

ES 1.0 Executive Summary

The 2003 Site Environmental Report provides stakeholders with the results from the Fernald site's environmental monitoring programs for 2003, along with a summary of the U.S. Department of Energy's (DOE's) progress toward final remediation of the site. In addition, this report provides a summary of the Fernald site's compliance with the various environmental regulations, compliance agreements, and DOE policies that govern site activities. All information presented in this executive summary is discussed more fully within the body of this report and the supporting appendices. This report has been prepared in accordance with DOE Order 5400.1, General Environmental Protection Program (DOE 1990a), and the Integrated Environmental Monitoring Plan (IEMP), Revision 3 (DOE 2003e). Note that in January 2003, DOE Order 450.1 went into effect, superceding DOE Order 5400.1; however, it has been determined that the intent of this order is met through existing DOE Fernald contractual requirements.

During 2003 DOE and Fluor Fernald, Inc., the prime contractor for the Fernald site, made considerable progress toward final cleanup goals established for the site. A wide range of environmental remediation activities continued during the year, including:

- Excavation and shipment of contaminated waste pit material to an off-site disposal facility (Operable Unit 1).
- Large-scale excavation of contaminated soil/materials from the waste pit area (e.g., Waste Pit 4 cap material), silos area (e.g., Silos 1 and 2 berm material), and former production area (Operable Unit 5).
- Placement of contaminated soil and debris in the on-site disposal facility (Operable Unit 2).
- Decontamination and dismantlement of former production buildings and support facilities (Operable Unit 3).
- Completion of most construction of equipment and facilities for implementation for Silos 1 and 2 remedy (Operable Unit 4).
- Extraction and treatment of contaminated groundwater from the Great Miami Aquifer (Operable Unit 5).

Several important milestones toward remediation of the Fernald site were reached in 2003. All major Operable Unit 2 remedial actions were completed. One new on-site disposal facility cell (Cell 6) was opened for waste placement. Twenty-six building structures were demolished bringing the total to 145 of 316 structures. The second phase of the South Field Module (groundwater pumping) began extracting contaminated groundwater.

The following sections highlight the results of environmental monitoring activities conducted during 2003.

ES 1.1 Liquid Pathway Highlights

ES 1.1.1 Groundwater Pathway

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

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

During 2003 active restoration of the Great Miami Aquifer continued or was initiated within each of the following groundwater restoration modules:

- South Field Module – continued pumping from nine existing extraction wells (Phase I). During 2003 one extraction well was replaced (Extraction Well 31562 replaced by Extraction Well 33298) and four became operational (Phase II).
- South Plume/South Plume Optimization Module – continued pumping from six existing extraction wells.
- Waste Storage Area (Phase I) Module – continued pumping from three existing extraction wells that became operational in 2002.
- Re-Injection Module – continued injecting water into the aquifer for most of the year via four existing re-injection wells. During 2003 three new re-injection wells and one injection pond began operating in the South Field area.

In addition, approximately 150 monitoring wells were sampled at various frequencies to determine water quality. Water elevations were measured quarterly in approximately 170 monitoring wells. The following highlights describe the key findings from the 2003 groundwater data:

- 2,428 million gallons (9,190 million liters) of groundwater were pumped from the Great Miami Aquifer and 360 million gallons (1,363 million liters) of water were re-injected into the aquifer. As a result of these restoration activities, 1,151 pounds (523 kilograms [kg]) of uranium were removed from the aquifer.
- The results of 2003 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. Installation of additional extraction and re-injection wells was necessary to support the accelerated aquifer remediation schedule. Ongoing refinement of the wellfield configuration will continue based on new monitoring data.
- 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.

- Pumping from the four South Field Module (Phase II) extraction wells began during 2003.
- Leak detection monitoring at Cells 1 through 5 of the on-site disposal facility indicates that all the individual cell liner systems are performing within the specifications outlined in the approved cell design.

ES 1.1.2 Surface Water and Treated Effluent Pathway

Surface water and treated effluent are monitored to determine the effects of Fernald remediation activities on Paddys Run, 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 2003, 16 surface water and treated effluent locations were sampled at various frequencies and 6 sediment locations were monitored. The following highlights describe the key findings from the 2003 surface water, treated effluent, and sediment monitoring programs:

- The uranium released to the Great Miami River through the treated effluent pathway was an estimated 562 pounds (255 kg), which was below the limit of 600 pounds (272 kg) per year. Uranium released through the uncontrolled runoff pathway was estimated at 118 pounds (54 kg). Therefore, the total amount of uranium released through the treated effluent and uncontrolled surface water pathways during 2003 was estimated to be 681 pounds (309.2 kg).
- No surface water or treated effluent analytical results from samples collected in 2003 exceeded the final remediation level (FRL) for total uranium, the site's primary contaminant. FRL exceedances and benchmark toxicity value (BTV) exceedances were each limited to one constituent at one location. These occasional, sporadic exceedances are expected to occur until site remediation is complete.
- Compliance sampling, consisting of sampling for non-radiological pollutants from uncontrolled runoff and treated effluent discharges from the Fernald site, 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 well over 99 percent of the time during 2003.
- The 2003 sediment results were consistent with data collected in previous years with the exception of one thorium-230 result from Paddys Run just above the Storm Sewer Outfall Ditch confluence (new maximum of 13.6 pCi/g versus the sediment FRL of 18,000 pCi/g). There were no FRL exceedances for any sediment result in 2003.

ES 1.2 Air Pathway Highlights

The air pathway is routinely monitored to assess the impact of Fernald site 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.

ES 1.2.1 Radiological Air Particulate Monitoring

- Data collected from the network of 17 fence-line and one background air monitoring stations showed that the annual average radionuclide concentrations were all less than 1 percent of DOE-derived concentration guidelines contained in DOE Order 5400.5, Radiation Protection of the Public and the Environment (DOE 1990b).
- The maximum effective dose at the fence-line from 2003 airborne emissions (excluding radon) was estimated to be 0.82 millirem (mrem) per year and occurred at AMS-9C along the eastern fence-line of the site. This represents 8.2 percent of the limit of 10 mrem per year established in National Emission Standards for Hazardous Air Pollutants, Subpart H. For comparison, the maximum effective dose was 0.8 mrem in both 2001 and 2002.
- As in 2001 and 2002, thorium-230 continued to be the major dose contributor to the air inhalation dose in 2003. This is the result of fugitive emissions from the Waste Pits Project operations where thorium-230 is the primary isotope of concern.

ES 1.2.2 Radon Monitoring

A network of 33 continuous radon monitors was used for determining compliance with the applicable limits during 2003. The annual average radon concentration recorded at the site's property boundary ranged from 0.2 picoCuries per liter (pCi/L) to 0.6 pCi/L (inclusive of background concentrations). The annual average background concentration measured in 2003 was 0.3 pCi/L. Property boundary results were well below the DOE radon standard of 3.0 pCi/L above background concentrations.

The annual average radon concentrations in the vicinity of Silos 1 and 2 (Operable Unit 4) during 2003 were comparable to those measured in 2002 through the end of April 2003, at which time the Radon Control System (RCS) began operating on a fairly continual basis. Because of RCS operations, radon concentrations in the vicinity of the silos have decreased sharply (i.e., approximately 60 percent). Additionally, there were no exceedances of the DOE limit of 100 pCi/L during 2003; whereas, in 2002 there were 10 exceedances of this limit.

Radon concentrations within the headspace of Silos 1 and 2 during 2003 were also comparable to those measured in 2002 until the end of April 2003. Again, since the operation of the RCS, concentrations have decreased significantly (i.e., approximately 97 percent).

ES 1.2.3 Direct Radiation Monitoring

Direct radiation measurements were continuously collected at 37 locations at the Fernald site and at background locations. As in years past, the direct radiation levels observed in 2003 indicate that the highest measurements were obtained in proximity to Silos 1 and 2. The direct radiation measurements near Silos 1 and 2 were significantly lower in 2003 than in 2002, primarily due to operation of the RCS.

ES 1.3 Estimated Dose for 2003

In 2003 the maximally exposed individual, near the western fenceline of the Fernald site, could have hypothetically received a maximum dose of approximately 7.33 mrem. For comparison purposes, in 2002 it was calculated that the maximally exposed individual living nearest the Fernald site in a west direction could have hypothetically received a maximum dose of approximately 14.8 mrem. This estimate represents the maximum incremental dose above background attributable to the site and is exclusive of the dose received from radon. The contributions to this all-pathway dose for 2003 were 0.63 mrem from air inhalation dose, 0.003 mrem from the consumption of locally grown produce, and 6.7 mrem from direct radiation. This dose can be compared to the limit of 100 mrem above background for all pathways (exclusive of radon) that was established by the International Commission on Radiological Protection and adopted by DOE.

ES 1.4 Natural Resources

Natural resources include the diversity of plant and animal life and their supporting habitats found in and around the Fernald site. During 2003 the following primary activities associated with natural resource monitoring and restoration occurred.

- The Area 2 (Phase I) Southern Waste Units Restoration Project was completed. This project expanded the riparian corridor along Paddys Run and created several open water and wetland areas within the footprint of the former Southern Waste Units. Re-vegetation focused on establishing the early stages of forest communities in upland areas.
- The Area 1 (Phase I) Northern Pine Plantation Restoration Project continued, with installation of all plants and the completion of most seeding. The new vegetation, as well as the addition of herbaceous plants and dormant cuttings, greatly enhanced the wetland and vernal pool features that were created in 2002.
- The Area 8 (Phase III) South Restoration Project commenced with approximately 700 trees and shrubs installed in a former pasture along the Paddys Run corridor. Field personnel also cleared invasive bush honeysuckle and prepared two additional fields for prairie seeding in 2004.
- The Phase II Wetland Mitigation Project was initiated. Grading was conducted to establish three shallow basins that will collect water downstream from the existing forested wetland in the northern woodlot.
- The restoration of Subareas 1 and 2 of the borrow area was completed. This effort involved grading to create several small ponds and swales, and seeding with native wetland vegetation across the project area.

Ecological restoration monitoring continued in 2003, and Sloan's crayfish turbidity monitoring in Paddys Run resumed. Also, several unexpected discoveries of cultural resources occurred during 2003 remediation activities although none were significant and no impacts to cultural resources occurred.

This Page
Intentionally Left Blank