

Executive Summary

The 2008 Fernald Preserve Site Environmental Report provides stakeholders with the results from the Fernald, Ohio, site's environmental monitoring programs for 2008; 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 2008a).

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 2008, activities at the Fernald Preserve included:

- 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 air, 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).

The following sections highlight the results of environmental monitoring activities conducted during 2008.

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 may indicate a need to modify the design or the operation of restoration modules.
- Meet compliance-based groundwater monitoring obligations.

During 2008, 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 2008 groundwater data:

- 2,320 million gallons (8,781 million liters) of groundwater were extracted from the Great Miami Aquifer, and 677 pounds (lb) (307 kilograms [kg]) of uranium were removed from the aquifer in 2008.

- The results of the 2008 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.

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 2008, 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 2008 surface water, treated effluent, and sediment monitoring programs:

- In 2008, 559 lb (254 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 92 lb (42 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 2008 was estimated to be 651 lb (296 kg).
- Analytical results of 18 surface water samples collected in 2008 exceeded the final remediation level (FRL) for total uranium, the site's primary contaminant. One of the 18 exceedances was from SWD-05, and 17 are related to a new monitoring point (SWD-09) established to monitor the maintenance action completed west of the former Waste Pit Area. Surface water at locations SWD-05 and SWD-09 do 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. The current permit became effective on July 1, 2003, and expired on June 30, 2008. A completed application was submitted to Ohio Environmental Protection Agency in December 2007 that allows discharges to continue under an expired permit. Discharges were in compliance with effluent limits identified in the NPDES permit 100 percent of the time during 2008.
- There were no FRL exceedances for any sediment result in 2008.

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. Six monitoring locations (one background and five boundary monitors) were used in 2008 to determine compliance with the applicable limits.

Radiological Air Particulate Monitoring

Data collected from the air monitoring stations (AMSs) 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 2008 airborne emissions (excluding radon) at the boundary is estimated to be 0.002 millirem per year (mrem/yr) (0.00002 millisievert per year [mSv/yr]) above background, and occurred at AMS-8A along the northeastern boundary of the site. This represents 0.02 percent of the limit established in Title 40 *Code of Federal Regulations* (CFR) Part 61, *National Emissions Standards for Hazardous Air Pollutants*, Subpart H, which is 10 mrem/yr (0.1 mSv/yr) above background.

Radon Monitoring

The annual average radon concentration recorded at the site's property boundary ranged from 0.1 picocurie per liter (pCi/L) to 0.2 pCi/L above background. The annual average background concentration measured in 2008 was 0.3 pCi/L. Property boundary results were well below the DOE Order 5400.5 radon standard of 3.0 pCi/L above background. In addition, the site's property boundary radon concentrations were below the proposed 10 CFR 834 limit of 0.5 pCi/L above background.

Long-term comparisons between the average radon concentrations at property boundary locations and the proposed 10 CFR 834, *Radiation Protection of the Public and the Environment*, limit of 0.5 pCi/L above background shows that the proposed limit has not been exceeded in the past 10 years. Additionally, the Fernald Preserve has no significant on-site sources for radon to generate an exceedance of the on-site or off-site limits set in DOE Order 5400.5. Radon will not be monitored after 2008.

Direct Radiation Monitoring

Direct radiation measurements were collected at five boundary locations and at one background location. The direct radiation levels measured in 2008 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 6 mrem/yr (0.06 mSv/yr) above background to an individual who spends the entire year (24 hours a day) at the boundary monitor.

Estimated Dose for 2008

In 2008, the maximally exposed individual, standing at the northeastern boundary monitor with the highest above-background reading, could receive a dose of 6 mrem (0.06 mSv). 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 0.002 mrem (0.00002 mSv) from air inhalation and

6 mrem (0.06 mSv) from direct radiation. This dose is 6 percent of the adopted DOE limit, which is 100 mrem/yr (1 mSv/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 2008. A major focus of effort was preparing the site for public access and supporting the construction of the Visitors Center. Maintenance in ecologically restored areas included repair of several eroded areas and herbicide application for control of noxious weeds. Monitoring involved continued evaluation of herbaceous cover and a fish and crayfish survey of Paddys Run. The results of this survey showed an expanded range for the state-threatened Sloan's crayfish. There were no major issues discovered during quarterly site and OSDF inspections, and there were no unexpected discoveries of cultural resources during 2008 construction activities.