

Executive Summary

The *2010 Fernald Preserve Site Environmental Report* provides stakeholders with the results from the Fernald, Ohio, site's environmental monitoring programs for 2010; 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 450.1A, *Environmental Protection Program*, and the "Integrated Environmental Monitoring Plan," which is Attachment D of the *Comprehensive Legacy Management and Institutional Controls Plan* (LMICP) (DOE 2010).

The Fernald Preserve has been successfully remediated, and only the continued operation of the groundwater remedy and the care and maintenance of the on-site disposal facility (OSDF) are ongoing components of remediation.

During 2010, activities at the Fernald Preserve included:

- Prescribed burns.
- Ecological restoration activities as well as inspections, care, and monitoring of the site and the OSDF to ensure that provisions of the LMICP are fully implemented.
- Environmental monitoring activities related to surface water and groundwater.
- Collection and treatment of leachate from the OSDF.
- Extraction and treatment of contaminated groundwater from the Great Miami Aquifer (Operable Unit 5).
- Operation of the Fernald Preserve Visitors Center and associated outreach and educational activities.

The following sections highlight the results of environmental monitoring activities conducted during 2010.

Liquid Pathway Highlights

Groundwater Pathway

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

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

During 2010, active restoration of the Great Miami Aquifer continued. 140 monitoring wells were sampled semiannually to determine water quality. Aquifer water elevations were measured quarterly in 178 monitoring wells. The following highlights describe the key findings from the 2010 groundwater data:

- 2,387 million gallons (9,035 million liters) of groundwater were extracted from the Great Miami Aquifer, and 551 pounds (lb) (257 kilograms [kg]) of uranium were removed from the aquifer.
- The results of the 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 OSDF indicates that all of the individual cell liner systems are performing as expected and within the specifications outlined in the approved OSDF design.
- Since 2005, the percentage of treatment needed to achieve discharge limits has decreased significantly. The aquifer remedy can now achieve uranium discharge limits without groundwater treatment.

Surface Water and Treated Effluent Pathway

Surface water and treated effluent are monitored to determine the effects of Fernald Preserve 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 2010, 21 surface water and treated effluent locations were sampled at various frequencies. The following highlights describe the key findings from the 2010 surface water and treated effluent monitoring programs:

- 565 lb (257 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 69.7 lb (31.6 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 2010 was estimated to be 635 lb (288 kg).
- Analytical results of 25 surface water samples exceeded the final remediation level (FRL) for total uranium, the site's primary contaminant. Two of the 25 exceedances were from SWD-05, and 23 are related to SWD-09, which was established to monitor the maintenance action completed west of the former Waste Pit Area. The surface water found at locations SWD-05 and SWD-09 does not flow off property. 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. Discharges were in compliance with effluent limits identified in the NPDES permit 100 percent of the time.

Direct Radiation Pathway Highlights

The direct radiation pathway is routinely monitored to assess the impact of direct radiation on the surrounding public and environment. In addition, the data are used to demonstrate compliance with various regulations and DOE orders. Eleven dosimeters (four trail locations, five boundary locations, one location at the Visitors Center and one background location) were used in 2010 to determine compliance with the applicable limits.

The direct radiation levels measured in 2010 indicate that the individual measurements obtained in the northeast quadrant of the site are slightly higher than background, but annual averages for on-site and background locations are not significantly different. The highest value for an on-site dosimeter produces a dose of 10 millirem per year (mrem/yr) (0.1 millisievert per year [mSv/yr]) above background to an individual who spends the entire year (24 hours a day) at the location.

Estimated Dose for 2010

In 2010, the maximally exposed individual, standing at the northeastern boundary monitor with the highest above-background reading, could receive a dose of 10 mrem (0.1 mSv). This estimate represents the maximum incremental dose above background attributed to direct radiation. This dose is 10 percent of the adopted DOE limit, which is 100 mrem/yr (1 mSv/yr) above background, 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 2010. Maintenance in ecologically restored areas included several restored area repair and enhancement activities resulting from Natural Resource Trustee walkdowns in 2009. Specific work included deer fence removal, the addition of soil amendment, seeding tallgrass prairie, planting seedlings, and erosion repair in several areas. Prescribed burning of prairie areas also continued. Monitoring involved several efforts resulting from agreement among the Fernald Natural Resource Trustees. An enhanced wetland mitigation program was continued. Activities in 2010 focused on amphibians, water level monitoring, and soil biogeochemistry sampling. Functional monitoring of established prairies was also conducted.

No major issues were discovered during quarterly site and OSDF inspections, and there were no unexpected discoveries of cultural resources during 2010 construction activities. The Ecological Restoration Park was closed down in the fall. The remote location had become prone to vandalism and littering.

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