

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. Permits for NPDES outfalls and numerous air emission sources that were associated with the gaseous diffusion plant were transferred from USEC Government Services to FBP during 2011. Non-radiological data collected in 2011 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 or USEC, Inc. specify discharge limitations, monitoring requirements, and/or reporting requirements for air emissions and water discharges. USEC, Inc. data for NPDES water discharges are included in this section to provide a more complete picture of environmental monitoring at PORTS. USEC, Inc. information for discharges to water is provided for informational purposes only; DOE cannot ensure the quality of USEC, Inc. 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

In 2011, DOE contractor FBP became responsible for numerous air emission sources associated with the former gaseous diffusion production facilities and support facilities (the sources that were formerly the responsibility of USEC Government Services). These sources, which include the boilers at the X-600 Steam Plant, emit more than 100 tons per year of non-radiological air pollutants specified by Ohio EPA, which caused DOE to become a major source of air pollutants as defined in Title 40 of the *Code of Federal Regulations*, Part 70.

Facilities that are major sources of air pollutants are required to submit an annual report called the Ohio EPA Fee Emissions Report to report emissions of selected non-radiological air pollutants. Because FBP

became a major source of air pollutants during 2011, FBP was required to submit this annual report instead of the biennial report that FBP completed in previous years when air emissions were less than 100 tons per year. FBP reported the following emissions of non-radiological air pollutants for 2011 in the Ohio EPA Fee Emissions Report: 0.155 ton of lead, 54.6 tons of particulate matter, 5.58 tons of organic compounds, 1495 tons of sulfur dioxide, and 176 tons of nitrogen oxides. These emissions are associated primarily with the boilers at the X-600 Steam Plant, which provide steam for PORTS, the X-670A Cooling Tower, and emergency generators.

The DUF₆ Conversion Facility emits only a small quantity of non-radiological air pollutants. Because of these small emissions, Ohio EPA requires a Fee Emissions Report only once every two years. BWCS reported less than 10 tons/year of specified non-radiological air pollutants for 2011 (the report requires reporting in increments of emissions: zero, less than 10 tons, 10-50 tons, more than 50 tons, and more than 100 tons). BWCS reported 3 lbs of hydrogen fluoride emitted to the air in the Toxic Chemical Release Inventory for 2011 (see Chapter 2, Section 2.3.1.2).

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 2011, 251.6 tons (503,164 lbs) of material contaminated with asbestos were shipped from PORTS.

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), activities associated with the former gaseous diffusion process, and operation of the DUF₆ Conversion Facility.

In 2011, samples for fluoride were collected weekly from 14 or 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. Beginning in May 2011, the monitoring station in Zahns Corner (A41) was removed due to road construction. The station was not replaced by the end of 2011.

In 2011, fluoride was not detected in more than half of the samples collected for the ambient air monitoring program. The average ambient concentration of fluoride measured in samples collected at background station A37 was 0.026 microgram per cubic meter ($\mu\text{g}/\text{m}^3$). Average ambient concentrations of fluoride measured at the stations around PORTS ranged from 0.021 $\mu\text{g}/\text{m}^3$ at station A6 in Piketon to 0.042 $\mu\text{g}/\text{m}^3$ 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 FBP, BWCS, and USEC, Inc. NPDES-permitted outfalls. PCBs are monitored in surface water downstream from the cylinder storage yards.

5.4.1 Water Discharges (NPDES Outfalls)

In 2011, DOE contractors (LPP, FBP, BWCS, and UDS) were responsible for NPDES outfalls at PORTS. FBP and BWCS became responsible for outfalls formerly operated by LPP and UDS on March 29, 2011. USEC Government Services NPDES outfalls were transferred to the FBP NPDES permit on September 1,

2011. USEC, Inc. retained responsibility for three outfalls. This section describes non-radiological discharges from these outfalls during 2011.

5.4.1.1 FBP NPDES outfalls

As of the end of 2011, FBP was responsible for 18 discharge points, or outfalls, through which water is discharged from the site. Nine outfalls discharge directly to surface water, and six outfalls discharge to another outfall before leaving the site. FBP also monitors three additional locations that are not discharge points. Chapter 4, Section 4.3.5.1, provides a brief description of each FBP outfall or monitoring point and provides a site diagram showing each FBP 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. For example, some of the FBP outfalls discharge water from the groundwater treatment facilities; therefore, the outfalls are monitored for selected volatile organic compounds (*trans*-1,2-dichloroethene and/or TCE) because the groundwater treatment facilities treat water contaminated with volatile organics. Chemicals and water quality parameters monitored at each FBP outfall are as follows:

- FBP NPDES Outfall 001 (X-230J7 East Holding Pond) – cadmium, chlorine, dissolved solids, fluoride, oil and grease, pH, silver, suspended solids, and zinc.
- FBP NPDES Outfall 002 (X-230K South Holding Pond) – cadmium, fluoride, mercury, oil and grease, pH, silver, suspended solids, and thallium.
- FBP 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.
- FBP NPDES Outfall 004 (Cooling Tower Blowdown) – acute toxicity, chlorine, copper, dissolved solids, mercury, oil and grease, pH, suspended solids, and zinc.
- FBP NPDES Outfall 005 (X-611B Lime Sludge Lagoon) – pH and suspended solids.
- FBP NPDES Outfall 009 (X-230L North Holding Pond) – cadmium, fluoride, oil and grease, pH, suspended solids, and zinc.
- FBP NPDES Outfall 010 (X-230J5 Northwest Holding Pond) – cadmium, mercury, oil and grease, pH, suspended solids, and zinc.
- FBP NPDES Outfall 011 (X-230J6 Northeast Holding Pond) – cadmium, chlorine, copper, fluoride, oil and grease, pH, suspended solids, and zinc.
- FBP NPDES Outfall 015 (X-624 Groundwater Treatment Facility) – total PCBs, pH, and TCE.
- FBP NPDES Outfall 602 (X-621 Coal Pile Runoff Treatment Facility) – iron, manganese, pH, and suspended solids.
- FBP NPDES Outfall 604 (X-700 Bionitrification Facility) – copper, iron, nickel, nitrate-nitrogen, pH, and zinc.

- FBP 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, TCE, and zinc.
- FBP NPDES Outfall 608 (X-622 Groundwater Treatment Facility) – TCE, pH, and *trans*-1,2-dichloroethene.
- FBP NPDES Outfall 610 (X-623 Groundwater Treatment Facility) – TCE, pH, and *trans*-1,2-dichloroethene.
- FBP NPDES Outfall 611 (X-627 Groundwater Treatment Facility) – pH and TCE.

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

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

The monitoring data detailed in the previous paragraphs are submitted to Ohio EPA in a monthly operating report. In 2011, two of the discharge limitations at the FBP NPDES outfalls were exceeded. In January 2011, the maximum daily concentration limit for 5-day carbonaceous biochemical oxygen demand (15 mg/L) was exceeded at Outfall 003 (the X-6619 Sewage Treatment Plant) with a sample result of 22 mg/L. This exceedence was the responsibility of USEC Government Services because it occurred prior to the outfall's transfer to FBP. The exceedence was caused by a sudden increase in solids in the aeration basin that is a part of the sewage treatment plant due to a problem with the sewage lift station. The lift station was repaired, and no additional exceedences occurred during 2011.

In November 2011, the maximum limit for acute toxicity for fathead minnows (*Pimephales promelas*) (1 acute toxicity unit [TUa]) was exceeded at Outfall 004 (Cooling Tower Blowdown) with a sample result of 1.41 TUa. The toxicity resulted from the chemicals used to treat the cooling water to inhibit corrosion, scale, and algae. Adjustments to the treatment chemicals were implemented to correct the source of the toxicity. In 2011, the overall FBP NPDES compliance rate with the NPDES permit was 99%.

5.4.1.2 BWCS NPDES outfall

Beginning on March 29, 2011, BWCS assumed responsibility for the NPDES permit for the discharge of process wastewaters from the DUF₆ Conversion Facility to the West Ditch, which flows to the X-230J5 Northwest Holding Pond (FBP NPDES Outfall 010) and then to the Scioto River. Chapter 4, Figure 4.2 shows the location of the BWCS NPDES outfall. Water discharged from BWCS 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 outfall is permitted for the discharge of process wastewater, the only water released through BWCS NPDES Outfall 001 during 2011 was due to precipitation run-off. Beginning in November of 2008, any process wastewater from the DUF₆ Conversion Facility is taken to the X-6619 Sewage Treatment Plant for treatment prior to discharge through FBP NPDES Outfall 003.

Discharge limitations for total suspended solids (daily concentration, average monthly concentration, daily loading limit, and/or average monthly loading limit) were exceeded 14 times during 2011. The exceedences were generally due to precipitation and the accumulation of sediment within the storm sewers around the DUF₆ Conversion Facility. Rainwater runoff often causes an increase in concentrations of suspended solids in surface water. Many NPDES permits, including the FBP and USEC, Inc. NPDES permits, include a provision that the discharge limitations for suspended solids do not apply if flow increases due to precipitation; however, the BWCS NPDES permit does not include this provision.

Discharge limitations for dissolved solids (daily concentration and daily loading) were exceeded four times during 2011. Two of the exceedences appeared to be related to spillage of an ice melt product (calcium chloride). The spillage was cleaned up and the ice melt was moved into the warehouse. Rainfall appeared to cause the two additional exceedences of the discharge limitations for dissolved solids.

The minimum discharge limitation for pH was not met seven times during 2011. The pH of the discharge, which ranged from 6.11 to 6.44 standard units (SU), was slightly less than the permit limit of 6.5 SU. Upon investigation, it appeared that the low pH measurements were caused by malfunctioning pH meter probes. The probes were replaced and no additional exceedences were measured.

Only precipitation run-off was discharged through the BWCS outfall during 2011. The overall BWCS NPDES compliance rate in 2011 was 96%.

In 2011, Ohio EPA and BWCS began discussions to eliminate the BWCS NPDES permit because process effluents are not discharged through the outfall. Precipitation runoff from the BWCS outfall flows to the X-230J5 Northwest Holding Pond and is monitored by FBP NPDES Outfall 010. These discussions continued in 2012.

5.4.1.3 USEC, Inc. NPDES outfalls

At the end of 2011, USEC, Inc. was responsible for 3 NPDES outfalls through which water was discharged from the site (see Chapter 4, Figure 4.2). Two outfalls discharge directly to surface water, and one outfall discharges to FBP NPDES Outfall 003 before leaving the site. Chapter 4, Section 4.3.5.2, provides a brief description of each USEC, Inc. NPDES outfall. Chemicals and water quality parameters monitored at each USEC, Inc. outfall are as follows:

- USEC NPDES Outfall 012 (X-2230M Southwest Holding Pond) – chlorine, iron, oil and grease, pH, suspended solids, total PCBs, and TCE.
- USEC NPDES Outfall 013 (X-2230N West Holding Pond) – chlorine, oil and grease, pH, suspended solids, and total PCBs.
- USEC NPDES Outfall 613 (X-6002A Recirculating Hot Water Plant particle separator) – chlorine, pH, and suspended solids.

The monitoring data are submitted to Ohio EPA in a monthly operating report. No exceedences of permit limitations at USEC, Inc. Outfalls 012, 013 and 613 occurred during 2011; therefore, the overall USEC, Inc. compliance rate with the NPDES permit was 100%.

5.4.2 Surface Water Monitoring Associated with Cylinder Storage Yards

Surface water samples (filtered and unfiltered) are collected quarterly from four locations in the drainage basins downstream from the X-745C, X-745E, and X-745G 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 2011. Section 5.5.2 presents the results for sediment samples collected as part of this program.

5.5 SEDIMENT

In 2011, sediment monitoring at PORTS included local streams and the Scioto River upstream and downstream from PORTS and drainage basins downstream from the DUF₆ 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 2011, 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 sediment samples collected downstream from PORTS. 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), downstream Big Run Creek at Wakefield (RM-2), and the West Drainage Ditch near 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).

Two of the detections of PCBs in sediment around PORTS were more 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 micrograms per kilogram ($\mu\text{g}/\text{kg}$) or parts per billion (ppb). These detections were in sediment samples collected on site in Little Beaver Creek at monitoring locations RM-11 (258 $\mu\text{g}/\text{kg}$) and RM-8 (303 $\mu\text{g}/\text{kg}$). Investigation and remediation of PCBs in soil and sediment at PORTS will be addressed as part of the environmental remediation of PORTS.

The results of metals sampling conducted in 2011 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 Cylinder Storage Yards

Sediment samples are collected quarterly from four locations in the drainage basins downstream from the X-745C, X-745E, and X-745G 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 2011, total PCBs (PCB-1254 and/or PCB-1260) were detected in at least one of the sediment samples collected from each location at concentrations up to 690 $\mu\text{g}/\text{kg}$ (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 DUF₆ cylinders at PORTS that may have paint on the exterior of the cylinders that contains more than 50 ppm PCBs. Only one sample (the first quarter sample from location RM-8) contained total PCBs above the risk-based concentration of PCBs for protection of human health developed by U.S. EPA Region 9 and utilized by Ohio EPA: 220 $\mu\text{g}/\text{kg}$ (ppb).

Section 5.4.2 presents the results for surface water samples collected as part of this program.

5.6 BIOLOGICAL MONITORING - FISH

In 2011, 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 sheephead (RW-6) and bass (RW-1). The samples collected from Big Beaver Creek were a mixture of catfish and bass (RW-15) and sheephead (RW-13). The sample collected from Little Beaver Creek (RW-8) was small mouth bass.

PCBs (PCB-1254) were detected only in the duplicate sample of small mouth bass collected from on-site sampling location RW-8 at an estimated concentration of 347 $\mu\text{g}/\text{kg}$. This detection was 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 is above the 1/week maximum limit (220 $\mu\text{g}/\text{kg}$) and below the 1/month maximum limit (1000 $\mu\text{g}/\text{kg}$).

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.