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 performed to reduce public concerns about plant operations. Non-radiological data collected in 2007 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, surface water, sediment, and fish. Non-radiological data are not collected for some sampling locations and some monitoring programs.

Environmental permits issued by the Ohio 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 boundaries 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, primarily the X-7725 building, account for almost all of the conventional air pollutants emitted by DOE sources. Because all DOE operations were removed from the X-7725 building in 2007, the building and the air permit for the boilers and associated aboveground oil storage tanks were transferred to USEC in 2007. USEC is using the X-7725 building for the American Centrifuge Plant. The DOE reported the following emissions from the boilers for 2007 (January 1 through September 28 only) in the Ohio EPA Fee Emissions Report: 0.045 ton of particulate matter, 0.033 ton of sulfur dioxide, 1.664 tons of nitrogen oxides, 0.0000038 ton of lead, and 0.397 ton of organic compounds. There were no emissions from the permitted UDS air emission sources in 2007.

Other emissions sources at DOE PORTS, which include two landfill venting systems, one glove box, 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 2007, 95.55 tons of material contaminated with asbestos were shipped from DOE PORTS. These wastes included scrap metal, pipe insulation, and other demolition debris that were contaminated with asbestos.

USEC reported the following emissions of non-radiological air pollutants for 2007 in the Ohio EPA Fee Emissions Report: 27.87 tons of particulate matter, 1.49 tons of organic compounds, 2050.32 tons of sulfur dioxide, and 251.64 tons of nitrogen oxides. These emissions are associated with three boilers at the X-600 Steam Plant, which provide steam for PORTS, the former DOE boilers (September 29 through December 31 only), compressors associated with two dry air systems (diesel engine-powered), and a mobile emergency generator.

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 2007, 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 experienced intermittent mechanical problems during 2007. The highest average ambient concentration of fluoride for the ambient air monitoring stations in 2007 was reported at station A37 (0.091 $\mu g/m^3$), which is possibly related to the mechanical issues at this station. Therefore, analytical results from an air station southwest of the plant (A28) are also used to compare to air sampling stations closer to the plant. In 2007, the average ambient concentration of fluoride measured in samples collected at station A28 was 0.067 $\mu g/m^3$. Average ambient concentrations of fluoride measured at the stations ranged from 0.058 $\mu g/m^3$ at station A15, located east of the southern plant boundary, to 0.091 $\mu g/m^3$ at station A36 (located on site at PORTS) and station A37. There is no standard for fluoride in ambient air. The data indicate that ambient concentrations of fluoride at background locations are not appreciably different from concentrations near PORTS.

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 2007.

5.4.1.1 DOE NPDES outfalls

Non-radiological discharges from DOE NPDES outfalls are regulated by the NPDES permit issued to the responsible DOE contractor (LPP or UDS). In 2007, UDS was issued an NPDES permit for the discharge of process wastewaters from the Depleted Uranium Hexafluoride Conversion Facility to the West Ditch, which flows to USEC NPDES Outfall 010 and then to the Scioto River. There were no discharges from the UDS outfall in 2007 because the facility was not operating.

In 2007, LPP was responsible for 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). Chapter 4, Section 4.3.5.1, provides a brief description of each LPP outfall and provides a site diagram showing each LPP 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 and sets discharge limitations for some of these parameters. For example, the LPP 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 LPP outfall are as follows:

- LPP NPDES Outfall 012 (X-2230M Holding Pond) – chlorine, iron, oil and grease, suspended solids, total PCBs, and trichloroethene.
- LPP NPDES Outfall 013 (X-2230N Holding Pond) – chlorine, oil and grease, suspended solids, and total PCBs.
- LPP NPDES Outfall 015 (X-624 Groundwater Treatment Facility) – total PCBs and trichloroethene.
- LPP NPDES Outfall 608 (X-622 Groundwater Treatment Facility) – trichloroethene and *trans*-1,2-dichloroethene.
- LPP NPDES Outfall 610 (X-623 Groundwater Treatment Facility) – trichloroethene and *trans*-1,2-dichloroethene.
- LPP NPDES Outfall 611 (X-627 Groundwater Treatment Facility) – trichloroethene.

- LPP NPDES Outfall 612 (X-625 Groundwater Treatment Facility) – iron and trichloroethene. There were no discharges from this outfall in 2007.

- LPP NPDES Outfall 613 (X-6002A Recirculating Hot Water Plant particle separator) – chlorine and suspended solids.

The monitoring data detailed in the previous paragraph are submitted to Ohio EPA in a monthly operating report. In 2007, none of the discharge limitations for LPP 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 (May-October only), 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.

The monitoring data are submitted to Ohio EPA in a monthly operating report. In 2007, none of the discharge limitations for USEC NPDES outfalls was exceeded; therefore, the overall USEC NPDES compliance rate with the NPDES permit was 100%.

5.4.2 Local Surface Water Monitoring

In the first through third quarters of 2007, 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 were 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. This sampling was discontinued in the fourth quarter of 2007 because data collected in previous years indicate that there are no significant differences in the monitored parameters between upstream and downstream locations.

One sample was collected for fluoride and total phosphate – phosphorus. In 2007, the concentrations of fluoride were not appreciably different in upstream and downstream samples : 0.36 and 0.33 milligram per liter (mg/L or ppm) in the upstream and downstream samples, respectively. Concentrations of total phosphate – phosphorus were not appreciably different in upstream and downstream samples collected in 2007: 0.38 and 0.32 mg/L in upstream and downstream samples, respectively.

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 2007. 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 2007. Section 5.5.2 presents the results for sediment samples collected as part of this program.

5.5 SEDIMENT

In 2007, 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 2007, 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 2007 at concentrations up to 160 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), Little Beaver Creek at the discharge point from the X-230J7 Pond (RM-11), downstream Big Beaver Creek (RM-13), downstream Big Run Creek at the PORTS boundary (RM-3), downstream Big Run Creek at Wakefield (RM-2), 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 2007 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. These locations are on site at PORTS and not accessible to the public.

In 2007, PCBs (PCB-1254, PCB-1260, and/or PCB-1262) were detected in at least one of the sediment samples collected from each location at concentrations ranging from 5.1 to 920 μg/kg (ppb). These concentrations are 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 2007, fish were collected from downstream sampling locations on Little Beaver Creek (RW-8) and the Scioto River (RW-1) as part of the routine fish monitoring program at PORTS. Chapter 4, Figure 4.4, shows the surface water monitoring locations 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 0.22 and 0.68 milligram per kilogram (mg/kg) in both fish samples. These concentrations of chromium are similar to or less than concentrations of chromium detected in fish caught in 2004 through 2006 (0.208 to 8.18 mg/kg).

The chromium detected in these fish in 2007 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.

PCBs were detected at 54 μg/kg (ppb) in the fish sample collected from the Scioto River (a mixture of small mouth bass and suckers). 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 2008). These limits are set for the following consumption rates: unrestricted, 1/week, 1/month, 6/year, and do not eat. This concentration of PCBs (54 μg/kg) is just above the unrestricted level (50 μg/kg) and below the 1/week maximum limit (220 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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