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 2009 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 all sampling locations or all 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 for air emissions and discharges to water 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
- 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 organic compounds and particulate matter. These air emission sources include two landfill venting systems, one glove box, and four groundwater treatment facilities. These air emission sources are regulated as minor sources by Ohio EPA. Air emissions are estimated every two years for the Ohio EPA biennial emission fee statement.

To calculate air emissions, DOE PORTS assumes that each source emits the maximum allowable amount of each pollutant as provided in the permit or registration for each source. Using this worst-case scenario, DOE PORTS estimated emissions of particulate matter to be 0.0015 ton and organic compounds to be 2.249 tons in 2009. These emissions were reported to Ohio EPA in the fee statement due April 15, 2010.

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 2009, 137.46 tons of material contaminated with asbestos were shipped from DOE PORTS. These wastes included demolition debris from D&D of the X-746 and X-344C Buildings, and miscellaneous materials from the X-326 Building.

USEC reported the following emissions of non-radiological air pollutants for 2009 in the Ohio EPA Fee Emissions Report: 0.202 ton of lead, 48.919 tons of particulate matter, 13.7513 tons of organic compounds, 2051.16 tons of sulfur dioxide, and 225.666 tons of nitrogen oxides. These emissions are associated with three boilers at the X-600 Steam Plant, which provide steam for PORTS, the X-6002 boilers, gravel roads and parking areas (due to construction activities for the American Centrifuge Plant), and compressors associated with the X-326 dry air systems (diesel engine-powered).

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 2009, samples for fluoride were collected weekly from 15 ambient air monitoring stations in and around PORTS (see Chapter 4, Figure 4.1) including a background ambient air monitoring station (A37) located approximately 13 miles southwest of the plant. In 2009, the average ambient concentration of fluoride measured in samples collected at background station A37 was 0.036 microgram per cubic meter ($\mu g/m^3$). Average ambient concentrations of fluoride measured at the stations around PORTS ranged from 0.030 $\mu g/m^3$ at station A10, located on-site near the Don Marquis substation, to 0.072 $\mu g/m^3$ at station A40 (on-site near the X-100 Administration Building). 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 the LPP, UDS, and USEC NPDES-permitted outfalls. PCBs are monitored in surface water downstream from the UDS depleted uranium cylinder storage yards.

5.4.1 Water Discharges (NPDES Outfalls)

DOE contractors (LPP and UDS) and USEC are responsible for NPDES outfalls at PORTS. This section describes non-radiological discharges from these outfalls during 2009.

5.4.1.1 LPP NPDES outfalls

In 2009, LPP was responsible for four discharge points, or outfalls, through which water is discharged from the site. One outfall discharges directly to surface water and three discharge to the USEC X-6619 Sewage Treatment Plant (USEC NPDES Outfall 003). 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. The LPP outfalls discharge water from the groundwater treatment facilities; therefore, the outfalls are monitored for selected volatile organic compounds (*trans*-1,2-dichloroethene and/or trichloroethene) because the groundwater treatment facilities treat water contaminated with volatile organics. Chemicals and water quality parameters monitored at each LPP outfall are as follows:

- LPP NPDES Outfall 015 (X-624 Groundwater Treatment Facility) – total PCBs, pH, and trichloroethene.
- LPP NPDES Outfall 608 (X-622 Groundwater Treatment Facility) – trichloroethene, pH, and *trans*-1,2-dichloroethene.
- LPP NPDES Outfall 610 (X-623 Groundwater Treatment Facility) – trichloroethene, pH, and *trans*-1,2-dichloroethene.
- LPP NPDES Outfall 611 (X-627 Groundwater Treatment Facility) – pH and trichloroethene.

The monitoring data detailed in the previous paragraph are submitted to Ohio EPA in a monthly operating report. In 2009, none of the discharge limitations for LPP NPDES outfalls were exceeded; therefore, the overall LPP NPDES compliance rate with the NPDES permit was 100%.

5.4.1.2 UDS NPDES outfalls

UDS holds 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 (the X-230J5 Northwest Holding Pond) and then to the Scioto River. Chapter 4, Figure 4.2 shows the location of the UDS NPDES outfall. Water discharged from UDS Outfall 001 is monitored for the following chemicals and water quality parameters: temperature, biochemical oxygen demand, pH, suspended solids, oil and grease, ammonia-nitrogen, phosphorus, chlorine, and dissolved solids.

The monitoring data are submitted to Ohio EPA in a monthly operating report. Although the UDS facility was not operating in 2009, the UDS NPDES Outfall 001 discharged from January through October. These discharges consisted only of precipitation run-off. Beginning in November of 2008, all UDS system testing process effluents were taken to USEC for treatment prior to discharge through a USEC NPDES outfall.

In February 2009, the daily concentration limit for total dissolved solids was exceeded twice due to the use of salt as a de-icing agent on roads and sidewalks around the UDS facilities. The average monthly temperature limit was also exceeded in February due to warmer than typical weather. The discharge limitations for total suspended solids were exceeded on numerous occasions during 2009. The exceedences were generally due to precipitation and the accumulation of sediment within the storm sewers around the UDS facilities. Rain often causes higher concentrations of suspended solids in surface water. Many NPDES permits, including the USEC NPDES permit, include a provision that the discharge limitations for suspended solids do not apply if flow increases due to precipitation; however, the UDS NPDES permit does not include this provision. Only precipitation run-off was discharged through the UDS outfall during 2009.

UDS and Ohio EPA are discussing modifications to the UDS NPDES permit to address precipitation events and permit limitations for solids. The overall UDS NPDES compliance rate in 2009 was 87%.

5.4.1.3 USEC NPDES outfalls

USEC is responsible for 14 NPDES outfalls through which water is discharged from the site (see Chapter 4, Figure 4.2). Ten outfalls discharge directly to surface water, and four 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 and water quality parameters 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, pH, silver, suspended solids, and zinc.

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

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

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

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

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

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

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

- USEC NPDES Outfall 012 (X-2230M Southwest Holding Pond) – chlorine, iron, oil and grease, pH, suspended solids, total PCBs, and trichloroethene.

- USEC NPDES Outfall 013 (X-2230N West Holding Pond) – chlorine, oil and grease, pH, suspended solids, and total PCBs.

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

- USEC NPDES Outfall 604 (X-700 Biodenitrification Facility) – copper, iron, nickel, nitrate-nitrogen, pH, and 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, pH, sulfate, suspended solids, trichloroethene, and zinc.

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

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 2009, two exceedences of discharge limitations were reported as discussed below:

- On August 17, 2009, the 24-hour maximum temperature limit of 29.4°Celsius (°C) was exceeded at NPDES Station Number 902. The maximum temperature recorded was 30°C. Hot, dry weather caused this exceedence.

- On December 9, 2009, the maximum concentration for total residual chlorine (0.038 mg/L) was exceeded at Outfall 004 for a period of 3.75 hours. Residual chlorine was measured at 0.5 mg/L. Routine refilling of the halogen feed system associated with the X-630 Cooling Tower resulted in higher levels of chlorine in the cooling water blowdown. Adjustments to the dechlorination treatment brought residual chlorine levels below the permit limitation.

In 2009, the overall USEC NPDES compliance rate with the NPDES permit was 99%.

5.4.2 Surface Water Monitoring Associated with UDS Cylinder Storage Yards

Surface water samples (filtered and unfiltered) are collected quarterly from four locations in the drainage basins downstream from the UDS depleted uranium cylinder storage yards (UDS X01, RM-8, UDS X02, and RM-10 - see Chapter 4, Figure 4.2) and analyzed for PCBs. PCB-1254 was detected at 0.22 µg/L in the filtered surface water sample collected in the first quarter at sampling location RM-8. This detection (0.22 µg/L) is less than the 0.5 ppb (0.5 µg/L) 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. PCBs were not detected in any of the other surface water samples (filtered or unfiltered) collected during 2009. Section 5.5.2 presents the results for sediment samples collected as part of this program.

5.5 SEDIMENT

In 2009, sediment monitoring at PORTS included local streams and the Scioto River upstream and downstream from PORTS and drainage basins downstream from the UDS 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 2009, samples were analyzed for 20 metals and PCBs, in addition to the radiological parameters discussed in Chapter 4.

PCBs, primarily PCB-1260 and PCB-1254, were detected in some of the sediment samples collected in 2009 at concentrations up to 187 micrograms per kilogram (µg/kg) or parts per billion (ppb). PCB-1260 and/or PCB-1254 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), the Southwest Drainage Ditch near USEC Outfall 012 (RM-9), and the West Drainage Ditch near USEC Outfalls 010 and 013 (RM-10). PCBs (PCB-1016, PCB-1254, and/or PCB-1260) were also detected in the upstream and downstream Scioto River sampling locations (RM-6 and RM-1, respectively). PCB-1260 and PCB-1254 are associated with PORTS activities, although they can also be present in the environment from other sources. PCB-1016 is not usually detected at PORTS and is 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 2009 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 UDS Cylinder Storage Yards

Sediment samples are collected quarterly from four locations in the drainage basins downstream from the UDS 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 2009, total PCBs (PCB-1242, PCB-1254 and/or PCB-1260) were detected in at least one of the sediment samples collected from each location at concentrations up to 608 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 5.4.2 presents the results for surface water samples collected as part of this program.

5.6 BIOLOGICAL MONITORING - FISH

In 2009, fish were collected from upstream locations on Big Beaver Creek (RW-15) and the Scioto River (RW-6) as well as 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 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. Fish samples collected from the Scioto River consisted of freshwater drum (RW-6) and a mixture of freshwater drum and catfish (RW-1). The sample collected from Big Beaver Creek upstream from PORTS (RW-15) was a mixture of sunfish and large mouth bass. Two samples were collected from Little Beaver Creek (RW-8); one sunfish sample and one large mouth bass sample.

PCBs were detected in the samples collected from the Scioto River downstream from PORTS (RW-1) and both Little Beaver Creek samples (RW-8). The downstream Scioto River fish sample (RW-1) contained PCB-1254 at an estimated concentration of 66.7 µg/kg. The largemouth bass sample from Little Beaver Creek contained PCB-1260 at an estimated concentration of 225 µg/kg. The sunfish sample from Little Beaver Creek contained total PCBs at an estimated concentration of 678 µg/kg (PCB-1254 at 120 µg/kg and PCB-1260 at 558 µg/kg). PCBs were not detected in the fish samples collected from the Scioto River at RW-6 or Big Beaver Creek at RW-15. 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. These concentrations of PCBs detected in fish collected from Little Beaver Creek (225 and 678 µg/kg) are above the 1/week maximum limit (220 µg/kg) and below the 1/month maximum limit (1000 µg/kg). The concentration of PCBs detected in the fish collected from the Scioto River (66.7 µg/kg) is just above the unrestricted limit (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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