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The Decision Document for the X-611A Solid Waste Management Unit

U.S. DOE - PORTS Site

June 1996

CONTENTS

ACRONYMS AND ABBREVIATIONS xi

PART 1: DECLARATION STATEMENT xiii

PART 2: DECISION SUMMARY 1

1.0 SITE NAME, LOCATION, AND DESCRIPTION 2

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES 5
- 2.1 HISTORY OF X-611A LIME SLUDGE LAGOONS 6
- 2.2 ENFORCEMENT ACTIVITIES 9

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION 9

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION 10

5.0 SUMMARY OF SITE CHARACTERISTICS 11
- 5.1 POTENTIAL SOURCES OF CONTAMINATION 11
- 5.2 SUMMARY OF NATURE AND EXTENT OF CONTAMINATION 12
- 5.3 PATHWAYS OF CONTAMINANT MIGRATION 13

6.0. SUMMARY OF SITE RISKS 14
- 6.1 OVERVIEW OF THE BASELINE RISK ASSESSMENT 14
  - 6.1.1. Identification Of Contaminants Of Concern 15
  - 6.1.2 Exposure Assessment for the Baseline Risk Assessment 16
  - 6.1.3 Current Land Use 16
  - 6.1.4 Future Land Use 16
  - 6.1.5 Exposure Point Concentrations 16
  - 6.1.6 Exposure Parameters 17
  - 6.1.7 Toxicity Assessment 17
  - 6.1.8 Risk Characterization 18
- 6.2 UNCERTAINTIES 22
- 6.3 ECOLOGICAL RISKS 24

6.4 CONCLUSION 25

7.0 DESCRIPTION OF REMEDIAL ALTERNATIVES 25
7.1 ALTERNATIVE 1: NO ACTION 26
7.2 ALTERNATIVE 2: LIMITED ACTION - FENCING/SIGNS, DEED RESTRICTIONS, AND ENVIRONMENTAL MONITORING 26
7.3 ALTERNATIVE 3: CAPPING AND INSTITUTIONAL CONTROLS 27
7.4 ALTERNATIVE 3A: CAPPING AND INSTITUTIONAL CONTROLS 28
7.5 ALTERNATIVE 3B: CAPPING AND INSTITUTIONAL CONTROLS 28
7.6 ALTERNATIVE 4: PARTIAL EXCAVATION, CONSTRUCTED WETLANDS, DEED RESTRICTIONS AND ENVIRONMENTAL MONITORING 29
7.7 ALTERNATIVE 5: PARTIAL EXCAVATION, CONSTRUCTED WETLANDS, SOIL LAYER, VEGETATIVE COVER, DEED RESTRICTIONS, AND ENVIRONMENTAL MONITORING 30
7.8 ALTERNATIVE 5A: CONSTRUCTED WETLANDS, SOIL LAYER, VEGETATIVE COVER, DEED RESTRICTIONS, AND ENVIRONMENTAL MONITORING 31
7.9 ALTERNATIVE 6: EXCAVATION, DEWATERING, AND DISPOSAL 31
7.10 ALTERNATIVE 8: IN SITU SOLIDIFICATION/STABILIZATION 32
7.11 MAJOR ARARs FOR THE X-611A LIME SLUDGE LAGOONS 32

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES 34
8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT 35
8.2 COMPLIANCE WITH ALL STATE, FEDERAL, AND LOCAL LAWS AND REGULATIONS 36
8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE 37
8.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT 38
8.5 SHORT-TERM EFFECTIVENESS 38
8.6 IMPLEMENTABILITY 39
8.7 COST 39
8.8 COMMUNITY ACCEPTANCE 40

9.0. THE SELECTED REMEDY 40 59

10.0 STATUTORY DETERMINATIONS 42 60
10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT 42 61
10.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND 62
APPROPRIATE REQUIREMENTS 43 63
10.2.1 Chemical-Specific ARARs 43 64
10.2.2 Action-Specific ARARs 44 65
10.2.3 Location-Specific ARARs 44 66
10.3 COST EFFECTIVENESS 46 67
10.4 USE OF PERMANENT SOLUTIONS AND ALTERNATIVE 68
TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE 46 69
10.5 PREFERENCE FOR TREATMENT AS A PRINCIPLE ELEMENT 46 70
10.6 SOURCE CONTROL 46 71
10.7 ATTAINMENT OF MEDIA CLEANUP STANDARDS 47 72
10.8 COMPLIANCE WITH STANDARDS FOR MANAGEMENT OF WASTES 47 73

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES 47 74

12.0 MINOR CHANGES 47 75

13.0 REFERENCES 48 76

PART 3: OHIO EPA RESPONSES TO PUBLIC COMMENTS 50 77

FIGURES

1. Counties surrounding PORTS 3
2. Quadrant map, Portsmouth Gaseous Diffusion Plant 4
3. X-611A Sludge Lagoons - Plan View 7
4. X-611A Lime Sludge Lagoons: Typical Cross-Section 8

TABLES

Table 6.1 Oral and Inhalation Slope Factors for COCS 19
Table 6.2 Dermal Reference Doses and Cancer Slope Factors for COCs 20
Table 6.3 Oral and Inhalation Reference Doses for COCs 21
Table 6.4 Summary of Risk Assessment 23
Table 8.1 Implementation Times 39

APPENDICES

Appendix A Administrative Record File Index . . . . . .
Appendix B-1 Action-Specific ARARs . . . . . .
Appendix B-2 Chemical-Specific ARARs . . . . . .
Appendix B-3 Location-Specific ARARs . . . . . .

ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order by Consent
ARAR	applicable or relevant and appropriate requirement
Bedford	Bedford Shale
BERA	Baseline Ecological Risk Assessment
Berea	Berea Sandstone
CAS	cleanup alternatives study
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	corrective measures study
COC	contaminant of concern
COPC	contaminant of potential concern
CWA	Clean Water Act
DNR	Department of Natural Resources
DOE	United States Department of Energy
DWQPA	Division of Water Quality Planning and Assessment
ELCR	excess lifetime cancer risk
Gallia	Gallia Sand and Gravel
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HOC	halogenated organic compound
HQ	Hazard Quotient
IRIS	Integrated Risk Information System
L	liter
LDR	land disposal restriction
LOAEL	lowest observed adverse effect level
MCL	maximum contaminant level
Minford	Minford Silt and Clay
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOAEL	no observed adverse effect level
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code

ORC	Ohio Revised Code	128
Ohio EPA	Ohio Environmental Protection Agency	129
PCB	polychlorinated biphenyl	130
PCE	tetrachloroethene	131
pCi	picocurie	132
PERA	Preliminary Ecological Risk Assessment	133
PORTS	Portsmouth Gaseous Diffusion Plant	134
ppb	parts per billion	135
ppm	parts per million	136
QI	Quadrant I (QII = Quadrant II, etc.)	137
RCRA	Resource Conservation and Recovery Act	138
RCW	recirculating cooling water	139
RFI	RCRA Facility Investigation	140
RME	reasonable maximum exposure	141
ROD	Record of Decision	142
SARA	Superfund Amendments and Reauthorization Act	143
SDWA	Safe Drinking Water Act	144
STD	standard	145
Sunbury	Sunbury Shale	146
SVOC	semivolatile organic compound	147
SWMU	solid waste management unit	148
TCE	trichloroethylene	149
TSD	treatment, storage, and disposal	150
TSS	total suspended solids	151
UCL	upper confidence limit	152
U.S. EPA	United States Environmental Protection Agency	153
USEC	United States Enrichment Corporation	154
VOC	volatile organic compound	155

PART 1: DECLARATION STATEMENT

156

DECLARATION STATEMENT

SITE NAME AND LOCATION

U.S. Department of Energy
Portsmouth Gaseous Diffusion Plant (PORTS)
X-611A Lime Sludge Lagoons Solid Waste Management Unit
Piketon, Ohio

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Portsmouth Gaseous Diffusion Plant (PORTS), X-611A Lime Sludge Lagoons Solid Waste Management Unit (SWMU), on the U.S. Department of Energy (U.S. DOE) Reservation in Piketon, Ohio. This action was chosen in accordance with the Resource Conservation and Recovery Act (RCRA) of 1976, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This decision is based on the administrative record for this response action. The U.S. DOE site is being cleaned up under a Consent Decree between U.S. DOE and the State of Ohio, and an Administrative Order by Consent (AOC) signed by U.S. DOE and the United States Environmental Protection Agency (U.S. EPA). Both legal agreements were signed in 1989.

Documentation for the selection of this remedial action is contained in the administrative record maintained at the Environmental Information Center in Waverly, Ohio. The specific documents include but are not limited to the *Quadrant IV Draft Final RFI Report* (Quadrant IV RFI) (DOE 1994a), the *Baseline Ecological Risk Assessment* (BERA) (DOE 1994b), the *X-611A Draft Cleanup Alternatives Study/Corrective Measures Study Report* (DOE 1994c), the *Ohio EPA and U.S. EPA Preferred Plan* (Preferred Plan) (Ohio EPA and U.S. EPA 1995), and other documents contained in the administrative record file for this response action. The most current Administrative File Index is provided in Appendix A of this Record of Decision (ROD).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the X-611A Sludge Lagoons, if not addressed by implementing the response action selected in this ROD, may present a current or future risk to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The X-611A Lime Sludge Lagoons are in the eastern portion of Quadrant IV of the PORTS site. The principle threat identified at this SWMU is from possible ingestion and dermal contact with sludge contained in the lagoons. The remedial action selected for the X-611A Lime Sludge Lagoons fits into the overall cleanup strategy for the PORTS facility by eliminating the exposure pathways that may present a current or future risk to human or ecological receptors. Remedial actions performed at the PORTS facility are coordinated to achieve overall risk reduction and complete remediation of the site.

The major components of the selected alternative include:

Placement of a minimum 2-ft-thick sloped soil cover over the north and middle lagoons. The soil cover will be contoured to divert surface water away from the north and middle lagoons.

Placement of a minimum 2-ft-thick soil cover over the south lagoon. Shallow water is expected to pond on the surface of the lagoon.

Placement of material to facilitate the deposition of soil on the sludge and enhance sludge stability may be required.

Development of a prairie habitat on the soil cover placed over the north, middle, and south lagoons. Prairie vegetation that grows in wetter areas may be cultivated in portions of the south lagoon to accommodate the shallow accumulation of water expected on the lagoon surface following implementation of the selected remedy.

Construction of a soil berm outside the northern boundary of the north lagoon to facilitate shallow accumulation of water in this low-lying area.

Groundwater monitoring to ensure that no contaminants of concern (COCs) are migrating to the groundwater.

STATUTORY DETERMINATIONS AND REMEDY SELECTION STANDARDS

The selected remedy meets the CERCLA statutory determinations because it is protective of human health and the environment, complies with federal and State of Ohio requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable for this site. However, because treatment of the sludge, which presents the principal threat at this site, was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

The selected remedy complies with RCRA remedy selection standards because it protects human health and the environment; controls the source of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment; and complies with applicable standards for management of wastes. Media cleanup levels were not established for this remedy because it is a containment remedy. Other factors considered are discussed below.

Implementation of the soil cover will protect human health and the environment by eliminating exposure pathways and controlling the source of potential releases from the SWMU. The selected remedy is implementable, cost effective, and is expected to provide both long and short-term effectiveness. The selected remedy will not reduce the toxicity, mobility, or volume of the sludge by treatment, because no treatment of sludge will occur; however, the mobility of contaminants contained within the sludge is expected to be reduced by limiting infiltration and potential contaminant transport.

This remedy will result in hazardous substances remaining on site above health-based levels; therefore, a review will be conducted no less often than every 5 years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Jan Carlson, Chief
Division of Emergency and Remedial Response
The Ohio Environmental Protection Agency

6/10/96
Date

PART 2: DECISION SUMMARY

236

DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The PORTS facility was constructed between 1952 and 1956 and is owned by U.S. DOE. The active portion of the PORTS plant occupies approximately 1,000 acres of a 4,000-acre U.S. DOE reservation in south central Ohio, approximately 80 miles south of Columbus, 20 miles north of Portsmouth, and 1 mile east of U.S. Route 23, near Piketon (Fig.1). The immediate region surrounding the site consists of Pike County, Scioto County, Jackson County, and Ross County. Approximately 24,250 people reside in Pike County (Energy Systems 1993), and scattered rural development is typical. Piketon is the nearest town, approximately 5 miles north of the facility on U.S. Route 23. Piketon had an estimated population of 1,717 in 1990. The county's largest community, Waverly, has approximately 4,500 residents and is situated 12 miles north of the facility.

Land within a 5-mile radius of PORTS is primarily undeveloped, including cropland, woodlots, pasture, and forest. This distribution includes approximately 25,000 acres of farmland and 25,000 acres of forest. There is approximately 500 acres of urban land within the same radius (Energy Systems, 1993).

The PORTS facility occupies an upland area of southern Ohio with an average land surface elevation of 670 feet above mean sea level. The terrain surrounding the plant site consists of marginal farmland and wooded hills, generally with less than 100 feet of relief. The plant is located within a mile-wide abandoned river valley.

The geology of the PORTS plant site consists of unconsolidated material overlying bedrock formations. The unconsolidated material is known as the Teays formation. The Teays formation is composed of two members, the Minford silt and clay (Minford), and the Gallia sand and gravel (Gallia). The bedrock formations underlying the Teays formation are, in descending order, the Sunbury shale, the Berea sandstone, and the Bedford shale.

For purposes of the RCRA Facility Investigation (RFI), the PORTS facility has been separated into four quadrants (Fig. 2). Each quadrant roughly corresponds to the uppermost groundwater flow paths beneath the site. The PORTS groundwater system includes two water-bearing units, the Berea Sandstone bedrock and the unconsolidated Gallia, and two aquitards, the Sunbury Shale (Sunbury) and the unconsolidated Minford. Although the Minford silt does not transmit groundwater as readily as Gallia, the basal silt portion of the Minford is generally grouped with the Gallia as part of the uppermost water-bearing unit at the PORTS site.

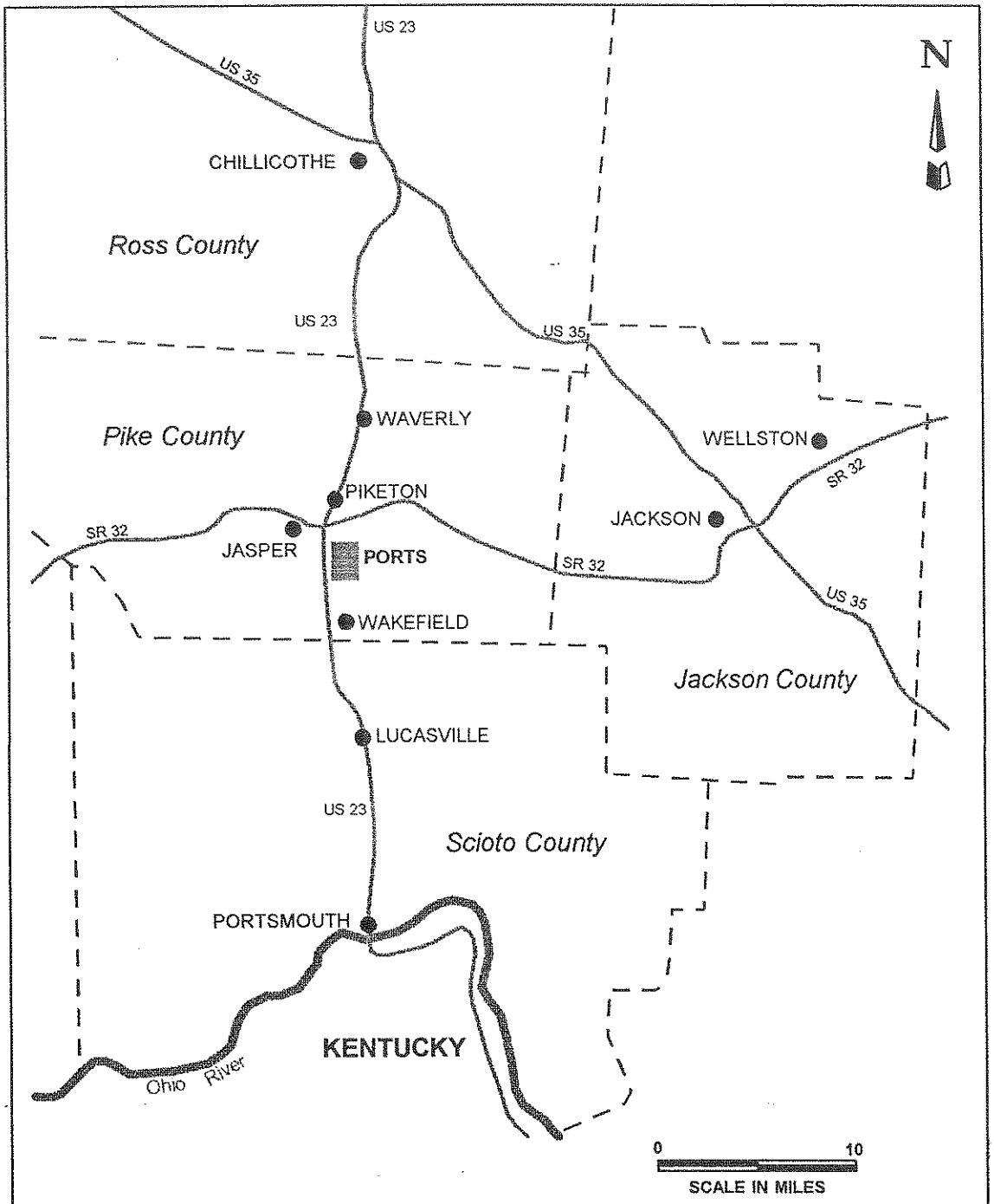
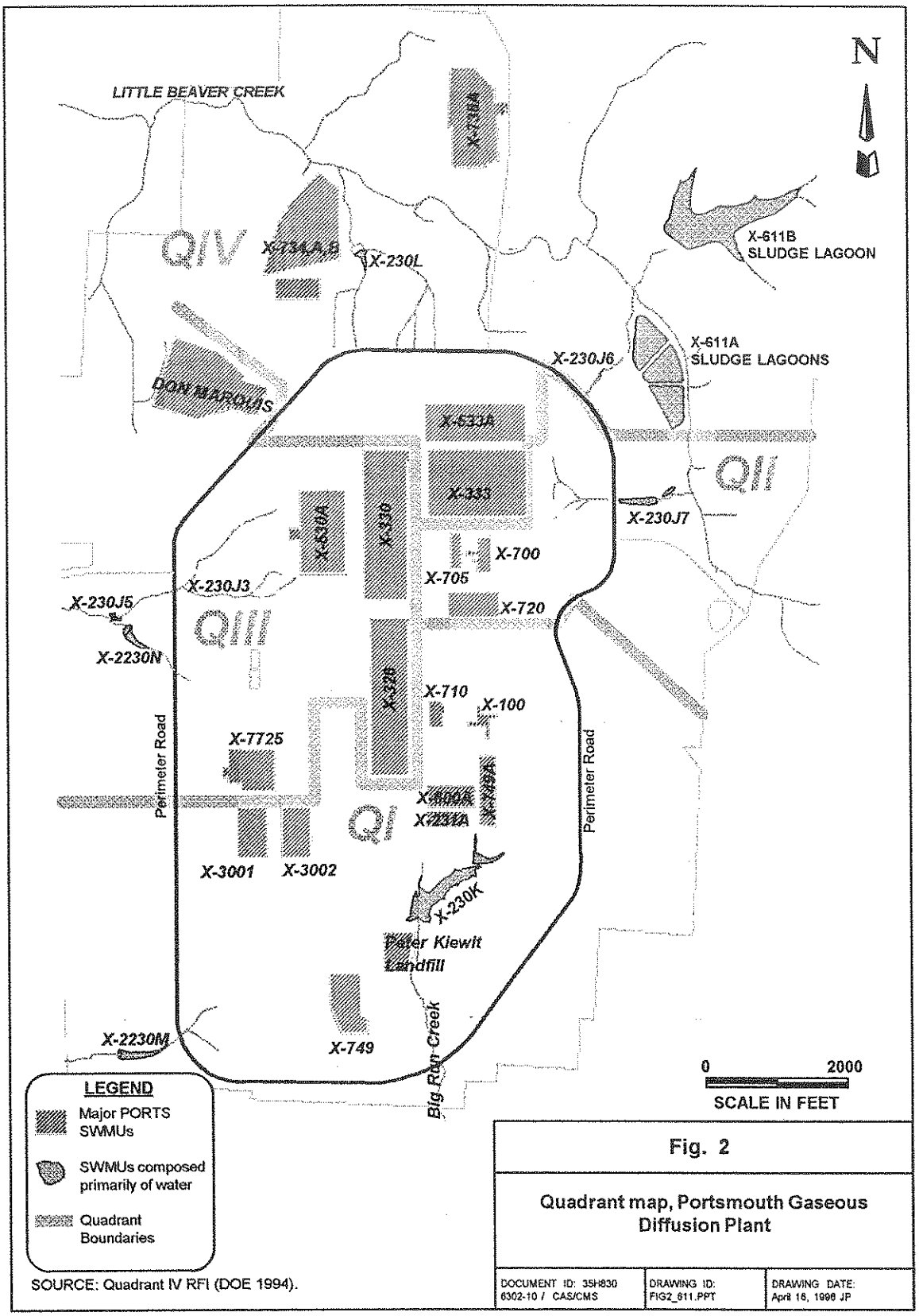


Fig. 1

Counties surrounding PORTS

DOCUMENT ID: 35H830 6302-10 / CAS/CMS	DRAWING ID: FIG1_611.PPT	DRAWING DATE: April 16, 1996 JP



SOURCE: Quadrant IV RFI (DOE 1994).

Fig. 2

Quadrant map, Portsmouth Gaseous Diffusion Plant

DOCUMENT ID: 35H830 6302-10 / CAS/CMS	DRAWING ID: FIG2_611.PPT	DRAWING DATE: April 16, 1996 JP

Creeks and holding ponds are the most important surface water features at the PORTS plant site. The PORTS site is drained by Little Beaver Creek, Big Run Creek, the West Drainage Ditch, and the unnamed southwest drainage ditch. Sources of water for the surface water flow system include precipitation run-off, groundwater discharge and effluent from plant processes. All surface water from the plant site eventually drains into the Scioto River which flows north to south approximately 1 mile west of the plant. The Scioto River is approximately 120 ft. lower in elevation than the PORTS site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The principal process at the PORTS facility is the separation of uranium isotopes via gaseous diffusion. PORTS has been in operation since 1954 and currently enriches uranium for electrical power generation. Prior to 1992 some of the enriched uranium was generated for utilization by the U.S. Navy. The United States Enrichment Corporation (USEC) assumed responsibility for the uranium operations at PORTS on July 1, 1993. Support operations include the feed and withdrawal of material from the primary enrichment process, water treatment for sanitary and cooling purposes, decontamination of equipment removed from the plant for maintenance or replacement, recovery of uranium from various waste products, and treatment of sewage wastes and cooling water blowdown. The construction, operation, and maintenance activities performed at the PORTS facility generate inorganic, organic, and low-level radioactive wastes, some of which have been stored or disposed of on site resulting in releases to surrounding media.

In 1989, U.S. DOE and the state of Ohio entered into a Consent Decree that outlined the requirements for handling hazardous waste generated at the PORTS facility and for conducting investigation and corrective measures studies at the site. U.S. EPA and U.S. DOE entered into a similar agreement, the AOC, in September 1989. This agreement was negotiated between U.S. EPA Region V and U.S. DOE. The AOC requires that the PORTS facility conduct a RCRA Facility Investigation (RFI) and a Corrective Measures Study (CMS), select remedies, and implement them according to a Corrective Measures Implementation (CMI) plan. A schedule is attached to each agreement outlining a submittal schedule to Ohio EPA and U.S. EPA for documents pertaining to the investigation and corrective measures studies.

The AOC and Consent Decree require corrective action based on the requirements of RCRA. In addition, the AOC states that CERCLA requirements must be incorporated into the corrective action process. In areas where the AOC and Consent Decree are not specific, regulations and guidance under RCRA statutes are used. In specific instances where RCRA provides no guidance, the provisions of CERCLA are used, as appropriate.

2.1 HISTORY OF X-611A LIME SLUDGE LAGOONS

The X-611A lagoons are in the eastern portion of Quadrant IV near PORTS plant coordinates N 13, E 11.5 (Fig. 2). The lagoons are situated along the west side of Little Beaver Creek approximately 1,000 ft east of the X-611 Water Treatment Plant.

The X-611A SWMU consists of three unlined sludge retention lagoons constructed in 1954 (Fig. 3). The lagoons are referred to as the north, middle and south lagoons. Together they cover a surface area of approximately 18 acres, and have a maximum combined volume of approximately 295,000 yd^3.

The lagoons were constructed in a low-lying area that included Little Beaver Creek. To accommodate construction of the X-611A lagoons, approximately 1,500 ft of Little Beaver Creek was relocated to a new channel just east of the current lagoons. Unconsolidated material cut from the construction area was used to form the elevated earthen dikes that make up the sides of the lagoons (Fig. 4). Construction documents suggest that the majority of the unconsolidated material that was overlying the Sunbury in this area was used to construct the earthen dikes; therefore, it is believed that the Sunbury forms much of the bottom surface of the X-611A lagoons. In general, lagoon depths range between 12 and 14 feet, and depths generally increase from west to east.

Between 1954 and 1960, the X-611A lagoons received waste lime sludge from the X-611 Water Treatment Plant. Between 1956 and 1957, the X-611A lagoons also received recirculating cooling water and contaminated lime sludge resulting from chromate reduction activities performed in storm sewer "L". Receipt of waste lime sludge from the X-611 Wastewater Treatment Plant was discontinued in 1960; subsequently, the process lines were disconnected. Currently, the only source of influent at X-611A is direct precipitation. Surface drainage in the X-611A area is controlled by the lagoon dikes and Little Beaver Creek. Surface water discharge from the X-611A lagoons to Little Beaver Creek is controlled by weir plates in each of the three lagoons. These three discharge points are monitored as NPDES discharge points. Surface water runoff from areas adjacent to the lagoons directly enters Little Beaver Creek.

Sludge in the X-611A lagoons consists primarily of white, saturated lime. Sparse, grassy vegetation has become established in the western portions of all three lagoons, and the eastern portions of the lagoons

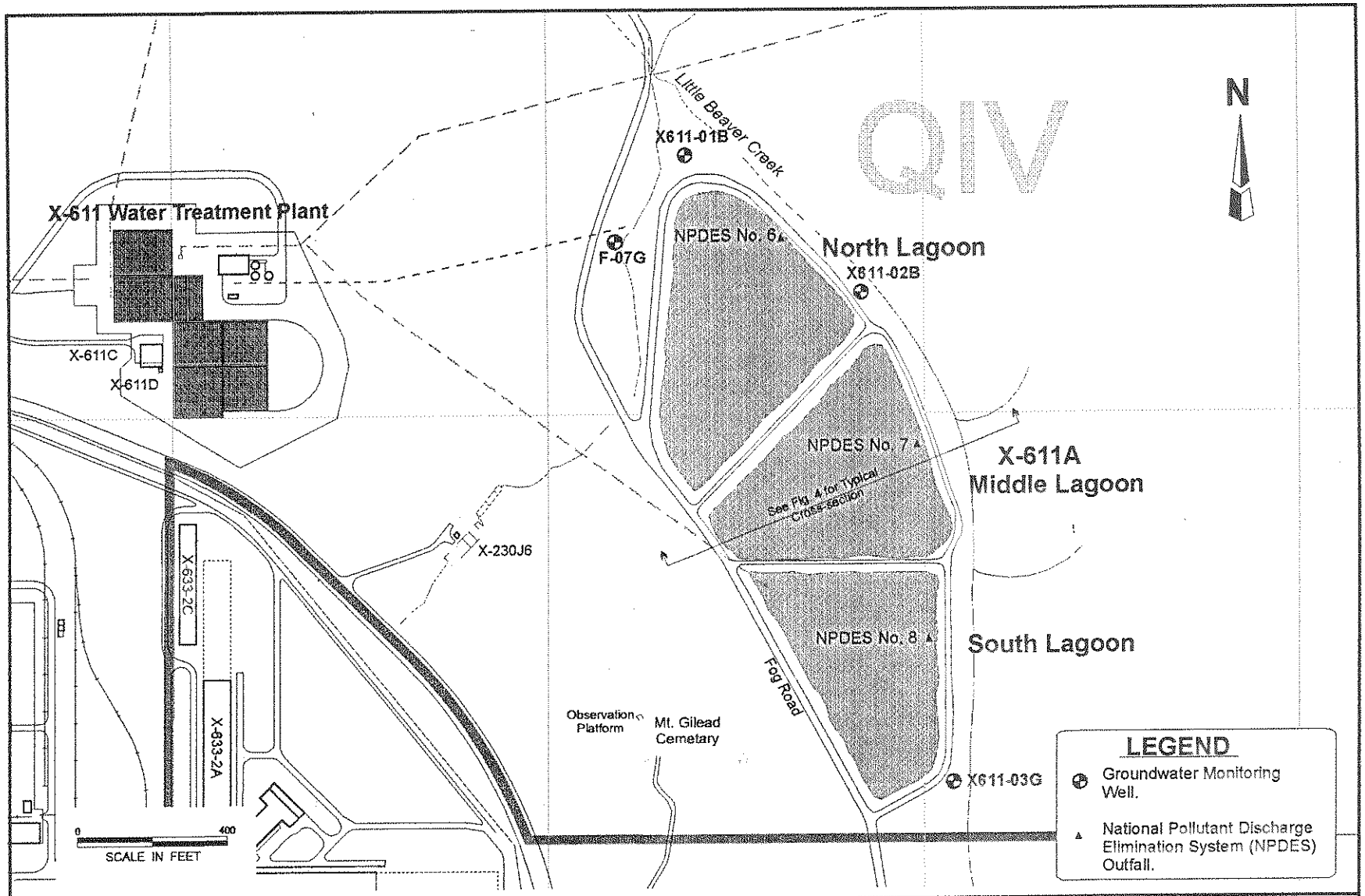
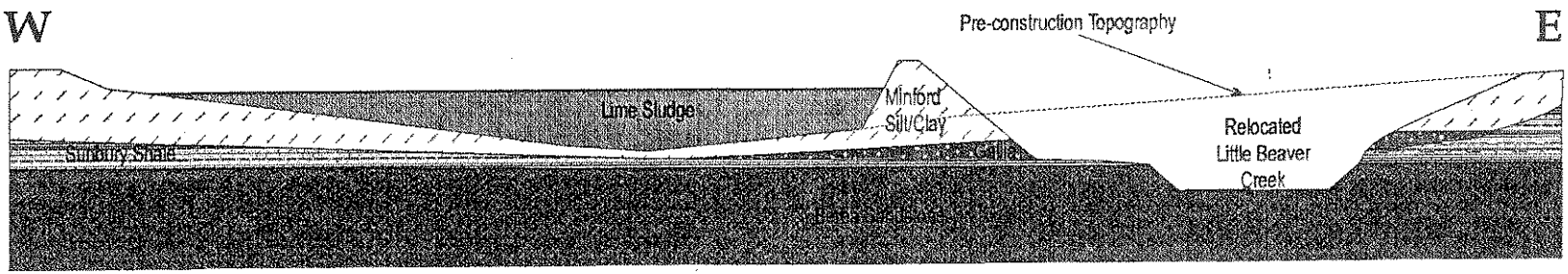


Fig. 3	X611A Sludge Lagoons : Plan View DOE - PORTS, Quadrant IV - Portsmouth, Ohio	DOCUMENT ID: 35H830 0063-10 / MISC	DRAWING ID: 96-12715.CDR_4	DRAWING DATE: FEBRUARY 28, 1996 JP



NOTE: This diagram is based on as-built engineering drawings and field observations and is not to scale. Available data is not sufficient to allow for a detailed scale diagram of the area.

Fig. 4	X-611A Lime Sludge Lagoons: Typical Cross-Section	DOCUMENT ID: 35H830 6301-10 / CAS/CMS	DRAWING ID: x611xsec CDR-1	DRAWING DATE: FEBRUARY 26, 1996 JP

contain shallow surface water. These areas are frequented by migratory waterfowl and other biota such as deer and turtles.

In October 1995, approximately 10 acres of land south of the X-611A lagoons were delineated as a jurisdictional wetland by the U.S. Army Corps of Engineers. Approximately 0.4 acres of this wetland is between the south boundary of the X-611A lagoons and Little Beaver Creek. The remaining 9.6 acres of wetland habitat are south of Little Beaver Creek.

Phase I of the Quadrant IV RFI (which includes the X-611A SWMU) was conducted between December 1992 and April 1993. Phase II of the investigation was conducted between February 1994 and July 1994. Additional sampling of the sediments to determine the extent of PCB contamination in the middle lagoon and chromium contamination in the north lagoon was conducted in July 1994. In order to confirm the previous results for chromium and PCBs, the Ohio EPA sampled the north, middle, and south lagoons in mid-September 1994. Sampling activities results are discussed in Section 5.0 of this report.

2.2 ENFORCEMENT ACTIVITIES

Receipt of waste lime sludge from the X-611 Wastewater Treatment Plant was discontinued in 1960; subsequently, the process lines were disconnected and the only influent has been direct precipitation. No RCRA or CERCLA enforcement activities have been performed at this SWMU.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Ohio EPA and U.S. EPA rely on the public to ensure that each remedial alternative selected at PORTS meets the needs of the local community, in addition to being an effective solution to the problem.

The Preferred Plan for the PORTS X-611A Lime Sludge Lagoons was released to the public in December 1995. This document is available to the public in the administrative record, maintained at the Environmental Information Center, 505 West Emmitt Street, Suite 3, Waverly, Ohio. Notice of the availability of the Preferred Plan was published in the *Pike County News Watchman* January 3, 1996. A public comment period was held from January 2, 1996, through March 15, 1996, during which time the public could obtain further information or offer comments on the Preferred Plan.

Ohio EPA and U.S. EPA formally presented the preferred alternative at the February 6, 1996, public meeting. At this meeting, representatives from U.S. EPA and Ohio EPA discussed the RCRA Facility Investigation (RFI), CAS/CMS, and Preferred Plan, and answered questions and received comments related to the X-611A Lime Sludge Lagoons and the remedial alternatives under consideration. Responses to significant comments, criticisms, or new data received during the comment period and public meeting are included in the "Responsiveness Summary," which is presented in Part 3 of this ROD.

This decision document presents the selected remedial action for the X-611A SWMU. This action was chosen in accordance with the Resource Conservation and Recovery Act (RCRA) of 1976, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This decision is based on the administrative record for this response action.

All documents leading up to the Preferred Plan have been available for public review and comment prior to selection of this remedy. Documents issued before the Preferred Plan include, but are not limited to the *Quadrant IV Draft Final RFI Report* (DOE 1994a), the *Baseline Ecological Risk Assessment* (DOE 1994b), and the *X-611A Draft CAS/CMS Report* (DOE 1994c).

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

The PORTS facility has been separated into four quadrants that roughly correspond to groundwater flow paths within the uppermost water-bearing unit beneath the site. Each quadrant contains multiple SWMUs and a diverse range of environmental media (i.e., soil, sediment, groundwater, etc.). Media within the SWMUs have been analyzed to determine if contaminants are present at concentrations that may present a threat to human health or the environment.

The scope of remedial actions implemented at the PORTS facility is to eliminate or reduce (to acceptable levels) any risks to human health or the environment posed by releases and/or potential releases of contaminants from the SWMUs at PORTS. SWMUs at the PORTS facility are in various stages of the remedial action process; however, remedial actions performed at the SWMUs are coordinated to achieve overall risk reduction and complete remediation of the entire facility. It is also desirable that remedial actions implemented restore and enhance the areas being remediated.

The X-611A SWMU is in Quadrant IV. The principle threat identified at this SWMU is from possible ingestion and dermal contact with sludge contained in the lagoons. The remedial action selected for the X-611A Lime Sludge Lagoons fits into the overall cleanup strategy for the PORTS facility by eliminating the exposure pathways that may present a current or future risk to human or ecological receptors. The selected remedy also addresses the potential for contaminant release and off-site migration. In addition, implementation of the selected remedy would restore and enhance the semiaquatic area at X-611A.

5.0 SUMMARY OF SITE CHARACTERISTICS

Several investigative studies were conducted to determine the nature and extent of contamination within the X-611A SWMU. These investigations focused on the following areas and media:

sludge contained within the lagoons;
shallow and deep soil immediately surrounding the lagoons; and
groundwater potentially impacted by X-611A.

This summary of X-611A investigations highlights important data collected during the Quadrant IV RFI and other sampling events. This section is not intended as a substitute for the Quadrant IV RFI report, the X-611A CAS/CMS report, or any other reports detailing the findings of sampling events conducted at this unit. For more detailed information on X-611A sampling activities and results, please refer to Section 4.3.9 of the *Quadrant IV Draft Final RFI Report* (DOE 1994a), pages 79-86, and the "Results of Supplementary Sampling and Analysis" located at the back of the *X-611A Draft CAS/CMS Report* (DOE 1994c).

5.1 POTENTIAL SOURCES OF CONTAMINATION

Sludge is the only medium of concern identified within the X-611A SWMU. The Quadrant IV risk assessment identified beryllium, chromium, and polychlorinated biphenyls (PCBS; specifically, Aroclor-1242 and Aroclor-1248) as COCs for sludge contained in the X-611A lagoons. Potential sources of these COCs are discussed below.

The X-611A lagoons were filled in a north-to-south sequence (north lagoon, first; middle lagoon, second; south lagoon, third) and appear to have two potential sources that contributed to the presence of chromium in the lagoons. Sludge contained within the X-611A lagoons was generated primarily as a result of the lime-slaking process at the X-611 Water Treatment Plant. Elevated levels of chromium in the north and middle lagoons

correspond chronologically to chromate reduction activities associated with corrosion inhibitors present in the recirculating cooling water (RCW) systems (ca. 1956-1957). In addition, for a short time in the late 1950s, a small amount of sludge that originated from chromate-reduction processes performed in Storm Sewer "L" was deposited in the lagoons.

PCBs present in the middle lagoon at X-611A were most likely captured as chromate-reduction processes were performed in Storm Sewer "L". Storm Sewer "L" inlets intercept stormwater runoff from the northern portion of the plant, including the X-333 Process Building and the X-533B Switchyard. No PCBs have been detected in areas associated with the X-611 Water Treatment Plant; however, PCBs have been detected in storm sewers that collect runoff in and around transformer switchyards, such as X-533B. PCB contamination in the X-611A lagoons is restricted to a small portion of the middle lagoon at concentrations ranging from nondetectable to 2.2 parts per million (ppm). This contamination most likely originated from the X-533B Switchyard. PCB-contaminated stormwater emanating from the switchyard was likely collected in Storm Sewer "L" and subsequently captured in sludge generated during chromate-reduction activities. PCBs have not been detected in discharges from the three National Pollutant Discharge Elimination System (NPDES) outfalls at the X-611A lagoons.

A possible source of the beryllium contamination has not been identified. An analysis of the lime used in the water treatment lime-slaking process did not indicate the presence of beryllium. Although the lime used 40 years ago may have differed somewhat in composition, lime used in the process does not appear to be a possible source. Slaked lime from the water treatment plant was also tested, and the beryllium concentration was negligible (approximately 1/1,000 of the maximum concentrations present in the sludge lagoons); therefore, slaked lime does not appear to be a likely source of the beryllium contamination at X-611A. No other potential sources of beryllium were identified for this unit.

5.2 SUMMARY OF NATURE AND EXTENT OF CONTAMINATION

The nature and extent of contamination within X-611A are based on data collected before and during the Quadrant IV RFI and during supplementary sampling after the RFI. Additional information on the nature and extent of contamination in X-611A is provided in Section 4.3.9 of the *Quadrant IV Draft Final RFI Report* (DOE 1994a), pages 79-86, and in the "Results of Supplementary Sampling and Analysis" located at the back of the *X-611A Draft CAS/CMS Report* (DOE 1994c).

COCs were determined in the risk assessment performed on this SWMU. Additional information on the development of COCs is provided in Sections 6.0 and 6.1.1 of this document, and in the Quadrant IV RFI report.

Field investigations of the sludge lagoons indicate that while contaminants are present in the sludge, the soils surrounding the lagoons and in the dikes and the groundwater do not contain any COCs. Three COCs have been identified for the sludge - beryllium, chromium, and PCBs.

Total chromium was detected at concentrations ranging from 2.3 to 5,230 ppm. The elevated levels of chromium (above 1,000 ppm) were only detected in deep samples (i.e., greater than 10 ft), except for one location in the north lagoon. The elevated levels of chromium appear to be in isolated areas adjacent to the western edge of the north and middle lagoons. Beryllium was detected at concentrations ranging from 1.7 to 4.9 ppm. PCBs were detected in the middle lagoon at concentrations ranging from 1.8 to 2.2 ppm.

Beryllium, chromium, and PCBs all have associated noncarcinogenic (toxic) risks; beryllium and PCBs also are carcinogens. The populations which could potentially be exposed to contamination are on-site workers and wildlife attracted to ponded water. Leaching tests have shown that beryllium and chromium will not leach from the sludge [see "Results of Supplementary Sampling and Analysis" located at the back of the *X-611A Draft CAS/CMS Report* (DOE 1994c) for test results], and PCBs are relatively immobile.

For the purposes of this remedial action, the following assumptions have been made: (1) the sludge is homogeneous (i.e., it has a uniform composition throughout the lagoons); (2) all contaminants are contained within the boundaries of the dikes; and (3) the entire volume of the sludge contained in the lagoons is affected. The maximum depth of the lagoons is estimated to be 14 feet deep, the total area of the lagoons is approximately 18 acres, and the total volume of the sludge is estimated at 295,000 yd^3.

5.3 PATHWAYS OF CONTAMINANT MIGRATION

This section summarizes the results of the evaluation of contaminant migration from X-611A. The potential routes of contaminant migration have been determined to be surface water, groundwater, and air.

Surface Water

- Dispersion of contaminants transported to Little Beaver Creek via surface water runoff from the X-611A area, for both surface water and sediments

Groundwater

- Leachate migration from the unit
- Vadose zone transport vertically downward to the groundwater
- Transport of contaminants through groundwater

Air

- Dispersion of inorganic and organic contaminants

The routes of exposure to human receptors is outlined in Section 6.0, Summary of Site Risks.

6.0. SUMMARY OF SITE RISKS

The potential risk from the X-611A SWMU (both current and future) has been calculated in the Quadrant IV RFI (DOE 1994a) as the Baseline Risk Assessment. This assessment was based on the nature and extent of the contaminants found in the SWMU during field investigations. The portion of the Quadrant IV Baseline Risk Assessment pertaining to X-611A is summarized in this section. For more in-depth information on the methodology and details of the Baseline Risk Assessment, refer to Chapter 6 and Appendix H of the Quadrant IV RFI.

6.1 OVERVIEW OF THE BASELINE RISK ASSESSMENT

A baseline risk assessment was conducted using EPA risk assessment methodology to provide an evaluation of the potential threat (both current and future) to human health and the environment caused by constituent releases from the SWMU in the absence of any remedial action (the no action alternative). The assessment provides the basis for determining whether remedial action is necessary. The primary objectives of the Baseline Risk Assessment are to: (1) determine those constituents that pose a significant risk to receptors; (2) perform an exposure assessment to determine the pathways and media of concern; (3) determine toxicity levels of constituents in relevant media (e.g., air, soil, water) within the boundaries of the SWMU; and (4) determine the magnitude and likelihood of any expected impact or threat.

The chemical constituents present within the X-611A SWMU present potential risks to human and environmental receptors. Two types of human health effects can result from exposures to chemicals: carcinogenic (e.g., lung cancer caused by inhalation of beryllium) and noncarcinogenic (e.g., reduced birth weight caused by ingestion of Aroclor-1216). To limit the likelihood of someone developing cancer from exposure to contamination at a RCRA site, the EPA has established an acceptable range of excess lifetime cancer risk (ELCR). This range is from $1x10^{-4}$ to $1x10^{-6}$. Cancer risk is defined as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The ELCR of $1x10^{-6}$ is referred to as the point of departure and provides a reference for the risk estimates presented in the Quadrant IV Baseline Risk Assessment.

To put the ELCR acceptable range in the context of a background cancer rate, it is estimated that about one in three Americans will develop cancer during their lifetime from all causes, and the risk from exposure to naturally-occurring radiation in the environment is about $1x10^{-2}$, primarily from radon. Thus the EPA acceptable range for RCRA cleanup sites is a very small percentage of the normal cancer risk expected in the general United States population from everyday exposures and other causes. For example, the ELCR targeted by the upper end of the EPA's range (i.e., $1x10^{-4}$) means that if all persons in a population of 10,000 were assumed to be repeatedly exposed to a site's contaminants, one person might develop cancer as a result of those exposures, in addition to the approximately 3,300 cancer cases expected from all other causes; similarly, for the ELCR point of departure ($1x10^{-6}$), one person in a population of 1,000,000 might develop cancer in addition to the approximately 330,000 cancer cases expected from all other causes.

The EPA has developed a measure for noncancerous hazards from chemicals that is called a hazard quotient (HQ). The HQ is determined by comparing the amount of a specific chemical to which someone might be exposed at a site with a dose that the scientific community considers safe or acceptable for that chemical (EPA 1989). An HQ of greater than 1.0 indicates that the exposure level exceeds the protective level for that chemical. Exposures to more than one chemical can result in multiple HQs. The sum of these HQs equals the hazard index (HI). If the HI exceeds 1.0, an adverse health effect might result from the estimated exposure.

For someone to be at risk from a chemical hazard, the individual must be exposed to the waste at the site. To help determine if there is a need to undertake cleanup at a CERCLA or RCRA site, the EPA evaluates the risk an individual site poses, assuming that no additional engineering controls were installed to prevent the migration of contaminants from the SWMU. By this approach, the primary hazards can be identified, and it can be determined whether someone who might enter the site or who uses the site in the future could be at risk. This is referred to as a baseline risk assessment.

6.1.1. Identification Of Contaminants Of Concern

The Quadrant IV RFI identified contaminants of potential concern (COPCs) present within X-611A's media. All detected chemicals that exceeded EPA-approved screening criteria were considered as chemicals of potential concern. The Quadrant IV baseline Risk Assessment evaluated constituents and exposure pathways to determine their potential current and future impact on human health. Constituents which resulted in risk to a receptor greater than $1x10^{-6}$ or which yielded a HI greater than 1 were designated as COCs. Section 6.0 and Appendix H of the Quadrant IV RFI and the X-611A Draft Cleanup Alternatives Study/Corrective Measures Study Report (DOE 1994c) presents a more detailed discussion of the COCs. COCs for the X-611A SWMU are beryllium, chromium, Aroclor-1242, and Aroclor-1248. All of the COCs for this SWMU were contained in the sludge.

6.1.2 Exposure Assessment for the Baseline Risk Assessment

The exposure assessment was developed to depict what may happen in and around the PORTS site if no further remedial actions were taken. Exposure scenarios were used to determine the need for additional cleanup activities at the site.

The baseline exposure scenarios are used to identify the sources of contamination and the potential routes to humans by presenting the exposure pathways for each land use scenario. The exposure scenarios evaluated include: (1) current land use and (2) future land use. These exposure scenarios were carried through the decision making process for this SWMU to develop the maximum and minimum cleanup goals with the understanding that final goals would fall within this range.

6.1.3 Current Land Use

This scenario was evaluated for current conditions assuming the U.S. DOE maintains the PORTS site as it exists with current access controls. The following receptors were evaluated for this scenario: (1) on-site worker; (2) on-site excavation worker; (3) off-site resident; and (4) off-site recreational user. The worker receptor scenario is equivalent to the industrial/commercial scenario.

6.1.4 Future Land Use

This scenario was evaluated for future land use assuming that the PORTS site may no longer be owned by the federal government, that access controls are discontinued, and that the land use changes to industrial, residential, and/or recreational use. For this scenario the following receptors were evaluated: (1) on-site resident; (2) on-site recreational user; (3) on-site worker; (4) off-site resident; and (5) off-site recreational user.

6.1.5 Exposure Point Concentrations

The exposure point concentration is the concentration of a constituent in an environmental medium that may be contacted by a real or hypothetical receptor. It is used in combination with other exposure parameters in intake equations to quantify the actual intake (in milligrams/kilograms-day [mg/kg-day] for chemicals, and picocuries [pCi] for radionuclides) that a receptor may receive via a specific pathway (e.g., soil. groundwater, etc.) and route of exposure (e.g., ingestion, inhalation, and dermal contact) (U.S. EPA 1988, 1992a).

Exposure point concentrations for Quadrant IV were determined in different ways, depending on whether the exposures were assumed to be current or future and depending on the environmental medium of interest. To

be consistent with the concept of the reasonable maximum estimate (RME) scenario required by the EPA, an estimate of the highest exposure that can reasonably be expected to occur must be made for each contaminant in each exposure medium. Because of the uncertainty associated with any estimate of exposure point concentrations, the 95 percent upper confidence limit (UCL) on the calculated mean for either normal or lognormal distribution is the recommended statistic (concentration value) to be constructed from measured contaminant data for use in risk assessments (U.S. EPA 1989). When the amount of data does not allow one to be confident of the 95 percent UCL statistic, the maximum detected value is used. The Quadrant IV Baseline Risk Assessment used the maximum detected value for contaminant concentrations in the affected media in each SWMU.

6.1.6 Exposure Parameters

The equations and exposure parameter values used in estimating intakes are provided in Tables 6.169 to 6.199 of the Quadrant IV RFI. Appendix H of the Quadrant IV RFI presents calculated intakes for each SWMU for current and future receptors, media, pathways and chemicals. The excavation worker has the lowest frequency and exposure duration of all the current and assumed future receptors. The excavation worker is assumed to be exposed 250 days a year for 5 years. The future on-site resident has the maximum exposure duration and frequency. The on-site resident is assumed to be exposed 24 hours a day, 350 days a year for 30 years. All other receptors have exposure durations and frequencies that fall between the values for the excavation worker and the future on-site resident.

6.1.7 Toxicity Assessment

Chemical Carcinogens - The toxicity information considered in the assessment of potential carcinogenic risks includes (1) a weight-of-evidence classification and slope factor. The weight of evidence classification describes the likelihood that a chemical is a human carcinogen and is based on an evaluation of available data from human and animal studies. A chemical may be placed by the EPA in one of three groups in EPA's classification system to indicate its potential for carcinogenic effects: Group A, a human carcinogen; Group B1, or B2, a probable human carcinogen; and Group C, a possible human carcinogen. Chemicals that cannot be classified as human carcinogens because of a lack of data are placed by EPA in Group D, and those for which there is evidence of noncarcinogenicity in humans are placed by the EPA in Group E.

The cancer slope factor is the toxicity value used to quantitatively express the carcinogenic risk of cancer causing contaminants. It is defined as the upper-bound estimate of the probability of cancer incidence per unit dose averaged over a lifetime. Slope factors are derived from studies of carcinogenicity in humans and/or laboratory animals and are typically calculated for compounds in Groups A, B1, and B2. Slope factors are specific to chemicals and routes of exposure and are expressed in units of $(mg/kg/day)^{-1}$ for both oral and

inhalation routes. The induction of cancer by dermal absorption is evaluated using oral slope factors. Inhalation toxicity values are usually expressed as inhalation unit risks in units of $(\mu g/m^3)^{-1}$. The primary sources of these toxicity values are EPA's Integrated Risk Information System (IRIS) (EPA 1996a) and the quarterly updated Health Effects Assessment Summary Tables (HEAST) (EPA 1996b). Other EPA sources of cancer slope factors were also consulted when available. The oral and inhalation cancer slope factors for COC chemical carcinogens are listed in Table 6.1. The dermal cancer slope factors for COC chemical carcinogens are listed in Table 6.2.

Noncarcinogens - The potential for noncarcinogenic health effects resulting from exposure to chemical contaminants is assessed by comparing an exposure (intake) to a reference dose (RfD). The RfD expressed in units of mg/kg-day and represents a daily intake of a constituent per kilogram of body weight that is not sufficient to cause the threshold effect of concern for the constituent.

A RfD is specific to the chemical, route of exposure, and exposure duration. In order to derive a RfD, the EPA reviews all relevant human and animal studies for each compound and selects the studies pertinent to the derivation of the specific RfD. Each study is evaluated to determine the no-observed-adverse-effect level (NOAEL) or, if data are inadequate for such a determination, the lowest-observed effect level (LOAEL). The NOAEL corresponds to the dose, in mg/kg/day, that can be administered over a lifetime without inducing observable adverse effects. The LOAEL corresponds to the lowest daily dose, in mg/kg-day, that can be administered over a lifetime that induces an observable effect. The toxic effect characterized by the LOAEL is referred to as the critical effect . To derive a RfD, the NOAEL or LOAEL is divided by uncertainty factors to ensure that the RfD will be protective of human health. Separate RfDs are needed for ingestion and inhalation pathways. The primary source of values for RfDs are the IRIS and the HEAST, which are compiled and maintained by the EPA (EPA 1996a, 1996b). Other EPA sources of Rfd values also were consulted when available. The COC references doses for noncarcinogenic chemicals are listed in Table 6.3. Dermal reference doses for noncarcinogenic chemical are listed in Table 6.2.

6.1.8 Risk Characterization

The risk characterization was conducted using reasonable maximum exposure assumptions. This approach resulted in conservative estimates of the potential for adverse carcinogenic and noncarcinogenic

Table 6.1

ORAL AND INHALATION SLOPE FACTORS FOR COCs

Chemical	Oral Slope Factor $(mg/kg/day)^{-1}$	Inhalation Slope Factor $(mg/kg/day)^{-1}$	Tumor Site		Cancer Classification	Source
			Oral	Inhalation		
INORGANICS						
Beryllium	4.3	8.4	Gross tumors all sites (rat).	Lung (human)	B2	IRIS
Chromium (VI)	NA	41	N/A	Lung (human)	A	IRIS
PCBs						
Aroclor-1242	7.7	NA	Liver (rat).	NA	B2	a
Aroclor-1248	7.7	NA	Liver (rat).	NA	B2	a

a = Based on SF for Aroclor-1216
NA = no toxicity values available
N/A = not applicable

Table 6.2

DERMAL REFERENCE DOSES AND CANCER SLOPE FACTORS FOR COCs

Chemical	Gastrointestinal Absorption Factor	Dermal Reference Dose (mg/kg-day)	Dermal Slope Factor $(mg/kg/day)^{-1}$
		INORGANICS	
Beryllium	1.0	5×10^{-5} [a,b]	430[b]
Chromium (VI)	2.0	1×10^{-4} [a, b]	NA
		PCBs	
Aroclor-1242	7×10^{-5} [a,b]	6.3×10^{-5} [a,b]	8.6
Aroclor-1248	7×10^{-5} [a,b]	6.3×10^{-5} [a,b]	8.6

[a]Based on RFD for Aroclor-1216
[b]Toxicity values for use in Hazardous Waste Risk Assessment and Remediation (ORNL 1995)
NA = no toxicity value available

Table 6.3

ORAL AND INHALATION REFERENCE DOSES FOR COCs

Chemical	Chronic Oral Reference Dose (mg/kg/day)	Chronic Inhalation Reference Dose (m/kg/day)	Effect of Concern		Uncertainty Factor		
			Oral	Inhalation	Oral	Inhalation	Source
ORGANIC							
Beryllium	5×10^{-3}	NA	No adverse effects (rat).	N/A	100(m)	N/A	IRIS
Chromium (VI)	5×10^{-3}	NA	No adverse effects (rat).	N/A	500(m)	N/A	IRIS
PCBs							
Aroclor-1242	7×10^{-5}	NA	Reduced birth weight at higher doses (monkey).	N/A	100(m)	N/A	a
Aroclor-1248	7×10^{-5}	NA	Reduced birth weight at higher doses (monkey).	N/A	100(m)	N/A	a

a = Based on RFD for Aroclor-1216
IRIS = Integrated Risk Information System (EPA 1996a)
NA = no toxicity values available
N/A = not applicable

effects associated with long-term exposure to contaminants found at X-611A. For noncarcinogenic effects, specific chemicals were determined to be COCs (i.e., exceeding the target range established by U.S. EPA) if the hazard quotient for that chemical or hazard index for combined exposure of all chemicals present at a SWMU exceeded 1. Chemicals which had concentrations that were greater than the excess lifetime cancer risk of 1×10^{-6}, the target risk level established by Ohio EPA, also were determined to be COCs.

Results of the baseline human health risk assessment indicated that an unacceptable risk to human health may result from ingestion or dermal exposure to sludge within the X-611A lagoons. COCs identified in the X-611A lagoons include beryllium, chromium, Aroclor-1242 and Aroclor-1248 under the residential scenario; and beryllium, Aroclor-1242, and Aroclor-1248 under the on-site worker scenario. Aroclor-1242 and Aroclor-1248 are PCBs. The exposure pathways identified as a concern at X-611A include (1) ingestion of the sludge and (2) dermal exposure to the sludge for the residential and on-site worker scenarios. Table 6.4 contains a summary of the risk assessment for X-611A.

Groundwater beneath X-611A does not present an unacceptable risk to human health or the environment. Chromium has been detected (32 ppb) above background in one Berea well. However, this level is well below the residential risk-based preliminary remediation goal for chromium (400 ppb) and does not present a significant risk to human health or the environment. The Quadrant IV RFI risk estimate for vinyl chloride and arsenic in Gallia groundwater and arsenic in Berea groundwater (via ingestion and dermal absorption pathways) exceeded the acceptable U.S. EPA risk criteria. However, these constituents were not retained as COCs at X-611A for the following reasons: vinyl chloride was detected in only one groundwater sample (X611-03G) taken near X-611A with an estimated value of 2.7 ppb, which was below the practical quantitation limit of 10 ppb; and arsenic was detected in samples from two Berea wells (with a maximum detected concentration of 110 ppb) and one Gallia well (with a concentration of 17 ppb) at levels below the corresponding tentative background concentrations in Gallia (60 ppb) and Berea (210 ppb) groundwater.

Two studies completed by DOE have shown that contaminants are not leaching from the sludge into the surrounding media (Ohio EPA and U.S. EPA 1995).

6.2 UNCERTAINTIES

Sources of uncertainty in the Quadrant IV Baseline Risk Assessment process are discussed in Section 6.5.4 of the of the Quadrant IV RFI Report. Generally, uncertainty arises wherever imperfect information or understanding exists. In risk assessment, this typically is mitigated by making conservative assumptions for individual parameters. Significant uncertainty in assessment of exposure occurs when fate and transport

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Table 6.4

SUMMARY OF RISK ASSESSMENT

Exposure Scenario	COC	Maximum Concentration (ppm)	Total Noncancer HI	Total Excess Lifetime Cancer Risk
On-site Resident	Beryllium	4.9	N/A	2.7×10^{-5}
	Chromium	5,230	10	NA
	Aroclor-1242	1.9	N/A	2.4×10^{-5}
	Aroclor-1248	2.2	N/A	2.8×10^{-5}
TOTAL			10	7.9×10^{-5}
On-site Worker	Beryllium	4.9	N/A	1.3×10^{-5}
	Aroclor-1242	1.9	N/A	1.4×10^{-5}
	Aroclor-1248	2.2	N/A	1.6×10^{-5}
TOTAL			N/A	4.3×10^{-5}

N/A = not applicable
NA = no toxicity value available

modeling is required. Fate and transport modeling used to assess exposure to contaminants in produce, beef, and milk caused such uncertainties. The high uncertainty must be recognized in the interpretation of risk for these pathways. Certain exposure pathways for a particular medium also tend to have higher or lower uncertainties for their calculated exposure depending on the assumptions. For example, incidental ingestion of soils by residents tends to have significantly less uncertainty than ingestion of fruit, vegetables, and meat and milk raised on contaminated soils. Other major contributors to uncertainty in the exposure assessment include: using the maximum detected concentration of a chemical in a medium as the estimated exposure point concentration; using RME scenarios; and using adult intake scenarios for children when assessing exposure for the ingestion of soil, sediment and milk pathways.

Uncertainty associated with the toxicity assessment arises because available scientific information is insufficient to provide a thorough understanding of all the toxic properties of chemicals to which humans are potentially exposed. It is generally necessary, therefore, to infer these properties by extrapolating them from data obtained under other conditions of exposure, generally in laboratory animals. Uncertainties in using animal data to predict potential effects in humans are also introduced when routes of exposure in animal studies differ from human exposure routes; when the exposures in animal studies are short term or subchronic; and when effects seen at relatively high exposure levels in animal studies are used to predict effects at the much lower exposure levels found in the environment.

Taken together, the uncertainties identified with site data, exposure parameters, fate and transport modeling, and toxicity assessment are high and there is a potential to overestimate risk by two orders of magnitude or more.

6.3 ECOLOGICAL RISKS

The ecological risk assessment followed EPA's *Framework for Ecological Risk Assessment* (U.S. EPA, 1992b), which includes problem formulation, analysis, and risk characterization. Assessment endpoints and measurement endpoints were defined and used in the assessment. Assessment endpoints represent ecological values to be protected. Measurement endpoints are observed or measured variables related to assessment endpoints. An ecological effects assessment was conducted to determine the relationship between the level of exposure to contaminants and the magnitude of adverse response resulting from that exposure. Approved protocols were followed to select and measure abundance, diversity, taxonomic richness, and terrestrial organisms. Surface water, sediment, soils and sludge were evaluated as potential sources of contaminant risk to nonhuman receptors.

Analytical results presented in the Quadrant IV RFI (DOE 1994a) and ecological benchmarks presented in the BERA (DOE 1994b) indicate that the lagoons in their present state may present a current or future risk to ecological receptors. The levels of chromium and PCBs identified in the sludge may present a risk to short-tailed shrews. The levels of chromium in the sludge may present a risk to the American woodcock (DOE 1994a and 1994b). Beryllium was identified as a contaminant that exceeded the ecological benchmarks set forth in the Preliminary Ecological Risk Assessment, Section 6.6 of the Quadrant IV RFI (DOE 1994a).

6.4 CONCLUSION

The results of the Quadrant IV Baseline Risk Assessment demonstrate that current and future risks and hazards from the X-611A SWMU will exceed the Ohio EPA target risk level of 1×10^{-6} and the acceptable noncarcinogenic hazard limit of 1.0. Therefore, actual or threatened releases of hazardous contaminants from this unit, if not addressed by implementing the proposed remedy or another remedy, may present a current or potential threat to public health, welfare, or the environment.

7.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

The CAS/CMS was conducted to identify and screen technologies and cleanup alternatives to address COCs at the X-611A Lime Sludge Lagoons. The remedial action objective for alternatives evaluated in the CAS/CMS was to eliminate the potential for human or environmental receptors to be exposed to COCs through the pathways identified as a concern.

Nine primary remedial alternatives were developed for X-611A. After initial screening, seven of the primary alternatives (Numbers 1, 2, 3, 4, 5, 6, and 8) were retained and evaluated in detail in the X-611A Draft CAS/CMS Report (DOE 1994c). In addition, three additional alternatives (Numbers 3A, 3B, and 5A) were proposed and evaluated as a result of a decision team meeting between Ohio EPA, U.S. EPA, and U.S. DOE. All of the alternatives were compared based on overall effectiveness in addressing current and future site conditions. These alternatives (Numbers 1, 2, 3, 3A, 3B, 4, 5, 5A, 6, and 8) are summarized in the following sections.

7.1 ALTERNATIVE 1: NO ACTION

The no action alternative provides a basis for comparison with other alternatives. Under this alternative, no land use restrictions would be imposed and no active measures would be taken to reduce potential exposure to COCs. Access restrictions associated with this area would be discontinued. Existing NPDES monitoring at outfalls associated with the north, middle, and south lagoons, and monitoring activities performed in accordance with the PORTS facility environmental monitoring program would continue. Although limited monitoring would continue under this alternative, no provisions for future corrective action were factored into the cost estimate; therefore, there are no costs associated with implementation of Alternative 1. Alternative 1 is implementable immediately upon authorization.

7.2 ALTERNATIVE 2: LIMITED ACTION - FENCING/SIGNS, DEED RESTRICTIONS, AND ENVIRONMENTAL MONITORING

This limited action alternative includes the following three measures.

(1) Site security and isolation measures, which involve installation of a security fence to surround the X-611A Lime Sludge Lagoons and posting of signs prohibiting entry. Approximately 4,000 ft of security fence would be required to enclose the X-611A lagoon area.

(2) Deed and land use restrictions would be established to prohibit future activity such as digging, drilling, or habitation, which may result in exposure to contaminants.

(3) In addition to continuing existing NPDES monitoring, environmental monitoring would be continued and expanded to detect any migration of contaminants near X-611A. Environmental monitoring for groundwater would consist of monitoring the existing wells at X-611A; these wells include an upgradient well (F-07G) and three downgradient wells (X-611-01B, X-611-02B, and X-611-03G). A new well would be installed at the eastern edge of the intersection of the middle and south lagoons. Groundwater would be monitored semi-annually, and an annual report would be prepared summarizing all field activities and analytical data. Evaluation of the environmental monitoring program would be conducted every 5 years to determine remediation needs and/or need for continued monitoring. This alternative does not include any physical remedial activities other than fencing and monitoring.

Alternative 2 can be implemented in approximately 6 months. The location of utilities would require verification prior to installation of fence posts.

The total present worth cost for Alternative 2 is $1,075,000. The present worth cost is the amount of dollars needed today to cover the cost of this alternative over a 30-year time frame. The capital costs are $428,000, and 30-year O&M costs are $2,390,000.

7.3 ALTERNATIVE 3: CAPPING AND INSTITUTIONAL CONTROLS

Alternative 3 incorporates physical measures and institutional controls to achieve remedial objectives. Partial excavation (to 6 ft below land surface) of areas with elevated concentrations of chromium and PCBs would be performed. In addition, a cover consisting of a permeable geotextile filter fabric overlain by a minimum 2 ft-thick soil cover would be installed and seeded with vegetation to eliminate direct exposure of human and environmental receptors.

The geotextile fabric would cover the surface of each of the three lagoons that form the X-611A unit (approximately 18 acres). Individual permeable geotextile layers would be configured to cover the sludge within the three lagoons. The geotextile filter fabric would provide a barrier between the contaminated sludge and the added topsoil, prevent migration of soil/sludge particles, limit root penetration, and allow water migration within the soil/sludge column. The geotextile fabric in conjunction with the soil cover is not intended to preclude precipitation infiltration but to eliminate the direct exposure pathway, thereby achieving remedial objectives. The geotextile would allow the sludge to remain moist to prevent shrinkage that may ultimately result in failure of the cover system.

The soil cover would be graded to divert surface water off the lagoons and seeded with species of prairie flora to establish a prairie community and enhance the biological diversity of the area. The vegetative cover would control erosion and promote evapotranspiration.

Standing water would be removed from the lagoon surface using sump pumps. Wastewater generated from dewatering of the lagoon surfaces would be collected, tested, and treated, as necessary (i.e., treatment could potentially include on-site treatment before disposal through a permitted NPDES discharge).

Inspections of the soil cover, lagoon dikes, and prairie habitat would be conducted to ensure the integrity of each component. Repair of the dikes and soil cover would be performed as required. Controlled burning and/or potential mowing of alternate sections of the prairie would be performed to maintain a habitat for wildlife.

Monitoring of groundwater would be required to assess contaminant status. Sampling of the existing upgradient well, three existing downgradient wells, and the additional well to be installed between the middle and south lagoons, would be conducted semiannually. An annual report would be prepared and evaluation of the monitoring procedure would be conducted every 5 years.

The physical installation of the cover, including site mobilization and demobilization, would require about 31 months. Upon authorization, total time of installation, including engineering and administrative requirements, is 43 months. The cover should be installed during months when inclement weather would not adversely impact proper installation (i.e., proper moisture, compaction, etc.).

The present worth cost for Alternative 3 is $8,373,000. The capital costs are $8,751,000, and 30-year O&M costs are $2,919,000.

7.4 ALTERNATIVE 3A: CAPPING AND INSTITUTIONAL CONTROLS

This alternative is a modified version of Alternative 3. Alternative 3A includes the uniform placement of a 2 ft-thick soil cover over the existing lagoon topography. The excavation of sludge with elevated PCB concentrations and the installation of a geotextile filter fabric would be eliminated. Implementation of this modified alternative would be expected to result in areas of relief where standing water could accumulate in the same locations as in the current topography of the lagoons. Initial surface water removal, groundwater monitoring, and maintenance of the soil cover would be consistent with the activities outlined in Alternative 3.

The physical installation of the cover, including site mobilization and demobilization, would require about 31 months. Upon authorization, total time of installation, including engineering and administrative requirements, is 43 months. The cover should be installed during months when inclement weather would not adversely impact proper installation (i.e., proper moisture, compaction, etc.).

The total present worth cost for Alternative 3A is estimated to be $4,876,000. The capital costs are $3,635,000, and 30-year O&M costs are $3,258,000.

7.5 ALTERNATIVE 3B: CAPPING AND INSTITUTIONAL CONTROLS

This alternative is also a modification of Alternative 3. Components of Alternative 3B include the placement of a minimum 2-ft-thick soil cover over the existing topography of the south lagoon and placement of

a sloped soil cover over the middle and north lagoons. The sloped soil cover would be designed to promote surface water drainage away from the lagoons. Soil berms would be constructed in low-lying areas outside the north and south boundaries of the lagoons. The soil berms would allow the shallow accumulation of water in these areas. Partial excavation of the sludge with elevated concentrations of PCBs and mandatory installation of the geotextile filter fabric would be eliminated. Placement of the soil cover over all three of the lagoons is intended to protect against exposure of humans and biota to COCs within the sludge. Initial surface water removal, groundwater monitoring, and maintenance of the soil cover would be consistent with the activities described in Alternative 3.

The physical installation of the cover, including site mobilization and demobilization, would require about 31 months. Upon authorization, total time of installation, including engineering and administrative requirements, is 43 months. The cover should be installed during months when inclement weather would not adversely impact proper installation (i.e., proper moisture, compaction, etc.).

The total present worth cost for Alternative 3B is $5,090,000. The capital costs are $4,730,000, and 30-year O&M costs are $2,779,000.

7.6 ALTERNATIVE 4: PARTIAL EXCAVATION, CONSTRUCTED WETLANDS, DEED RESTRICTIONS AND ENVIRONMENTAL MONITORING

This alternative is similar to Alternative 3 with the exception of a wetland that would be developed on the 2-ft soil layer. Development of a wetland habitat would enhance the environmental quality of the area by providing multiple functions such as abundant biological activity, fish and wildlife habitat, and water quality protection.

Surface water removal, potential water treatment, excavation of sludge containing COCs, and cover installation would be similar to the methods described in Alternative 3. Additional excavation of sludge within the lagoons would likely be required to achieve an appropriate basin for wetland development. Removal of as much as 58,000 yd^3 of sludge from the lagoons may be required to ensure sufficient freeboard for wetlands installation. The excavated sludge would be disposed of in an on-site solid waste landfill meeting RCRA Subtitle D requirements, state solid waste laws, and local ordinances.

A geotextile filter fabric would be placed over the remaining sludge. The geotextile filter fabric would provide a barrier between the contaminated sludge and the added topsoil, prevent migration of soil/ sludge particles, limit root penetration, and allow water migration within the soil/sludge column. As stated in Alternative 3, it is important that the sludge remain moist to prevent failure of the soil cover.

Shallow-rooted plants would be used in the wetland to minimize potential penetration of the geotextile fabric. A minimum of 2 ft of topsoil would be placed on the geotextile filter fabric to provide a substrate for plant growth.

The existing monitoring wells and the proposed monitoring well would be sampled semiannually. An annual report and a 5-year periodic review would be conducted to evaluate all data collected.

At present, the physical construction of the wetlands, including site mobilization and demobilization, would require about 42 months. Total time of installation, including engineering and administrative requirements upon authorization, is 54 months. Construction activities should begin when inclement weather would not adversely impact the installation.

The total present worth cost for Alternative 4 is $25,433,000. The capital costs are $28,160,000, and 30-year O&M costs are $4,192,000.

7.7 ALTERNATIVE 5: PARTIAL EXCAVATION, CONSTRUCTED WETLANDS, SOIL LAYER, VEGETATIVE COVER, DEED RESTRICTIONS, AND ENVIRONMENTAL MONITORING

This alternative is a combination of Alternatives 3 and 4. A wetland habitat would be developed over the eastern portion of the middle and south lagoons and a prairie habitat would be installed over the north lagoon and western portion of the middle and south lagoons. A riprap divider would separate the prairie habitat from the constructed wetland. This alternative includes (1) excavation of sludge containing PCBs to 6 ft below land surface; (2) lagoon surface dewatering; (3) grading the sludge surface to create the appropriate surface elevation for either the wetland or prairie; (4) removing sludge to an on-site disposal facility; (5) minimum 2-ft-thick soil layer (geotextile filter fabric, if necessary); (6) implementation of deed and land-use restrictions; (7) sampling of existing and additional monitoring wells; and (8) production of annual reports and 5-year periodic reviews.

At present, the physical construction of the wetlands, including site mobilization and demobilization, would require about 36 months. Total time of installation, including engineering and administrative requirements upon authorization, is 48 months. Construction activities should begin when inclement weather would not adversely impact the installation.

The 30-year present worth cost for Alternative 5 is $12,121,000. The capital costs are $12,812,000, and 30-year O&M costs are $3,734,000.

7.8 ALTERNATIVE 5A: CONSTRUCTED WETLANDS, SOIL LAYER, VEGETATIVE COVER, DEED RESTRICTIONS, AND ENVIRONMENTAL MONITORING

Alternative 5A is a modification of Alternative 5 that would potentially eliminate the riprap divider, geotextile liner, and re-evaluate or eliminate the excavation of sludge. The basic design of the prairie habitat and wetland area would remain similar to Alternative 5. Implementation of institutional controls and groundwater monitoring would be consistent with those activities presented in Alternative 5.

At present, the physical construction of the wetlands, including site mobilization and demobilization, would require about 36 months. Total time of installation, including engineering and administrative requirements upon authorization, is 48 months. Construction activities should begin when inclement weather would not adversely impact the installation.

The 30-year present worth cost for Alternative 5A is $9,660,000. The capital costs are $9,957,000, and 30-year O&M costs are $3,734,000.

7.9 ALTERNATIVE 6: EXCAVATION, DEWATERING, AND DISPOSAL

Alternative 6 would require excavation of approximately 295,000 yd^3 of lime sludge. Following excavation, the sludge would be dewatered and transported in a covered vehicle to an appropriate landfill. The dikes forming the lagoon boundaries would be demolished following excavation of the sludge, and the entire lagoon area would be graded to an approximate prelagoon topography and hydroseeded. No groundwater monitoring would be performed in this alternative because all contaminant sources would be removed from the area.

The existence and location of all utilities would require confirmation prior to initiation of excavation. The physical excavation and disposal of all the contaminated sludge at X-611A would require about 53 months (including mobilization and demobilization) to complete. Total time of implementation upon authorization is 65 months. This includes engineering design and institutional and administrative requirements.

The 30-year present worth cost for Alternative 6 is $149,507,000. The capital costs are $173,940,000. No operation or monitoring costs were reflected in this alternative because all contaminant sources would be removed from the area.

7.10 ALTERNATIVE 8: IN SITU SOLIDIFICATION/STABILIZATION

This alternative uses an in situ process of mixing reagents with the lime sludge to produce a "solidified" product. Solidification/stabilization is a commercially available technology in which contaminants in a substrate (i.e., soil, sludge, etc.) are chemically fixed when mixed with water and a binder (e.g., lime fly ash, pozzolan, or Portland cement). Mixing would be completed using augers/mixers. The treated sludge would then harden into a solidified mass resistant to leaching.

Solidification/stabilization would increase the volume of treated sludge 10 to 30 percent. A 30 percent increase was used for estimation purposes. The excess volume of solidified sludge would be disposed of in an appropriate landfill meeting RCRA Subtitle D requirements, state solid waste laws, and applicable local ordinances.

Dewatering of the lagoons and the sludge may be necessary. Wastewater generated from the dewatering process would be treated, as necessary. Areas of elevated chromium and PCBs would be removed before solidification. The final surface elevation would be graded and a topsoil/vegetative cover installed.

Groundwater would be monitored semiannually. An annual report would be prepared summarizing all field activities and analytical data. Evaluation of the environmental monitoring program would be conducted every 5 years to determine remediation needs and/or needs for continued monitoring.

In situ solidification/stabilization of the three lagoons including mobilization and demobilization, excluding the physical/treatability studies, would require about 66 months. Total time of installation, including engineering design, institutional and administrative requirements, and physical/treatability studies, is 78 months.

The total present worth cost for Alternative 8 is $51,838,000. The capital costs are $59,491,000, and the 30-year O&M costs are $2,390,000.

7.11 MAJOR ARARs FOR THE X-611A LIME SLUDGE LAGOONS

Applicable, Relevant and Appropriate Requirements (ARARs) are defined as follows:

Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Relevant and appropriate requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

To Be Considered (TBC) criteria is a category that includes non-promulgated criteria, advisories, and guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. However, pertinent TBCs will be considered along with the ARARs in determining the necessary level of cleanup or technology requirements.

ARARs are divided into three categories:

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment [e.g., maximum contaminant levels (MCLs) that establish safe levels in drinking water].

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions or conditions involving special substances.

Location-specific ARARs restrict actions or contaminant concentrations in certain environmentally sensitive areas. Examples of areas regulated under various federal laws include floodplains, wetlands, and locations where endangered species or historically significant cultural resources are present.

ARARs considered for the remedial alternatives at the X-611A SWMU include federal and state laws, regulations, and guidance and U.S. DOE Orders.

No Action Alternative - All major ARARs apply to the no action alternative. A no-action decision can only be made when no remedial action is necessary because the site is already protective of human health and the environment and complies with ARARs.

Chemical-Specific ARARs/TBCs - Remedial alternatives 2, 3, 3A, 3B, 4, 5, 5A, 6, and 8 must all meet the chemical-specific ARARs associated with potential releases to surface water and groundwater. These ARARs include federal and any more stringent state non-zero maximum contaminant level goals (MCLGs) and MCLs for drinking water; the Ohio Water Quality Criteria for surface water and the National Pollutant Discharge Elimination System (NPDES) discharge limits.

Action-Specific ARARs/TBCs - Remedial alternatives 3, 3A, 4, 5, 5A, 6 and 8 include excavation or partial excavation and disposal. These alternatives must meet those requirements that deal with solid waste disposal and with the potential release of fugitive dust to the ambient air. These ARARs include Ohio solid waste requirements which limit solid waste placement and establish requirements for the proper operation and maintenance of the unit, the National Ambient Air Quality Standards and the Ohio Air Toxics Policy for air pollutants. Those alternatives that include environmental monitoring must meet ARARs associated with environmental sampling and analysis.

Location-Specific ARARs/TBCs - All remedial alternatives must meet location-specific requirements associated with the National Historical Preservation Act, the Archeological and Historic Preservation Act, the Endangered Species Act, and the Fish and Wildlife Coordination Act.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting the remedial alternative, Ohio EPA and U.S. EPA evaluated each alternative using the following criteria, noting how the preferred alternative compares to the other alternatives under consideration. The following are the EPA evaluation criteria.

(1) **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection, and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.

(2) **Compliance with ARARs** addresses whether or not a remedy will meet all of the applicable state, federal, and local environmental statutes.

(3) **Long-term effectiveness and permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

(4) **Reduction of toxicity, mobility, or volume through treatment** is the anticipated performance of the treatment technologies to yield a permanent solution. This includes the ability of the selected alternative to reduce the toxic characteristics of the contaminants of concern or remove the quantities of those contaminants to an acceptable risk concentration or regulatory limit and/or decrease the ability of the contaminants to migrate through the environment.

(5) **Short-term effectiveness** involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period.

(6) **Implementability** is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

(7) **Cost** includes capital and operation and maintenance costs.

(8) **Community acceptance** is assessed in this decision document following review of the public comments received on the Quadrant IV RFI Draft Report and the Preferred Plan (Ohio EPA and U.S. EPA, 1995).

Ohio EPA and U.S. EPA evaluated each alternative using the above eight criteria. The following discussion summarizes the compliance of the alternatives with these criteria. The first two criteria, overall protection of human health and the environment and compliance with ARARs, are the threshold criteria that must be satisfied in order for an alternative to be eligible for selection as the preferred remedial alternative.

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives 1 and 2 are not protective of human health and the environment because no soil cover would be constructed to prevent possible exposure and the dikes could deteriorate over time resulting in a release of sludge into Little Beaver Creek.

Alternatives 3, 3A, 4, and 5 provide protection by excavating sludge containing PCBs and disposing of it in a secure landfill, thereby decreasing the likelihood of exposure. Alternatives 3B and 5A provide

protection by reducing exposure of humans and biota to underlying contaminated sludge; however, Alternatives 3 and 3B would permanently displace existing habitat for environmental aquatic receptors.

Alternative 6 provides protection of human health and the environment by disposing of the sludge in a secure disposal facility. Alternative 8 provides protection by reducing mobility of the contaminants through treatment of the sludge, resulting in a decreased ability for exposure and possible future migration of the sludge to surface water.

8.2 COMPLIANCE WITH ALL STATE, FEDERAL, AND LOCAL LAWS AND REGULATIONS

Selected remedial actions on the U.S. DOE site must comply with applicable federal, state, and local laws and regulations. Examples of these include, but are not limited to, the following: Clean Air Act, Toxic Substances Control Act, Safe Drinking Water Act, Clean Water Act, RCRA, Ohio Revised Code (ORC) 6111, ORC 3734, and Ohio Administrative Code (OAC) 3745. CERCLA requires that remedial actions meet the ARARs of all environmental laws and regulations. CERCLA §121 provides that under certain circumstances an otherwise applicable or relevant and appropriate requirement may be waived. A waiver must be invoked for each ARAR that will not be attained or exceeded. The circumstances under which each waiver might be invoked are listed below:

Interim Measures - The remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed. (CERCLA §121(d)(4)(A).)

Greater Risk to Health and the Environment - Compliance with such requirement at the facility will result in greater risk to human health and the environment than alternative options. (CERCLA §121(d)(4)(B).)

Technical Impracticability - Compliance with such requirement is technically impracticable from an engineering perspective. (CERCLA §121(d)(4)(C).)

Equivalent Standard of Performance - The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation , through use of another method or approach. (CERCLA §121(d)(4)(D).)

Inconsistent Application of State Requirements - With respect to a State standard, requirement, criteria, or limitation, the State has not consistently applied (or demonstrated the intention to

consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions. (CERCLA §121(d)(4)(E).)

Fund Balancing - In the case of a remedial action to be undertaken solely under section 104 using the Fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats. (CERCLA §121(d)(4)(F).)

The selected remedy for the X-611A Lime Sludge Lagoon meets all ARARs; therefore, an ARAR waiver will not be required.

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 6 (excavation and disposal) was expected to provide a comparatively higher degree of long-term permanence than the remaining alternatives because removal of sludge and disposal into a secured landfill would provide greater protection against unintended releases and migration of sludge. Alternative 8 (in situ solidification) also was expected to provide a great degree of long-term permanence because the sludge would be solidified to prevent potential migration of COCs to groundwater or surface water (although leachability testing has demonstrated that the sludge is not amenable to leaching; treatment is assumed to further reduce the probability of this occurring in the future).

The next level of long-term effectiveness was provided by Alternatives 3 and 3B which minimized or eliminated the ponding of water on the soil cover over the north and middle lagoon areas. Although the amount of future surface water ponding was estimated to be small, a greater probability for failure of the soil cover and/or migration of sludge was considered likely with those alternatives that allowed significant accumulation of surface water on the lagoons (Alternatives 3A, 4, 5, and 5A). Potential failure of the dikes could be caused by increased activity from mammals attracted to the water (e.g., muskrats, beaver) and an increased probability for erosion of sludge would exist if prolonged surface water flow should occur (e.g., washout during heavy rains). Although these alternatives may require additional maintenance, they would retain the habitat for aquatic species.

Alternative 2 was estimated to provide the next level of long-term effectiveness and permanence. Alternative 2 would control access to the impoundments through installation of signs and fencing, but does not address the potential for migration of sludge beyond the SWMU boundaries. The success of Alternative 2 would be largely dependent on maintenance of the institutional controls and continued ownership of PORTS by U.S. DOE. Because continued U.S. DOE ownership cannot be assured, Alternative 2 was not considered to provide a high degree of permanence. Alternative 1 was estimated to be the least effective alternative because no action would be taken to prevent exposure to, or migration of the sludge.

8.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative 8 would reduce the mobility of contaminants through solidification of the sludge; however, there would be a volume increase from the solidification process. None of the other alternatives would actively reduce toxicity, mobility, or volume through treatment. As previously stated, leachability tests indicate that the sludge would not leach contaminants even if left untreated.

8.5 SHORT-TERM EFFECTIVENESS

Alternatives 2 and 3B are expected to provide the greatest degree of short-term effectiveness because they minimize the disturbance or removal of sludge and require the least amount of time to implement (6 months and 43 months, respectively). Alternatives 3, 3A, 4, 5, 5A, and 6 all involve some level of sludge excavation and are expected to increase, respectively, in short-term risk of exposure to COCs; however, these risks could be easily managed through appropriate controls and procedures. Alternative 8, in situ treatment, was expected to increase the potential for exposure to contaminated sludge during the solidification process and, therefore, was considered to have a lower level of short-term effectiveness. Alternative 6 was expected to provide the lowest level of short-term effectiveness because the complete excavation of sludge was likely to cause the greatest increase in risk of exposure to contaminants. The time required for each alternative to achieve protection is shown (in ascending order) in Table 8.1.

Table 8.1

IMPLEMENTATION TIMES

Alternative	Implementation Time Required (months)
2	6
3, 3A, 3B	43
5, 5A	48
4	54
6	65
8	78

8.6 IMPLEMENTABILITY

Varying degrees of implementability are expected from each alternative. Alternatives 3, 4, 5, 5A, and 6 involve the removal of sludge to a solid waste landfill and are expected to be more difficult to implement because of the anticipated problems in placing construction equipment on the sludge and the impoundments. Complete excavation of the sludge (Alternative 6) was expected to be the most difficult alternative to implement because of the long period of time needed within the impoundments to remove the sludge. Stabilization of the sludge would likely be necessary to enable operation of the construction equipment. The instability of the sludge was also expected to present difficulties in completing Alternative 8 (in situ solidification). Because a smaller amount of sludge would be removed in Alternatives 3, 4, 5, and 5A, these alternatives were estimated to be easier to implement than Alternatives 6 and 8. The remaining alternatives (1, no action; 2, institutional controls; and 3B, soil cover) are expected to be the easiest to implement because construction activities would be limited for Alternatives 2 and 3B, and non-existent for Alternative 1. All services and materials required for all the alternatives are readily available.

8.7 COST

Alternative 6, complete excavation of the sludge, was the most expensive alternative at $149.5 million. The next most expensive alternative was Alternative 8, in situ solidification, at $51.838 million. The costs in descending order for the remaining alternatives are: Alternative 4, constructed wetlands at $25.433 million; Alternative 5, constructed wetlands/prairie, $12.121 million; Alternative 5A, a modification of Alternative 5, $9.66 million; Alternative 3, engineered soil cover, $8.373 million; Alternative 3B, a modification of

Alternative 3, at $5.090 million; Alternative 3A, a modification of Alternative 3, at $4.876 million; and, Alternative 2 at $1.075 million.

8.8 COMMUNITY ACCEPTANCE

The Ohio EPA and the U.S. EPA presented the preferred plan to the public in a meeting held on February 6, 1996. Following the meeting there was a 38 day public comment period. During the meeting and the subsequent comment period the agencies received no opposition to the preferred plan.

9.0. THE SELECTED REMEDY

Based on a comparative analysis of the alternatives presented in the *X-611A Draft CAS/CMS Report* (DOE 1994c), the Ohio EPA and U.S. EPA selected Alternative 3B. This alternative achieves protection of human health and the environment, reflects the best balance of the evaluation criteria, will achieve restoration and enhancement of the area, and is cost-effective.

The selected remedy addresses sludge contaminated with beryllium, chromium, and PCBs at concentrations that, in the X-611A lagoon's present condition, present an unacceptable risk to human health and the environment. The selected remedy achieves remedial goals for human health and the environment by eliminating exposure pathways to COCs within the sludge.

Alternative 3B includes installation of a minimum 2-ft-thick sloped soil cover over the north and middle lagoons. This soil cover will be sloped to divert water off of the surface of the north and middle lagoons, thereby minimizing the likelihood that animals generally attracted to water (such as muskrats or turtles) will frequent the area. A 2-ft-thick soil cover will be placed over the south lagoon with the expectation that shallow water will accumulate on a portion of the south lagoon surface.

Following installation of the soil cover, prairie style vegetation will be planted on the north and middle lagoons, and vegetation that grows in wetter areas will be planted on the south lagoon. Surface drainage from the north and middle lagoons will flow into the south lagoon or into a low-lying bermed area north of the lagoons.

A soil berm will be constructed outside the northern boundary of the north lagoon to allow shallow accumulation of water in this low-lying area. No sludge is present in this area and no waste was previously stored there. Addition of the berm north of the X-611A lagoons will be completed to satisfy the penalty project outlined in the Consent Decree between U.S. DOE and the state of Ohio. This project required that U.S. DOE maintain the lagoons' ability to retain surface water. Since the north and middle lagoons will no longer achieve this criterion, the adjacent area was added to the selected remedy. The soil berm that was to be constructed outside the south lagoon has been eliminated due to the existing wetland in this area and in response to public comments on the selected remedy.

Alternative 3B does not include excavation of any sludge and eliminates mandatory installation of a geotextile filter fabric. However, material may be installed, if required, to facilitate remedial efforts by increasing the stability of the sludge and to prevent mixing of the sludge and cover material.

Surface water that currently covers large portions of all three lagoons will be removed. Wastewater generated from surface dewatering will be collected and analyzed to evaluate compliance with NPDES permit requirements. If the analyses indicate that the wastewater violates NPDES requirements, then the discharge may be temporarily suspended until a method to achieve compliance with NPDES requirements is identified. A bench-scale study may be necessary to determine an adequate wastewater treatment technology.

Maintenance and monitoring programs will be established to ensure the integrity of the soil cover and berms and to maintain appropriate prairie habitat. During the first year after construction, at a minimum, monthly inspections of the lagoon dikes and adjacent bermed areas will be conducted. Maintenance of the prairie ecosystem may include burning or mowing of grasses and plants. An evaluation and report that addresses the effectiveness of the remedial action and monitoring procedures will be conducted no less than every 5 years based on the establishment of the prairie habitat and biota.

The groundwater monitoring program will include semiannual sampling and analysis of groundwater collected from wells surrounding the lagoons. The groundwater will be analyzed for COCs associated with the X-611A SWMU. If COCs are detected in the groundwater at levels that are determined to be a threat to human health or the environment, they will be addressed as part of the Quadrant IV remedial action. A report presenting the groundwater monitoring results will be prepared and submitted to Ohio EPA and U.S. EPA annually.

This alternative complies with all state and federal regulations. No known local regulations exist that would be violated by this alternative. The remedy is implementable using currently available construction

technologies, will be effective in the long term by containing the sludge and isolating it from the environment, and will be effective in the short term through careful construction practices and isolation of the area.

Although the CMS lists the total time required for installation as 31 months (43 months including engineering and administrative requirements), this time will be shortened. Implementation of Alternative 3B will require a total capital expenditure of $4.730 million and a total operation and maintenance investment of $2.779 million (adjusted dollar value for years 1-30). The additional cost of berm construction is estimated to be $200,000 or less. The total 1995 present worth for Alternative 3B is $5.090 million.

Alternative 3B provides the best balance between overall risk reduction (both human health and ecological risks), restoration of the X-611A area, and cost. Since X-611A currently functions as a semi-aquatic environment, the selected alternative most effectively meets the protectiveness criteria for existing receptors, while considering the remaining evaluation criteria, including cost.

10.0 STATUTORY DETERMINATIONS

Under CERCLA Section 121, selected remedies must be protective of human health and the environment, comply with ARARs (unless a waiver is justified), be cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that use treatments that permanently and significantly reduce the toxicity, mobility, or volume through treatment of hazardous wastes as their principal element. Under RCRA general standards for corrective measures must provide overall protection of human health and the environment, attain media cleanup standards, control the sources of releases and comply with standards for management of wastes. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Upon completion, the selected remedy will be protective of human health and the environment by eliminating the relevant exposure pathways. Remedial objectives will be satisfied by eliminating exposure pathways rather than achieving numerical cleanup levels. Ingestion and dermal exposure are the most probable routes of exposure if the sludge impoundments are left in their current state. The remedy is implementable using currently available construction technologies, will be effective in the long term by containing the sludge

and isolating it from the environment, and will be effective in the short term through careful construction practices and isolation of the area.

10.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Selected remedial actions at PORTS must comply with applicable federal, state, and local laws and regulations. Examples of these include, but are not limited to, the Clean Air Act, Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Water Act, RCRA, Ohio Revised Code (ORC) 6111, ORC 3734, and Ohio Administrative Code 3745. CERCLA requires that remedial actions legally meet ARARs of other applicable environmental laws.

The ARARs selected by the Ohio EPA and U.S. EPA for use at X-611A are presented in Appendix B. The selected remedy will comply with all ARARs identified by the Ohio EPA and U.S. EPA, and will be performed in accordance with all pertinent U.S. DOE orders. The major ARARs and requirements to be considered are discussed below.

10.2.1 Chemical-Specific ARARs

Chemical-specific ARARs were evaluated to identify each environmental law or regulation applicable to the types of contaminants found at the X-611A lagoons.

The Safe Drinking Water Act establishes MCLs and MCL goals for pollutants in drinking water. These requirements would be applicable for monitoring contaminants potentially found in groundwater beneath X-611A.

SDWA MCL for beryllium (0.004 mg/L) in groundwater
SDWA MCL for PCBs (0.0005 mg/L) in groundwater
SDWA MCL for chromium (0.1 mg/L) in groundwater

The Clean Water Act establishes federal water quality criteria, pretreatment standards for wastewater releases to publicly owned treatment works, effluent limits for discharges into waters of the United States, and requirements for dredge and fill activities. These requirements are applicable to potential off-site releases to surface waters. Any off-site discharges that may result from remedial action would be managed in accordance with the NPDES permitting requirements and discharge limits.

NPDES daily concentration of total suspended solids (TSS) for Outfalls 006 and 007: 45 ppm

NPDES 30-day TSS concentration for Outfalls 006 and 007: 30 ppm

NPDES daily TSS concentration for Outfall 008: 15 ppm

NPDES 30-day TSS concentration for Outfall 008: 10 ppm - no limits for rainfall events

NPDES concentration for PCBs: nondetectable in all outfalls

The Clean Air Act

- The State Implementation Plan for particulate matter requires that visible particulate emissions not exceed 20 percent opacity as a 3-minute average and prohibits the significant and avoidable degradation of air quality where presently existing air quality is equal or better than that required by the National Ambient Air Quality Standards. These requirements are applicable for the release of fugitive dust from X-611A capping activities.

10.2.2 Action-Specific ARARs

Action-specific ARARs were evaluated to identify each environmental law or regulation applicable to the types of actions taken at the X-611A Lime Sludge Lagoons.

Ohio Dam Safety Laws and Division of Water Administrative Rules established requirements specific to dams, including predesign specifications, monitoring requirements, and maintenance and operating requirements. These requirements apply to the safety and long-term stability of the dikes that surround the lagoons for the chosen remedy.

The Resource Conservation and Recovery Act

RCRA specifies location, design, construction, operation, maintenance, and closure requirements for landfills and surface impoundments and restricts the type of waste that may be disposed of.

10.2.3 Location-Specific ARARs

Location-specific ARARs were evaluated to identify each environmental law or regulation applicable to the location of the X-611A Lime Sludge Lagoons.

The *National Historic Preservation Act* requires federal agencies to take into account the effect of any federally-assisted undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. The *Historic Sites, Objects, and Antiquities Act* requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid adverse impacts on each landmark. No adverse impacts to buildings or structures of potential historical significance or registered landmarks are anticipated from the remedial action.

The *Archaeological and Historic Preservation Act* requires that data recovery and preservation activities be conducted to prevent prehistoric, historical, or archaeological data from being destroyed as a result of a federal activity. The *Archaeological Resources Protection Act* requires a permit for excavation or removal of any archaeological resources on federal lands. These requirements are considered applicable to the remedial action. U.S. DOE has conducted consultations with the State Historic Preservation Office which indicates that no adverse impacts to archaeological or historic resources are anticipated from the remedial action.

The Fish and Wildlife Coordination Act requires consultation when a federal agency proposes or authorizes any modification of any stream or other water body, and adequate provisions for protection of fish and wildlife resources. This requirement is considered applicable to the remedial action. U.S. DOE has conducted appropriate consultation with the Fish and Wildlife Service. The X-611A Lime Sludge Lagoon remedy is not anticipated to result in any significant stream modification or adverse impacts to fish and wildlife.

The Endangered Species Act requires that federal agencies ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify any critical habitat. This requirement is considered applicable to the remedial action. U.S. DOE consulted with the Fish and Wildlife Service and determined that no threatened or endangered species or critical habitats would be adversely impacted by the remedy.

Ohio State Implementation Plan requires prior authorization for open burning within unrestricted areas. This requirement is considered applicable because open burning will be used for wildlife management practices.

10.3 COST EFFECTIVENESS

The selected remedy is cost-effective because the overall effectiveness of the selected remedy is proportional to its cost. As a comparison, Alternatives 6 and 8 are not cost-effective because their overall effectiveness is not proportional to their high costs. The total present worth cost for Alternative 3B is $5,090,000. The capital costs are $4,730,000, and the 30-year O&M costs are $2,779,000.

10.4 USE OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

Treatment of the X-611A sludge is not practicable because of the large surface area and substantial quantity of sludge present in the lagoons. However, with proper maintenance, the engineered soil cover will provide permanence and long-term effectiveness by eliminating the potential for ingestion or direct exposure of human or ecological receptors to COCs.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPLE ELEMENT

Treatment of the X-611A sludge (approximately 295,000 yd^3) was not considered practicable because of the large surface area and substantial quantity present within the lagoons. Consequently, this remedy does not satisfy the statutory preference for treatment as a principle element.

10.6 SOURCE CONTROL

Leachability tests conducted at X-611A indicated that the sludge would not leach contaminants even if left untreated. Implementation of the soil cover will protect human health and the environment by eliminating exposure pathways and controlling the source of potential releases from the SWMU. The toxicity and volume of the sludge will not be effected by this remedy; however, the mobility of contaminants contained within the sludge is expected to be reduced by limiting infiltration and potential contaminant transport from surface water runoff.

10.7 ATTAINMENT OF MEDIA CLEANUP STANDARDS

Standards relating to media cleanup levels are not considered applicable to the selected remedy. Remedial objectives will be satisfied by eliminating exposure pathways rather than achieving numerical cleanup levels.

10.8 COMPLIANCE WITH STANDARDS FOR MANAGEMENT OF WASTES

Standards relating to management of waste are not considered applicable to the selected remedy. Non-intrusive methods will be utilized to isolate contaminants in place; consequently no waste is expected to be removed from the SWMU.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes were made to the selected remedy from the preferred remedy presented in the preferred plan issued by U.S. EPA and Ohio EPA.

12.0 MINOR CHANGES

The implementation time for the selected remedy will be shortened.

13.0 REFERENCES

DOE (U.S. Department of Energy) 1994a. *Quadrant IV RFI Draft Final Report for Portsmouth Gaseous Diffusion Plant*. DOE/OR/11/1180/D2. Piketon, Ohio.

DOE. 1994b. *Baseline Ecological Risk Assessment for Portsmouth Gaseous Diffusion Plant*. DOE/OR/11-1315/D1. Piketon, Ohio.

DOE. 1994c. *X-611A Draft Cleanup Alternative Study/Corrective Measures Study Report for Portsmouth Gaseous Diffusion Plant*. DOE/OR/12-1244/D4. Piketon, Ohio.

Energy Systems (Martin Marietta Energy Systems, Inc.). 1993. *Portsmouth Gaseous Diffusion Plant, Environmental Report for 1992*. ES/ESH-37. Piketon, Ohio.

Ohio EPA (Environmental Protection Agency) and U.S. EPA (U.S. Environmental Protection Agency). 1995. *The Ohio EPA's and U.S. EPA's Preferred Plan for the X-611A Solid Waste Management Unit U.S. DOE - PORTS Site*. Piketon, Ohio.

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U.S. EPA. 1989. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A), Interim Final*. EPA/540/1-89/002. Office of Emergency and Remedial Response. Washington, D.C.

U.S. EPA. 1991. *Guidance on RCRA Corrective Action Decision Documents: The Statement of Bases Final Decision and Response to Comments*. EPA/540/G-911/011. Office of Research and Development. Washington, D.C.

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U.S. EPA. 1992b. *Framework for Ecological Risk Assessment*. Washington, D.C.

U.S. EPA. 1996a. *Integrated Risk Information System (IRIS)*. Office of Health and Environmental Assessment Criteria Office. Cincinnati, OH.

U.S. EPA. 1996b. *Health Affects Assessment Summary Tables (HEAST)*. OERR, EPA,. Washington, DC.

University of Tennessee. Knoxville, Tennessee. *Reclamation of the DOE Lagoon Sites in Portsmouth, Ohio for Revegetation*.

PART 3: OHIO EPA RESPONSES TO PUBLIC COMMENTS

1364

1.0 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

1.1 Overview

This responsiveness summary has been prepared to respond to each of the significant comments, criticisms, and new data submitted in written or oral presentations on the preferred plan for the X-611A Lime Sludge Lagoons and is intended to be consistent with Sections 113(k) (2) (B) (iv) and 117(B) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This section requires that the Agency(S) respond "... to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on the preferred plan. Numerous comments were made during the public comment period that do not pertain to the proposed remedial action at the X-611A Lime Sludge Lagoons. These comments were not addressed in this responsiveness summary. Attempts will be made to address all comments and concerns not specific to the X-611A Lime Sludge Lagoons by communicating with the public in future public informational/update meetings and during site visits where Ohio EPA and/or U.S. EPA representatives are present.

The administrative record index for the DOE site which includes the RCRA Facility Investigation (RFI), the Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) and the Preferred Plan is available to the public at the **Environmental Information Center located in Waverly, Ohio**. The first draft of the RFI was submitted to Ohio EPA and U.S. EPA on August 27, 1993. The CAS/CMS was submitted on July 13, 1994, and a public notice alerting the public of their opportunity to comment on the preferred plan was placed in the ***Waverly Watchman*** and the ***Portsmouth Times*** on January 2, 1996. The public comment period closed on March 15, 1996. A public meeting to discuss the preferred plans was held on February 6, 1996 at the Vern Riffe Vocational School near the U.S. DOE plant.

1.2 Summary of Significant Comments

The public comments regarding the U.S. DOE site are organized into the following categories:

(1) Summary of comments and Agency responses to citizens regarding the preferred plan;

(2) Summary of comments from U.S. DOE and Agency responses.

2.0 COMMENTS FROM THE COMMUNITY

1. One commenter noted that the preferred alternative balances costs with the protection of human health and the environment. The commenter further noted the community acceptance of "cost" versus "benefit" would appear to be an important component of the Agencies decision to implement this alternative.

The Ohio EPA Response: Ohio EPA agrees with this statement. Remedial action decisions place primary emphasis on the protection of human health and the environment. Cost is always considered, but is done so after remediation goals are established for the protection of human health and the environment. The remedial alternative that is protective, complies with ARARs, and is cost-effective is selected. Cost-effectiveness, as stated in the NCP, is determined by evaluating the overall effectiveness of an alternative and then assessing the cost of the alternative to ensure that the cost is proportional to the overall effectiveness.

2. The same commenter asked if the Agencies could directly involve two or three members of the public in monitoring the effectiveness of the preferred alternative.

The Ohio EPA Response: The Ohio EPA and the U.S. EPA are willing to involve the public in the remedial process. As needed, the Agencies are willing to meet with the public to discuss the progress and any problems noted with the ongoing remediation at this SWMU. The public is encouraged to meet with Agency representatives to discuss their concerns regarding this project. However, the Agencies are unable to provide training and education regarding the remedial process, sampling techniques, as well as health and safety procedures for monitoring the cleanup for this site. All data collected during the remedial process and subsequent operation and maintenance of this SWMU and others on site will be made available to the public. The Agencies are willing to discuss the data with the public and provide any interpretation of the results.

Currently, the U.S. DOE conducts stakeholders meetings to discuss the potential future uses of this site. Discussions regarding potential cleanup alternatives and remedial goals may be incorporated into these meetings. The remedial goals selected for this site may influence the potential future use and therefore, may be appropriate for discussion among the stakeholders.

3. The same commenter asked if wildlife could be monitored at this SWMU at the completion of the remediation. The monitoring should include aquatic as well as other species.

The Ohio EPA Response: One of the purposes in selecting the prairie cover as well as allowing water to pond on the south lagoon was to create a habitat that encouraged wildlife to inhabit this location and create an ecological enhancement to this area. U.S. DOE and Agency personnel will observe the lagoons to determine which species of biota are present at the site in the future following the completion of the remedial project. The depth of the soil cover and vegetative layer will prevent the exposure of biota to the contaminants in the sludge in the lagoons. The OEPA and U.S. EPA do not believe it is necessary to monitor biota for potential uptake of contaminants at this time. Periodic inspections and five year reviews of the remedial action will be conducted. If at some point it is determined that biota have penetrated through the soil cover and have contacted the sludge it may be necessary to reconsider monitoring.

4. The commenter asked if rather than create a habitat that is attractive to water fowl, if a soil cover could be placed on the lagoon to minimize contact with the lime sludge.

The Ohio EPA Response: The selected alternative requires that all lagoons will be "covered" isolating the contaminants from biota. The south lagoon will be contoured such that it will allow for the ponding water. The Ohio EPA and the U.S. EPA believe that a two foot soil cover is sufficient to prevent any contact with the lime sludge remaining on the lagoons and thus, prevent any possible ecological risk.

5. The commenter wished to know what means will be used to limit exposure to nearby residents or intruders.

The Ohio EPA Response: The X-611A lime sludge lagoons are located within the U.S. DOE reservation which is secured by the constant monitoring by security patrols. Additionally, the road leading to the lagoons is closed and can only be opened by U.S. DOE personnel. During construction of the selected remedial alternative, trained personnel will be present to prevent any trespassers and on-lookers from entering the site.

6. The same commenter wished to know how long the Agencies planned to monitor the SWMU as well as how long will the SWMU present a risk to human health.

The Ohio EPA Response: The SWMU will be monitored by the Agencies for at least 30 years. The U.S. DOE must prepare a report and submit it to the Agencies for their review within the first year after completion of the remedy discussing all sampling results and operation and maintenance procedures. The report will be updated on a periodic basis after the first submittal. The NCP states if a remedial action is selected that results in hazardous substances remaining at the site above levels that allow for

unlimited use and unrestricted exposure, the action shall be reviewed no less than every five years after initiation of the selected remedial action. Since this is the case at X-611A, it is expected that at no less than every five years a review of the success of the remedy will evaluated. The Agencies may consider monitoring the progress of the prairie habitat to determine its success on a yearly basis after the prairie has become established.

Upon completion of the remedial alternative all pathways of exposure shall be eliminated, therefore, greatly reducing potential risk to any intruder. The option selected is a containment option and therefore the toxicity and the volume of the waste will not be reduced. The U.S. DOE will place a deed restriction on this SWMU, notifying any potential future occupant that the waste has remained in place and that removal of and disruption of the soil cover is prohibited. It is expected that the U.S. DOE or a branch of the federal government will own the property and be responsible for the operation and maintenance of the SWMU for the next 30 years.

7. One commenter asked if Beryllium is very toxic to humans.

The Ohio EPA Response: Beryllium, under elevated dose and exposure scenarios, has the potential to produce adverse effects to humans. The Beryllium detected in the sludge was considered a contaminant of concern because it exceeded the risk based criteria developed in the RFI. The risk assessment scenario developed for the site assumes "reasonable maximum" exposure to a potential future resident. The scenario assumes that the potential future resident would come into direct contact with the contaminants in the sludge every day for 70 years. The risk assessment is then developed based on ingestion, inhalation, and dermal contact. Therefore, based on these assumptions Beryllium was determined to be a contaminant of concern. (Please refer to Section 6 of the QIV RFI for a detailed description of the risk assessment.)

In order to eliminate contact with the Beryllium in the sludge, a soil cover of 2 to 10 feet will be placed on the sludge The selected remedial alternative will eliminate pathways of exposure, minimizing risk to human health and ecological receptors.

8. The same commenter wanted to know why "some data was not appropriate for certain exposure pathways and why this data was excluded."

The Ohio EPA Response: Pages 9 and 10 of the Preferred Plan explain that some data collected during the RFI was excluded. For instance, soil data greater than 10 feet would not be expected to be available for ingestion by children or adults and is only a threat to ground water contamination. This data was

therefore not used during the development of the risk assessment. For development of risk assessments, soil data collected from a depth of 10 feet or greater is commonly eliminated from use in the ingestion pathway. The risk assessment scenario presented in the text correctly assumed that it was highly unlikely for a future resident to come into contact with the contaminants below 10 feet in the sludge even though it was assumed that a potential future residence was placed directly on the sludge in the lagoons. Therefore, based on the assumptions made during the development of the risk assessment which depicts a "reasonable maximum" scenario (i.e. the lime sludge lagoons would remain uncovered and access would be unrestricted), it is appropriate to eliminate certain pathways from consideration.

9. The same commenter wished an explanation of why certain exposures were assumed and what is meant in the Preferred Plan by stating that "Exposures were assumed to result from contaminants that could potentially migrate off site."

The Ohio EPA Response: The risk assessments are developed using conservative estimates to determine the potential risks to human health and the environment. In this instance, it was assumed that the U.S. DOE no longer controlled access to the site in the future. Access to the lagoons would be unlimited and a potential resident would live directly on the sludge in the lagoons. The assumptions are important for the development of the reasonable maximum exposure (RME) scenario. This scenario is a conservative estimate of risk. Therefore, if it is assumed that no future controls are placed on access to the site and the lagoons are not remediated, it may be likely that contaminants could migrate from the unit either through dike failure or human intervention.

10. The same commenter asked why the gross alpha activity, elevated levels of arsenic, and vinyl chloride although detected in ground water are not believed to be from the X-611A Lime Sludge Lagoons.

The Ohio EPA Response: Arsenic has not been detected in the lime sludge and has not been identified as a contaminant of concern. The gross alpha activity is believed not to be associated with the X-611A Lime Sludge Lagoons. It is believed that the elevated gross alpha activity detected in the groundwater is due to natural sources of uranium found in the shale and soils at this site. Due to the method in which the Gallia groundwater was sampled (i.e. with bailers), particles of shale and clay were included. Therefore, the concentration of inorganics, gross alpha and gross beta detected in the groundwater samples may be elevated due to the turbidity of the sample collected. The U.S. DOE is conducting an extensive background study to determine the concentration of inorganics and gross alpha and gross beta activity which may be naturally associated with the site.

The vinyl chloride is believed to be associated with the X-701B plume in Quadrant II of the site. Elevated levels of organics such as TCE have been detected at the unit and the plume had migrated considerably prior to the installation of a trench developed to contain the ground water plume at X-701B SWMU. Ground water will continue to be monitored as part of the operation and maintenance plan for the SWMU to ensure that no contaminants of concern are affecting the ground water.

11. The same commenter asked where to find the additional studies the U.S. DOE used to determine if the contaminants in the sludge were affecting the ground water.

The Ohio EPA Response: The information is located as an Appendix in the X-611A CAS/CMS Report approved of by the OEPA in December 14, 1995.

12. The same commenter wished to know if the Agencies considered Little Beaver Creek off site.

The Ohio EPA Response: Little Beaver Creek is within the U.S. DOE Reservation and therefore unauthorized access to the creek is prohibited. The U.S. DOE security monitors the reservation to prevent trespassers from entering the site. However, the creek is considered waters of the State and is governed by all the rules and regulations as stated in ORC 6111.

There are several NPDES outfalls which discharge to the creek from various units at the site. The U.S. DOE and USEC (United States Enrichment Corporation) must report any violations of the permitted discharge limits to the Ohio EPA. Little Beaver Creek has been evaluated by the Ohio EPA. The reports are available at the

Environmental Information Center
505 West Emmitt Street, Suite 3
Waverly, Ohio, 45690

or by contacting

Maria Galanti, Site Coordinator
Ohio EPA - SEDO
2195 Front Street
Logan, Ohio 43138

COMMENTS FROM U.S. DOE: 1545

The U.S. DOE stated "On November 16, 1995, the Army Corps of Engineers verified the presence of a 1546
jurisdictional wetland on the south side of the X-611A south lagoon. It is therefore unnecessary to install soil 1547
berms to create wet conditions. Placement of the soil berms in jurisdictional wetlands may in fact violate 1548
provisions of Section 404 of the Clean Water Act." 1549

Based on this information, the U.S. DOE requested to prevent impacts to existing wetland and possible violation 1550
of regulatory requirements, it is requested that the southern soil berm requirement be removed from the X-611A 1551
preferred plan. 1552

The Ohio EPA Response: The Ohio EPA agrees with the request to remove the southern soil berm requirement 1553
from the X-611A preferred plan, due to the fact that a wetland has been identified adjacent to the south lagoon. 1554

APPENDIX A

ADMINISTRATIVE RECORD FILE INDEX

AR Doc. No. Catalog No.	Internal Doc. No. Revision	Document Title	Date Pages	Originator From	Recipient To	Location Document Type
		Plant Piketon, Ohio				
4-10-05/81.007 1350		Comments on DOE Responses to EPA Comments on "X-611A Draft Cleanup Alternatives Study/Corrective Measures Study Report, July 13, 1994", Portsmouth Gaseous Diffusion Plant, Piketon, Ohio	9/19/94 6	USEPA Averill	USDOE Gillespie	PORTS AR Comments
4-10-00/00.001 1218	EF-21-6328	Ohio Environmental Protection Agency (OEPA) Sampling of X-611A Lime Sludge Lagoons	9/21/94 2	USDOE Gillespie	OEPA Rochotte	PORTS AR Letter
4-10-05/15.002A 1352	DOE/OR/12-1244&D3 2	Description: X-611A Draft Cleanup Alternatives Study/Corrective Measures Study Report for the Portsmouth Gaseous Diffusion Plant Piketon, Ohio	10/14/94 415	SAIC Gillespie	USEPA, OEPA Averill, Rochotte, Welch	PORTS AR Revised Pages
4-10-05/81.008 1384		The OEPA's Approval of the Revised X-611A CAS/CMS Report	10/28/94 3	OEPA Galanti	USDOE Gillespie	PORTS AR Approval/Comments
4-10-05/15.002B 1354	DOE/OR/12-1244&D4 3	Description: X-611A Draft Cleanup Alternatives Study/Corrective Measures Study Report for the Portsmouth Gaseous Diffusion Plant Piketon, Ohio	10/31/94 173	SAIC Gillespie	USEPA, OEPA Averill, Rochotte, Welch	PORTS AR Revised Pages
4-10-05/81.009 1353	EF-21-6396	Description: Responses to Ohio EPA Comments on X-611A Draft Final CAS/CMS Report	11/1/94 4	SAIC Gillespie	USEPA, OEPA Averill, Rochotte, Welch	PORTS AR Responses
4-10-05/81.010 1428	EF-21-6519	Response to USEPA Comments Regarding the X-611A Lime Sludge Lagoons CAS/CMS Report	1/5/95 5	USDOE Gillespie	USEPA, OEPA Averill, Rochotte	PORTS AR Responses
4-10-05/15.002C 1632	DOE/OR/12-1244&D5 4	Description: X-611A Draft Cleanup Alternatives Study/Corrective Measures Study Report for the Portsmouth Gaseous Diffusion Plant Piketon, Ohio	6/12/95 75	Jacobs ER Team Gillespie	USEPA, OEPA Averill, Rochotte	PORTS AR Revised Pages
4-10-05/81.011 1923		+ Description: OEPA Approval of X-611A Draft Cleanup Alternatives Study/Corrective Measures Study	12/14/95 1	OEPA Galanti	USDOE Gillespie	PORTS AR Approval

AR Doc. No. Catalog No.	Internal Doc. No. Revision	Document Title	Date Pages	Originator From	Recipient To	Location Document Type
		(CAS/CMS) Report				
4-10-15/60.001 1943		+ The Ohio EPA's and U.S. EPA's Preferred Plan for the X-611A Solid Waste Management Unit, U.S. DOE PORTS Site	12/28/95 62	OEPA, USEPA	USDOE	PORTS AR Preferred Plan
4-10-15/73.001 1947		+ Description: Public Notice - Ohio EPA's and U.S. EPA's Preferred Plan for the X-611A Solid Waste Management Unit	1/3/96 1	OEPA, USEPA	Public	PORTS AR Public Notice
4-10-00/00.002 1958	EF-21-7384	+ Description: USDOE's Request for the Ohio Historic Preservation Office's Concurrence on the Proposal to Remediate the X-611A Lime Sludge Lagoons	1/11/96 6	USDOE Gillespie	OHPO Snyder	PORTS AR Letter
4-10-15/75.001 2005		+ Ohio EPA's and U.S. EPA's Meeting Regarding Preferred Plans for DOE PORTS X-611A Solid Waste Management Unit	2/6/96 4	OEPA	Public	PORTS AR Public Meeting
4-10-05/54.001 1980		+ Description: OEPA's List of Appropriate, Relevant and Applicable Requirements (ARAR's) to be Applied to X-611A Sludge Lagoons	2/15/96 8	OEPA Galanti	USDOE Gillespie	PORTS AR ARAR's
4-10-15/81.001 1982	EF-21-7469	+ Comment on Ohio EPA's and U.S. EPA's Preferred Plan for the X-611A Solid Waste Management Unit	2/23/96 3	USDOE Gillespie	OEPA, USEPA Yersavich, Omohundro	PORTS AR Comment
4-10-00/00.003 1987	EF-21-7476	+ Description: Response to Additional Information Requested by the Ohio Historic Preservation Office regarding the X-611A Lime Sludge Lagoons Areas at PORTS	2/27/96 41	USDOE Gillespie	OHPO Snyder	PORTS AR Letter

APPENDIX B-1

CHEMICAL-SPECIFIC ARARs

Table B-1. X-611A LIME SLUDGE LAGOONS CHEMICAL-SPECIFIC REQUIREMENTS

Citation	Chemical	Requirement	Determination	Remarks
WATER POLLUTION CONTROL				
Water Quality Standards OAC 3745-1-04(A)-(E)	The "five freedoms" for surface water	All surface waters of the state shall be free from: (A) objectional suspended solids; (B) floating debris, oil, and scum; (C) materials that create a nuisance; (D) toxic, harmful, or lethal substances; and (E) nutrients that create nuisance growth	Applicable	Surface water will be discharged to Little Beaver Creek during drainage of the lagoons. Surface water will be monitored throughout the project.
Water Quality Standards OAC 3745-1-05(A)-(C) 40 CFR §131.12	Antidegradation policy for surface water	Prevents degradation of surface water quality below designated use or existing water quality, existing in-stream uses shall be maintained and protected. The most stringent controls for treatment shall be required by the director to be used for all new and existing point source discharges. Prevents any degradation of "state resource waters".	Applicable	Surface water will be discharged to Little Beaver Creek during drainage of the lagoons. Engineering controls will be employed to prevent surface water degradation.
Water Quality Standards OAC 3745-1-06(A)(B)	Mixing zones for surface water	(A) Presents the criteria for establishing non-thermal mixing zones for point source and (B) presents the criteria for establishing thermal mixing zones.	Applicable	Surface water will be discharged to Little Beaver Creek during drainage of the lagoons. The mixing zone criteria will be used when establishing an alternative discharge point.

Table B-1. X-611A LIME SLUDGE LAGOONS
CHEMICAL-SPECIFIC REQUIREMENTS (continued)

Citation	Chemical	Requirement	Determination	Remarks
WATER POLLUTION CONTROL				
Water Quality Standards OAC 3745-1-07(C) 40 CFR §131.11 CWA §304	Water quality criteria	For point source discharges, establishes water quality criteria for pollutants which do not have specific numerical or narrative criteria identified in Tables 7-1 through 7-16 of this rule.	Applicable	Surface water will be discharged to Little Beaver Creek during drainage of the lagoons. Surface water discharge will be in accordance with the DOE NPDES permit.
AIR POLLUTION CONTROL				
General Provision on Air Pollution Control OAC 3745-15-07(A)	Air Pollution Nuisances Prohibited	Defines air pollution nuisance as the emission or escape into the air from any source(s) of smokes, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors and combinations of the above that endanger health, safety or welfare of the public or cause personal injury or property damage. Such nuisances are prohibited.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cover material. There are no activities anticipated that will result in an air pollution nuisance. Fugitive dust emission shall be controlled in accordance with the PTI.

Table B-1. X-611A LIME SLUDGE LAGOONS
CHEMICAL-SPECIFIC REQUIREMENTS (continued)

Citation	Chemical	Requirement	Determination	Remarks
AIR POLLUTION CONTROL				
Particulate Matter Standards OAC 3745-17-02(A)(B)(C) National Primary and Secondary Ambient Air Quality Standards 40 CFR §50	Particulate ambient air quality standards	The following are the primary National Ambient Air Quality Standards (NAAQs) for particulate matter: Primary Standard — Averaging Time 50 $\mu g/m^3$ — Annual 150 $\mu g/m^3$ — 24 hr.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cover material. Compliance with the terms and conditions of the PTI will fulfill this requirement.
Particulate Matter Standards OAC 3745-17-05	Particulate non-degradation policy	Degradation of air quality in any area where air quality is better than required by 3745-17-02 is prohibited.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cover material. Compliance with terms and conditions of the PTI will fulfill this requirement.
Particulate Matter Standards OAC 3745-17-07	Visible particulate emission control	Specifies the allowable opacity for particulate emissions; provides exceptions for uncombined water, start-up/shutdown of fuel burning equipment, and malfunctions.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cover material. Opacity will be measured by method 22, 40 CFR Part 60.

Table B-1. X-611A LIME SLUDGE LAGOONS
CHEMICAL-SPECIFIC REQUIREMENTS (continued)

Citation	Chemical	Requirement	Determination	Remarks
SOLID AND HAZARDOUS WASTE				
Standards for Generators of Hazardous Wastes OAC 3745-52-11	Evaluation of wastes	Any person generating a waste must determine if that waste is a hazardous waste (either through listing or by characteristic).	TBC	The addition of waste to the X-611A SWMU is prohibited. The waste at X-611A SWMU has been characterized as non-hazardous.
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-32 (A)(B)(E)(F) Prohibitions on Land Disposal 40 CFR §268.32	California listed waste prohibited	Prohibits land disposal of the following wastes: 1. liquid wastes with pH<2 or pH=2 2. liquid waste containing PCBs with concentrations > or = 50 ppm 3. liquid wastes with halogenated organic loading of > or = 100 mg/l and < 10,000 mg/l.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no California listed waste disposed of at the X-611A SWMU.
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-33 (A-G) Prohibitions on Land Disposal 40 CFR §268.33	First-third wastes prohibited	Prohibits on-site land disposal of first third wastes unless requirements of paragraphs D, E, F, and G are met.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no first-third waste disposed of at the X-611A SWMU.

Table B-1. X-611A LIME SLUDGE LAGOONS
CHEMICAL-SPECIFIC REQUIREMENTS (continued)

Citation	Chemical	Requirement	Determination	Remarks
SOLID AND HAZARDOUS WASTE				
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-34 (A-H) Prohibitions on Land Disposal 40 CFR §268.34	Second-third wastes prohibited	Prohibits on-site land disposal of second third wastes unless requirements of paragraph D, E, F, and G are met.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no second-third waste disposed of at the X-611A SWMU.
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-35 (A-I) Prohibitions on Land Disposal 40 CFR §268.35	Third-third wastes prohibited	Prohibits on-site land disposal of third-third wastes unless requirements of paragraph D, E,F, and G are met.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no third-third waste disposed of at the X-611A SWMU.
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-40 (A)(B)(C) Land Disposal Restrictions 40 CFR §268.1	Restricted wastes	Prohibits on-site disposal of restricted waste unless the waste is tested using the test method in the appendix to OAC-3745-21-24 or this rule and the concentration of any hazardous constituent does not exceed the concentration shown in Table CCWE of rule 3745-59-41 or Table CCW of rule 3745-59-43. A waste treated using a technology specified under rule 3745-59-42 or equivalent may be land disposed.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no restricted waste disposed of at the X-611A SWMU.

Table B-1. X-611A LIME SLUDGE LAGOONS
CHEMICAL-SPECIFIC REQUIREMENTS (continued)

Citation	Chemical	Requirement	Determination	Remarks
SOLID AND HAZARDOUS WASTE				
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-41(A) Treatment Standards 40 CFR §268.40	Restricted wastes	Restricted waste should be treated to concentration levels specified in this rule using test method in Appendix to rule 3745-51-24 or the appendix to rule 3745-59-40.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no restricted waste treated at the X-611A SWMU.
Hazardous Wastes Restricted from Land Disposal OAC 3745-59-41 (A)(B)(C)	Restricted wastes	Identifies the restricted wastes and the concentrations of their associated hazardous constituents which may not be exceeded by the waste or treatment residual for the allowable land disposal of such waste or residual.	TBC	The addition of waste to the X-611A SWMU is prohibited. There will be no restricted waste disposed of at the X-611A SWMU.

OAC = Ohio Administrative Code
DNR = Department of Natural Resources
DWQPA = Division of Water Quality Planning and Assessment
T/S/D = Treatment/Storage/Disposal
EPA = U.S. Environmental Protection Agency
MCLs = maximum contaminant levels
STDs = standards

APPENDIX B-2

ACTION-SPECIFIC ARARs

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS

Citation	Action	Requirement	Determination	Remarks
THREATENED AND ENDANGERED SPECIES PROTECTION				
Ohio Endangered Species Regulations ORC 1518.02 OAC 1501-18-1 (03)(A)	Endangered Plant Species	No person shall root up, injure, destroy, remove, or carry away on or from public highways, public property, or waters of the state, or on or from the property of another, without the written permission of the owner, lessee, or other person entitled to possession, any endangered or threatened plant listed in OAC 1501-18-1.	Applicable	Appropriate action will be taken in the event that an endangered or threatened species is discovered. A Threatened and Endangered Species Survey was conducted at PORTS in 1994. There were no federally threatened and endangered species identified within the boundary of PORTS at that time.
Classification of Solid Waste Disposal Facilities 40 CFR §257.32	Solid waste disposal practices	Solid waste facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish or wildlife. Solid waste disposal facilities or practices shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17.	Applicable	Appropriate action will be taken in the event that an endangered or threatened species is discovered. A Threatened and Endangered Species Survey was conducted at PORTS in 1994. There were no federally threatened and endangered species identified within the boundary of PORTS at that time.
OHIO DAM SAFETY LAWS				
General Requirement OAC 1501-21-11(03)-(05)	Predesign investigation (dams, dikes, and levees)	Presents predesign requirements for dams, dikes, and levees, including on-site construction material data, surveys, and hydrologic and hydraulic investigations.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
OHIO DAM SAFETY LAWS (continued)				
Classification and design criteria OAC 1501-21-13(02)-(08)	Additional design requirements for dams	Presents design requirements specific to dams, including such criteria as design storm and flood, spillway design, freeboard requirements, etc.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.
Classification and design criteria OAC 1501-21-13(10)-(14)	Additional design requirements for dikes and levees	Presents design requirements specific to dikes and levees. Includes criteria such as design storm and flood and freeboard requirements.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.
The Owner's Supervision of Construction OAC 1501-21-15(6)	Operation, maintenance, and inspections	Presents the minimum information required in a plan addressing the operation, maintenance, and inspection of dams, dikes, and levees.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.
Periodic Inspection ORC 1501.21.21	Monitoring, maintenance, and operation (dams, dikes, and levees)	Dams, dikes, and levees (and all appurtenances) shall be monitored, maintained, and operated safely in accordance with state rules, terms, and conditions of the permit and other requirements issued pursuant to this section or Section 1627.08 of the OAC.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.
Periodical Inspection OAC 1501-21-21(03)-(04)	Deficiency and operation and maintenance of dams, dikes, and levees	Dams, dikes, and levees must be operated safely, repairs or other remedial measures shall be performed on dams, dikes, and levees as necessary to safeguard life, health, or property.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.
Application Procedure OAC 1501-21-5(02)-(06)	Design requirements for dams, dikes, and levees	Specifies minimum information required during design for Ohio DNR to determine adequacy of proposed dam, dike, or levee. Includes design reports, plans, and specifications.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.
Construction Permits ORC 1521.06	Construction permits for dams, dikes, and levees	No dam may be constructed for the purpose of storing, conserving, or retarding water, or for any other purpose, nor shall any dike or levee be constructed for the purpose of diverting or retaining flood water without a permit.	Relevant and Appropriate	Applies to the safety and long-term stability of the dikes that surround the lagoons.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
WATER POLLUTION CONTROL (continued)				
Water Quality Certification OAC 3745-32-05 Clean Water Act Nationwide Permit Program CWA §330.4(c)(l)	Water quality criteria for decision by the director	Specifies substantive criteria for Section 401 water quality criteria for dredging, filling, obstructing, or altering waters of the state.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA.
Nuisances ORC 3767.13	Prohibition of nuisances	Prohibits noxious exhalations or smells and the obstruction of waterways.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. There will be no activities associated with the X-611A SWMU that will result in noxious exhalation or smells or the obstruction of waterways.
Nuisances ORC 3767.14	Prohibition of nuisances	Prohibition against throwing refuse or filth into lakes, streams, or drains.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. There will be no refuse or filth intentionally thrown into the stream.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
WATER POLLUTION CONTROL				
Water Quality Standards OAC 3745-1-03 Test Procedures for the Analysis of Pollutants 40 CFR Part 136	Analytical and collection procedures	Specifies analytical methods and collection procedures for surface water discharges.	Applicable	Surface water will be discharged into Little Beaver Creek during draining of the lagoons. The required analytical and collection techniques are incorporated into the site SOPs.
Permit to Install New Sources OAC 3745-31-05	Water/air permit criteria for decision by the director	A permit to install (PTI) or plans must demonstrate best available technology (BAT) and shall not interfere with or prevent the attainment or maintenance of applicable ambient air quality standards.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. Compliance with the terms of the PTI will fulfill this requirement.
National Pollutant Discharge Elimination System 40 CFR §122.26(a)(l)(ii) 40 CFR §122.26 (b)(14)(v)(x)	Storm Water Discharge Associated with Industrial Activity	A discharge composed entirely of storm water associated with industrial activity is required to obtain a NPDES permit. These categories of facilities are considered to be engaging in "industrial activity": • Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under subtitle D of RCRA; and • construction activity including clearing, grading, and excavation activities that disturbs 5 acres or more of total land area.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. This source is covered under the Ohio General Construction Permit. A pollution prevention plan (PPP) has been prepared and a NOI has been submitted to the Ohio EPA.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
WATER POLLUTION CONTROL (continued)				
Water Pollution Control ORC 6111.01.2	Rules requiring compliance with national effluent STDs	Establishes regulations requiring compliance with national effluent standards.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. Discharge from the X-611A SWMU will be in accordance with the NPDES permit.
Water Pollution Control ORC 6111.04	Acts of pollution prohibited	Pollution of waters of the state is prohibited.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. Discharge from the X-611A SWMU will be in accordance with the NPDES permit.
Water Pollution Control ORC 6111.07	Water pollution control requirements - duty to comply	Prohibits failure to comply with requirements of sections 6111-01 to 6111-08 or any rules, permit or order issued under those sections.	Applicable	Surface water will be discharged into Little Beaver Creek before and after construction in accordance with the CWA. Discharge from the X-611A SWMU will be in accordance with the NPDES permit.
GROUNDWATER PROTECTION				
Water Well Standards OAC 3745-9-04(A)(B)	Location/siting of new groundwater wells	Mandates that groundwater wells be: A) Located and maintained so as to prevent contaminants from entering well. B) Located so as to be accessible for cleaning and maintenance.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
GROUNDWATER PROTECTION (continued)				
Water Well Standards OAC 3745-9-06(A1)(B-H)	Construction of new groundwater wells	Specifies minimum construction requirements for new groundwater wells in regards to casing material, casing depth, potable water, annular spaces, use of drive shoe, openings to allow water entry, contaminant entry.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.
Water Well Standards OAC 3745-9-08 (A)(B)(D)E)	Casing requirements for new groundwater wells	Establishes specific requirements for well casings, such as suitable material, diameters and condition.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.
Water Well Standards OAC 3745-9-07 (A-F)	Surface design of new groundwater wells	Establishes specific surface design requirements, such as height above ground, well vents, well pumps, etc.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.
Water Well Standards OAC 3745-9-08(A)(C)	Start-up and operation of groundwater wells	Require disinfection of new wells and use of potable water for priming pumps.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
GROUNDWATER PROTECTION (continued)				
Water Well Standards OAC 3745-9-09 (A-C)(D1)(E-G)	Maintenance and operation of groundwater wells	Establishes specific maintenance and modification requirements for casing, pump and wells in general.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.
Water Well Standards OAC 3745-9-10(A)(B)(C)	Abandonment of test holes and groundwater wells	Following completion of use, wells and test holes shall be completely filled with grout or similar material or shall be maintained in compliance of all regulations.	Applicable	Applies to the installation of the groundwater monitoring well to prevent the contamination of the well. Water well standards are incorporated into the site SOPs.
Management of Hazardous Wastes OAC 3745-54-90 Requirements for Hazardous Waste Management Facilities 40 CFR §271.12	Groundwater Protection Applicability	Establishes circumstances under which an operator of a hazardous waste facility must implement a groundwater protection program or a corrective action program.	Relevant and Appropriate	A groundwater protection program is in place at PORTS.
AIR POLLUTION CONTROL				
Open Burning Standards OAC 3745-19-04 U.S. EPA Solid Waste Disposal Regulations 40 CFR §257.3-7 ORC 3734.03	Open burning standards in unrestricted areas	Open burning without prior authorization from Ohio EPA is prohibited. The solid waste disposal facility or practice shall not engage in open burning of residential, commercial, institutional, or industrial solid waste. This requirement does not apply to land-clearing debris, diseased trees, debris from emergency clean-up operations, and ordinance.	Applicable	Once the prairie is established portions of it will be burned annually. An application to open burn shall be submitted in writing at least 10 days before the fire is set.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
AIR POLLUTION CONTROL (continued)				
General Provisions OAC 3745-15-07	Air pollution nuisances prohibited	Defines air pollution nuisance as the emission or escape into the air from any source(s) of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors and combinations of the above that endanger health, safety, or welfare of the public or cause personal injury or property damage. Such nuisances are prohibited.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cap material. Control measures will be employed in order to prevent a public nuisance.
Ohio Particulate Matter Standards OAC 3745-17-08(A1)(A2)(B)(D)	Emission restrictions for fugitive dust	All emissions of fugitive dust shall be controlled.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cap material. Control measures will be employed in accordance with the source permit.
Emergency Episode Standards OAC 3745-25-03	Emission control action programs	Requires preparation for air pollutants, alerts, warnings, and emergencies for particulate emissions above .025 tons per day.	Applicable	Fugitive dust will be generated during loading, unloading, transportation and grading of cap material. Particulate emissions from the X-611A SWMU will be less than .025 tons per day.
SOLID AND HAZARDOUS WASTE				
Resource, Conservation and Recovery Act 42 U.S.C §6903(27) 40 CFR §§261 and 263		Defines federal hazardous waste, solid waste, and remediation waste and exempts flyash and bottom ash from the definition of hazardous waste.	Applicable	Applies in order to ensure that proper operation and maintenance is maintained at the unit.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
SOLID AND HAZARDOUS WASTE (continued)				
Solid Waste and Infectious Waste Regulations OAC 3745-27-10 (B)(C)(D) Groundwater Monitoring 40 CFR §267.50	Sanitary landfill - groundwater monitoring	Groundwater monitoring program must be established for all sanitary landfill facilities. The system must consist of a sufficient number of wells that are located so that samples indicate both upgradient (background) and downgradient water samples. The system must be designed per the minimum requirements specified in this rule. The sampling and analysis procedures used must comply with this rule.	Relevant and Appropriate	Applies in order to ensure that proper operation and maintenance is maintained at the unit. Wells have been installed both upgradient and downgradient of the X-611A SWMU. Sampling and analysis procedures have required by this rule are incorporated into the site procedures.
Solid Waste and Infectious Waste Regulations OAC 3745-27-14(A) Landfills CFR §267.23	Postclosure care of sanitary landfill facilities	Specifies the required postclosure care for solid waste facilities. Includes continuing operation of leachate and surface water management systems, maintenance of the cap systems, and groundwater monitoring.	Relevant and Appropriate	Applies in order to ensure that proper operation and maintenance is maintained at the unit. Maintenance and monitoring requirements are specified in the preferred plan.
Solid Waste and Infectious Waste Regulations OAC 3745-27-19	Sanitary landfill operations - leachate management	Requires repair of leachate outbreaks; collection and treatment of leachate on the surface of the landfill; and action to minimize control or eliminate conditions causing leachate outbreaks.	Relevant and Appropriate	Applies in order to ensure that proper operation and maintenance is maintained at the unit.
General Hazardous Waste Rules OAC 3745-50-44(C)(9)	Additional permit information: hazardous waste T/S/D in miscellaneous units	Establishes substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of miscellaneous units used to treat or store hazardous waste. Includes information such as waste characteristics, detailed design plans and reports, control of run-on and run-off, closure information, etc.. See OAC 3745-67-80 through 3745-57-83 for additional requirements for miscellaneous units.	Relevant and Appropriate	Applies in order to ensure that proper operation and maintenance is maintained at the unit. These requirements will be fulfilled through the CMS/CMI process.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
SOLID AND HAZARDOUS WASTE (continued)				
Management of Hazardous Waste OAC 3745-54-53(A)(B)	Copies of contingency plan; hazardous waste facilities	Copies of the contingency plan required by 3745-54-60 must be maintained at the facility and submitted to all local police departments, fire departments, hospitals, local emergency response teams, and the Ohio EPA.	Applicable	Applies in order to ensure that proper operation and maintenance is maintained at the unit. Copies of the contingency plan are maintained on site and have been submitted to the local police departments, fire departments, hospitals, local emergency response teams and the Ohio EPA.
Closure and Post-Closure Requirements OAC 3745-55-011(A)(D)	Corrective action for waste management units	Requires an applicant for a hazardous waste permit to institute corrective action for all releases of hazardous waste or constituents from any waste management unit regardless of the time at which waste was placed in such unit.	Applicable	Applies in order to ensure that proper operation and maintenance is maintained at the unit. Corrective action will be implemented through the CMI process.
Miscellaneous Methods of Waste Treatment OAC 3745-57-01(A)-(D) Environmental Performance Standards 40 CFR §267.10	Environmental performance standards; land-based units	Specifies location, design, construction, operation, maintenance, and closure requirements for landfills, waste piles, surface impoundments, and underground injection wells.	Relevant and Appropriate	Applies in order to ensure that proper operation and maintenance is maintained at the unit.
General Hazardous Waste Rules ORC 3734.02(G)	Exemptions to solid and hazardous waste T/S/D requirements	Provides authority and conditions by which the director may exempt any person from permitting or other requirements governing the generation, storage, treatment, transport, or disposal of solid or hazardous waste.	Applicable	Applies in order to ensure that proper operation and maintenance is maintained at the unit.

Table B-2. X-611A LIME SLUDGE LAGOONS
ACTION-SPECIFIC REQUIREMENTS (Continued)

Citation	Action	Requirement	Determination	Remarks
SOLID AND HAZARDOUS WASTE (continued)				
Solid and Hazardous Wastes ORC 3734.02(H)	Filling, grading, excavating, building or mining	Filling, grading, excavating, building, or mining land where a hazardous waste facility or a solid waste facility was operated is prohibited without prior authorization from the director of the Ohio EPA.	Relevant and Appropriate	Applies in order to ensure that proper operation and maintenance is maintained at the unit. Authorization will be obtained prior to filling or grading of the SWMU.
Solid and Hazardous Wastes ORC 3734.03	Open dumping	Prohibits open burning or open dumping of solid waste or treated or untreated infectious waste.	Relevant and Appropriate	Open burning or dumping of solid waste is prohibited. There will be no solid waste dumped or open burning. There is no infectious waste associated with the X-611A SWMU.

OAC = Ohio Administrative Code
DNR = Department of Natural Resources
DWQPA = Division of Water Quality Planning and Assessment
T/S/D = Treatment/Storage/Disposal
EPA = U.S. Environmental Protection Agency
MCLs = maximum contaminant levels
STDs = standards

APPENDIX B-3

LOCATION-SPECIFIC ARARs

Table B-3. X-611A LIME SLUDGE LAGOONS LOCATION-SPECIFIC REQUIREMENTS

Citation	Location	Requirement	Determination	Remarks
THREATENED AND ENDANGERED SPECIES PROTECTION				
Procedures for Implementing the National Environmental Policy Act 40 CFR §6.302(b) Endangered and Threatened Wildlife and Plants 50 CFR §17.21, §17.94 Interagency Cooperation-Endangered Species Act 50 CFR §402.01	Endangered Species and Critical Habitat	All Federal agencies must insure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the constituent elements essential to the conservation of a listed species within a defined critical habitat.	Applicable	Appropriate action will be taken in the event that an endangered or threatened species is discovered. A Threatened and Endangered Species Survey was conducted at PORTS in 1994. There were no federally threatened and endangered species identified within the boundary of PORTS at that time.
Interagency Cooperation-Endangered Species Act 50 CFR §402.12 (a), (b)	Biological Assessment	A biological assessment shall evaluate the potential effects of the action on listed and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action and is used in determining whether formal consultation or a conference is necessary. These procedures are required for Federal actions that are "major construction activities".	Applicable	A biological assessment is required at federal facilities. No critical habitat is present at X-611A.

Table B-3. X-611A LIME SLUDGE LAGOONS
LOCATION SPECIFIC REQUIREMENTS (continued)

Citation	Location	Requirement	Determination	Remarks
THREATENED AND ENDANGERED SPECIES PROTECTION (continued)				
Ohio Endangered Species Regulations ORC 1531.25 OAC 1501-31-23	Endangered Animal Species	No person shall take or possess any native species of wild animal, or any eggs or offspring thereof, that is threatened with state-wide extinction. List of Ohio animal species considered endangered.	Applicable	Appropriate action will be taken in the event that an endangered or threatened species is discovered. A Threatened and Endangered Species Survey was conducted at PORTS in 1994. There were no federally threatened and endangered species identified within the boundary of PORTS at that time.
Ohio Endangered Species Regulations ORC 1518.02 OAC 1501-18-1	Endangered Plant Species	No person shall root up, injure, destroy, remove, or carry away on or from public highways, public property, or waters of the state, or on or from the property of another, without the written permission of the owner, lessee, or other person entitled to possession, any endangered or threatened plant listed in OAC 1501-18-1.	Applicable	Appropriate action will be taken in the event that an endangered or threatened species is discovered. A Threatened and Endangered Species Survey was conducted at PORTS in 1994. There were no federally threatened and endangered species identified within the boundary of PORTS at that time.

Table B-3. X-611A LIME SLUDGE LAGOONS
LOCATION SPECIFIC REQUIREMENTS (continued)

Citation	Location	Requirement	Determination	Remarks
WATER POLLUTION CONTROL				
Water Quality Standards OAC 3745-1-09 CERCLA §121(d)(2)(B)(i)	Water use designation for the Scioto River	Establishes water use designations for stream segments within the Scioto River basin	Applicable	Water from Little Beaver Creek ultimately discharged to the Scioto River and is designated as: • State resource waters • Agricultural and industrial water supply • Primary contact recreational use
HISTORIC AND CULTURAL RESOURCE PROTECTION				
Classification of Solid Waste Disposal Facilities and Practices 40 CFR §257.3-2	Any	Solid waste disposal facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife. Solid waste disposal facilities or practices shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17.	Applicable	Appropriate action will be taken in the event that an endangered or threatened species is discovered. A Threatened and Endangered Species Survey was conducted at PORTS in 1994. There were no federally threatened and endangered species identified within the boundary of PORTS at that time.

Table B-3. X-611A LIME SLUDGE LAGOONS
LOCATION SPECIFIC REQUIREMENTS (continued)

Citation	Location	Requirement	Determination	Remarks
FLOODPLAINS/WETLANDS PROTECTION				
Procedures for Implementing the National Environmental Policy Act 40 CFR §6.302(b) [Executive Order 11988]	Floodplain Management	Federal agencies must evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain.	Applicable	A jurisdictive wetland is located south of the X-611A SWMU. A 1988 FIRMS map indicates that the X-611A SWMU is not within a floodplain.
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.3(a), (b)(1),(2),(3),(5), (6),(c),(d),(e)	Floodplain/ Wetlands	DOE shall exercise leadership and take action: • avoid to the extent possible the long- and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands, and avoid direct and indirect support of floodplain and wetlands development wherever there is a practicable alternative. • incorporate floodplain management goals and wetlands protection considerations into its planning, regulatory, and decision-making processes and shall to the extent practicable: - reduce the hazard and risk of flood loss.	Applicable	A jurisdictive wetland is located south of the X-611A SWMU. Construction activities are not expected to cause an adverse impact to the wetlands areas associated with X-611A Lime Sludge Lagoons. A 1988 FIRMS map indicates that the X-611A SWMU is not within a floodplain.

Table B-3. X-611A LIME SLUDGE LAGOONS
LOCATION SPECIFIC REQUIREMENTS (continued)

Citation	Location	Requirement	Determination	Remarks
FLOODPLAINS/WETLANDS PROTECTION (continued)				
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.3(a),(b)(1),(2),(3),(5),(6),(c),(d),(e) (continued)		- minimize the impact of floods on human safety, health, and welfare. - restore and preserve natural and beneficial values served by the floodplains. - minimize the destruction, loss, or degradation of wetlands. - preserve and enhance the natural and beneficial values of wetlands • undertake a careful evaluation of the potential effects of any DOE action taken in a floodplain and any new construction undertaken by DOE in wetlands not located in a floodplain • identify, evaluate, and as appropriate, implement alternative actions which may avoid or mitigate adverse floodplain/wetlands impacts • provide opportunity for early public review of any plans or proposals for actions in floodplains and new construction in wetlands		

Table B-3. X-611A LIME SLUDGE LAGOONS
LOCATION SPECIFIC REQUIREMENTS (continued)

Citation	Location	Requirement	Determination	Remarks
FLOODPLAINS/WETLANDS PROTECTION (continued)				
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.5(b),(h)	Floodplain/Wetlands	This part shall apply to all proposed floodplain/wetlands actions, including those sponsored jointly with other agencies, where practicable alternatives to the proposed actions are still available. The policies and procedures of this part which are applicable to floodplain actions shall apply to all proposed actions which occur in a wetlands located in a floodplain.	Applicable	A jurisdictive wetland is located south of the X-611A SWMU. A 1988 FIRMS map indicates that the X-611A SWMU is not within a floodplain.
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.11(a),(b),(c)	Floodplain/Wetlands	Concurrent with its review of a proposed action to determine appropriate NEPA requirements, DOE shall determine applicability of the floodplain management and wetlands protection requirements of this part.	Applicable	A jurisdictive wetland is located south of the X-611A SWMU. A 1988 FIRMS map indicates that the X-611A SWMU is not within a floodplain.
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.11(a),(b),(c)	Floodplain/Wetlands	In making a floodplain determination, DOE shall utilize the Flood Insurance Rate Maps (FIRMs) or the Flood Hazard Boundary Maps (FHBMs) prepared by the Federal Insurance Administration of the Department of Housing and Urban Development to determine if a proposed action is located in the base or critical action floodplain, as appropriate. For a proposed action in an area of predominantly Federal or State land holding where FIRM or FHBM maps are not available, information shall be sought from the land administering agency (e.g., Bureau of Land Management, Soil Conservation Service, etc.) or from agencies with floodplain analysis expertise.		A jurisdictive wetland is located south of the X-611A SWMU. A 1988 FIRMS map indicates that the X-611A SWMU is not within a floodplain.

Table B-3. X-611A LIME SLUDGE LAGOONS
LOCATION SPECIFIC REQUIREMENTS (continued)

Citation	Location	Requirement	Determination	Remarks
SOLID WASTE DISPOSAL				
Ohio Solid Waste Disposal Regulations OAC 3745-27-20 (C)(2)	Floodplain	The limits of solid waste placement and the leachate management system cannot be located in a regulatory floodplain, unless deemed acceptable by the Director.	Applicable	A 1988 FIRMS map indicates that the X-611A SWMU is not within a floodplain.
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (h)(4)(d)	Stream, Lake, or Wetland	The limits of waste placement cannot be located within 200 feet of a stream, lake, or wetland, unless deemed acceptable by the Director.	Relevant and Appropriate	There will be no expansion of the X-611A SWMU.
Ohio Solid and Hazardous Waste Rules ORC 3734.02(A)	Protection of Human Health and the Environment	The director of environmental protection shall adopt and may modify, suspend, or repeal rules for all solid waste facilities in order to ensure that the facilities will be located, maintained, and operated, and will undergo closure and post-closure care, in a sanitary manner so as not to create a nuisance, cause or contribute to water pollution, create a health hazard, or violate 40 CFR §237.3-2 or 257.3-8.	Applicable	A waiver from these rules is not anticipated but if required the director will be contacted.

OAC = Ohio Administrative Code
DNR = Department of Natural Resources
DWQPA = Division of Water Quality Planning and Assessment
T/S/D = Treatment/Storage/Disposal
EPA = U.S. Environmental Protection Agency
MCLs = maximum contaminant levels
STDs = standards