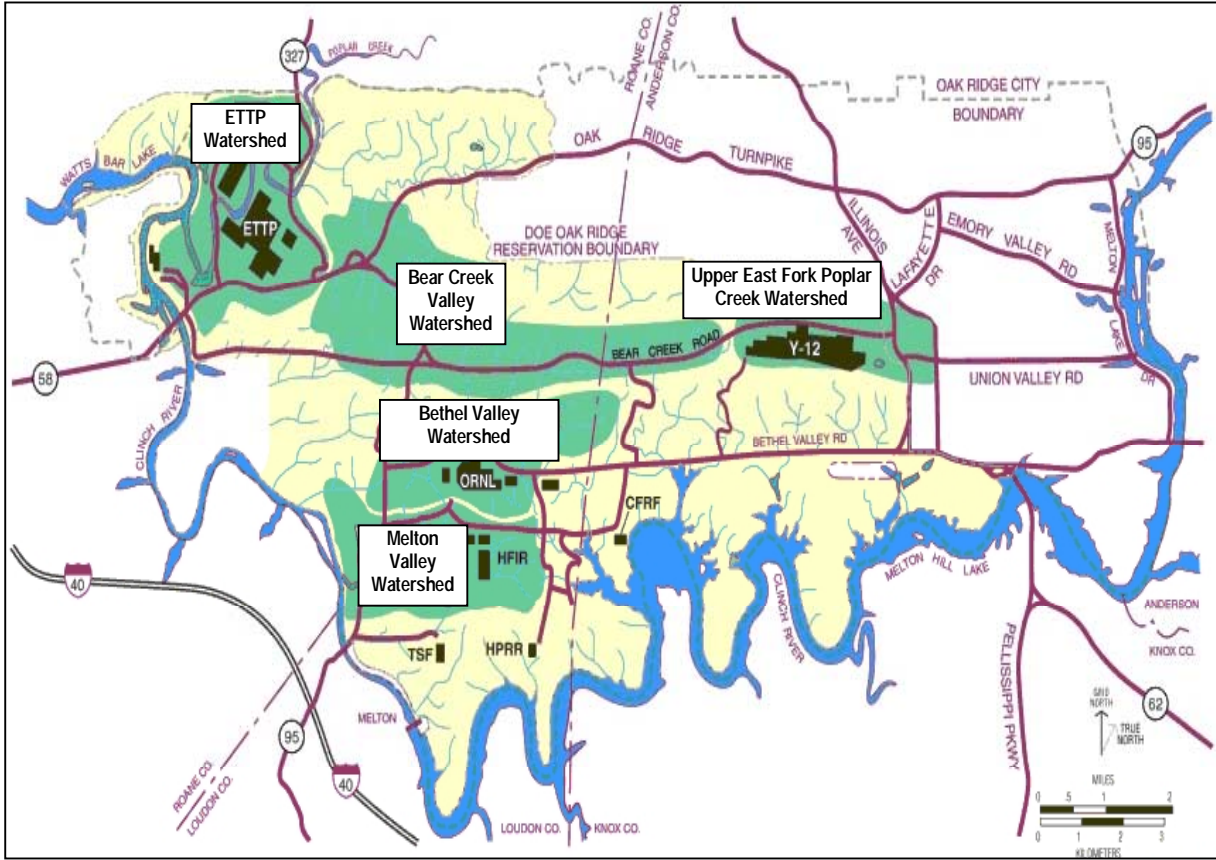
## OAK RIDGE RESERVATION RISK

The table that follows summarizes the contamination problems on the reservation.

### Contamination Problems on the Oak Ridge Reservation

Problem	ORNL		Y-12		ETTP	Offsite
	Bethel Valley	Melton Valley	UEFPC	Bear Creek Valley		
Contaminated Groundwater	✓	✓	✓	✓	✓	
Contaminated Soil	✓	✓	✓	✓	✓	✓
Contaminated Sediment	✓	✓	✓	✓	✓	✓
Contaminated Surface Water	✓	✓	✓	✓	✓	✓
Buried Waste	✓	✓		✓	✓	
Inactive Low-Level Waste Tanks	✓	✓				
Contaminated Pipelines	✓	✓	✓		✓	
Hydrofracture Wells and Grout Sheets		✓				
Contaminated/ Deteriorating Facilities and Debris	✓	✓	✓	✓	✓	✓
Uranium Hexafluoride Cylinders					✓	
Inactive Wells	✓	✓				
Impoundments	✓	✓	✓		✓	
Legacy Waste	✓	✓	✓	✓	✓	

To address these risks, key decisions (see map below) have been signed: Melton Valley, Bethel Valley, Bear Creek Valley, Upper East Fork Poplar Creek (UEFPC), and K-25/K-27 Buildings at ETTP. Progress has also been made on decisions for ETTP. G-Pit and K-1070-A Burial Ground decisions address significant groundwater sources and facility demolition is addressed in an action memorandum. While these records of decision are relatively large in scope, they are interim decisions and additional decision documents will be required to make final groundwater decisions, to address collateral areas not covered in them and to specify institutional controls.



**Oak Ridge Reservation Watersheds**