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 completed to reduce public concerns about plant operations. Non-radiological data collected in 2004 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, local surface water, sediment, and fish. Non-radiological data are not collected for some sampling locations and some monitoring programs.

Environmental permits issued by the EPA to both DOE and 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; 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.

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 the DOE reservation 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 account for almost all of the conventional air pollutants emitted by DOE sources. DOE reported the following emissions from the

boilers for 2004 in the Ohio EPA Fee Emissions Report: 0.08 ton of particulate matter, 0.56 ton of organic compounds, 0.07 ton of sulfur dioxide, and 2.38 tons of nitrogen oxides.

Other emissions sources at DOE PORTS, which include two landfill venting systems, two glove boxes (not used in 2004), two aboveground storage tanks in the X-6002A Fuel Oil Storage Facility, 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 2004, 214 tons of material contaminated with asbestos were shipped from DOE PORTS. These wastes included scrap metal, pipe insulation, and personal protective equipment that were contaminated with asbestos.

USEC reported the following emissions of non-radiological air pollutants for 2004 in the Ohio EPA Fee Emissions Report: 27.66 tons of particulate matter, 1.59 tons of organic compounds, 2021.97 tons of sulfur dioxide, and 228.73 tons of nitrogen oxides. These emissions are associated with the boilers at the X-600 Steam Plant, which provide steam for the PORTS reservation, a boiler at the X-611 Water Treatment Plant, and diesel-powered compressors for emergency use.

5.3.2 Ambient Air Monitoring

In addition to the radionuclides discussed in Chap. 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 the gaseous diffusion process.

In 2004, samples for fluoride were collected weekly from 15 ambient air monitoring stations in and around PORTS (see Chap. 4, Fig. 4.1). A background ambient air monitoring station (A37) is located approximately 13 miles southwest of the plant. The analytical results from air sampling stations closer to the plant are compared to this background station. In 2004, the average ambient concentration of fluoride measured in samples collected at the background station was 0.043 microgram per cubic meter ($\mu g/m^3$). Ambient concentrations of fluoride measured at the other stations ranged from 0.036 $\mu g/m^3$ at Station A9 (southwest of the southwestern plant boundary) to 0.060 $\mu g/m^3$ at Station A36, which is within the process area of PORTS at the X-611 Water Treatment Plant.

5.4 WATER

Surface water and groundwater are monitored at PORTS. Groundwater monitoring is discussed in Chap. 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 DOE and USEC NPDES-permitted outfalls. In addition, non-radiological parameters are monitored in the Scioto River upstream and downstream of PORTS to determine whether discharges from PORTS affect water quality in the river.

5.4.1 Water Discharges (NPDES Outfalls)

5.4.1.1 DOE NPDES outfalls

Non-radiological discharges from DOE NPDES outfalls are regulated by the DOE PORTS NPDES permit. DOE PORTS has 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). Outfall 612 is currently inactive because the X-625 Groundwater Treatment Facility was placed on stand-by with the approval of Ohio EPA in July 2003. Chapter 4, Sect. 4.3.5.1, provides a brief description of each DOE outfall and provides a site diagram showing each DOE PORTS NPDES outfall (see Chap. 4, Fig. 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. For example, the DOE 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. The following chemicals are monitored at each DOE outfall.

- DOE NPDES Outfall 012 (X-2230M Holding Pond) – chlorine, iron, oil and grease, suspended solids, total PCBs, and trichloroethene.
- DOE NPDES Outfall 013 (X-2230N Holding Pond) – chlorine, oil and grease, suspended solids, and total PCBs.
- DOE NPDES Outfall 015 (X-624 Groundwater Treatment Facility) – total PCBs and trichloroethene.
- DOE NPDES Outfall 608 (X-622 Groundwater Treatment Facility) – trichloroethene and *trans*-1,2-dichloroethene.
- DOE NPDES Outfall 610 (X-623 Groundwater Treatment Facility) – trichloroethene and *trans*-1,2-dichloroethene.
- DOE NPDES Outfall 611 (X-622T Groundwater Treatment Facility) – trichloroethene.
- DOE NPDES Outfall 612 (X-625 Groundwater Treatment Facility) –iron and trichloroethene. This outfall is currently inactive because the X-625 Groundwater Treatment Facility was placed on stand-by with approval from Ohio EPA on July 9, 2003.
- DOE NPDES Outfall 613 (X-6002A Recirculating Hot Water Plant particle separator) – chlorine and suspended solids.

In 2004, none of the discharge limitations for DOE NPDES outfalls were exceeded; therefore, the overall DOE NPDES compliance rate with the NPDES permit was 100%.

5.4.1.2 USEC NPDES outfalls

Non-radiological discharges from USEC NPDES outfalls are regulated by the USEC NPDES permit that became effective on March 1, 2000. USEC is responsible for 11 NPDES outfalls through which water is discharged from the site (see Chap. 4, Fig. 4.2). Eight outfalls discharge directly to surface water, and three discharge to another USEC NPDES outfall before leaving the site. Chapter 4, Sect.

4.3.5.2, provides a brief description of each USEC NPDES outfall. The following chemicals are monitored at each USEC outfall.

- USEC NPDES Outfall 001 (X-230J7 East Holding Pond) – arsenic, copper, fluoride, manganese, nickel, oil and grease, suspended solids, zinc.
- USEC NPDES Outfall 002 (X-230K South Holding Pond) – fluoride, manganese, mercury, oil and grease, silver, suspended solids, thallium.
- USEC NPDES Outfall 003 (X-6619 Sewage Treatment Plant) – ammonia-nitrogen, biochemical oxygen demand, chlorine, copper, fecal coliform (May-October only), mercury, nitrate-nitrogen, oil and grease, silver, suspended solids, zinc.
- USEC NPDES Outfall 004 (Cooling Tower Blowdown) – copper, dissolved solids, oil and grease, suspended solids, zinc.
- USEC NPDES Outfall 005 (X-611B Lime Sludge Lagoon) – suspended solids, PCBs.
- USEC NPDES Outfall 009 (X-230L North Holding Pond) – fluoride, manganese, oil and grease, suspended solids, zinc.
- USEC NPDES Outfall 010 (X-230J5 Northwest Holding Pond) – manganese, oil and grease, suspended solids, zinc.
- USEC NPDES Outfall 011 (X-230J6 Northeast Holding Pond) – copper, fluoride, oil and grease, suspended solids, zinc.
- USEC NPDES Outfall 602 (X-621 Coal Pile Runoff Treatment Facility) – iron, manganese, settleable solids, 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 four 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. USEC NPDES Station Number 901 is a monitoring location on the Scioto River downstream from Outfalls 003 and 004 and located in the discharge plume from these two outfalls. Samples are collected from both of these monitoring points 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, and 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.

In 2004, none of the discharge limitations for USEC NPDES outfalls were exceeded; therefore, the overall USEC NPDES compliance rate with the NPDES permit was 100%.

5.4.2 Local Surface Water Monitoring

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 Chap. 4, Fig. 4.4). Samples from the Scioto River are analyzed for total phosphate as phosphorus, fluoride, 28 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.

Semiannual samples were collected for fluoride and total phosphate as phosphorus. The concentration of fluoride was the same at the upstream and downstream Scioto River sampling locations for each sampling event in 2004. Concentrations of total phosphate as phosphorus were not appreciably different in upstream and downstream samples collected in 2004: 0.11 and 0.12 milligram per liter (mg/L) or part per million (ppm) in upstream samples and 0.11 and 0.11 mg/L in downstream samples.

Quarterly samples were collected for PCBs and 28 metals from the upstream and downstream Scioto River sampling locations. PCBs were not detected in any of the samples collected in 2004. 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.

5.5 SEDIMENT

Sediment samples are collected annually at the same locations upstream and downstream from the PORTS reservation where surface water samples are collected and at the NPDES outfalls on the east and west sides of the reservation (see Chap. 4, Fig. 4.4). In 2004, samples were analyzed for 21 metals and PCBs, in addition to the radiological parameters discussed in Chap. 4.

The results of sampling conducted in 2004 indicate that there are no appreciable differences in the concentrations of metals present in sediment samples taken upstream from PORTS or 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.

Historically, PORTS sediment sampling has detected low levels of PCB contamination in the Little Beaver Creek. This contamination was caused by discharges of treated process water before 1988. PCB-1260 (a specific form of PCB) was detected at 0.6 microgram per gram (μg/g) or ppm at one of the on-site sampling locations on Little Beaver Creek (RM-8 – see Chap. 4, Fig. 4.4). PCBs have been detected previously at this sampling location.

5.6 BIOLOGICAL MONITORING - FISH

In 2004, fish were collected from downstream sampling locations on Little Beaver Creek (RW-8) and the Scioto River (RW-1). Chapter 4, Fig. 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 Chap. 4. Fish samples collected for this program were prepared by removing the head from each fish and pureeing the remainder of the fish. This method of sample preparation means that portions of the fish that are not usually eaten, such as the internal organs, are included in the sample analyzed by the laboratory.

PCBs were detected in 1 of 5 fish samples at 2.1 μg/g of total PCBs. The fish was a bass caught in Little Beaver Creek at surface water sampling location RW-8, which is on the PORTS reservation. Chapter 4, Fig. 4.4, shows the surface water monitoring location where the fish was caught.

PCBs, a widespread environmental contaminant, are often detected in fish. The Ohio Department of Health, which issues fish consumption advisories for Ohio, does not recommend eating fish that contain PCBs at concentrations above 1.9 ppm. However, this recommendation is based on concentrations of PCBs detected only in the portion of the fish that would be eaten (the fillet of the fish). PCBs and other contaminants tend to accumulate in the fatty portions of the fish and in the organs such as the liver, intestines, and kidneys. Because the fish samples from PORTS included the entire body of the fish (excluding the head), it is unknown whether PCBs were present above 1.9 ppm in only the fillet portion of the fish. The Ohio Sport Fish Consumption Advisory, available from the Ohio EPA, Division of Surface Water, should be consulted before eating any fish caught in Ohio waters.

In 2004, chromium was detected in 4 of 5 fish samples at concentrations ranging from 2.79 to 8.18 milligrams per kilogram (mg/kg) (or ppm). These fish were collected from both downstream sampling locations (Little Beaver Creek and the Scioto River). No upstream, or background, fish were collected in 2004. These results are consistent with levels of chromium detected in both upstream and downstream fish caught in previous years.

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. The chromium detected in these fish in 2004 is most likely due to naturally-occurring chromium.