

3. ENVIRONMENTAL PROGRAM INFORMATION

3.1 SUMMARY

Environmental Restoration activities in 2004 included a special groundwater remediation project in the southern portion of the X-749/X-120 groundwater plume in Quadrant I and development of various work plans and other documents required by Ohio EPA. Planning to implement the remedial actions required for the X-701B area in Quadrant II took place throughout 2004. These remedial actions include construction of landfill caps in the western portion of the area, groundwater treatment through injection of a chemical oxidant, and phytoremediation, if necessary.

In 2004, approximately 9.5 million lbs of waste from DOE PORTS were recycled, treated, or disposed at off-site facilities. Activities undertaken by the Waste Minimization, Pollution Prevention, Training, Information Exchanges, and Public Awareness programs are also discussed in this chapter.

3.2 ENVIRONMENTAL RESTORATION PROGRAM

DOE established the Environmental Restoration Program in 1989 to identify, control, and remediate environmental contamination at PORTS. The Environmental Restoration Program was granted an initial budget of \$13.8 million. The Environmental Restoration Program budget for fiscal year 2004 was \$41 million.

The Environmental Restoration Program addresses inactive sites through remedial action and deals with active facilities through eventual decontamination and decommissioning. Options for correcting or mitigating the contaminated sites and facilities include removal, containment, and treatment of contaminants. Because PORTS is a large facility, it is divided into quadrants (Quadrant I, II, III, and IV) to facilitate the cleanup process.

The Environmental Restoration Program was established to fulfill the cleanup requirements of the Ohio Consent Decree and U.S. EPA Administrative Consent Order. As required by these enforcement actions, DOE PORTS Environmental Restoration Program activities are conducted in accordance with the RCRA corrective action process, which consists of the following:

- *Description of current conditions* – to provide knowledge of the groundwater, surface water, soil, and air.
- *RCRA facility assessment* – to identify releases of contaminants and determine the need for further investigation.
- *RCRA facility investigation* – to determine the nature and extent of any contamination.
- *Cleanup alternatives study/corrective measures study* – to evaluate and select a remediation alternative.
- *Corrective measures implementation* – to implement the selected remediation measure.

DOE PORTS has completed the description of current conditions, RCRA facility assessment, RCRA facility investigation, and cleanup alternatives study/corrective measures study for each quadrant. Following the approval of the final cleanup alternative study/corrective measure study, Ohio EPA selects the remedial alternatives that will undergo further review for determining the final remedial actions for each quadrant (the Preferred Plan). Upon concurrence from the U.S. EPA and completion of the public review and comment period, the U.S. EPA and Ohio EPA select the final remedial actions for each quadrant. Ohio EPA issues a decision document to select the final remedial actions.

Implementation of corrective measures is underway in each quadrant. Corrective measures implementations are described for each quadrant in the following sections. Table 3.1 lists completed activities for the groundwater monitoring areas at PORTS, which include corrective measures required by decision document and other actions.

Ohio EPA has deferred further investigation and/or corrective action for certain areas known as "deferred units." Deferred units are areas that are in or adjacent to current production and operational areas such that remedial activities would interrupt operations, or are areas that could become recontaminated from ongoing operations. Ohio EPA has deferred investigation/corrective action for these units until decontamination and decommissioning of PORTS.

3.2.1 Quadrant I

The *Quadrant I Cleanup Alternative Study/Corrective Measures Study* was approved by Ohio EPA in 2000. Ohio EPA issued the Decision Document for Quadrant I in 2001. The following sections discuss the remedial actions required for the X-749/X-120/Peter Kiewit (PK) Landfill and the Quadrant I Groundwater Investigative Area. Deferred units in Quadrant I will be addressed during decontamination and decommissioning of PORTS.

3.2.1.1 X-749/X-120/PK Landfill

The remedial actions identified for X-749/X-120 groundwater plume include phytoremediation of the groundwater plume, installation of a barrier wall around the eastern and southern portion of the X-749 Landfill, and continued operation of the groundwater collection trenches installed at the PK Landfill and X-749 Landfill.

Phytoremediation is a process that uses plants to remove, degrade, or contain contaminants in soil and/or groundwater. Phytoremediation at the X-749/X-120 groundwater plume was installed in two phases. The first phase was completed in 2002. Hybrid poplar trees were planted in two areas of the X-749/X-120 groundwater plume: one area immediately east of the X-749 Landfill and one area on the southern edge of the plume. The second phase, which encompasses the southern and western portion of the plume, was completed in 2003. A certification report for both phases of this project was submitted to Ohio EPA in December 2003 and approved by Ohio EPA in January 2004.

A five-year review was completed for the PK Landfill in 2002 to evaluate the effectiveness of the corrective measures implemented at this area (the groundwater collection systems and landfill cap - see Table 3.1). U.S. EPA and Ohio EPA approved the report contingent upon additional evaluation and monitoring at PK Landfill. A monitoring plan entitled *Comprehensive Monitoring Program for the X-749 and Peter Kiewit Landfill Areas for the Portsmouth Gaseous Diffusion Plant* was developed and implemented in 2003 to provide additional data to evaluate the performance of the groundwater collection systems and landfill cap for the PK Landfill and to monitor the effect of the new X-749 barrier wall on

Table 3.1. Corrective actions completed at PORTS

Quadrant/monitoring area	Corrective action/year completed
Quadrant I X-749/X-120 plume	X-749 multimedia cap – 1992 X-749 barrier wall (north and northwest sides of landfill) – 1992 X-749 subsurface drains and sumps – 1992 South barrier wall – 1994 X-120 horizontal well – 1996 X-625 Groundwater Treatment Facility – 1996 X-749 barrier wall (east and south sides of landfill) – 2002 Phytoremediation (22 acres) – 2002-2003
Quadrant I PK Landfill	Relocation of Big Run Creek – 1994 Groundwater collection system – 1994 Groundwater collection system expansion – 1997 PK Landfill Subtitle D cap – 1998
Quadrant I Quadrant I Groundwater Investigative Area	Groundwater extraction wells (3) – 1991 X-622 Groundwater Treatment Facility – 1991 (upgraded in 2001) Interim soil cover at X-231B – 1995 X-231A/X-231B multimedia caps – 2000 Groundwater extraction wells (11) – 2002
Quadrant I X-749A Classified Materials Disposal Facility	Cap – 1994
Quadrant II Quadrant II Groundwater Investigative Area	Operation of X-700 and X-705 building sumps – 1989 X-622T Groundwater Treatment Facility – 1992 Removal of X-720 Neutralization Pit (NP) – 1998 Removal of X-701C Neutralization Pit – 2001 Removal of contaminated soil near X-720 NP – 2001 X-627 Groundwater Treatment Facility – 2004 (replaced the X-622T facility)
Quadrant II X-701B Holding Pond	X-237 Groundwater Collection System – 1991 X-624 Groundwater Treatment Facility – 1991 Extraction wells (3) – 1993 X-623 Groundwater Treatment Facility – 1993 X-701B sump – 1995
Quadrant III X-740 Waste Oil Handling Facility	Phytoremediation – 1999
Quadrant IV X-611A Former Lime Sludge Lagoons	Soil cover/prairie habitat – 1996
Quadrant IV X-735 Landfills	Cap on northern portion – 1994 Cap on southern portion – 1998
Quadrant IV X-734 Landfills	Cap on X-734B Landfill (Phase I) – 1999 Cap on X-734 and X-734A Landfills (Phase II) – 2000

groundwater quality and migration in the northern area of the X-749 plume and at the PK Landfill. Data was collected for this monitoring program throughout 2004, and an annual summary report was submitted to Ohio EPA on December 28, 2004.

A project began in 2004 to remediate volatile organics at the southern edge of the X-749/X-120 groundwater plume in the area of the X-749 South Barrier Wall (an interim remedial measure constructed in 1994) and the DOE property boundary. Hydrogen release compounds, which act as an accelerant to the natural microbial process that breaks down volatile organics into nontoxic compounds, were injected into the soil in over 150 locations during April 2004. Additional monitoring took place after the injections to monitor the concentrations of volatile organics, gases, and other breakdown products in the groundwater. Chapter 6 provides 2004 groundwater monitoring results for the X-749/X-120/PK Landfill area, including this project.

3.2.1.2 Quadrant I Groundwater Investigative Area

Remedial actions identified for the Quadrant I Groundwater Investigative Area are (1) installation of multimedia caps over the X-231A and X-231B Biodegradation Plots and (2) installation of 11 additional groundwater extraction wells to extract contaminated groundwater for treatment in the X-622 Groundwater Treatment Facility. Table 3.1 lists the remedial actions completed for the Quadrant I Groundwater Investigative Area.

Operation of the groundwater extraction wells is affecting the concentrations of contaminants detected in some of the wells in the groundwater plume. Chapter 6, Sect. 6.4.2.3, provides information on the groundwater monitoring completed at this area in 2004.

3.2.2 Quadrant II

The *Quadrant II Cleanup Alternative Study/Corrective Measures Study* was approved by Ohio EPA on March 26, 2001. After approval of the document, however, Ohio EPA requested an amendment to the approved study to address additional remedial alternatives for the X-701B area. Amendments were submitted in 2001 and 2002. In January 2003, Ohio EPA informed DOE that a separate Preferred Plan and Decision Document would be prepared for the X-701B area. Ohio EPA issued the Preferred Plan in September 2003 and the X-701B Decision Document in December 2003.

Remedial actions required for soil in the X-701B area include removal of contaminated soil in the western portion of the area and consolidation of the soil under two landfill caps to be constructed over the X-701B Holding Pond/East Retention Basin and the West Retention Basin. Two landfill caps will be constructed so that an existing storm water drainage pipe will not be covered. Groundwater remediation will be accomplished by injection of a chemical oxidant and recirculation of the groundwater and by phytoremediation, if necessary. Planning to implement the remedial actions required by the Decision Document took place throughout 2004, with field activities beginning in 2005.

Deferred units in Quadrant II will be addressed during decontamination and decommissioning of PORTS. In 2003, DOE agreed to conduct an annual review of all deferred units at PORTS to confirm that the status of the units has not changed. The annual update to the Deferred Unit Plan was submitted to Ohio EPA on December 21, 2004. A number of deferred units are in the groundwater plume in the Quadrant II Groundwater Investigative Area. DOE has evaluated existing Quadrant II monitoring data for deferred units to determine whether actions could be taken to reduce or eliminate sources of contamination; however, operation of the sumps in buildings X-700 and X-705 appears to be sufficient to control groundwater contamination in this area.

Chapter 6 provides 2004 groundwater monitoring results for the following areas in Quadrant II that require groundwater monitoring: X-701B Holding Pond, Quadrant II Groundwater Investigative Area, and X-633 Pumphouse/Cooling Towers Area (a deferred unit).

3.2.3 Quadrant III

The *Quadrant III Cleanup Alternative Study/Corrective Measures Study* was approved by Ohio EPA in 1998. The Decision Document for Quadrant III required phytoremediation of the groundwater plume near the X-740 Waste Oil Handling Facility. Deferred units in Quadrant III will be addressed during decontamination and decommissioning of PORTS.

Over 700 hybrid poplar trees were planted on a 2.6-acre area above the X-740 groundwater plume in 1999. Groundwater monitoring of both the elevation of groundwater in the aquifer and the concentration of contaminants in the groundwater plume is used to monitor the system. Chapter 6, Sect. 6.4.7.1, provides information about the groundwater monitoring completed for this area in 2004.

In 2003, a five-year review was completed for the X-740 groundwater plume to evaluate the effectiveness of the phytoremediation system. The report, entitled *Five-Year Evaluation Report for the X-740 Phytoremediation Project*, indicates that the trees in the phytoremediation system do not noticeably affect the overall groundwater flow in the Gallia at this area, although the trees do appear to influence water levels in individual wells. Concentrations of trichloroethene in the X-740 groundwater plume have not decreased appreciably.

Upon review of the Five-Year Evaluation Report, Ohio EPA required installation of two new wells in the area to further define the groundwater plume. Monitoring of these wells began in 2005. DOE will also complete another evaluation of this area in three years to show that the phytoremediation system is effective in remediating the groundwater plume. Additional data to be collected for this evaluation includes soil moisture at specified depths below ground surface, wind speed/direction, rainfall, air/soil temperature, tree growth rates, and sap flow measurements. Continued growth of the trees should increase the effectiveness of the phytoremediation system.

3.2.4 Quadrant IV

The *Quadrant IV Cleanup Alternative Study/Corrective Measures Study* was approved by Ohio EPA in 1998. DOE received the Decision Document for Quadrant IV in 2000. No new remedial actions were required in Quadrant IV (remedial actions had already taken place at the X-344D Hydrogen Fluoride Neutralization Pit, X-735 Landfills, X-611A Former Lime Sludge Lagoons, and X-734 Landfill Area). Deferred units in Quadrant IV will be addressed during decontamination and decommissioning of PORTS.

In 2002, a five-year review was completed for the X-611A Former Lime Sludge Lagoons to evaluate the effectiveness of the corrective measures implemented at this area. The report found that the soil cover and prairie habitat constructed at the X-611A Former Lime Sludge Lagoons is meeting the objectives for this unit by eliminating exposure pathways to the contaminants of concern in the sludge at this area.

Chapter 6 provides 2004 groundwater monitoring results for the following areas in Quadrant IV that require groundwater monitoring: X-611A Former Lime Sludge Lagoons, X-735 Landfills, X-734 Landfills, and X-533 Switchyard Area (a deferred unit).

3.3 WASTE MANAGEMENT PROGRAM

The DOE PORTS Waste Management Program directs the safe storage, treatment, and disposal of waste generated by past and present operations and from current Environmental Restoration projects. DOE PORTS also stores USEC-generated waste in the RCRA Part B permitted storage areas. Waste managed under the program is divided into the following seven categories, which are defined below:

- *Low-level radioactive waste (LLW)* – radioactive waste not classified as high level or transuranic waste.
- *Hazardous (RCRA) waste* – waste that contains one or more of the wastes listed under RCRA or that exhibits one or more of the four RCRA hazardous characteristics: ignitability, corrosivity, reactivity, and toxicity. Universal waste, which includes common items such as batteries and light bulbs, is a subset of RCRA waste that is subject to reduced requirements for storage, transportation, and disposal or recycling.
- *RCRA/LLW mixed waste* – waste containing both hazardous and radioactive components. The waste is subject to RCRA, which governs the hazardous components, and to the Atomic Energy Act that governs the radioactive components.
- *PCB wastes* – waste containing PCBs, a class of synthetic organic chemicals. Disposal of PCB materials is regulated under TSCA.
- *PCB/LLW mixed waste* – waste containing both PCB and radioactive components. The waste is subject to TSCA regulations that govern PCB components, and to the Atomic Energy Act that governs radioactive components.
- *PCB/LLW/RCRA mixed waste* – waste containing PCB and radioactive components that is also a RCRA hazardous waste. The waste is subject to RCRA regulations, TSCA regulations that govern PCBs, and to the Atomic Energy Act that governs radioactive components.
- *Industrial sanitary waste* – waste generated by industrial or commercial operations that is not in any of the categories listed above. These wastes can include waste from construction or demolition activity and office waste. Waste contaminated with asbestos may also be included in this category if it is not included in any of the categories listed above (PCB, RCRA, and/or LLW).

In 2004, approximately 9.5 million lbs of waste from PORTS were recycled, treated, or disposed at off-site facilities (Table 3.2). Future waste management projects include continuing shipments for disposal of low-level radioactive waste and mixed waste, and the treatment of mixed and PCB/mixed waste at off-site commercial facilities.

Waste management requirements are varied and are sometimes complex because of the variety of waste streams generated by DOE PORTS activities. DOE Orders, Ohio EPA regulations, and U.S. EPA regulations must be satisfied to demonstrate compliance for waste management activities. Additional policies have been implemented for management of radioactive, hazardous, and mixed wastes. These policies include the following:

- minimizing waste generation;

Table 3.2. Waste Management Program off-site treatment, disposal, and recycling accomplishments for 2004

Waste type	Waste stream	Quantity (lbs)	Treatment, disposal, or recycling facility
RCRA/PCB/LLW	Light bulbs and other solids that contain metals	3003	Envirocare
PCB	Transformers	24,125	Clean Harbors
PCB/LLW	Soil, sludge, empty containers, and cleanup materials	2,503,922	Envirocare
PCB	Transformer	37,736	Clean Harbors
PCB/LLW	Empty containers	9494	Materials and Energy Corp
LLW	Demolition debris, personal protective equipment, scrap metal, empty drums, soil, etc.; some of which contain asbestos	6,712,390	Envirocare
RCRA/LLW	Lab packs or off-specification chemicals	1100	Diversified Scientific Solutions, Materials and Energy Corp, Envirocare
RCRA/LLW	Spent filters, plastics, and personal protective equipment contaminated with solvents	64,903	Perma-Fix
RCRA/LLW	Labpacks and other chemicals	581	Perma-Fix
RCRA/LLW	Soil, personal protective equipment, sample returns, and other waste contaminated with solvents	20,859	Envirocare
RCRA/LLW	Waste from treatability study for cyanide plating solutions	27,005	Envirocare
RCRA/LLW	Waste contaminated by chromic acid sludge	10,121	Envirocare
RCRA/LLW	Liquids that are corrosive, contaminated with metals, and/or contaminated with organics	42,828	Envirocare
RCRA/LLW	Sludges that are corrosive or contaminated with metals	18,550	Envirocare
RCRA/LLW	Solids that are corrosive, contaminated with metals, and/or contaminated with organics	31,778	Envirocare
Universal waste	Recyclable lead acid batteries	5344	Onyx
Universal waste	Recyclable light bulbs (incandescent, sodium, mercury vapor, etc.)	1890	Onyx
Industrial waste	Recyclable cardboard and office paper	31,180	Star/Rumpke
Industrial waste	Recyclable aluminum cans	648	Star

- characterizing and certifying wastes before they are stored, processed, treated, or disposed;
- pursuing volume reduction (such as blending and bulking) as well as on-site storage in preparation for safe and compliant final treatment and/or disposal; and
- recycling.

3.4 WASTE MINIMIZATION AND POLLUTION PREVENTION PROGRAM

DOE PORTS has combined its waste minimization and pollution prevention efforts to consolidate related activities. The objectives of the DOE PORTS Waste Minimization and Pollution Prevention Program include the following:

- fostering a philosophy to conserve resources and create a minimum of waste and pollution;
- promoting the use of nonhazardous materials in DOE PORTS operations to minimize potential risks to human health and the environment;
- reducing or eliminating the generation of wastes through material substitution, product reformulation, process modification, improved housekeeping, and on-site recycling; and
- complying with federal and state regulations and DOE policies and requirements for waste minimization.

The DOE PORTS Waste Minimization and Pollution Prevention Program continues activities to achieve the waste minimization objectives. Typical projects include the following:

- maintaining a comprehensive waste tracking and reporting system;
- evaluating DOE PORTS processes and activities to identify waste minimization opportunities;
- maintaining an effective DOE PORTS waste minimization training program;
- maintaining a waste minimization and pollution prevention awareness promotional campaign; and
- providing a waste minimization and pollution prevention information exchange network.

The Pollution Prevention Awareness Program consists of (1) pollution prevention awareness through newsletters, bulletins, and memoranda; (2) information exchange; and (3) training. Another recognized pollution prevention measure is the *Portsmouth Spill Prevention, Control, and Countermeasures Plan*.

Highlights of the Waste Minimization and Pollution Prevention Program in 2004 include the following:

- recycled more than 39,000 lbs of waste including office paper, toner cartridges, corrugated cardboard, aluminum cans, lamps, and batteries; and
- maintained 100% procurement of post-consumer recycled office paper and continued purchasing of other products containing recycled material.

3.5 ENVIRONMENTAL TRAINING PROGRAM

DOE PORTS provides environmental training to increase employee awareness of environmental activities and to enhance the knowledge and qualifications of personnel performing tasks associated with environmental assessment, planning, and restoration. The program includes on- and off-site classroom instruction, on-the-job training, seminars, and specialized workshops and courses. Environmental training conducted or prepared by DOE PORTS includes hazardous waste training required by RCRA and numerous Occupational Safety and Health Administration training requirements.

3.6 INFORMATION EXCHANGE PROGRAM

To improve and update its environmental monitoring and research programs, DOE PORTS exchanges information within the site, with other DOE facilities, and other sources of information. DOE PORTS representatives attend both DOE-sponsored and independent technical information exchange workshops, such as the annual DOE Model Conference and other professional conferences.

3.7 PUBLIC AWARENESS PROGRAM

A comprehensive community relations and public participation program is in place at PORTS. The purpose of the program is to foster a spirit of openness and credibility between PORTS officials and local citizens, elected officials, business, media, and various segments of the public. The program also provides the public with opportunities to become involved in the decisions affecting environmental issues at PORTS.

DOE PORTS opened a public Environmental Information Center in February 1993 to provide public access to all documents used to make decisions on remedial actions being taken at the plant. The Information Center is on the west side of the plant site in a modular unit outside the E-Vehicle portal. The mailing address for the Information Center is U.S. DOE Environmental Information Center, P.O. Box 693, Piketon, Ohio 45661, and the email address is eic@bright.net. The street address is 3930 U.S. Route 23 South, Perimeter Road West, Piketon, Ohio 45661. Hours for the Information Center are 9 a.m. to 12 p.m. Monday and Tuesday, 12 p.m. to 4 p.m. Wednesday and Thursday, or by appointment (740-289-3317). Due to additional security measures in place at the plant post-September 11, 2001, members of the public must call the Information Center in advance at the number listed above to be placed on the visitor list prior to visiting the Information Center. The latest Annual Environmental Report and other information can also be obtained from the PORTS web site at www.lpports.com.

Semiannual public update meetings and public workshops on specific topics are also held to keep the public informed and to receive their comments and questions. Periodically, fact sheets about major projects are written for the public. The *Portsmouth Environmental Bulletin* is distributed to more than 4,000 recipients, including those on the community relations mailing list, neighbors within 2 miles of the plant, plant employees, and plant retirees.

Points of contact have been established for the public to obtain information or direct questions regarding the Environmental Management Program. The DOE Site Office may be contacted at 740-897-5010. The LATA/Parallax Portsmouth Office of Public Affairs (740-897-2336) also provides information on the program.

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