Fact Sheet

U.S. DEPARTMENT OF ENERGY | Legacy Management

Maxey Flats, Kentucky, Disposal Site

A CERCLA site

This fact sheet provides information about the **Maxey Flats site**. Long-term stewardship responsibilities performed by the **U.S. Department of Energy Office of Legacy Management** are limited to records management activities. Site stewardship is the responsibility of the **commonwealth of Kentucky** under the **Comprehensive Environmental Response, Compensation, and Liability Act**.

Site Information and History

The Maxey Flats site is an inactive, low-level radioactive waste disposal site located in eastern Kentucky about 10 miles northwest of Morehead. The property encompasses approximately 770 acres, including a buffer zone of 230 acres of adjacent land. The site is located in the Knobs physiographic region, which is characterized by hills and relatively flat-topped ridges. The disposal cell is located on a spur of Maxey Flats, one of the larger flat-topped ridges in the region. The site is bounded by steep slopes on the west, east, and south and is approximately 350 feet above the adjacent valleys.

The commonwealth of Kentucky (commonwealth) owns the disposal site and surrounding buffer zone. The land surrounding the site is primarily mixed woodlands and open farmland. The area is sparsely populated and mostly undeveloped. The few residences in the area have a public water supply system.

In 1963, the commonwealth issued a license to Nuclear Engineering Company, Inc., (NECO) to bury low-level radioactive waste at Maxey Flats. From May 1963 to December 1977, radioactive waste was disposed of in 46 large, unlined trenches up to 680 feet long, 70 feet wide, and 30 feet deep that covered approximately 27 acres of land within a 45-acre fenced portion of the site. Containment structures known as “hot wells” were used for the burial of small-volume wastes with higher radioactivity. The hot wells were 10 to 15 feet deep and constructed of concrete-coated steel pipe (or tile) and capped with a large slab of concrete. The trench wastes were deposited in both solid and solidified-liquid form. Some wastes arrived at the site in containers, such as drums, wooden crates, and concrete or cardboard boxes. Other wastes were disposed of loosely. The trenches were backfilled with 3 to 10 feet of soil to serve as a protective cover. After 1977, six additional trenches were excavated for the disposal of waste material generated on-site.

Environmental monitoring beginning in the early 1970s confirmed that radionuclides were leaching from the buried materials and migrating through the shallow groundwater. In December 1977, the commonwealth directed NECO to cease the receipt and burial of radioactive wastes. About 4.5 million cubic feet of waste was buried in the trenches during the facility’s years of operation. Radiological waste has been estimated to contain about 2.4 million curies of byproduct material (material that became radioactive by neutron activation in nuclear reactors); about 553,000 pounds of source material; 950 pounds of special nuclear material (plutonium, uranium-233, or uranium enriched in the isotopes uranium-233, or uranium-235); and more than 140 pounds of plutonium.

The NECO license to receive low-level waste was terminated in 1979, and operational responsibilities for the site were transferred to the commonwealth. Private companies, such as Westinghouse Electric Corporation, were hired as the site custodians with responsibility to stabilize and maintain the site. Stabilization and maintenance activities included installing a temporary cover over approximately 27 acres of trench area, establishing surface water controls, and monitoring both subsidence and waste containment.

2017 Aerial View of the Maxey Flats Disposal Site; Substantial Completion of the Final Cap Was Achieved in November 2016.

In 1986, the U.S. Environmental Protection Agency (EPA) placed the Maxey Flats facility on the National Priorities List, which is comprised of hazardous waste sites that are to be addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund). EPA notified 832 parties who had generated or transported hazardous or radioactive waste that was received at the Maxey Flats facility that they were potentially responsible for site cleanup. The parties included private companies, hospitals, research institutions, and laboratories, the U.S. Department of Defense, the U.S. Department of Energy (DOE), and the commonwealth.

In March 1987, 82 parties signed an Administrative Order by Consent to begin preparation of a remedial investigation/feasibility study, which included a complete evaluation of site hydrogeology, current site conditions, a risk assessment, and alternatives for remedial action. In 1991, EPA issued a Record of Decision (ROD) for the Maxey Flats site and announced that the remedy selected was natural stabilization. This remedy would allow the materials in the trenches to subside naturally to a stable condition, after which a permanent, engineered cap would be placed over the entire area of buried contaminants.

The 1991 ROD identified 12 radionuclides and 11 nonradionuclides as indicators of contaminants in groundwater, surface water, and soils at the site. Tritium, the most abundant and the most mobile of the radionuclides indicator contaminants, was selected as the primary contaminant of concern. Following an evaluation of historical data, post-ROD data, site hydrogeology, and realistic exposure pathways, investigators concluded that compliance testing and environmental monitoring should focus on migration of tritium through water. EPA and the commonwealth agreed that other contaminants would not be analyzed in water samples unless any annual average concentration of tritium exceeded 50 percent of the screening level during the previous five years.

The remedy was divided into four phases: the initial closure period (22 months), the interim maintenance period (35 to 100 years), the final closure period (10 months), and the custodial maintenance period (in perpetuity).

The initial closure period consisted of: (1) removing leachate from the trenches, mixing it with cement, then transferring the mixture to earth-mounded concrete bunkers where it solidified; (2) demolishing site buildings and disposing of them on-site; (3) constructing an interim geomembrane cap; (4) constructing engineered drainage features to direct runoff and minimize infiltration of rainwater; and (5) monitoring groundwater and surface water, monitoring subsidence in the trench areas, and performing site maintenance. The work required during the initial closure period was completed by the settling of private parties in 2003. Since that time, the commonwealth has been performing the monitoring and maintenance activities required during the interim maintenance period, and EPA has conducted three Five-Year Reviews of the remedy. In the nearly 10 years that the interim cap has been in place, subsidence monitoring data demonstrates that minimal subsidence has occurred.

When the ROD was written, the time required for the contents of the disposal area to naturally stabilize was estimated at 35 to 100 years. Since that time, it has become evident that a number of factors may have contributed to substantially less time required to complete natural stabilization, including the 30- to 40-year age of the waste, the passive action of compacting the trenches during construction of the interim cap, and the weight of approximately 250,000 cubic yards of soil fill placed over the waste during construction of the interim cap.

The end of the interim maintenance period and the beginning of the final closure period is defined in the ROD as the time when subsidence of the trenches has nearly ceased and final cap installation can begin. EPA is required to determine the acceptable subsidence criteria, in consultation with the commonwealth. The commonwealth has presented EPA with subsidence data verifying that the trench stabilization criteria have been achieved. After evaluating the data, EPA agreed with the criteria and approved the commonwealth's request to proceed to the final closure period beginning September 2013. Final closure included construction of a permanent earthen cap consisting of layers of plastic covered with soil and vegetation. Substantial completion of the final cap was achieved in November 2016.

The Construction Final Completion Inspection was successfully conducted in September 2017 and the Certification of Completion is dependent on EPA approval of the commonwealth's Institutional Control Plan. Once the commonwealth obtains this certification, the site will enter the final phase of remediation known as the custodial maintenance period. This is the period where the site is monitored and maintained by the commonwealth of Kentucky into perpetuity.

Regulatory Setting

The National Oil and Hazardous Substances Pollution Contingency Plan (known as the National Contingency Plan, codified at Title 40 *Code of Federal Regulations* [CFR], Part 300) is EPA's implementing regulations under CERCLA. The National Contingency Plan directs that remedial actions resulting in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years to ensure protection of human health and the environment. EPA conducted its third Five-Year Review at the Maxey Flats site in September 2012 and concluded that the selected remedy is expected to be protective of human health and the environment at the conclusion of the remedial action, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The fourth Five-Year Review was completed in 2017.

Other federal regulations that apply to the Maxey Flats site include Occupational Safety and Health Standards at 29 CFR 1910, National Emission Standards for Hazardous Air Pollutants at 40 CFR 61, and Resource Conservation and Recovery Act Hazardous Waste Management Standards at 40 CFR 268.

Commonwealth standards that apply to the site include Title 401 *Kentucky Administrative Regulations*, Chapter 5 (401 KAR 5), "Water Quality;" 401 KAR 34, "Standards for Owners and Operators of Hazardous Waste Storage, Treatment and Disposal Facilities;" 401 KAR 63, "General Standards of Performance;" and 902 KAR 100, "Radiology."

Legacy Management Activities

The DOE Office of Legacy Management (LM) manages project records pertaining to the remediation activities of the Maxey Flats disposal site through the final closure period, as provided by the commonwealth. In addition, LM responds to stakeholder inquires regarding the site.

CONTACT INFORMATION

IN CASE OF AN EMERGENCY AT THE SITE, CONTACT 911

LM TOLL-FREE EMERGENCY HOTLINE: (877) 695-5322

Site-specific documents related to the **Maxey Flats, Kentucky, Disposal Site** are available on the LM website at **www.energy.gov/lm/maxey-flats-kentucky-disposal-site**

For more information about LM activities at the **Maxey Flats, Kentucky, Disposal Site**, contact:

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