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 2008 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 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 nitrogen oxides, sulfur dioxide, 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. Emissions from 2008 and 2009 will be provided to Ohio EPA in the fee statement due in 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 2008, no asbestos waste was shipped from DOE PORTS.

USEC reported the following emissions of non-radiological air pollutants for 2008 in the Ohio EPA Fee Emissions Report: 0.214 ton of lead, 55.14 tons of particulate matter, 16.92 tons of organic compounds, 2057.48 tons of sulfur dioxide, and 247.285 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 (a new source due to construction activities for the American Centrifuge Plant), 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 2008, 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 2008, the average ambient concentration of fluoride measured in samples collected at background station A37 was 0.047 microgram per cubic meter ($\mu g/m^3$). Average ambient concentrations of fluoride measured at the stations around PORTS ranged from 0.037 $\mu g/m^3$ at station A24, located north of the plant at Schuster Road, to 0.061 $\mu g/m^3$ at stations A12 and A23 (both located on the eastern plant boundary. 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 2008.

5.4.1.1 LPP NPDES outfalls

At the end of 2008, 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). LPP was responsible for three additional outfalls (Outfall 012, 013, and 613) from January through April of 2008; these outfalls were transferred to USEC on May 1, 2008 and are discussed in Section 5.4.1.3. 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, and 611) 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 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.

The monitoring data detailed in the previous paragraph are submitted to Ohio EPA in a monthly operating report. In 2008, 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 or 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. In 2008, UDS NPDES Outfall 001 discharged only between August and December because the facility was undergoing systems testing and was not discharging wastewater on a regular basis. Between August and December, UDS experienced five exceedences of discharge limitations as discussed below:

- In September 2008, the daily loading limits for suspended solids and dissolved solids were exceeded. The water discharged on the day of these exceedences was precipitation run-off that had accumulated in electrical vaults at the UDS facility. The water from the electrical vaults was pumped through a filter to remove solids and then into a storm drain prior to sampling and discharge through the outfall. Upon investigation of the incident, it appears that the water disturbed sediment present in the storm drain due to construction. The outfall sampling location is downstream from the storm drain.

- In November 2008, the daily concentration limit for suspended solids was exceeded due to excessive rainfall. 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 on the day of this exceedence.

- In December 2008, the daily concentration limit for dissolved solids was exceeded twice. The water discharged on the two days of the exceedences consisted solely of precipitation run-off, which had been affected by the use of salt as a de-icing agent on roads and sidewalks around the UDS facilities.

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 2008 was 96%.

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. These outfalls include Outfalls 012, 013, and 613 that were transferred from LPP to USEC beginning on May 1, 2008 (see Section 5.4.1.1). 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, and zinc.

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

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

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

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

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

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

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

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

- USEC NPDES Outfall 613 (X-6002A Recirculating Hot Water Plant particle separator) – chlorine 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 2008, four exceedences of discharge limitations were reported as discussed below:

- In April 2008, the compliance range for pH (6.5 to 9.0 standard units) was exceeded at Outfall 002. The pH was measured at 4.2 standard units on April 18, 2008 because too much citric acid was added to the water discharge by the automated citric acid feed system used to adjust the pH of the discharge. Repairs to the citric acid feed system resolved the problem.

- In August, September, and November of 2008, the monthly average discharge limitation for thallium was exceeded at Outfall 002. This limitation became effective on August 1, 2008; there was no limitation prior to August 1. As reported by USEC to Ohio EPA, these exceedences appear to be due to the detection limit for the analytical method used to analyze the samples. For several samples in August, September, and November, thallium was detected at low concentrations just above the instrument detection limit; however, there is uncertainty and potential error associated with results just above the detection limit. Preliminary analyses using a different analytical method with a lower detection limit indicated that there were no exceedences, but the analyses using the different analytical method could not be considered official until the laboratory completed quality assurance and control procedures for the method. Analyses for thallium changed to the new method in January 2009.

In 2008, 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. No PCBs were detected in surface water samples collected in 2008. Section 5.5.2 presents the results for sediment samples collected as part of this program.

5.5 SEDIMENT

In 2008, 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 2008, 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 2008 at concentrations up to 200 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), and the West Drainage Ditch near USEC Outfalls 010 and 013 (RM-10). PCB-1248 was detected in the upstream Scioto River sampling location (RM-6). PCB-1260 and PCB-1254 are associated with PORTS activities, although they can also be present in the environment from other sources. PCB-1248 is not usually detected at PORTS and is present in the upstream Scioto River sample 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 2008 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 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 2008, total PCBs (PCB-1254 and/or PCB-1260) were detected in at least one of the sediment samples collected from each location at concentrations ranging from 5.4 to 210 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 2008, fish were collected from 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.

PCBs (PCB-1260) were detected at 250 µg/kg (ppb) in the fish sample collected from Little Beaver Creek (a mixture of rock bass and blue gill) and at 368 µg/kg in the catfish caught from Big Beaver Creek. 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 (250 and 368 µg/kg) are just 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 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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