

Executive Summary

The *2007 Fernald Preserve Site Environmental Report* provides stakeholders with the results from the Fernald, Ohio, site's environmental monitoring programs for 2007; a summary of the U.S. Department of Energy's (DOE's) activities conducted on site; and a summary of the Fernald Preserve's compliance with the various environmental regulations, compliance agreements, and DOE policies that govern site activities. This report has been prepared in accordance with DOE Order 450.1, *Environmental Protection Program*, and the *Integrated Environmental Monitoring Plan*, which is Attachment D of the *Comprehensive Legacy Management and Institutional Controls Plan* (LMICP) (DOE 2006a).

During 2007, activities at the Fernald Preserve included:

- Ecological restoration activities as well as inspections, care, and monitoring of the site and the on-site disposal facility to ensure that provisions of the LMICP are fully implemented.
- Environmental monitoring activities related to air, surface water, and groundwater.
- Collection and treatment of leachate from the on-site disposal facility.
- Extraction and treatment of contaminated groundwater from the Great Miami Aquifer (Operable Unit 5).

An important milestone was achieved on January 22, 2007, when DOE accepted that the remedial actions undertaken by Fluor Fernald, Inc. had been successfully completed. Achieving this completion milestone required that all remediation in the five operable units had been completed, with the exception of the final disposal of waste materials from Silos 1 and 2 and the groundwater remedy being conducted under Operable Unit 5.

The completion of the remediation of the Fernald Preserve resulted in

- The demolition of 323 structures.
- The placement of 2.96 million in-place cubic yards (yd³) (2.2 million cubic meters) of contaminated debris and soil in the on-site disposal facility.
- The excavation of 2.1 million in-place yd³ of contaminated soils and sediments.
- The rail shipment of 975,100 tons of waste pit material to Envirocare of Utah.
- The preparation and shipment by truck of 2,297 containers of Silo 3 material for disposal at Envirocare.
- The preparation and shipment by truck of 3,776 containers of material from Silos 1 and 2 for interim storage at Waste Control Specialists in Texas.

DOE's Office of Legacy Management and their Technical Assistance Contractor, S.M. Stoller Corporation, completed their first full year of responsibility for operations at the Fernald Preserve during 2007.

The following sections highlight the results of environmental monitoring activities conducted during 2007.

Liquid Pathway Highlights

Groundwater Pathway

The groundwater pathway at the Fernald Preserve is routinely monitored to:

- Determine capture and restoration of the total uranium plume and non-uranium constituents, and evaluate water quality conditions in the aquifer that indicate a need to modify the design or the operation of restoration modules.
- Meet compliance-based groundwater monitoring obligations.

During 2007, active restoration of the Great Miami Aquifer continued.

Approximately 140 monitoring wells were sampled semiannually to determine water quality. Water elevations were measured quarterly in approximately 170 monitoring wells. The following highlights describe the key findings from the 2007 groundwater data:

- 2,228 million gallons (8,433 million liters) of groundwater were extracted from the Great Miami Aquifer, and 653 pounds (lb) (296 kilograms [kg]) of uranium were removed from the aquifer in 2007.
- The results of the 2007 groundwater capture analysis and monitoring for total uranium and non-uranium constituents indicate that the design of the groundwater remedy for the aquifer restoration system is appropriate for capture of the plume.
- Pumping of the South Plume/South Plume Optimization Module continued to meet the objective of preventing further southward migration of the southern total uranium plume beyond the extraction wells.
- Leak detection monitoring at Cells 1 through 8 of the on-site disposal facility indicates that all of the individual cell liner systems are performing within the specifications outlined in the approved cell design.

Surface Water and Treated Effluent Pathway

Surface water and treated effluent are monitored to determine the effects of Fernald activities on Paddys Run (an intermittent stream), the Great Miami River, and the underlying Great Miami Aquifer and to meet compliance-based surface water and treated effluent monitoring obligations. In addition, the results from sediment sampling are discussed as a component of this primary exposure pathway.

In 2007, 21 surface water and treated effluent locations and two sediment locations were sampled at various frequencies. The following highlights describe the key findings from the 2007 surface water, treated effluent, and sediment monitoring programs:

- In 2007, 533 lb (242 kg) of uranium were discharged in treated effluent to the Great Miami River, which was below the limit of 600 lb (272 kg) per year. Approximately 79 lb (36 kg) of uranium were released to the environment through uncontrolled storm water runoff. Therefore, the total amount of uranium released through the treated effluent and uncontrolled surface water pathways during 2007 was estimated to be 612 lb (277 kg).

- One surface water analytical result collected in 2007 exceeded the final remediation level (FRL) for total uranium, the site's primary contaminant. There were no FRL exceedances for any other constituent.
- Compliance sampling, consisting of sampling for nonradiological pollutants from uncontrolled runoff and treated effluent discharges from the Fernald Preserve, is regulated under the state-administrated National Pollutant Discharge Elimination System (NPDES) program. The current permit became effective on July 1, 2003, and expires on June 30, 2008. Discharges were in compliance with effluent limits identified in the NPDES permit 100 percent of the time during 2007.
- There were no FRL exceedances for any sediment result in 2007.

Air Pathway Highlights

The air pathway is routinely monitored to assess the impact of Fernald Preserve emissions of radiological air particulates, radon, and direct radiation on the surrounding public and environment. In addition, the data are used to demonstrate compliance with various regulations and DOE orders. Approximately 20 monitoring locations were used for determining compliance with the applicable limits during 2006, and this was reduced to one background and five boundary monitors in 2007 to reflect the completion of surface remedial actions in October 2006.

Radiological Air Particulate Monitoring

Data collected from the air monitoring stations around the boundary of the Fernald Preserve show that the annual average radionuclide concentrations are less than 1 percent of DOE derived concentration guidelines in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*.

The maximum effective dose equivalent for 2007 airborne emissions (excluding radon) at the boundary is estimated to be 0.023 millirem (mrem) above background per year, and occurred at AMS-24 along the southern boundary of the site. This represents 0.23 percent of the limit established in National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H, which is 10 mrem/yr above background.

Radon Monitoring

The annual average radon concentration recorded at the site's property boundary ranged from 0.3 picocurie per liter (pCi/L) to 0.5 pCi/L (inclusive of background concentrations). The annual average background concentration measured in 2007 was 0.3 pCi/L. Property boundary results were well below the DOE radon standard of 3.0 pCi/L above background concentrations. In addition, the site's property boundary radon concentrations were below the proposed Title 10 *Code of Federal Regulations* (CFR) Part 834 limit of 0.5 pCi/L above background.

Long-term comparisons are also performed on average radon concentrations at western property boundary locations and background locations as a basis for comparison to the 0.5 pCi/L annual average limit. In 2007, a marginal difference in radon concentrations was observed between background and western property boundary monitoring locations. Additionally, there are no significant on-site sources for radon to generate an exceedance of the DOE limit of 100 pCi/L at any point or time.

Direct Radiation Monitoring

Direct radiation measurements were collected at five boundary locations and at one background location. The direct radiation levels observed in 2007 indicate that the individual measurements obtained in the northeast quadrant of the site are slightly higher than background, but annual averages for boundary and background locations are not significantly different. The highest value for a boundary monitor produces a dose of 5 mrem/year above background to an individual who spends the entire year (24 hours a day) at the boundary monitor.

Estimated Dose for 2007

In 2007, the maximally exposed individual, standing at the eastern boundary monitor with the highest above-background reading, could receive a dose of 5.0 mrem. This estimate represents the maximum incremental dose above background attributed to inhalation of particulate and direct radiation and is exclusive of the dose received from radon. The contributions to the estimated dose are 0.023 mrem from air inhalation and 5.0 mrem from direct radiation. This dose is 5 percent of the adopted DOE limit, which is 100 mrem/yr above background (exclusive of radon), as established by the International Commission on Radiological Protection.

Natural Resources

Natural resources include the diversity of plant and animal life and their supporting habitats found in and around the Fernald Preserve. Ecological activities were conducted sitewide during 2007. There were no unexpected discoveries of cultural resources during 2007 remediation activities.