

## **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 2010 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 Ohio EPA to DOE contractors, USEC, Inc., or USEC Government Services specify discharge limitations, monitoring requirements, and/or reporting requirements for air emissions and water discharges. Because USEC, Inc., and USEC Government Services data are important in developing a complete picture of environmental monitoring at PORTS, these data are included in this report. USEC, Inc., and USEC Government Services information for air emissions and discharges to water is provided for informational purposes only; DOE cannot ensure the quality of USEC, Inc., or USEC Government Services data. Data from the following environmental monitoring programs are included in this chapter:

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

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 contractors are responsible for 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, each source is assumed to emit the maximum allowable amount of each pollutant as provided in the permit or registration for each source. Emissions from 2010 and 2011 will be

provided to Ohio EPA in the fee statement due in 2012. Emissions for 2010 are the same as those reported in 2009: 0.0015 ton of particulate matter and 2.249 tons of organic compounds.

Another potential air pollutant present at PORTS is asbestos released by D&D of plant facilities. Asbestos emissions are controlled by a system of work practices. The amount of asbestos removed and disposed is reported to Ohio EPA. In 2010, 523 tons of material contaminated with asbestos from DOE activities were shipped from PORTS. These wastes were primarily from D&D of the X-533 Switchyard and X-633 Cooling Towers Complex.

USEC, Inc. and USEC Government Services reported the following emissions of non-radiological air pollutants for 2010 in the Ohio EPA Fee Emissions Report: 0.187 ton of lead, 51.2 tons of particulate matter, 5.78 tons of organic compounds, 1833 tons of sulfur dioxide, and 217 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 ACP), the X-670A Cooling Tower (a new source in 2010), and emergency generators.

### **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), USEC Government Services activities associated with the former gaseous diffusion process, and operation of the DUF<sub>6</sub> Conversion Facility.

In 2010, 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 2010, the average ambient concentration of fluoride measured in samples collected at background station A37 was 0.043 microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Average ambient concentrations of fluoride measured at the stations around PORTS ranged from 0.029  $\mu\text{g}/\text{m}^3$  at station A6 in Piketon to 0.048  $\mu\text{g}/\text{m}^3$  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 Government Services NPDES-permitted outfalls. PCBs are monitored in surface water downstream from the DUF<sub>6</sub> cylinder storage yards.

### **5.4.1 Water Discharges (NPDES Outfalls)**

In 2010, DOE contractors (LPP and UDS) and USEC Government Services were responsible for NPDES outfalls at PORTS. This section describes non-radiological discharges from these outfalls during 2010.

#### **5.4.1.1 LPP NPDES outfalls**

In 2010, 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 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).

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 2010, 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**

In 2010, UDS held the NPDES permit for the discharge of process wastewaters from the DUF<sub>6</sub> Conversion Facility to the West Ditch, which flows to the X-230J5 Northwest Holding Pond (USEC NPDES Outfall 010) 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. The only water released through UDS NPDES Outfall 001 during 2010 was due to precipitation run-off. Beginning in November of 2008, any UDS process effluents were taken to USEC Government Services for treatment prior to discharge through a USEC Government Services NPDES outfall.

In February 2010, the average monthly temperature limit (45 degrees Fahrenheit) was exceeded due to warmer than typical weather. Three of the discharge limitations for total suspended solids (daily concentration, average monthly concentration, and daily loading limit) were exceeded in September 2010. The exceedences were generally due to precipitation and the accumulation of sediment within the storm sewers around the DUF<sub>6</sub> Conversion Facility. Rainwater runoff often causes an increase in concentrations of suspended solids in surface water. Many NPDES permits, including the USEC Government Services 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 2010.

Modifications to the UDS NPDES permit may be made in the future to address precipitation events and permit limitations for solids. The overall UDS NPDES compliance rate in 2010 was 93%.

#### **5.4.1.3 USEC Government Services NPDES outfalls**

In 2010, USEC Government Services was responsible for 14 NPDES outfalls through which water was discharged from the site (see Chapter 4, Figure 4.2). Ten outfalls discharge directly to surface water, and

four discharge to another USEC Government Services NPDES outfall before leaving the site. Chapter 4, Section 4.3.5.2, provides a brief description of each USEC Government Services NPDES outfall. Chemicals and water quality parameters monitored at each USEC Government Services 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 Bionitrification 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 Government Services 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 2010, seven exceedences of discharge limitations were reported as discussed below:

- In April 2010, five exceedences of temperature limitations occurred at NPDES Station Numbers 902 and 903. The monthly average winter temperature limitation (16.7 degrees Celsius [ $^{\circ}\text{C}$ ]) was exceeded at both stations by approximately  $3^{\circ}\text{C}$ . The 24-hour maximum temperature limit of  $21.1^{\circ}\text{C}$  was exceeded at NPDES Station Number 902 on April 15 and 16 and at NPDES Station Number 903 on April 16 with maximum temperatures of 22 to  $23^{\circ}\text{C}$ . Unseasonably warm weather caused the exceedences of the winter limitations, which are effective in April. These results would not have exceeded the summer temperature limitations.
- On May 13, 2010, the maximum concentration for fecal coliform (2000 colonies/100 milliliters [mL]) was exceeded at Outfall 003. The sample result was 2400 colonies/100 mL. A review of operating information revealed that heavy rainfall occurred during the sampling timeframe that resulted in a sudden increase in effluent flow. The chlorination rate was increased to accommodate the increased discharge, but the sample was collected between the increase in effluent flow and the increase in chlorination. The sample collected on the following day (18 colonies/100 mL) was well within the permit limitation.
- On November 23, 2010, the maximum daily concentration limit (15 mg/L) for 5-day carbonaceous biochemical oxygen demand (CBOD) was exceeded at Outfall 003. The sample result was 15.7 mg/L. The exact cause of the exceedence was unclear, but contributing factors appeared to be recent rainfall, damage to the facility's west clarifier, and loss of some filter media. CBOD was undetected in the sample collected the following week. The exceedence appeared to be an isolated event.

In 2010, the overall USEC Government Services NPDES compliance rate with the NPDES permit was 99%.

#### **5.4.2 Surface Water Monitoring Associated with DUF<sub>6</sub> Cylinder Storage Yards**

Surface water samples (filtered and unfiltered) are collected quarterly from four locations in the drainage basins downstream from the DUF<sub>6</sub> cylinder storage yards (UDS X01, RM-8, UDS X02, and RM-10 – see Chapter 4, Figure 4.2) and analyzed for PCBs. PCBs were not detected in any of the surface water samples (filtered or unfiltered) collected during 2010. Section 5.5.2 presents the results for sediment samples collected as part of this program.

### **5.5 SEDIMENT**

In 2010, sediment monitoring at PORTS included local streams and the Scioto River upstream and downstream from PORTS and drainage basins downstream from the DUF<sub>6</sub> 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 2010, 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 2010 at concentrations up to 174 micrograms per kilogram ( $\mu\text{g/kg}$ ) or parts per billion (ppb). PCBs were 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), and the West Drainage Ditch near USEC Outfalls 010 and 013 (RM-10). PCBs were also detected in the upstream and downstream Scioto River sampling locations (RM-6 and RM-1, respectively). 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  $\mu\text{g/kg}$ .

The results of metals sampling conducted in 2010 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 DUF<sub>6</sub> Cylinder Storage Yards

Sediment samples are collected quarterly from four locations in the drainage basins downstream from the DUF<sub>6</sub> 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 2010, 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 166  $\mu\text{g/kg}$  (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 DUF<sub>6</sub> 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 2010, 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), Big Beaver Creek (RW-13), 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 RW-1). The samples collected from Big Beaver Creek were rock bass (RW-15) and blue gill (RW-13). The sample collected from Little Beaver Creek (RW-8) was a mixture of rock bass and large mouth bass.

PCBs (PCB-1248, PCB-1254, PCB-1260, and PCB-1268) were not detected in the fish samples at concentrations higher than the detection limits for the samples (approximately 300  $\mu\text{g/kg}$ ). Although PCBs were not detected in the fish samples, the detection limits 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. The

detection limits are above the 1/week maximum limit (220 µg/kg) and below the 1/month maximum limit (1000 µg/kg).

The Ohio Sport Fish Consumption Advisory, available from 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.