5. ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

5.1 SUMMARY

Non-radiological environmental monitoring at PORTS includes air, water, sediment, and fish. Monitoring of non-radiological parameters is required by state and federal regulations and/or permits, but is also completed to reduce public concerns about plant operations. Non-radiological data collected in 2006 are similar to data collected in previous years.

5.2 INTRODUCTION

Environmental monitoring programs at PORTS usually monitor both radiological and non-radiological constituents that could be released to the environment as a result of PORTS activities. The radiological components of each monitoring program were discussed in the previous chapter. The DOE *Environmental Monitoring Plan for the Portsmouth Gaseous Diffusion Plant* specifies non-radiological monitoring requirements for ambient air, local surface water, sediment, and fish. Non-radiological data are not collected for some sampling locations and some monitoring programs.

Environmental permits issued by the EPA to the DOE, DOE contractors, or USEC specify discharge limitations, monitoring requirements, and/or reporting requirements for air emissions and water discharges. Because USEC data are important in developing a complete picture of environmental monitoring at PORTS, these data are included in this report. USEC information is provided for informational purposes only; the DOE cannot certify the accuracy of USEC data. Data from the following environmental monitoring programs are included in this chapter:

- Air,
- Surface water,
- Sediment, and
- Biota (fish).

The DOE also conducts an extensive groundwater monitoring program at PORTS that includes both radiological and non-radiological constituents. Chapter 6 provides information on the groundwater monitoring program, associated surface water monitoring, and water supply monitoring.

5.3 AIR

Permitted air emission sources at PORTS emit non-radiological air pollutants. In addition, the DOE ambient air monitoring program measures fluoride at monitoring stations within PORTS and in the surrounding area.

5.3.1 Airborne Discharges

DOE PORTS operates several sources of conventional air pollutants such as nitrogen oxides, sulfur dioxide, and particulate matter. The boilers that provide heat for DOE facilities account for almost all of the conventional air pollutants emitted by DOE sources. The DOE reported the following emissions from the boilers for 2006 in the Ohio EPA Fee Emissions Report: 0.062 ton of particulate matter, 0.045 ton of sulfur dioxide, 2.241 tons of nitrogen oxides, 0.0000053 ton of lead, and 0.555 ton of organic compounds.

Other emissions sources at DOE PORTS, which include two landfill venting systems, two glove boxes (one not used in 2006), two aboveground storage tanks in the X-6002A Fuel Oil Storage Facility, and four groundwater treatment facilities, emit less than 1 ton per year of conventional air pollutants (on an individual basis), and therefore do not require reporting in the Ohio EPA Fee Emissions Report.

Another potential air pollutant present at DOE PORTS is asbestos released by renovation or demolition of plant facilities. Asbestos emissions are controlled by a system of work practices. The amount of asbestos removed and disposed is reported to the Ohio EPA. In 2006, 40.8 tons of material contaminated with asbestos were shipped from DOE PORTS. These wastes included scrap metal, pipe insulation, and other construction debris that was contaminated with asbestos.

USEC reported the following emissions of non-radiological air pollutants for 2006 in the Ohio EPA Fee Emissions Report: 25.43 tons of particulate matter, 2.80 tons of organic compounds, 1726.51 tons of sulfur dioxide, and 225.89 tons of nitrogen oxides. These emissions are associated with the boilers at the X-600 Steam Plant, which provide steam for PORTS, a boiler at the X-611 Water Treatment Plant, and diesel-powered compressors for emergency use.

5.3.2 Ambient Air Monitoring

In addition to the radionuclides discussed in Chapter 4, DOE ambient air monitoring stations also measure fluoride. Fluoride detected at the ambient air monitoring stations could be present due to background concentrations (fluoride occurs naturally in the environment) or from USEC activities associated with the former gaseous diffusion process.

In 2006, samples for fluoride were collected weekly from 15 ambient air monitoring stations in and around PORTS (see Chapter 4, Figure 4.1). A background ambient air monitoring station (A37) is located approximately 13 miles southwest of the plant; however, this station did not operate for several months due to mechanical issues. Therefore, analytical results from an air station southwest of the plant (A28) are used to compare to air sampling stations closer to the plant. In 2006, the average ambient concentration of fluoride measured in samples collected at station A28 was 0.039 microgram per cubic meter ($\mu g/m^3$). Average ambient concentrations of fluoride measured at the other stations ranged from 0.033 $\mu g/m^3$ at Station A8, located on the northwestern plant boundary, to 0.065 $\mu g/m^3$ at Station A3, located on the southeastern PORTS boundary.

5.4 WATER

Surface water and groundwater are monitored at PORTS. Groundwater monitoring is discussed in Chapter 6, along with surface water monitoring conducted as part of the groundwater monitoring program. Non-radiological surface water monitoring primarily consists of sampling water discharges associated with both the DOE and USEC NPDES-permitted outfalls. Non-radiological parameters are also monitored in the Scioto River upstream and downstream of PORTS to determine whether discharges

from PORTS affect water quality in the river. PCBs are monitored in surface water discharges and surface water downstream from the DOE depleted uranium cylinder storage yards.

5.4.1 Water Discharges (NPDES Outfalls)

Both the DOE and USEC are responsible for NPDES outfalls at PORTS. This section describes non-radiological discharges from these outfalls during 2006.

5.4.1.1 DOE NPDES outfalls

Non-radiological discharges from DOE NPDES outfalls are regulated by the DOE PORTS NPDES permit issued to LPP, the responsible DOE contractor. DOE PORTS has eight discharge points, or outfalls, through which water is discharged from the site. Three outfalls discharge directly to surface water, four discharge to the USEC X-6619 Sewage Treatment Plant (USEC NPDES Outfall 003), and one discharges to the X-2230M Holding Pond (DOE Outfall 012). Outfall 612 is currently inactive because the X-625 Groundwater Treatment Facility was placed on stand-by with the approval of the Ohio EPA in July 2003. Chapter 4, Section 4.3.5.1, provides a brief description of each DOE outfall and provides a site diagram showing each DOE PORTS NPDES outfall (see Chapter 4, Figure 4.2).

The Ohio EPA selects the chemical parameters that must be monitored at each outfall based on the chemical characteristics of the water that flows into the outfall. For example, the DOE outfalls that discharge water from the groundwater treatment facilities (Outfalls 015, 608, 610, 611, and 612) are monitored for trichloroethene because the groundwater treatment facilities treat water contaminated with this chemical. Chemicals monitored at each DOE outfall are as follows:

- DOE NPDES Outfall 012 (X-2230M Holding Pond) – chlorine, iron, oil and grease, suspended solids, total PCBs, and trichloroethene.
- DOE NPDES Outfall 013 (X-2230N Holding Pond) – chlorine, oil and grease, suspended solids, and total PCBs.
- DOE NPDES Outfall 015 (X-624 Groundwater Treatment Facility) – total PCBs and trichloroethene.
- DOE NPDES Outfall 608 (X-622 Groundwater Treatment Facility) – trichloroethene and *trans*-1,2-dichloroethene.
- DOE NPDES Outfall 610 (X-623 Groundwater Treatment Facility) – trichloroethene and *trans*-1,2-dichloroethene.
- DOE NPDES Outfall 611 (X-627 Groundwater Treatment Facility) – trichloroethene.
- DOE NPDES Outfall 612 (X-625 Groundwater Treatment Facility) – iron and trichloroethene. This outfall is currently inactive because the X-625 Groundwater Treatment Facility was placed on stand-by with approval from the Ohio EPA on July 9, 2003.
- DOE NPDES Outfall 613 (X-6002A Recirculating Hot Water Plant particle separator) – chlorine and suspended solids.

In 2006, none of the discharge limitations for DOE NPDES outfalls was exceeded; therefore, the overall DOE NPDES compliance rate with the NPDES permit was 100%.

5.4.1.2 USEC NPDES outfalls

USEC is responsible for 11 NPDES outfalls through which water is discharged from the site (see Chapter 4, Figure 4.2). Eight outfalls discharge directly to surface water, and three discharge to another USEC NPDES outfall before leaving the site. Chapter 4, Section 4.3.5.2, provides a brief description of each USEC NPDES outfall. Chemicals monitored at each USEC outfall are as follows:

- USEC NPDES Outfall 001 (X-230J7 East Holding Pond) – cadmium, chlorine, dissolved solids fluoride, oil and grease, silver, suspended solids, zinc.

- USEC NPDES Outfall 002 (X-230K South Holding Pond) – cadmium, fluoride, mercury, oil and grease, silver, suspended solids, thallium.

- USEC NPDES Outfall 003 (X-6619 Sewage Treatment Plant) – ammonia-nitrogen, biochemical oxygen demand, chlorine, copper, fecal coliform (May-October only), mercury, nitrite + nitrate, oil and grease, silver, suspended solids, zinc.

- USEC NPDES Outfall 004 (Cooling Tower Blowdown) – chlorine, copper, dissolved solids, mercury, oil and grease, suspended solids, zinc.

- USEC NPDES Outfall 005 (X-611B Lime Sludge Lagoon) – suspended solids.

- USEC NPDES Outfall 009 (X-230L North Holding Pond) – cadmium, fluoride, oil and grease, suspended solids, zinc.

- USEC NPDES Outfall 010 (X-230J5 Northwest Holding Pond) – cadmium, mercury, oil and grease, suspended solids, zinc.

- USEC NPDES Outfall 011 (X-230J6 Northeast Holding Pond) – cadmium, chlorine, copper, fluoride, oil and grease, suspended solids, zinc.

- USEC NPDES Outfall 602 (X-621 Coal Pile Runoff Treatment Facility) – iron, manganese, suspended solids.

- USEC NPDES Outfall 604 (X-700 Biodenitrification Facility) – copper, iron, nickel, nitrate-nitrogen, zinc.

- USEC NPDES Outfall 605 (X-705 Decontamination Microfiltration System) – ammonia-nitrogen, chromium, hexavalent chromium, copper, iron, Kjeldahl nitrogen, nickel, nitrate-nitrogen, nitrite-nitrogen, oil and grease, sulfate, suspended solids, trichloroethene, zinc.

The USEC NPDES Permit also identifies additional monitoring points that are not discharge points as described in the previous paragraphs. USEC NPDES Station Number 801 is a background monitoring location on the Scioto River upstream from USEC NPDES Outfalls 003 and 004. Samples are collected from this monitoring point to measure toxicity to minnows and another aquatic organism (*Ceriodaphnia*).

USEC NPDES Station Number 902 is a monitoring location on Little Beaver Creek downstream from USEC NPDES Outfall 001. USEC NPDES Station Number 903 is a monitoring location on Big Run Creek downstream from USEC NPDES Outfall 002. Water temperature is the only parameter measured at each of these monitoring points.

In 2006, the overall USEC NPDES compliance rate was 99.8%. During 2006, USEC experienced four exceedences of its NPDES permit limits as described below:

- The daily concentration discharge limitation for suspended solids at USEC NPDES Outfall 011, 45 milligrams per liter (mg/L), was exceeded in April 2006, the sample result was 91.6 mg/L.

- The monthly average discharge limitation for suspended solids at USEC NPDES Outfall 011, 30 mg/L, was exceeded in April 2006, the average was 45.8 mg/L.

- The monthly average temperature limitation at USEC NPDES Station Number 902, 16.7 °C, was exceeded in April 2006, the average was 18 °C.

- The monthly average temperature limitation at USEC NPDES Station Number 903, 16.7 °C, was exceeded in April 2006, the average was 17.9 °C.

In addition, USEC was issued a Notice of Violation in September 2006 for discharge of an oil sheen from Outfall 011, which was observed by an Ohio EPA inspector.

5.4.2 Local Surface Water Monitoring

Non-radiological monitoring of local surface water locations was conducted on the Scioto River upstream and downstream of PORTS (sampling locations RW-6 and RW-1 – see Chapter 4, Figure 4.4). Samples from the Scioto River are analyzed for total phosphate – phosphorus, fluoride, 29 metals, and PCBs. Each of these measurements, with the exception of PCBs, will detect naturally-occurring constituents; therefore, measurements from the upstream location are compared to the downstream location to assess whether PORTS activities have affected the river. Natural variation and manmade activities not related to PORTS can also cause sample variation.

Semiannual samples were collected for fluoride and total phosphate – phosphorus. In 2006, the concentrations of fluoride were not appreciably different in upstream and downstream samples : 0.37 and 0.24 mg/L (ppm) in the upstream samples and 0.39 and 0.24 mg/L in the downstream samples. Concentrations of total phosphate – phosphorus were not appreciably different in upstream and downstream samples collected in 2006: 0.27 and 0.44 mg/L in upstream samples and 0.27 and 0.48 mg/L in downstream samples.

Quarterly samples were collected for PCBs and 29 metals from the upstream and downstream Scioto River sampling locations. PCBs were not detected in any of the samples collected in 2006. No significant differences in the concentrations of metals were noted at the upstream and downstream Scioto River sampling locations. Discharges of non-radiological constituents from PORTS do not appear to affect surface water quality in the Scioto River downstream from PORTS.

5.4.3 Surface Water Monitoring Associated with DOE Cylinder Storage Yards

Surface water samples (filtered and unfiltered) are collected quarterly from four locations in the drainage basins downstream from the DOE depleted uranium cylinder storage yards (UDS X01, RM-8, UDS X02, and RM-10 - see Chapter 4, Figure 4.2) and analyzed for PCBs. No PCBs were detected in surface water samples collected in 2006, with the exception of the third quarter unfiltered sample collected from UDS X02 (one of the western drainage basin monitoring locations). However, this detection was qualified by the laboratory with a “B,” which indicates that the analyte was also detected in the laboratory blank associated with the environmental sample. The detection of PCBs in the laboratory blank sample means that the detection in the sample collected at UDS X02 is most likely due to

laboratory contamination. Section 5.5.2 presents the results for sediment samples collected as part of this program.

5.5 SEDIMENT

In 2006, sediment monitoring at PORTS included local streams and the Scioto River upstream and downstream from PORTS and drainage basins downstream from the DOE depleted uranium cylinder storage yards.

5.5.1 Local Sediment Monitoring

Sediment samples are collected annually at the same locations upstream and downstream from PORTS where local surface water samples are collected and at the NPDES outfalls on the east and west sides of PORTS (see Chapter 4, Figure 4.4). In 2006, samples were analyzed for 30 metals and PCBs, in addition to the radiological parameters discussed in Chapter 4.

PCBs, primarily PCB-1260, were detected in some of the sediment samples collected in 2006 at concentrations up to 57 micrograms per kilogram (μg/kg) or parts per billion (ppb). PCB-1260 was detected in samples collected from Little Beaver Creek at the confluence from the X-230L North Holding Pond (RM-8), Little Beaver Creek west of the PORTS boundary (RM-7), upstream Big Beaver Creek (RM-5), upstream Big Run Creek (RM-33), downstream Big Run Creek at the PORTS boundary (RM-3), and the West Drainage Ditch USEC Outfall 010/DOE Outfall 013 (RM-10). PCB-1248 was detected in both the upstream and downstream Scioto River sampling locations (RM-6 and RM-1, respectively). PCB-1260 is associated with PORTS activities, although it is also present in the environment from other sources. PCB-1248 is not usually detected at PORTS and is most likely present in the Scioto River samples as a result of contamination not attributable to PORTS. The detections of PCBs in sediment around PORTS are less than the risk-based concentration of PCBs for protection of human health developed by U.S. EPA Region 9 and utilized by Ohio EPA: 220 μg/kg.

The results of metals sampling conducted in 2006 indicate that no appreciable differences are evident in the concentrations of metals present in sediment samples taken upstream from PORTS, at background sampling locations, and downstream from PORTS. Metals occur naturally in the environment. Accordingly, the metals detected in the samples most likely did not result from activities at PORTS.

5.5.2 Sediment Monitoring Associated with the DOE Cylinder Storage Yards

Sediment samples are collected quarterly from four locations in the drainage basins downstream from the DOE depleted uranium cylinder storage yards (UDS X01, RM-8, UDS X02, and RM-10) and analyzed for PCBs.

In 2006, PCBs (PCB-1260) were detected in sediment samples collected from three of the four sampling locations (UDS X01, RM-8, and UDS X02) at concentrations ranging from 45 to 140 μg/kg (ppb). These concentrations are well below the 1 ppm (1000 ppb) reference value set forth in the U.S. EPA Region 5 *TSCA Approval for Storage for Disposal of PCB Bulk Product (Mixed) Waste,* which applies to the storage of depleted uranium cylinders at PORTS that may have paint on the exterior of the cylinders that contains more than 50 ppm PCBs.

Section 5.4.3 presents the results for surface water samples collected as part of this program.

5.6 BIOLOGICAL MONITORING - FISH

In 2006, fish were collected from a downstream sampling location on Little Beaver Creek (RW-8) as part of the routine fish monitoring program at PORTS. Chapter 4, Figure 4.4, shows the surface water monitoring location where the fish were caught. Fish samples were analyzed for chromium and PCBs, in addition to the radiological parameters discussed in Chapter 4. Fish samples collected for this program included only the fish fillet, that is, only the portion of the fish that would be eaten by a person.

Chromium was detected at 0.34 milligram per kilogram (mg/kg) in the blue gill sample analyzed for chromium. This concentration of chromium is similar to or less than concentrations of chromium detected in fish caught in 2004-2005 (0.208 to 8.18 mg/kg).

The chromium detected in these fish in 2006 is most likely due to naturally-occurring chromium. Chromium occurs naturally in soil and is often present in stream sediment and surface water. For example, chromium is usually detected in samples of surface water collected at the upstream Scioto River sampling location (RW-6) and in the sediment sample collected from this location.

PCB-1260 was detected at 320 μg/kg (ppb) in the large mouth bass sample analyzed for PCBs. Concentrations of PCBs in fish were compared to the Ohio Fish Consumption Advisory Chemical Limits provided in the *State of Ohio Cooperative Fish Tissue Monitoring Program Sport Fish Tissue Consumption Advisory Program* (Ohio EPA 2005). These limits are set for the following consumption rates: unrestricted, 1/week, 1/month, 6/year, and do not eat. This concentration of PCBs is between the 1/week limit (220 μg/kg) and the 1/month limit (1000 μg/kg).

The Ohio Sport Fish Consumption Advisory, available from the Ohio EPA, Division of Surface Water, advises the public on consumption limits for sport fish caught from all water bodies in Ohio and should be consulted before eating any fish caught in Ohio waters.

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