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Department of Energy
Portsmouth Site Office
P.O. Box 700
Piketon, Ohio 45661-0700
Phone: 740-897-5010

March 23, 2001
UE-54-9968

Mr. Jim King
Portsmouth Project Manager
Bechtel Jacobs Company LLC
P.O. Box 900
Piketon, Ohio 45661

RECEIVED
MAR 30 2001

Dear Mr. King:

QUADRANT I DECISION DOCUMENT

Enclosed is Ohio EPA's Decision Document for Quadrant I. Please review the document against the Supplemental Report for Quadrant I and notify DOE immediately if any significant issues are discovered. Per paragraph forty-seven of the Three Party Administrative Order on Consent, a Corrective Measures Implementation (CMI) work plan must be prepared and submitted within forty-five days of the receipt of the Decision Document. Please provide the DOE Site Office with a copy the Quadrant I Work Plan no later than April 24, 2001.

If you have any questions, please contact Kristi Wiehle of my staff at 5020.

Sincerely,

Sharon J. Robinson
Site Manager
Portsmouth Site Office

Enclosure

cc w/enclosure:
Administrative Records

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MAY - 1 2001

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/

OhioEPA
State of Ohio Environmental Protection Agency

Southeast District Office

2195 Front Street
Logan, OH 43138

TELE: (740) 385-8501 **FAX:** (740) 385-6490

Bob Taft, Governor
Christopher Jones, Director

March 21, 2001

RE: US DOE-PORTS
PIKE COUNTY
OH ID# 466-0865

DERR CORRESPONDENCE

Sharon J. Robinson
Site Manager
U.S. Department of Energy
Portsmouth Enrichment Office
P.O. Box 700
Piketon, Ohio 45661-0700

RECEIVED
MAR 22 2001

Dear Ms. Robinson:

RE: The Quadrant I Decision Document

Enclosed is the Quadrant I Decision Document. Please review the document and prepare a CMI in accordance with the requirements of the Ohio consent Decree and paragraph 47 of the Three Party Administrative Order on Consent.

If you have any questions, please do not hesitate to contact me at (740) 380-5289.

Sincerely,

Maria Galanti
Site Coordinator
Division of Emergency and Remedial Response

MG/mg

Kristi Wiehle, US DOE (w/o enclosure)
Melda Rafferty, US DOE (w/o enclosure)
Gene Jablonowski, US EPA-Region V (w/o enclosure)
Jim King, Bechtel-Jacobs Company LLC (w/o enclosure)

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US DOE PORTSMOUTH

QUADRANT I DECISION DOCUMENT

PORTSMOUTH GASEOUS DIFFUSION PLANT

MARCH 2001

TABLE OF CONTENTS

Page

List of Acronyms ..... a
Part 1: Declaration Statement 1
Part 2: Decision Summary 9
1.0 Site Name, Location, and Description 10
2.0 Site History and Enforcement Activities 12
3.0 History of Quadrant I Remedial Investigation 15
4.0 Risk Assessment 15
4.1 Identification of Chemicals of Potential Concerns 15
4.2 Exposure Assessment 16
4.2.1 Characterization of the Exposure Setting 16
4.2.1.1 Current Use Scenarios 16
4.2.1.2 Future Use Scenarios 17
4.2.2 Identification of Human Exposure Pathways 18
4.2.3 Estimation of Environmental Concentrations 19
4.2.4 Estimation of Human Intake 19
4.3 Toxicological Assessment 20
4.4 Risk Characterization 20
4.5 Conclusions 21
5.0 Geology/Hydrogeology 22
6.0 Summary of Risk Management Decisions 24
6.1 Groundwater Summary 24
6.2 Summary of the PAH Position Paper 25
6.3 Summary of the PCB Position Paper 26
7.0 SWMUs Requiring No Further Corrective Action 27
7.1 X-120 Old Training Facility Site (soil only) 27
7.2 X-710 Technical Services Building and Neutralization Pit (soil only) 27
7.3 X-741 Oil Drum Storage Facility 33
7.4 X-747F Miscellaneous Material Storage Yard 33
7.5 X-760 Pilot Investigation Building and Neutralization Pit (soil only) 34
7.6 X-103 Auxiliary Office Building 34
7.7 X-104A Indoor Firing Range 34
7.8 X-751 Mobile Equipment Garage 35
7.9 X-750 Mobile Equipment Maintenance Shop, Fuel Station, and Waste Oil Tank 35
7.10 X-749A Classified Materials Burial Ground 36
7.11 GCEP USTs 37
7.12 X-749 Contaminated Materials Disposal Facility (soil only) 37
7.13 X-749B Peter Kiewit Landfill 38

8.0 SWMUs Deferred to Gaseous Diffusion D&D Program 39
8.1 X-600 Coal-Fired Steam Plant 40
8.2 X-600A Coal Pile Yard 41
8.3 X-626 Recirculating Cooling Water Pump House and Cooling Tower 41
8.4 X-621 Coal Pile Runoff Treatment Facility 42
8.5 X-770 Mechanical Testing Facility (soil only) 42
9.0 Creeks, Streams, and Ponds 45
9.1 X-230K South Holding Pond 45
9.2 X-2230M Southwest Holding Pond 46
9.3 Big Run Creek 46
10.0 SWMUs Requiring Development of Remedial Alternatives 47
10.1 X-231A and X-231B Oil Biodegradation Plots (soil only) 47
10.1.1 Alternative 1 - Institutional Controls 49
10.1.2 Alternative 2 - Synthetic Covers 49
10.1.3 Alternative 3 - Vacuum Extraction Recovery (VER) Wells and Synthetic Covers 50
10.1.4 Alternative 4 - Multimedia Cap 50
10.1.5 Summary of Alternatives 50
10.2 Five-Unit Groundwater Investigative Area 50
10.2.1 Alternative 1 - No Action 52
10.2.2 Alternative 2 - No Further Corrective Action 52
10.2.3 Alternative 3 - Groundwater Extraction 52
10.2.4 Alternative 4 - Groundwater Extraction and Oxidant Injection 55
10.2.5 Alternative 5 - VER Wells at X-231A and X-231B Oil Biodegradation Plots and Groundwater Extraction 55
10.2.6 Alternative 6 -VER Wells at X-231A and X-231B Oil Biodegradation Plots, Oxidant Injection, and Groundwater Extraction 55
10.2.7 Summary 56
10.3 X-749/X-120 Area Groundwater Plume (Groundwater only) 56
10.3.1 Alternative 1 - No Action 59
10.3.2 Alternative 2 - No Further Corrective Action 59
10.3.3 Alternative 3 - Groundwater Pumping and Treatment 59
10.3.4 Alternative 4 - Pumping and Treatment with Phytoremediation 62
10.3.5 Alternative 5 - Phytoremediation 62
10.3.6 Alternative 6 - Enhanced Bioremediation and Phytoremediation 62
11.0 Highlights of Community Participation 63
12.0 Summary of Comparative Analysis of Alternatives 64
12.1 No Further Corrective Action and Deferral to D&D Alternatives 66
12.1.1 Overall Protection of Human Health and the Environment 66
12.1.2 Compliance with State, Federal, and Local Laws and Regulations 66
12.1.3 Long-Term Effectiveness and Permanence 66
12.1.4 Reduction of Toxicity, Mobility, or Volume 67
12.1.5 Short-Term Effectiveness 67
12.1.6 Implementability 67

12.1.7 Cost 67
12.1.8 Community Acceptance 67
12.2 X-231A and X-231B Oil Biodegradation Plots (soil only) 68
12.2.1 Overall Protection of Human Health and the Environment 68
12.2.2 Compliance with State, Federal, and Local Laws and Regulations 69
12.2.3 Long-Term Effectiveness and Permanence 69
12.2.4 Reduction of Toxicity, Mobility, or Volume of Contaminants 70
12.2.5 Short-Term Effectiveness 70
12.2.6 Implementability 70
12.2.7 Cost 71
12.2.8 Community Acceptance 71
12.3 Five-Unit Groundwater Investigative Area 72
12.3.1 Overall Protection of Human Health and the Environment 72
12.3.2 Compliance with State, Federal, and Local Laws and Regulations 74
12.3.3 Long-Term Effectiveness and Permanence 74
12.3.4 Reduction of Toxicity, Mobility, and Volume 75
12.3.5 Short-Term Effectiveness 75
12.3.6 Implementability 76
12.3.7 Cost 76
12.3.8 Community Acceptance 77
12.4 X-749/X-120 Area Groundwater Plume 77
12.4.1 Overall Protection of Human Health and the Environment 78
12.4.2 Compliance with State, Federal, and Local Laws and Regulations 80
12.4.3 Long-Term Effectiveness and Permanence 80
12.4.4 Reduction of Toxicity, Mobility, and Volume 81
12.4.5 Short-Term Effectiveness 81
12.4.6 Implementability 82
12.4.7 Cost 82
12.4.8 Community Acceptance 83
13.0 Ohio EPA's Selected Alternatives for Quadrant I 83
13.1 No Further Corrective Action Alternative 84
13.2 SWMUs Deferred to D&D 85
13.3 SWMUs Requiring Remedial Alternatives 86
13.3.1 X-231A and X-231B Oil Biodegradation Plots (soil only) 86
13.3.2 Five-Unit Groundwater Investigative Area 87
13.3.3 X-749/X-120 Area Groundwater Plume 89
14.0 Concurrence 91

Appendix I - ARAR's for the Quadrant I
Appendix II - Responsiveness Summary

Tables

		Page
Table 1	Summary of RFI Risk Determination	28
Table 2	Soil PRGs for X-231A and X-231B Oil Biodegradation Plots	49
Table 3	Summary of Alternative Analysis for X-231A and X-231B Oil Biodegradation Plots	51
Table 4	Groundwater PRGs for Five-Unit Groundwater Investigative Area	54
Table 5	Summary of Alternatives for Five-Unit Groundwater Investigative Area	57
Table 6	Groundwater PRGs for X-749/X-120 Area Groundwater Plume	60
Table 7	Summary of Alternatives for the X-749/X-120 Area Groundwater Plume	61
Table 8	Extraction Wells and Periods of Operation for Five-Unit Groundwater Investigative Area	88

Figures

		Page
Figure 1	Site Location Map, PORTS	11
Figure 2	Quadrant Map, PORTS	13
Figure 3	Schematic Block Diagram Showing Geology at PORTS	23
Figure 4	Disposition of SWMUs Investigated for Quadrant I	32
Figure 5	Soil Sampling Locations at the X-710, X-770, and X-760 Facilities	43
Figure 6	X-231A/X-231B Detailed Area Map	48
Figure 7	Five-Unit Groundwater Investigative Area, 1997 TCE Plume	53
Figure 8	X-749/X-120 Area and Groundwater Plume	58

List of Acronyms

ACO:	Administrative Consent Order
ALARA:	As low as reasonably achievable
ARAR:	Applicable or Relevant and Appropriate Requirements
BAT:	Best Available Technology
bgs:	Below ground surface
BRA:	Baseline Risk Assessment
BTEX:	Benzene, toluene, ethylbenzene, and xylene
CERCLA:	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund Law)
CAS/CMS:	Clean-up Alternatives Study/Corrective Measures Study
CDI:	Chronic daily intake
CFR:	Code of Federal Regulations
COC:	Chemical of concern
COPC:	Chemical of potential concern
DFF&Os:	Director's Final Findings and Orders
D&D:	Decontamination and Decommissioning
ELCR:	Excess Lifetime Cancer Risk
ft^2:	Square foot
GCEP:	Gas Centrifuge Enrichment Plant
gpd:	Gallon per day
HDPE:	High-density polyethylene
HI:	Hazard index
HQ:	Hazard quotient
HSWA:	Hazardous and Solid Waste Amendments
IGWMP:	Integrated groundwater monitoring plan
MCL:	Maximum contaminant level
mg/kg:	Milligram per kilogram
mg/kg/day:	Milligram per kilogram per day
NCP:	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES:	National Pollutant Discharge Elimination System
OAC:	Ohio Administrative Code
O&M:	Operation and maintenance
Ohio EPA:	Ohio Environmental Protection Agency
PAH:	Polycyclic aromatic hydrocarbon
PCB:	Polychlorinated biphenyl
PCE:	Perchloroethene
pCi/kg:	Picocurie per kilogram
PORTS:	Portsmouth Gaseous Diffusion Plant
ppm:	Part per million
PRG:	Preliminary remediation goal
RCRA:	Resource Conservation and Recovery Act

RfD:	Reference dose
RFI:	RCRA facility investigation
SARA:	Superfund Amendments and Reauthorization Act
SVOC:	Semivolatile organic compound
SWMUs:	Solid waste management units
TCE:	Trichloroethene
TPH:	Total petroleum hydrocarbons
TSCA:	Toxic Substances Control Act
UF_6:	Uranium hexafluoride
US DOE:	United States Department of Energy
USEC:	United States Enrichment Corporation
US EPA:	United States Environmental Protection Agency
UST:	Underground storage tank
VER:	Vacuum extraction recovery
VOC:	Volatile organic compound
μg/kg:	Microgram per kilogram
μg/L:	Microgram per liter

PART 1: DECLARATION STATEMENT

DECLARATION STATEMENT

SITE NAME AND LOCATION

US Department of Energy
Portsmouth Gaseous Diffusion Plant (PORTS)
Quadrant I
Piketon, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial actions for the PORTS Quadrant I, on the US Department of Energy (US DOE) Reservation in Piketon, Ohio. These actions were 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. These decisions are based on the administrative record for this response action. The PORTS Quadrant I site is being cleaned up under a Consent Decree between US DOE and the State of Ohio, an Administrative Consent Order (ACO) signed by US DOE and the United States Environmental Protection Agency (US EPA). Both legal agreements were signed in 1989. US DOE, US EPA and Ohio EPA signed an agreement in August 1997 giving the Ohio EPA lead agency status for the day-to-day activities at PORTS. For certain units at Quadrant I, the Ohio EPA Director's Final Findings & Orders (DFF&Os) for the integration units signed in March 1999 applies.

Documentation for the selection of these remedial actions are contained in the administrative record which is maintained at both the US DOE Environmental Information Center in Piketon,

Ohio, and at the Ohio EPA Southeast District Office in Logan, Ohio. The specific documents include, but are not limited to, the Quadrant I Final RCRA Facility Investigation (RFI) report dated 1996, the Baseline Ecological Risk Assessment (BERA), the Air RFI Report, the Background Sampling Investigation Report for Soil and Groundwater, the Ohio EPA Preferred Plan, the Polycyclic Aromatic Hydrocarbon (PAH) Position Paper, the Polychlorinated Biphenyl (PCB) Position Paper, the Quadrant I Clean-up Alternative Study and Corrective Measures Study (CAS/CMS) Final report, and other documents contained in the administrative record file for this response action.

Technical Information about the site and the administrative record documents can be obtained from the following individuals:

Maria Galanti
Project Coordinator
Ohio Environmental Protection Agency
2195 Front Street
Logan, Ohio 43138
Telephone No.: (740) 385-8501

Gene Jablonowski
Project Manager
US Environmental Protection Agency
77W. Jackson Blvd.
Chicago, Illinois 60604-3590
Telephone No.: (312) 886-4439

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from Quadrant I, if not addressed by implementing the response actions selected in this Decision Document, may present a current or future risk to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDIES

Quadrant I contains 24 Solid Waste Management Units (SWMUs) that were investigated as part of the RFI. The X-231B Southwest Oil Biodegradation Plot and the X-749 Contaminated Materials Disposal Facility were not investigated as part of the RFI because they were undergoing RCRA closure. The groundwater contaminant plumes from these units were addressed as part of the CAS/CMS process. The March 1999 DFF&Os for integration of units provided certain exemptions to closure requirements in order to unify all PORTS-wide groundwater remedial requirements in a timely and efficient manner.

For purposes of this Decision Document, the Solid Waste Management Units (SWMUs) were placed into the following four categories in the CAS/CMS report:

1. SWMUs requiring no further corrective action -- SWMUs that have been determined to fall within the risk goals outlined in RCRA and CERCLA;

2. SWMUs deferred to decontamination and decommissioning (D&D) -- SWMUs that will be addressed under the 1989 Ohio Consent Decree when the units are no longer used as they were originally intended, when the gaseous diffusion plant is no longer in operation, or earlier (if deemed appropriate); most of these SWMUs pose minimal risk, are still in operation, and are part of the operational plant infrastructure;

3. Creeks, streams, and ponds; and

4. SWMUs requiring remedial alternatives -- SWMUs that were evaluated as part of the CAS/CMS process; these SWMUs are considered to pose unacceptable risks to human health or the environment unless active remedy is implemented.

SWMUs Requiring No Further Corrective Action

These SWMUs do not pose an unacceptable risk to human health and environment as described in the Baseline Risk Assessment (BRA) in the approved RFI. These SWMUs are described in detail in the approved RFI Report for Quadrant I. The SWMUs listed below were determined to meet the risk guidelines for no further corrective action:

- Gas Centrifuge Enrichment Plant (GCEP) Underground Storage Tanks (UST)
- X-103 Auxiliary Office Building
- X-104A Indoor Firing Range
- X-120 Old Training Facility Site (soil only)
- X-710 Technical Services Building and Neutralization Pit (soil only)
- X-741 Oil Drum Storage Facility
- X-747F Miscellaneous Material Storage Yard
- X-749 Contaminated Materials Disposal Facility* (soil only)
- X-749A Classified Material Burial Ground*
- X-749B Peter Kiewit Landfill*
- X-750 Mobile Equipment Maintenance Shop, Fuel Station, and Waste Oil Tank
- X-751 Mobile Equipment Garage
- X-760 Pilot Investigation Building and Neutralization Pit (soil only)

* The landfill caps at these units will be maintained in accordance with the approved operation and maintenance (O&M) plans for these units. Groundwater will be monitored per the Integrated Groundwater Monitoring Plan (IGWMP).

SWMU'S Deferred to D&D

The D&D of the facility will require remediation in accordance with existing US DOE Orders and Internal Policies (and all applicable state and federal regulations, including the Ohio Consent Decree and ACO). It is Ohio EPA's intent to work with US EPA and US DOE to develop other legal and technical tools as necessary, to prepare the facility for future use. The D&D actions at each SWMU will further reduce or eliminate any residual contaminants to acceptable future risk levels in accordance with as low as reasonably achievable (ALARA) principles. Ongoing worker health and safety programs, routine monitoring in place at the facility, and the required implementation of the D&D program are intended to protect human health and the environment and provide an efficient approach to final disposition of the subject SWMUs. Should it become apparent that an imminent threat to human health and the environment is identified for units which are currently being deferred to D&D, immediate action will be taken to eliminate the threat.

- X-600 Coal-Fired Steam Plant
- X-600A Coal Pile Yard
- X-621 Coal Pile Runoff Treatment Facility
- X-626 Recirculating Cooling Water Pump House and Cooling Tower
- X-770 Mechanical Testing Facility

Creeks, Streams, and Ponds

These SWMUs do not require corrective action at this time but will be re-evaluated during D&D under the corrective action program.

- Big Run Creek
- X-230K South Holding Pond
- X-2230M Southwest Holding Pond

SWMUs Requiring Remedial Alternatives

The SWMUs in this section pose an unacceptable risk for contaminants of concern as described in the RFI. Three SWMUs in the quadrant required the development of alternatives for consideration due to volatile contaminants.

- X-231A and X-231B Oil Biodegradation Plots (soil only)*
- Five-Unit Groundwater Investigative Area
- X-749/X-120 Area Groundwater Plume

* The landfill caps at these units will be maintained in accordance with the approved O&M plans for these units. Groundwater will be monitored per the IGWMP.

STATUTORY DETERMINATIONS AND REMEDY SELECTION STANDARDS

The selected remedies meet the CERCLA statutory determination because they are protective of human health and the environment, comply with federal and State of Ohio requirements that are legally applicable or relevant and appropriate to the remedial actions, and are cost-effective. The remedies use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedies selected for the Five-Unit Groundwater Investigative Area and X-749/X-120 Area Groundwater Plume SWMUs satisfies the statutory preference in CERCLA and SARA for treatment as a principal element. However, remedies for the X-231A and X-231B Oil Biodegradation Plots do not satisfy the statutory preference for treatment as a principal element.

The selected remedies comply with RCRA remedial selection standards because they protect human health and the environment; control 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 comply with applicable standards for management of wastes. Media cleanup levels were established for the Five-Unit Groundwater Investigative Area and X-749/A-X-120 Area Groundwater Plume.

Implementation of the no further corrective action alternative for those SWMUs within acceptable risk levels is protective of human health and the environment because those SWMUs fall into the risk goals outlined by CERCLA and RCRA. Those SWMUs which have been deferred (Please refer to Section 8 of this report) to D&D pose minimal risk to human health and the environment. These units are currently still operating and may become re-contaminated if remediated due to ongoing production of enriched uranium. Implementation of the selected remedies are readily accomplished, cost effective and is expected to provide both long and short term effectiveness. The selected remedies will reduce the toxicity, mobility and volume of groundwater contaminants. The mobility of the contaminants will be contained and through the ability of the selected remedial alternative reduce the levels of contaminants in groundwater. These remedies may result in some hazardous substances remaining on site above health-based levels for a period of time; therefore, a review will be conducted no less than every five years after commencement of the remedial actions to insure that the remedies selected continue to provide adequate protection of human health and the environment.

156

PART 2: DECISION SUMMARY

DECISION SUMMARY

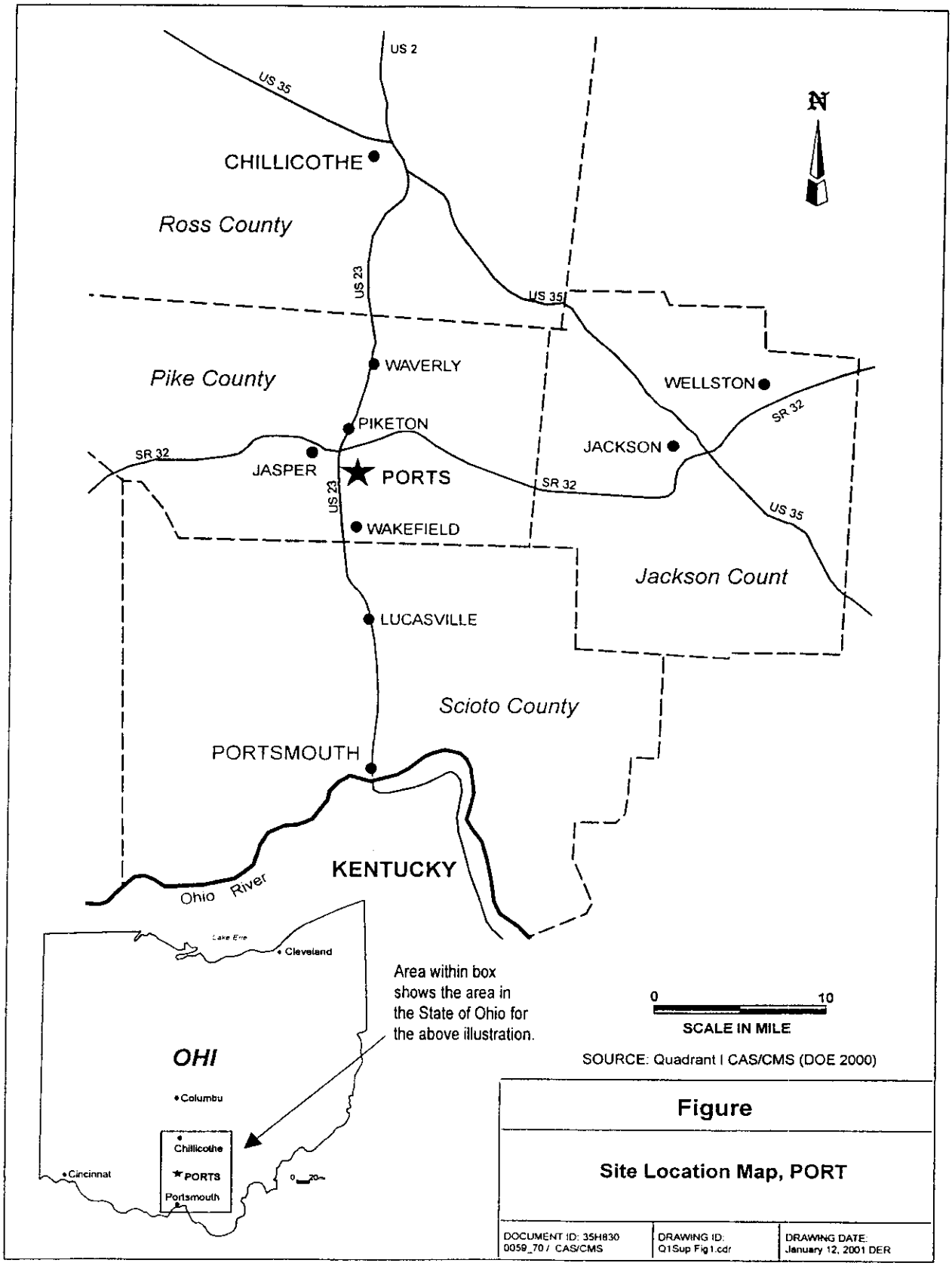
1.0 SITE NAME, LOCATION, AND DESCRIPTION

The PORTS facility was constructed between 1952 and 1956 and is owned by US DOE. The industrialized portion of the PORTS plant occupies approximately 1,000 acres of a 3,714-acre US 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 (Figure 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 1997), and scattered rural development is typical. Piketon is the nearest town, approximately five 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 five-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 former 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



Figure

Site Location Map, PORT

DOCUMENT ID: 35H830 0059_70 / CAS/CMS	DRAWING ID: Q1Sup Fig1.cdr	DRAWING DATE: January 12, 2001 DER

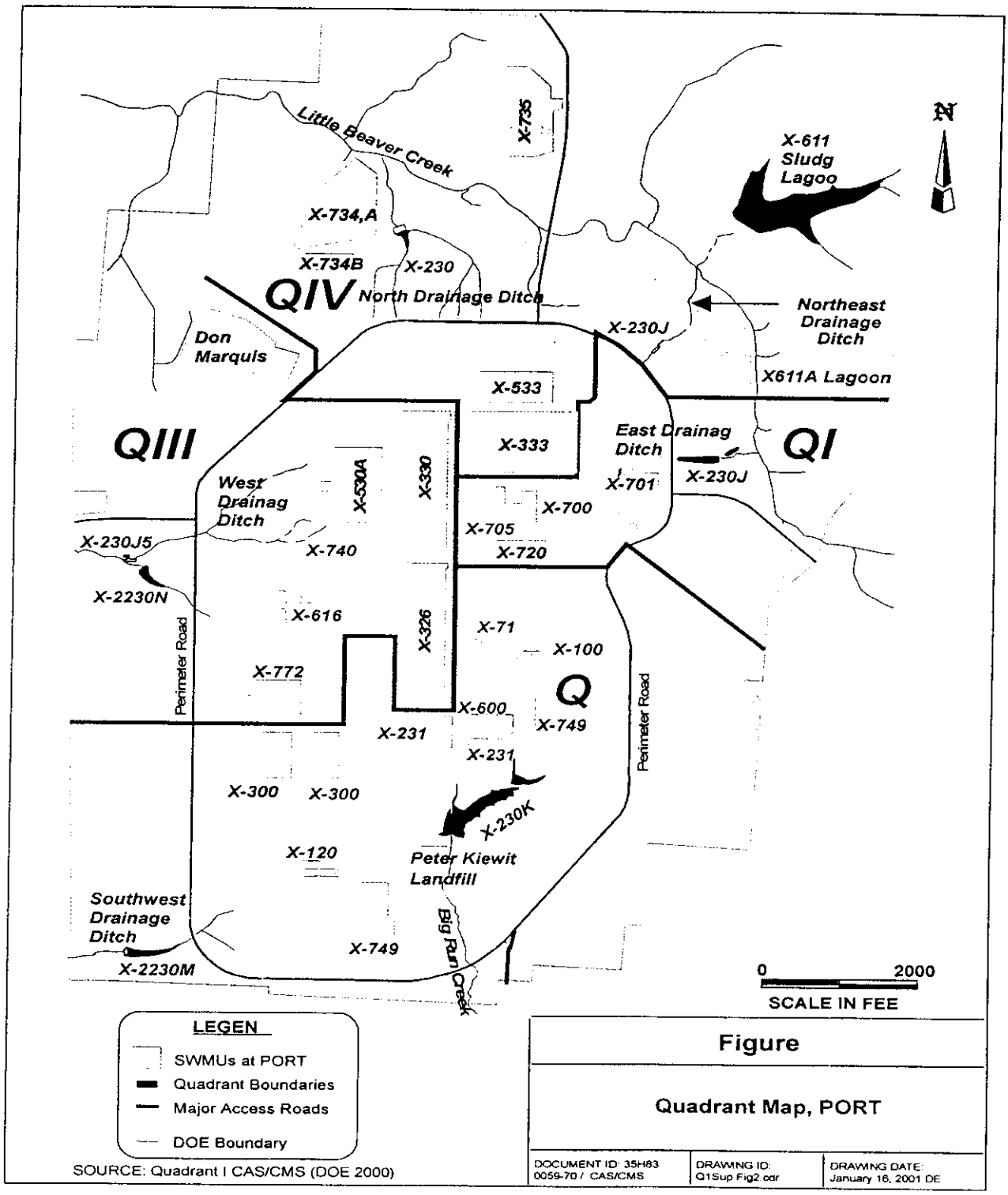
(Gallia). The bedrock formation underlying the Teays formation are, in descending order, the Sunbury shale, the Berea sandstone, and the Bedford shale.

For purposes of the RFI, the PORTS facility has been separated into quadrants (Figure 2). Each quadrant roughly corresponds to the uppermost groundwater flow paths beneath the site. The PORTS groundwater systems includes two water-bearing units, the Berea Sandstone bedrock and the unconsolodiated Gallia, and two aquitards, the Sunbury Shale (Sunbury) and the unconsolidated Minford. Although the Minford silt does not transmit groundwater as readily as the 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.

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 PORTS is the separation of uranium isotopes through gaseous diffusion. PORTS has been operating since 1954, enriching uranium for use in commercial reactors and in US Navy power reactors. Production of enriched uranium for the US Navy ceased in 1991. PORTS and all its production facilities are owned by US DOE and have been leased by the United States Enrichment Corporation (USEC) since 1993. The enrichment operation became private in July 1998. Other portions of PORTS are leased to the Ohio Army National Guard. US DOE remains the property owner.


Little Beaver Creek
X-735
X-611
Sludg
Lagoo
N
X-734,A
X-734B
X-230
QIV
North Drainage Ditch
Northeast
Drainage
Ditch
X-230J
Don
Marquis
X611A Lagoon
X-533
QIII
X-333
East Drainag
Ditch
QI
West
Drainag
Ditch
X-530A
X-330
X-701
X-230J
X-700
X-705
X-230J5
X-740
X-720
X-2230N
X-616
X-326
X-71
X-100
Perimeter Road
X-772
Q
X-600
X-749
X-231
X-231
Perimeter Road
X-300
X-300
X-230K
X-120
Peter Kiewit
Landfill
Southwest
Drainage
Ditch
Big Run Creek
X-749
X-2230M
0
2000
SCALE IN FEE
LEGEN
SWMUs at PORT
Quadrant Boundaries
Major Access Roads
DOE Boundary
SOURCE: Quadrant I CAS/CMS (DOE 2000)
Figure
Quadrant Map, PORT
DOCUMENT ID: 35H83 0059-70 / CAS/CMS
DRAWING ID: Q1Sup Fig2.cdr
DRAWING DATE: January 16, 2001 DE

Support operations for the production of enriched uranium include the feed and withdrawal of material from the primary process, decontamination of equipment removed from the primary 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 materials, and treatment of sewage wastes and cooling water blowdown. The construction, operation, and maintenance of PORTS require the use of a wide range of commercially available chemicals. Continuous operation of PORTS since 1954 has resulted in the generation of inorganic, organic, and low-level radioactive wastes.

In 1989, US 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. US EPA and US DOE entered into a similar agreement, the ACO, in September 1989. This agreement was negotiated between US EPA Region V and US DOE. The ACO requires that the PORTS facility conduct an RFI, a CMS, and develop a Corrective Measures Implementation (CMI) plan. A schedule is attached to each agreement outlining a submittal schedule to Ohio EPA and US EPA for documents pertaining to the investigation and corrective measures studies. A schedule for completion of remedial activities was approved by Ohio EPA on December 11, 1998.

The ACO and Consent Decree require corrective action based on the requirements of RCRA. In addition, the ACO states that CERCLA requirements must be incorporated into the corrective action process. In areas where the ACO 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.

Ohio EPA and US EPA signed a three-party ACO in August 1997 which granted Ohio EPA the authority for oversight of the day-to-day activities at the PORTS facility. Under this agreement, US EPA must concur with all remedy selections.

3.0 HISTORY OF QUADRANT I REMEDIAL INVESTIGATION

For purposes of the RFI, PORTS was divided into quadrants. Each quadrant roughly corresponds to a distinct groundwater flow cell within the primary water-bearing unit beneath PORTS and has been investigated separately. Quadrant I occupies the southern portion of PORTS. The Quadrant I RFI was conducted in two phases. Phase I of the investigation was conducted from February to August 1991. Phase II was conducted from October to December 1993. The final version of the RFI report was submitted on January 2, 1997. The Quadrant I RFI report received final approval from Ohio EPA on September 5, 1997. The Quadrant I CAS/CMS report was approved on June 12, 2000.

4.0 RISK ASSESSMENT

The assessment of potential or current risks from wastes present in Quadrant I is based on guidance provided by the US EPA, in particular, the "Risk Assessment Guidance for Superfund" (RAGS) dated 1989 and "Guidelines for Exposure Assessment" dated 1992. These guidance documents are founded on well-established chemical risk assessment principles developed for the regulation of environmental contaminants.

The risk assessment for contaminated areas in Quadrant I consisted of a human health risk assessment and an ecological risk assessment. The ecological risk assessment was conducted separately. The initial risk assessment conducted for Quadrant I assumed that no future cleanup action would be taken and is referred to as the BRA. The methodology used to conduct each step of the risk assessment, starting from the BRA, is discussed below.

4.1 Identification of Chemicals of Potential Concerns

After data collected during the RFI were evaluated, chemicals detected during laboratory analysis were retained as chemicals of potential concerns (COPCs). Some data not appropriate for certain

exposure pathways were excluded. For example, soil data for samples collected from greater than 10 feet below ground surface (bgs) are not expected to apply to the threat of possible ingestion of contaminated soil by children or adults but are expected to pose a threat to groundwater. Therefore, these data were not included in the assessment of soil ingestion risks.

4.2 Exposure Assessment

This step involves the evaluation of potential human exposure to site chemicals. There are basically four separate tasks necessary in the exposure assessment. These steps are: (a) The characterization of the exposure setting; (b) identification of exposure pathways; (c) estimation of environmental concentrations; and (d) estimation of human intake.

4.2.1 Characterization of the Exposure Setting

The exposure setting was characterized by modeling or simulating exposure scenarios considered possible in Quadrant I under both current and future land use scenarios.

4.2.1.1 Current Use Scenarios

- on-site worker
- off-site resident
- off-site recreational population
- on-site resident*

* (This scenario was no longer considered viable after the completion of the RFI report. Stakeholders and regulators determined it is likely that the area within the security fence at Quadrant I will remain industrial and that other areas within the reservation will be used for commercial or recreational purposes. Areas at the reservation boundary will still be evaluated as residential.)

The on-site worker scenario describes potential exposures to outdoor media at PORTS of a worker engaged in normal day-to-day activities throughout Quadrant I. The future worker scenario describes potential exposures to outdoor media at PORTS and includes the ingestion of groundwater. The off-site recreational population scenario assesses potential exposure to surface water bodies on the PORTS reservation and to fish and game eaten by local recreational anglers and hunters. To estimate exposure for both current off-site resident and recreational populations, significant direct access to media within the quadrant was considered unlikely. Exposures were assumed to result from contaminants that could potentially migrate off-site.

4.2.1.2 Future Use Scenarios

- on-site commercial use (evaluated after approval of the RFI and BRA)
- on-site recreational population
- on-site industrial worker
- off-site resident
- off-site recreational population

Future use scenarios were developed consistent with reasonable maximum exposure. The area within the security fence at Quadrant I is expected to remain industrial in the future. Areas outside the security fence within the reservation were evaluated under a future recreational and commercial use scenario.

In addition to the on-site worker involved in normal day-to-day activities, another exposure scenario modeled under both current and future use conditions involves the on-site industrial worker. This worker is assumed to be in contact with contaminated media during periodic intrusive activities such as construction or landscaping. The future industrial worker scenario describes potential exposures to outdoor media at PORTS and includes ingestion of groundwater.

4.2.2 Identification of Human Exposure Pathways

The exposure scenarios discussed above were developed to model or simulate possible exposure situations at Quadrant I. It was necessary to determine the most likely exposure pathways as well. An example of an exposure pathway is the ingestion of contaminated groundwater by future on-site industrial workers. The following exposure pathways were evaluated for both the current and future on-site industrial worker as well as for the off-site recreational population:

- Exposure to groundwater through ingestion of drinking water and dermal contact and inhalation of volatiles during showering (for future on-site industrial worker only);
- Exposure to soil through incidental ingestion and dermal contact and through external gamma radiation from radionuclides present in soil;
- Exposure to sediment through incidental ingestion and dermal contact;
- Exposure to surface water through incidental ingestion and dermal contact;
- Exposure to air through inhalation of vapors and particulates;
- Exposure through ingestion of local game contaminated by grazing on land affected by Quadrant I operations;
- Exposure through ingestion of fish affected by Quadrant I operations.

4.2.3 Estimation of Environmental Concentrations

Concentrations of chemicals and radionuclides in various environmental media from which exposure may occur were estimated through the evaluation of sampling results and mathematical modeling. The Quadrant I RFI report provides detailed discussion of this estimation.

4.2.4 Estimation of Human Intake

Estimation of human intake involves calculating the amount of each chemical and radionuclide an individual is exposed to through the various environmental media. Chemical intakes (referred to as chronic daily intakes [CDI]) are typically expressed in terms of the amount of material in contact with the body for a certain time period and are calculated as functions of (1) chemical concentration in soil or water, (2) how often the exposure occurs and for how long (exposure frequency), (3) body weight, and (4) the portion of a lifetime that exposure occurs. The generic equation for calculating a CDI (along with example units of measure) is as follows:

$$CDI = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

where

CDI	=	Chronic daily intake (milligram per kilogram per day [mg/kg/day])
C	=	Chemical concentration in soil or water, e.g. mg/kg soil
CR	=	Contact rate, e.g. (kg soil/day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time; portion of lifetime over which exposure is averaged (days).

Variations of this equation are used to calculate air inhalation and radiological exposures.

4.3 Toxicological Assessment

The toxicological assessment involves identifying adverse health effects associated with exposure to a chemical or radionuclide and the relationship between the extent of exposure and the likelihood and/or severity of adverse effects. The US EPA has conducted such assessments of many frequently occurring environmental chemicals and radionuclides and has developed toxicity values based on these assessments for use in risk assessments. Further information regarding the toxicological assessment is presented in the Quadrant I RFI report.

4.4 Risk Characterization

Risk characterization involves calculating estimates of carcinogenic (cancer causing) and non-carcinogenic risks from chemicals of concern for different exposure pathways. CERCLA requires keeping cumulative residual excess cancer risks (ELCR) within the one in 1×10^{-4} to 1×10^{-6} range for all chemical carcinogenic contaminants (with 1×10^{-6} as the "point of departure") and hazard indicies (HI) of 1 or less for non-carcinogenic contaminants. Cancer risk is defined as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen <u>in addition</u> to the probability of cancer risks from all other causes. As a benchmark in developing cleanup goals at contaminated sites, an acceptable range of ELCR has been established of one in one million (1×10^{-6}) to one in ten thousand (1×10^{-4}). The point of departure or program goal for risk remaining after a site is cleaned up is 1×10^{-6} (that is, a one in one million excess lifetime cancer risk above and beyond risks from other unrelated causes). This is the risk goal for Quadrant I.

The "Hazard Quotient" (HQ) is used to determine the severity of non-carcinogenic hazards posed by a site. The HQ is determined by dividing the Chronic Dose Intake (CDI) by the reference

dose (RfD). The reference dose is the amount of a chemical determined to cause a toxic effect. If the HQ is less than or equal to 1, the estimated exposure to a substance represented by the CDI is judged to be below the threshold that could result in a toxic effect. An HQ greater than one indicates that a toxic effect may result. To assess the cumulative effect of similar non-carcinogenic substances, the HQ for all substances being assessed at a site are added, and this result is the HI.

4.5 Conclusions

The risks estimated for substances evaluated at SWMUs and in Quadrant I are compared to preliminary remediation goals (PRGs), and general conclusions are made regarding potential risks associated with these substances. In general, if the risks are unacceptable, remedial alternatives are developed to prevent potential exposure of human and ecological receptors.

US DOE will adhere to RCRA and CERCLA guidance and has also agreed that the initial goal for each alternative in the CAS/CMS report is to achieve PRGs when practicable. The agreed-upon remedy may vary from the achievement of PRGs based on evaluation of ALARA and Best Available Technology (BAT) principles.

To select the remedial alternatives for Quadrant I, Ohio EPA considered ALARA principles. US DOE used BAT principles to develop alternatives for presentation in the CAS/CMS report. Under BAT principles, it may not have been feasible to achieve the initial risk goal of 1×10^{-6} throughout the area of contamination. Under the ALARA process, incremental levels of risk reduction resulting from implementation of a given remedial technology are evaluated as a function of project requirements. It may then be necessary to consider a cleanup target that equates to a higher risk level but is still within the 1×10^{-4} to 1×10^{-6} range. The use of ALARA principles provides a justification for lower cleanup levels if these levels can be achieved without appreciably more effort, expense, or social impact. Engineering or institutional controls can be implemented to offset additional incremental risk. In addition, review of the selected remedy

performance will occur every five years after initial implementation to ensure that the selected remedy continues to be technically adequate and that new demonstrated technologies are evaluated for their potential to further reduce risks.

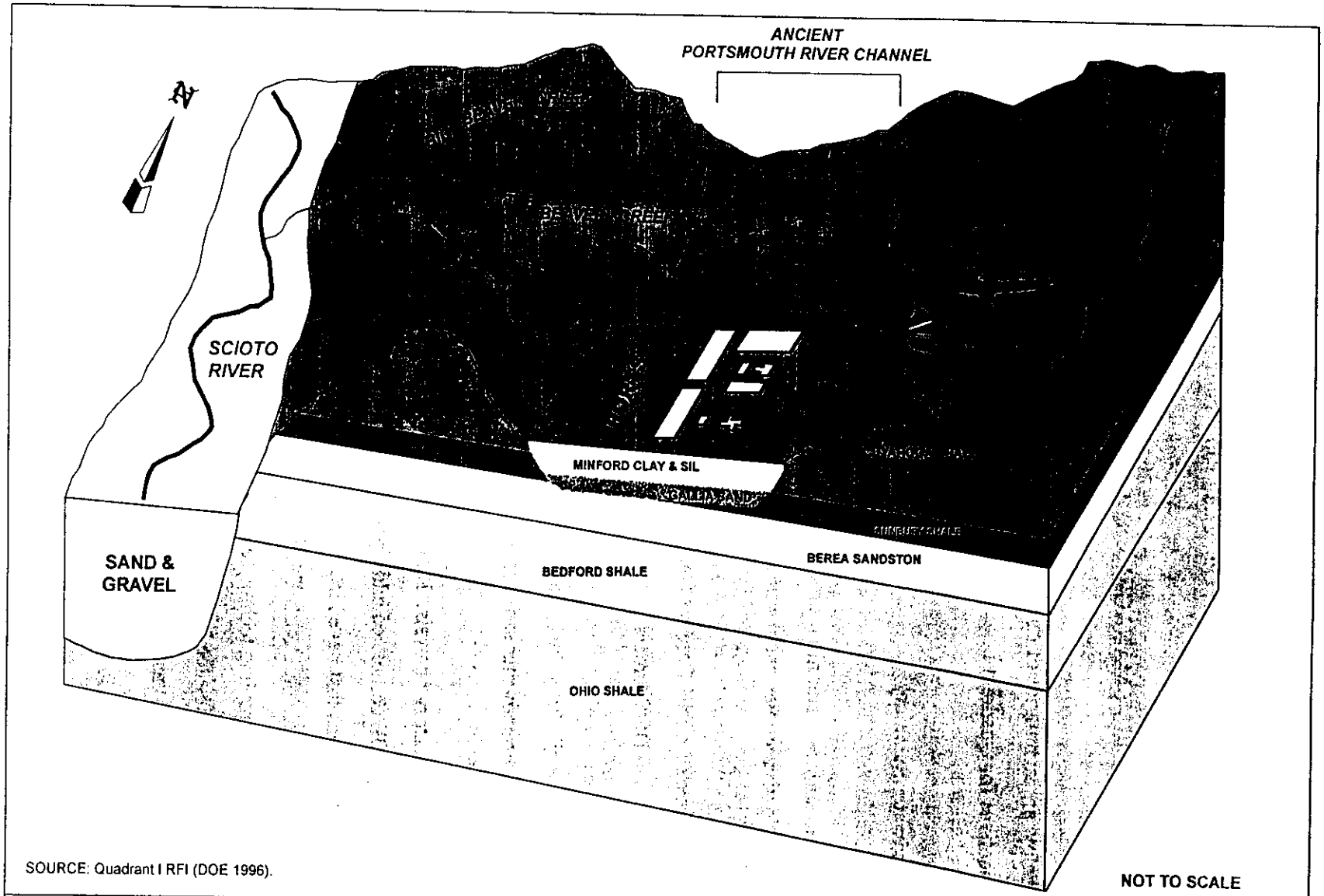
5.0 GEOLOGY/HYDROGEOLOGY

GEOLOGY

The geology (or site soil and bedrock) at PORTS has been characterized through the drilling of over 1,200 borings throughout the facility. The uppermost geologic layer (called the "unconsolidated material") consists of Minford member of the Teays Formation composed of silt and clay and Gallia member of the Teays Formation composed of sand and gravel. Where undisturbed, the Minford consists of an upper clay layer that grades into a silt layer. Generally, the upper clay layer comprises two-thirds of the Minford and consists of strong stiff clay. The silt portion of the Minford is more permeable but still contains a relatively high percentage of finer clay material. The Gallia is composed of poorly sorted sand and gravel with silt and clay. Below the Gallia sand and gravel is the Sunbury Shale and then the Berea Sandstone. The Sunbury Shale generally thins from east to west across PORTS and is generally absent on PORTS's western side (Figure 3). A more detailed description of the PORTS geology is provided in Section 2.0 of the Quadrant I RFI report.

HYDROGEOLOGY

The groundwater flow system at PORTS includes two aquifers: the bedrock Berea Sandstone and the unconsolidated Gallia sand and gravel. PORTS also has two aquitards: the Sunbury Shale and the unconsolidated Minford clay and silt. The basal silt portion of the Minford is generally



SOURCE: Quadrant I RFI (DOE 1996).

Figure 3	Schematic Block Diagram Showing Geology at PORTS	DOCUMENT ID: 35H830 0059-70 / CAS/CMS	DRAWING ID Q1Sup Fig3.cd	DRAWING DATE: January 12, 2001 DE

grouped with the Gallia as the uppermost primary aquifer at PORTS. The hydraulic properties of these units were well defined during the RFI. Groundwater flow maps for the Gallia and Berea are provided in Appendix A of the Quadrant I RFI report.

6.0 SUMMARY OF RISK MANAGEMENT DECISIONS

Discussed below are summaries of risk management decisions which were used to determine the clean-up objectives for Quadrant I.

6.1 Groundwater Summary

Groundwater and surface water monitoring at PORTS began in the 1980s. Since that time, numerous investigative studies and routine monitoring programs have provided much geologic and hydrogeologic information. Groundwater monitoring has been conducted in response to regulatory requirements of the Consent Decree, closure documents, the ACO between US DOE and Ohio EPA, and US DOE Orders.

Elevated levels of arsenic, beryllium, and other metals were detected in the groundwater during the Quadrant I RFI. Groundwater samples were collected during the RFI using a bailer that allowed collection of highly turbid samples. These samples were not filtered to remove sediments prior to laboratory analysis. Risk was determined based on the results of these highly turbid samples. US DOE completed additional sampling of groundwater using low-flow pumps from wells located in areas that have historically had high metals concentrations in groundwater. Based on the results, metals previously detected in groundwater appear to be the result of turbidity from previous sampling techniques. Numerous results indicate that the metals detected in groundwater samples using the low-flow technique were below Maximum Contaminant Levels (MCLs) and in some cases were below the analytical method detection limits. Therefore, risks calculated for exposure to metals in groundwater in the BRA for the RFI may be overestimated.

The IGWMP is designed to minimize the potential for conflicts in requirements and to maximize resources for collecting data needed for sound decision-making. Keeping the intent of the regulatory directives and objectives of various monitoring programs in mind, the IGWMP is designed to establish all groundwater monitoring requirements for PORTS. The requirements established for continued groundwater monitoring for the selected remedial alternatives will be incorporated into the IGWMP and will be revised as deemed necessary by Ohio EPA. Areas where elevated levels of inorganics are still detected, using the low-flow pumps, will continue to be monitored under the IGWMP. If necessary, a remedy will be installed to remediate inorganics in areas of concern.

6.2 Summary of the PAH Position Paper

PAHs, a common contaminant at PORTS, are introduced into the environment by both natural and anthropogenic combustion processes. PAHs are semivolatile organic compounds (SVOC) that consist of two or more fused aromatic rings and include chemicals such as anthracene, benzo(a)pyrene, fluoranthene, and naphthalene. PAHs are formed when hydrocarbons undergo incomplete combustion, such as when hydrogen is consumed in preference to carbon.

The purpose of the PAH position paper was to evaluate and demonstrate that the PAH contamination at PORTS was similar in concentration to areas outside of PORTS and therefore not related to site processes but rather resulting from the infrastructure of the Reservation (such as asphalt roofs, roadways, and automobile exhaust). The PAH position paper was approved by Ohio EPA on May 8, 1997. Risk goals were developed based on the most current PAH information available. The concentrations of PAH contamination were evaluated in unregulated areas (such as along roadways and community parks) as well as residential areas.

The report concluded that many of the elevated detections of PAHs appeared to result from sources such as tar-covered gravel lots, asphalt roads and parking lots, vehicle exhaust and possibly air emissions, and runoff from the coal-fired steam plant. The paper also concluded that

areas containing PAHs at concentrations similar to PAH concentrations in nonregulated or residential areas should not be remediated at this time. Such an effort would not be cost-effective because these areas would likely become recontaminated. Areas such as drainage ditches, streams, and creeks will be deferred to D&D. The risk from PAHs will be evaluated at that time, and the proper remedial action will be taken.

6.3 Summary of the PCB Position Paper

The purpose of the PCB position paper, which was approved on September 11, 1997, was to evaluate the levels and extent of PCB contamination at Quadrant I and develop a risk goal protective of human health and the environment. At PORTS, PCBs have been used as cooling fluids in electrical transformers and capacitors; for heat transfer and hydraulic fluids; as dye carriers in carbonless copy paper; in paints, adhesives, and caulking compounds; and as sealants and road coverings to control dust. RFI and baseline ecological risk assessment sampling activities indicated that at least one PCB compound was detected at 98 of the 1,007 locations where soil was sampled at Quadrant I. PCB detections in soil appear to be distributed widely across PORTS. Of the 148 sediment samples analyzed for PCBs during the RFI and the baseline ecological risk assessment, 28 contained at least one PCB compound.

The PCB remedial goal for PORTS was based on the most probable future land use, which has been determined as industrial for Quadrant I within the perimeter road. In order to be consistent with risk goals, the cleanup goal for Quadrant I within the perimeter road is 25 parts per million (ppm). The 25-ppm goal for Quadrant I is consistent for an industrial site as cited in the Toxic Substances Control Act (TSCA) and CERCLA guidance as well as in the Federal Register, Proposed Rule, December 1996. Soil at the X-749B Peter Kiewit Landfill at Quadrant I is the only location where PCB concentrations exceed 25 ppm. This soil has been addressed as part of the remedial activity at the landfill.

7.0 SWMUs REQUIRING NO FURTHER CORRECTIVE ACTION

The SWMUs in this category were determined to require no further corrective action by the PORTS Decision Team, which consists of US EPA Region V, Ohio EPA, and US DOE personnel. Table 1 briefly summarizes risk for each SWMU. The location of each SWMU is shown on Figure 4.

7.1 X-120 Old Training Facility Site (soil only)

The X-120 Old Training Facility Site is located in the southern portion of Quadrant I. The former training facility, which included the Goodyear Training Center, two warehouses, a machine shop, a metal shop, and a paint shop, was located west of the X-749 Contaminated Materials Disposal Facility. The SWMU was used for training PORTS employees during the construction of the PORTS facility in the 1950s. All structures associated with the SWMU were demolished and removed in the 1970s during construction activities of an alternative method of uranium enrichment.

7.2 X-710 Technical Services Building and Neutralization Pit (soil only)

The technical services building of this SWMU is located in the north-central portion of Quadrant I. The building was constructed in 1955 and contains laboratories and facilities that provide technical support and development activities for PORTS. A 5,000-gallon neutralization pit measuring approximately 9 by 15 feet and 8 feet deep is located just outside and west of the X-710 building. The neutralization pit, which is constructed of concrete and lined with acid-proof brick, was used to treat facility effluent (including organic solvents) with lime before discharge to the sanitary sewer system.

Table 1
Summary of RFI Risk Determination

	Soil						Groundwater				Combined Soil and Groundwater			
	Current On-Site Worker		Future On-Site Worker		Excavation Worker		On-Site Worker				Current On-Site Worker		Future On-Site Worker	
SWMU	HI	ELCR	HI	ELCR	HI	ELCR	Current HI	Current ELCR	Future HI	Future ELCR	HI	ELCR	HI	ELCR
No Further Corrective Action														
GCEP	NA	NA	NA	NA										
X-103	<1	NA	<1	NA	<1	NA								
X-104A	<1	NA	<1	NA	<1	$<1 \times 10^{-6}$								
X-750	Not evaluated in RFI.													
X-751	No risk associated with this unit.													
X-749	Closed Unit													
X-749A	Closed Unit													
X-749B	Closed Unit													
[ab]X-120 (soils only-NFA)					1 Sb and As	3×10^{-6} As					<1	$<1 \times 10^{-6}$	30 Sb,Cr, As, Tl, and V in GW	5×10^{-3} As, Be, and VOCs in GW; As in soil
[ab]X-710 (soils only - NFA)					<1	2×10^{-6} TCE					NA	NA	20 Sb, As, Cr, Th and V in GW	3×10^{-3} benzene, As, Be and chlorinated hydrocarbons in GW
X-741	<1	$<1 \times 10^{-6}$	<1	$<1 \times 10^{-6}$	<1	3×10^{-6} alpha BHC								
[ab]X-747F					<1	2×10^{-6} As					<1	$<1 \times 10^{-6}$	4 As in GW	3×10^{-4} As and Be in GW; As in soil

Table 1
Summary of RFI Risk Determination (Continued)

	Soil						Groundwater				Combined Soil and Groundwater			
	Current On-Site Worker		Future On-Site Worker		Excavation Worker		On-Site Worker				Current On-Site Worker		Future On-Site Worker	
SWMU	HI	ELCR	HI	ELCR	HI	ELCR	Current HI	Current ELCR	Future HI	Future ELCR	HI	ELCR	HI	ELCR
[a]X-760					<1	<1 x 10^{-6}					<1	<1 x 10^{-6}	20 Sb, As,Cr, Tl,and V in GW	3 x 10^{-3} chlorinated hydrocarbons benzene, As, Be in GW
Deferred to D&D														
[ab]X-230K					<1	<1 x 10^{-6}					<1	<1 x 10^{-6}	20 Sb,As, Cr,Tl, and V in GW	3 x 10^{-3} chlorinated hydrocarbons benzene, As, Be in GW; Be in soil
[ab]X-600, X-600A, X-621					<1	2 x 10^{-6} As					NA	NA	20 Sb,As, Cr,Tl, and V in GW	3 x 10^{-3} chlorinated hydrocarbons benzene, As, Be in GW; As in soil
[ab]X-626					<1	2 x 10^{-5} Be and Cr					<1	<1 x 10^{-6}	<1	4 x 10^{-4} Chloroform, 1,1-DCE, TCE in GW; Be in soil
Big Run Creek	<1	<1 x 10^{-6}	<1	<1 x 10^{-6}	<1	<1 x 10^{-6}								
X-2230M	NA	NA	<1	9 x 10^{-6} As	<1	2 x 10^{-6} As								

Table 1
Summary of RFI Risk Determination (Continued)

	Soil						Groundwater				Combined Soil and Groundwater			
	Current On-Site Worker		Future On-Site Worker		Excavation Worker		On-Site Worker				Current On-Site Worker		Future On-Site Worker	
SWMU	**HI**	**ELCR**	**HI**	**ELCR**	**HI**	**ELCR**	**Current HI**	**Current ELCR**	**Future HI**	**Future ELCR**	**HI**	**ELCR**	**HI**	**ELCR**
Alternatives Developed														
5-Unit Groundwater Investigative Area							<1	$<1 \times 10^{-6}$	20 Sb,As, Cr, Tl, and V	3×10^{-3} chlorinated hydrocarbons benzene, As, Be, chloroform, TCE and 1,1-dichloroethene				
X-231B	Not evaluated in RFI. Soil contamination will be remediated to eliminate source.													
X-231A					<1	3×10^{-5} gamma-chlordane and U					<1	2×10^{-5} PCBs, Be, Tc and U in soil	20 Sb, As, Cr, Tl, V in GW	3×10^{-3} chlorinated hydrocarbons benzene, As and Be in GW; PCBs, Be, Tc and U in soil
X-749/X-120 Area Groundwater							<1	$<1 \times 10^{-6}$	30 Sb, As, Cr, Tl, and V	5×10^{-3} As, Be, and VOCs				

Table 1
Summary of RFI Risk Determination (Continued)

Notes:

[a]Elevated levels of arsenic, beryllium, and other metals were detected in groundwater during the Quadrant I RFI. Groundwater samples were collected during the RFI using a bailer that allowed collection of highly turbid samples. These samples were not filtered to remove sediment prior to laboratory analysis. Risk was determined based on the results of these highly turbid samples. US DOE completed additional sampling of groundwater using low-flow pumps in wells located in areas that historically had high metals concentrations in groundwater. Based on the low-flow pump results, metals previously detected in groundwater appear to be the result of turbidity from previous sampling techniques. Numerous results indicate that the metals detected in groundwater samples using the low-flow technique were below MCLs and in some cases were below the analytical method detection limits. Therefore, risks calculated for exposure to metals in groundwater in the BRA for the RFI may be overestimated.

[b]In some instances for the SWMUs listed above, the total risk level may have fallen outside the acceptable risk range for current on-site workers based on BRA and RFI report data. US DOE has implemented administrative controls to ensure that workers do not excavate soil or come into contact with sediment or surface water without proper environmental and health and safety controls. Such controls include wearing of proper protective clothing prior to working in areas of concern and notification of US DOE personnel prior to soil excavation. US DOE has installed fencing in some areas to control entry of current on-site workers. Ohio EPA will continue to monitor these areas to ensure that workers are not exposed to potential contaminants in soil, sediment and surface water.

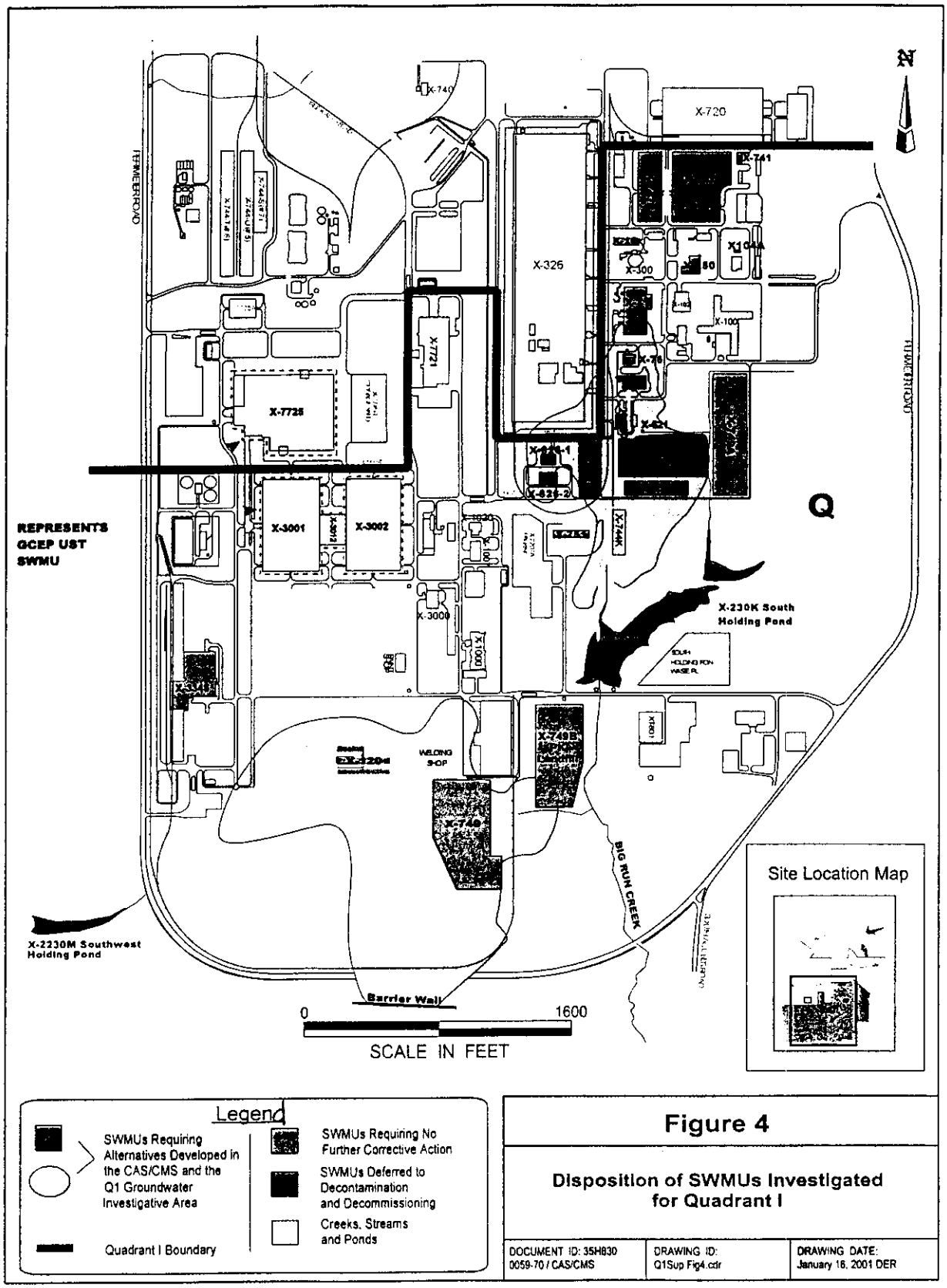


Figure 4

Disposition of SWMUs Investigated for Quadrant I

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Located on the west side of the technical services building directly north of the neutralization pit is the X-710 radioactive wastewater tank (also known as the "hot pit"). The tank is a buried steel, 500-gallon, radioactive wastewater storage tank installed in 1954 to collect effluent from the originally planned high-level radiological laboratory in the X-710 technical services building; however, this laboratory was never fully operational. The contents of the tank were removed in the mid-1980s, when the tank was taken out of service.

In 1989, approximately 500 gallons of 50/50 ethylene glycol-water antifreeze was discharged to a technical services building floor drain that discharged to Storm Sewer G. In addition, a recirculating water spill of 2,000 gallons was released into Storm Sewer G.

7.3 X-741 Oil Drum Storage Facility

The X-741 Oil Drum Storage Facility is located in the northern portion of Quadrant I. The SWMU has been in operation since 1954 and consists of an elevated concrete slab with a storage area of approximately 3,600 ft^2. The sides are open, and steel columns support a corrugated transit roof. Drums of waste oil are temporarily stored at this unit before their final disposal.

7.4 X-747F Miscellaneous Material Storage Yard

The X-747F Miscellaneous Material Storage Yard is located in the northern portion of Quadrant I. The storage yard measures 800 by 500 feet and consists of an open grassy area just south of the X-720 building. The yard is divided into two portions by Mahoning Avenue. This unit was used to burn refuse and as a material and equipment storage area. The period of operation of this SWMU is unknown.

7.5 X-760 Pilot Investigation Building and Neutralization Pit (soil only)

The X-760 Pilot Investigation Building is located in the central portion of Quadrant I. The building has been used for chemical and mechanical engineering pilot- and demonstration-scale investigations since 1955. Pilot and demonstration area sinks and floor drains discharge to a 2,000-gallon capacity underground neutralization pit north of the building. The neutralization pit is approximately 10 feet long, 8 feet wide, and 5 feet deep. Outfall from the pit discharges to the X-6619 Sewage Treatment Facility.

7.6 X-103 Auxiliary Office Building

The X-103 Auxiliary Office Building has been used since 1954 to house administrative offices. On March 24, 1982, an aboveground gasoline tank on the east side of the SWMU overflowed from overheating in the sun. An unknown quantity of gasoline spilled onto the asphalt and soil; the on-site fire department flushed the spill area into Storm Sewer F, which discharges to the X-230K South Holding Pond. No benzene, toluene, ethylbenzene, or xylene (BTEX) compounds were detected in soil samples collected during Phase I RFI at this SWMU.

7.7 X-104A Indoor Firing Range

The X-104A Indoor Firing Range is a building approximately 50 feet long and 20 feet wide located north of the X-100 building. The indoor firing range has been used since May 1954 as a practice range by the PORTS guards and police force. The building is equipped with exhaust fans that draw fumes and smoke associated with weapons-firing through a high-efficiency particulate air filter before discharging exhaust toward the ground directly east of the indoor firing range. In 1990, an improper filter was found to have been installed in the exhaust system. The use of this filter may have allowed particulates, especially lead, to discharge from the building to nearby soil. Samples collected near the area where the firing range vent exhausted contained lead above background levels, but the HI was less than 1.

7.8 X-751 Mobile Equipment Garage

The X-751 Mobile Equipment Garage measures approximately 350 feet by 60 feet. The unit was used for vehicle maintenance. The unit also had four fiberglass underground storage tanks (UST) installed in 1979. The UST capacities and contents are as follows:

- Two 15,000-gallon gasoline USTs located near the southeast corner of X-751; tanks operated from 1979 to 1991.

- One 15,000-gallon diesel UST located near the southeast corner of X-751; tank operated from 1979 to 1991.

- One 1,000-gallon waste-oil UST located on the west side of X-751; tank operated from 1985 to 1991.

An investigation was conducted at this unit in March 1991 to determine the possibility of environmental impact from the four USTs. SVOCs were detected above and below laboratory detection limits in wastewater samples. No volatile organic compounds (VOC) were detected in wastewater samples. No middle hydrocarbon distillates, gasoline, BTEX, or total petroleum hydrocarbons (TPH) were detected in soil samples. These tanks were filled with concrete and abandoned in place in 1996 per approval of the Ohio Bureau of Underground Storage Tank Regulations.

7.9 X-750 Mobile Equipment Maintenance Shop, Fuel Station, and Waste Oil Tank

This unit covers approximately 15,600 ft^2, most of which (8,400 ft^2) is used as a general repair area. The building houses a grease pit, wash area, tire and battery shop, spare parts storage, offices, and equipment.

Four USTs associated with the SWMU are as follows:

- One steel 500-gallon UST used to store waste oil from various mobile equipment; tank removed under RCRA closure; clean closure certification approved on January 1, 1995.

- One fiberglass 10,000-gallon UST designated as an alcohol storage tank but used instead for gasoline storage; tank has been removed.

- Two steel 18,000-gallon USTs used for gasoline and diesel fuel storage; tanks have been removed and replaced with two 20,000-gallon fiberglass tanks.

Investigations were conducted during tank removal actions under both the RCRA and the UST programs. As a result, these tanks were not investigated during the RFI.

During the RFI, SVOCs, VOCs, and gasoline were not detected in soil samples collected from the SWMU; therefore, it was concluded that no release to soil occurred from this unit.

7.10 X-749A Classified Materials Burial Ground

The X-749A Classified Materials Burial Ground has a total area of approximately 5.9 acres. This unit was used from 1955 until 1993 to bury classified nonhazardous materials in wooden boxes and steel or fiber drums deposited into 14-foot-deep trenches that were backfilled to the ground surface. Prior to backfilling, each burial site was mapped.

Wastes buried in this unit include metallic process scrap, floor sweepings from the X-700 Chemical Cleaning Facility and X-705 Decontamination Building, computer media, centrifuge scrap, aluminum dross (slag), ashes from classified document destruction, and miscellaneous

scrap of a classified nature. In October 1979, part of a nickel processing plant that contained traces of nickel carbonyl was buried at this unit. The unit was capped in accordance with Ohio Solid Waste Regulations in 1994. The cap will continue to be maintained in accordance with the requirements of the approved closure plan. Groundwater monitoring wells at this unit continue to be monitored in accordance with the requirements of the March 1999 DFF&Os for integration and the monitoring data will be reported in the IGWMP.

7.11 GCEP USTs

The GCEP is located in the western portion of PORTS straddling the boundary between Quadrants I and III. The GCEP was intended to replace the diffusion process for separating U^{238} and U^{235} but was abandoned before being put to use. The GCEP has 27 USTs for liquid effluent installed from 1980 to 1983. These tanks were originally designed to contain floor drain effluent in case of spills and wash water. The buildings are currently used for office and warehouse space, and all effluent collected in these tanks is believed to be wash water. All of the tanks have capacities of less than 500 gallons each and are buried with their vents to the surface. All are also believed to be constructed of fiberglass or fiberglass-reinforced plastic. There is no evidence that these tanks are leaking.

7.12 X-749 Contaminated Materials Disposal Facility (soil only)

This unit was used for the disposal of solid wastes and low-level radioactive contaminated wastes and equipment. In general, wastes disposed of at the unit were placed in trenches approximately 15 feet deep and covered with earthen material. The landfill is divided into two areas, a northern and a southern portion. The northern portion occupies approximately 7.5 acres and was used from 1955 to 1989 to dispose of equipment and materials contaminated with low-level radioactivity (uranium and technetium). It has also received chlorinated solvents, metal hydroxide sludges from the raffinate treatment process at X-705, and low-level radioactive waste oils. The southern portion occupies approximately four acres and was used from 1986 to 1989 to

609 dispose of various types of low-level radioactive demolition debris and scrap materials, including
610 asbestos. Other radionuclide-contaminated materials disposed of at this SWMU include alumina,
611 sodium fluoride, and incinerator ash.

612 The RCRA and solid waste closures for both the northern and southern portions of the unit were
613 initiated in 1989. Closure activities included installing slurry walls and groundwater collection
614 trenches to act as groundwater contamination source controls (completed March 1991) and
615 installing a multilayer landfill cap over the entire unit (completed December 1992).
616 Contaminated groundwater captured by the collection trench system is pumped to and treated at
617 the X-622 Groundwater Treatment Facility. The PORTS Decision Team determined that no
618 further corrective action is required for the wastes and soil at this unit other than the requirements
619 outlined in the approved closure plan for the maintenance of the cap. Groundwater at the unit
620 will continue to be monitored in accordance with the requirements of the IGWMP.

621 7.13 X-749B Peter Kiewit Landfill

622 The X-749B Peter Kiewit Landfill has a total area of approximately 11 acres and was operated
623 from approximately 1953 until 1968. During plant construction, the landfill was used by the
624 plant construction contractor, X-749B Peter Kiewit and Sons, as a salvage yard, burn pit, and
625 trash disposal area. After plant construction, the landfill was used as a sanitary landfill.

626 During the Quadrant I RFI, several intermittent seeps were discovered along the eastern side of
627 the landfill. An interim remedial measure was initiated in March 1994 to relocate a portion of
628 Big Run Creek, install a seep collection system, and initiate treatment of the collected seep water
629 at X-622 (completed November 1994). Seep discharge contaminants associated with the X-749B
630 Peter Kiewit Landfill appear to pose the greatest risk to human health and the environment of all
631 media considered in the X-749B Peter Kiewit Landfill CAS/CMS Report. A Decision Document
632 for the landfill outlining the selected corrective measure for the unit, a RCRA Subtitle D cap, was
633 received July 1996 from the Ohio EPA. The RCRA cap will limit recharge into and through the

landfill, thereby, minimizing the potential for contaminants to infiltrate to groundwater or leach to surface water.

During a site inspection in April 1997, seeps were discovered in a shallow drainage ditch that empties into Big Run Creek near the southern slope of the X-749B Peter Kiewit Landfill. Because the groundwater flow in the X-749B Peter Kiewit Landfill area has the potential to transport contaminants from the X-749/X-120 plume to seeps at the drainage ditch, several actions were taken to prevent contamination from entering surface water. These actions included capping the landfill to prevent infiltration of precipitation and collecting water from the seeps to prevent potential contaminated water from entering Big Run Creek. A stormwater discharge pipe was installed to replace the eroded tributary channel.

A slurry wall was installed as part of an Interim Remedial Measure along the PORTS property line to the south of the X-749/X-120 groundwater plume. The slurry wall, completed in September 1994, was installed to prevent contaminated groundwater from migrating off site.

In 1999 a multi-media cap was installed over the X-749B Peter Kiewit Landfill. The cap will continue to be maintained in accordance with the requirements of the operation and maintenance plan. Groundwater monitoring wells of this unit continue to be monitored in accordance with the requirements of the March 1999 DFF&Os for integration and monitoring data will be reported according to the IGWMP.

8.0 SWMUs DEFERRED TO D&D PROGRAM

The SWMUs described in this section were identified by the PORTS Decision Team as appropriate for deferral to D&D (Figure 4). Under current uses, these SWMUs were determined to have media-specific, total non-carcinogenic cancer risks with HIs generally less than 1 and ELCR levels generally within the acceptable range of 1×10^{-6} to 1×10^{-4} based on available data. The contaminants responsible for risk concerns are believed to be mostly immobile. Under

current-use scenarios, on-site worker health and safety programs and routine monitoring are required to be protective of human health and the environment. Further, these SWMUs are located in or adjacent to PORTS operational areas and it was not possible in all instances to fully investigate each SWMU, therefore warranting deferral to D&D. Remediation of some of these SWMUs before PORTS D&D would likely disrupt ongoing production activities and may not be cost-effective because of a strong potential for the SWMUs to become recontaminated. For example, stormwater runoff from asphalt pavement and roof tops containing PAHs may recontaminate drainage ditch sediments.

Consistent with the Energy Act of 1992, US DOE executed an agreement with USEC in 1993 to lease all facilities at PORTS necessary for the successful operation of the uranium enrichment enterprise. The lease requires USEC to provide a two-year notice to US DOE before the facilities are to be returned to US DOE for D&D. The D&D of PORTS will require remediation in accordance with US DOE Orders (and all applicable state and federal requirements, including the Ohio Consent Decree) to prepare the site for future use. D&D actions at each SWMU will further reduce or eliminate any residual contaminants to acceptable future-use risk levels in accordance with ALARA principles. Ongoing worker health and safety programs, routine monitoring, and the required implementation of the D&D program will protect human health and the environment and provide an efficient approach to the final disposition of these SWMUs.

8.1 X-600 Coal-Fired Steam Plant

The X-600 Coal-Fired Steam Plant provides steam to heat buildings, vaporize Uranium Hexafluoride (UF_6), clean equipment, and for various other purposes. It has a floor area of approximately 19,900 ft^2. Coal for the unit comes from the adjacent X-600A Coal Pile Yard. Steam generation at the plant produces coal ash and dust ash wastes. Boiler water blowdown consisting of water, phosphates, sulfite, and other chemicals is also produced and discharged to the X-230K South Holding Pond through the storm sewer system. The by-products of water-

softener regeneration, which consist of calcium, magnesium, sodium sulfates, sulfuric acid, and calcium chloride, are also discharged to the X-230K South Holding Pond.

8.2 X-600A Coal Pile Yard

The X-600A Coal Pile Yard measures approximately 800 feet long and 400 feet wide and is located 300 feet southeast of the X-600 Coal-Fired Steam Plant. It has a capacity of 50,000 tons of coal but typically holds about 10,000 tons. Coal from the unit has been used at the X-600 plant since 1954. The coal storage area is bordered by a retention pond on the northern and eastern sides. The western and southern boundaries consist of an earthen dike that diverts runoff east to a retention pond. Precipitation falling on the stored coal results in a flow of approximately 20,000 cubic feet per year to the retention pond. The runoff transports contaminants, including coal dust, sulfuric acid, sulfides, iron, zinc, and copper to the retention pond. The retention pond also receives discharge from the ash-washing silo at the X-600 plant. The ash wastewater solution, which has a pH of approximately 4.0, is discharged to the pond at a rate of about 3,600 gallons per day (gpd). Effluent from the retention pond is subsequently treated at the X-621 Coal Pile Runoff Treatment Facility. Before the X-621 Coal Pile Runoff Treatment Facility was constructed in 1984, runoff was directed to the X-230K South Holding Pond.

8.3 X-626 Recirculating Cooling Water Pump House and Cooling Tower

This SWMU consists of the X-626 Recirculating Cooling Water Pump House (X-626-1), a cooling tower (X-626-2) with an associated 2.2-million-gallon holding tank, and a network of piping that carries recirculating cooling water to and from process buildings. The cooling water removes heat from compression from process gas, along with waste heat from a few auxiliary processes, and dissipates this energy to the atmosphere in the form of water vapor. This unit has been in operation since February 1955.

Heated water entering the cooling tower is exposed to cool atmospheric air. Heat is removed from the water by the air, which exits the top of the tower under a forced drift The cooled water collects in a basin below the tower. Drift consisting of small water droplets is incidentally released with heated air from the top of the towers. The amount of drift depends on weather conditions and operating conditions in the X-326 Process Building.

8.4 X-621 Coal Pile Runoff Treatment Facility

The X-621 Coal Pile Runoff Treatment Facility was constructed in 1984 and includes processes to adjust pH and remove iron, zinc, and copper from the X-600A Coal Pile Yard surface water runoff. The sludge is removed up to twice a year and subsequently landfilled off site. An aboveground storage tank at the treatment facility contains 25,000 gallons of sodium hydroxide. After treatment, the water is discharged to the X-230K South Holding Pond.

8.5 X-770 Mechanical Testing Facility (soil only)

The X-770 Mechanical Testing Facility is located near the center of the Five-Unit Groundwater Investigative Area (see Figure 5). This building was not originally designated to have had a history of releases to environmental media. This unit was not investigated as part of the RFI. Subsequent investigations have revealed that past operations at the facility may have contributed to soil and groundwater contamination. Groundwater contamination will be addressed as part of the SWMU remedial activities.

The X-770 building housed test facilities that evaluated the performance and reliability of equipment and components used in the gaseous diffusion process. The facility, a steel frame building with a gravel roof and corrugated asbestos siding, was built in 1955. It is 84 feet wide, 102 feet long, and 30 feet high and is located between the X-760 laboratory building and the X-600 Coal-Fired Steam Plant. The superstructure covers a control room and several enclosed

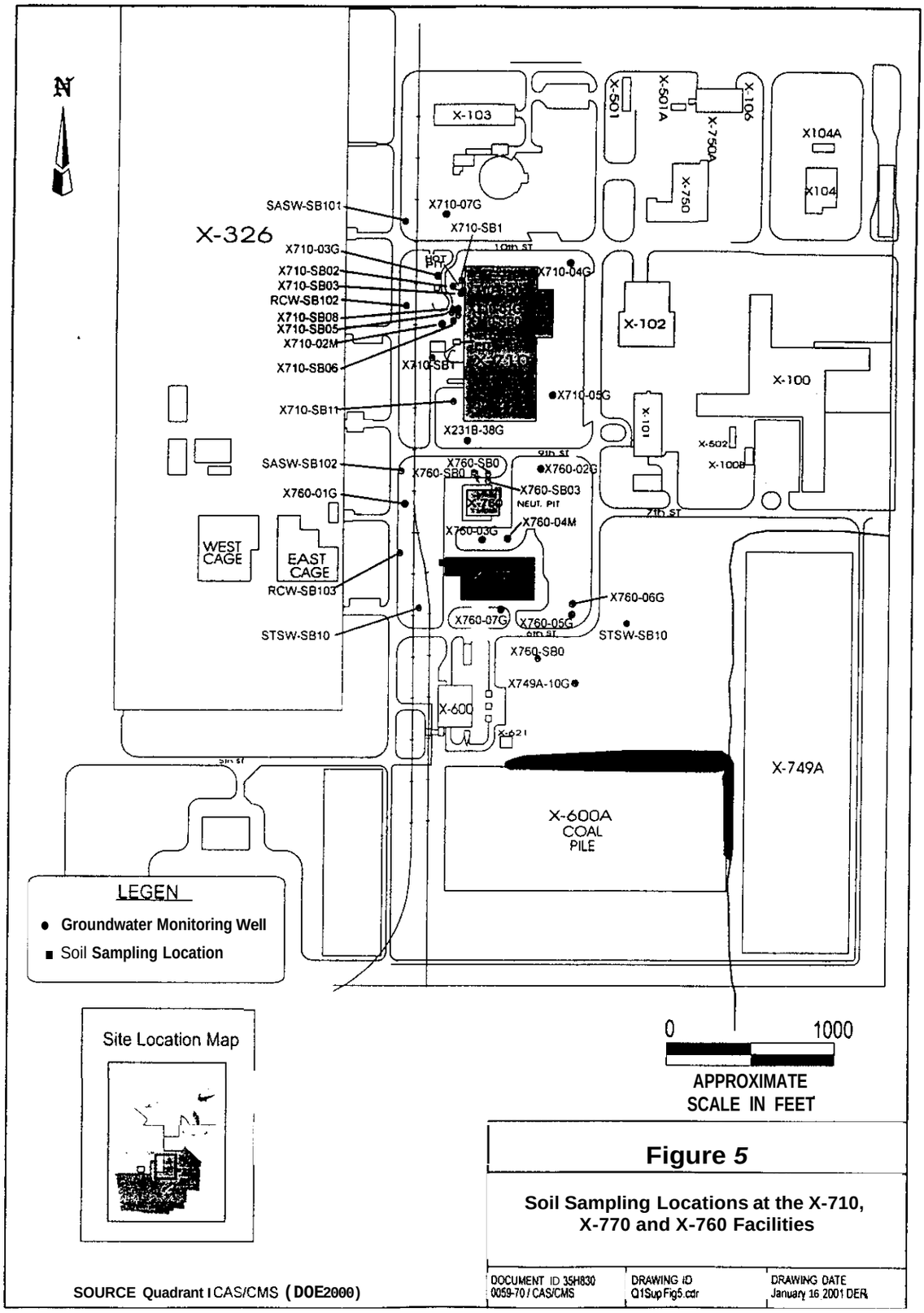

Figure 5

Soil Sampling Locations at the X-710, X-770 and X-760 Facilities

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SOURCE Quadrant I CAS/CMS (DOE2000)

test areas that were designed for evaluating equipment of various sizes by using UF, as the test gas. The actual components and arrangements used varied with each test. This facility contained many of the operations that would be found in a gaseous diffusion process building. These operations, as well as the frequent change-out of equipment at the facility, necessitated the use of industrial solvents in cold baths for UF, sampling purposes and as cleaning agents. Operations at the facility ceased in the mid-1980s.

Soil surrounding this unit may be re-investigated if the remedy selected for the Five-Unit Groundwater Investigative Area does not perform as expected. **A** review of the performance of the remedy for the Five-Unit area will take place within five years of implementation.

Potential contaminants associated with the X-770 building include TCE, uranium, and mercury. The primary release pathways for the facility are postulated to be spills to adjacent soil during handling operations in and around the building and discharges to the building's pits and drain systems. No releases have been documented, but because waste management practices were not rigorous during the years that the facility operated releases may have occurred.

Soil data reported for the X-770 facility are discussed in the Quadrant I RFI report under the X-760 Pilot Investigation Building summary. A single VOC detection was reported at one location north of the building (tetrachloroethene [PCE] at 5.8 micrograms per kilogram [μg/kg]). This concentration is less than the acceptable soil-leaching level of 270 μg/kg. All detections of radiological parameters reported for the unit were below background levels. Therefore, based on available data, no continuing sources of groundwater contamination from leaching from vadose soils are present at this SWMU. Groundwater data for the unit are evaluated as part of the Five-Unit Groundwater Investigative Area.

Three groundwater sampling wells are located adjacent to the X-770 building, wells X760-03G, X760-07G, and X760-04M (Figure 5). These wells were used to assess residual contamination. There was only a single detection of a contaminant from these wells (5.8 μg/kg PCE at well

X760-03G). Based on available data, no further corrective action with respect to soil remediation is necessary at this SWMU. The required implementation of the D&D program will provide an efficient approach to the final disposition of this unit.

9.0 CREEKS, STREAMS, AND PONDS

Evaluation of the data for these units indicates that total human non-carcinogenic risks and ELCRs are acceptable for all exposure scenarios and that carcinogenic risks are within target levels for soil at these units. Creeks, streams, and ponds have a potential for future contamination from operational incidents. These SWMUs do not require corrective action at this time but will be re-evaluated during D&D under the corrective action program. Effluent from the holding ponds will continue to be monitored under the conditions of National Pollutant Discharge Elimination System (NPDES) permits before discharge into creeks and streams.

9.1 X-230K South Holding Pond

The X-230K South Holding Pond is located in the central portion of Quadrant I. The holding pond is approximately 900 feet long and 300 feet wide at its widest point and has an average depth of approximately 15 feet. The pond was constructed in 1956 to control sedimentation resulting from stormwater runoff from Storm Sewers F, G, and H. Effluent from the holding pond is monitored under USEC's NPDES permit before it is discharged into Big Run Creek. Major contributors to the X-230K South Holding Pond are treated coal pile and coal-ash runoff from the X-600 Coal-Fired Steam Plant, water from the recirculating cooling water system, and air-conditioning system cleaning and condensate-discharge water. The X-230K waste pile, an 800- by 1,500-foot open area adjacent to the holding pond to the east, was used to dispose of sediment dredged from the holding pond in 1980 and 1993.

9.2 X-2230M Southwest Holding Pond

The X-2230M Southwest Holding Pond covers approximately 1.1 acres and is in direct contact with bedrock. The holding pond was constructed in 1978 to control sedimentation resulting from stormwater runoff and now receives runoff from Storm Sewers N and O, which drain the GCEP area and the southernmost portion of the Southwest Drainage Sector. Effluent from the holding pond is monitored at US DOE's outfall before it flows into the unnamed Southwest Drainage Ditch. Past discharges into the X-2230M Southwest Holding Pond include 700 gallons of cleaning solution (containing sodium nitrate, boric acid, sodium silicate, and trinitromethane) and chromated water discharge from the aboveground X-6643 firewater tanks.

9.3 Big Run Creek

Big Run Creek is located east of the X-749B Peter Kiewit Landfill and south of the X-230K South Holding Pond. The primary source of flow in Big Run Creek is direct discharge from the X-230K South Holding Pond; Big Run Creek also receives some recharge from shallow groundwater in the area. Big Run Creek drains the southern end of the site and discharges into the Scioto River approximately four miles southwest of PORTS. Big Run Creek has been investigated as part of a site-wide drainage ditch radiological survey. Data presented in US DOE's "Data Assessment and Risk Evaluation Report for Big Run Creek and the unnammed Southwest Drainage Ditch" (dated 1997) show that the ELCR at Big Run Creek and the unnamed Southwest Drainage Ditch from radionuclides in sediment and surface soil is not currently of concern because the risk is acceptable for all exposure scenarios. This unit will be re-evaluated at the time of D&D.

10.0 SWMUs REQUIRING DEVELOPMENT OF REMEDIAL ALTERNATIVES

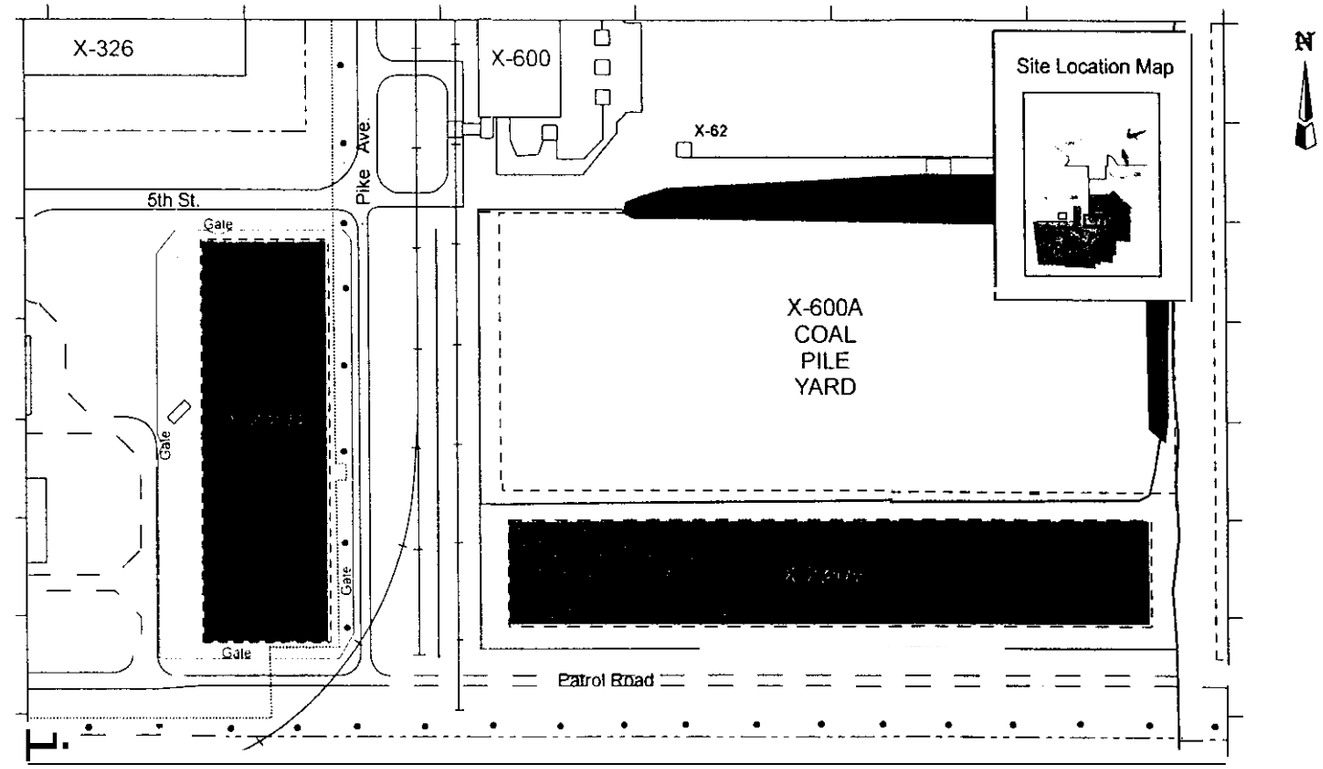
The three SWMUs requiring the development of remedial alternatives in the CAS/CMS are described below, including descriptions of alternatives considered for each SWMU.

10.1 X-231A and X-231B Oil Biodegradation Plots (soil only)

Remedial activities are planned for the X-231A and X-231B Oil Biodegradation Plots (see Figure 6) because both plots are potential sources of continuing groundwater contamination. The plots were used in the 1970s and early 1980s to dispose of waste contaminated with VOCs (primarily TCE) and low levels of uranium and technetium. Data from investigation of the SWMU indicate that TCE and technetium concentrations in soil exceed leaching levels established by Ohio EPA, and uranium is present above its background concentration. TCE was detected at various depths in the soil plots, but uranium and technetium were generally confined to depths of less than six feet bgs.

The X-231A plot covers approximately 48,000 ft^2, and the X-231B plot covers approximately 37,000 ft'. Source removal actions at the X-231B plot in 1994 associated with RCRA closure of the unit removed a significant portion of the VOC contamination in soil, but TCE remains at concentrations exceeding its soil leaching level. Thus, completion of RCRA (substantive) requirements are necessary as outlined in the March 1999 DFF&Os for integration.

Potentially viable remedial alternatives have been assembled for soil at this SWMU. These alternatives are discussed below. Alternatives have been evaluated for effectiveness, implementability, and cost. All alternatives were evaluated for their abilities to meet PRGs, address all environmental problems, reduce overall risks, and protect human health and the environment. PRGs for the SWMU are listed in Table 2.



Legen

Fence		Electric Pole	
Steam Lin		Security Fenc	
Ditch		RR Tracks	

0 200

APPROXIMATE SCALE IN FEET

SOURCE: Quadrant I CAS/CMS (DOE 2000).

Figure 6	X-231A / X-231B Detailed Area Map	DOCUMENT ID: 35H830 0180-40 / CAS/CMS	DRAWING ID: Q1Sup Fig6.cdr	DRAWING DATE: January 16, 2001 DER

COC	PRG (mg/kg)
TCE	0.048
Cadmium	2.0
Nickel	34
Chromium	52.7
1,1,1-Trichloroethane	1.3
1,1-Dichloroethene	0.24
Chloroform	0.35
Technetium	11,400 pCi/kg
Uranium	7.4

10.1.1 Alternative 1 - Institutional Controls

This alternative includes access and use restrictions, general maintenance, and groundwater monitoring activities.

10.1.2 Alternative 2 - Synthetic Covers

This alternative combines the institutional controls and groundwater monitoring of Alternative 1 with covers over both plots, each consisting of a 40-mil-thick synthetic liner overlain by a 12-inch-thick soil protective layer and **a** 6-inch-thick vegetative layer.

10.1.3 Alternative 3 - Vacuum Extraction Recovery (VER) Wells and Synthetic Covers

This alternative combines all aspects of Alternative 2 with soil remediation at the X-231A and X-231B plots using VER wells (9 at X-231A and 10 at X-231B) in conjunction with soil vapor collection systems.

10.1.4 Alternative 4 - Multimedia Cap

Alternative 4 consists of a multimedia cap and the deed restrictions discussed under Alternative I to prevent development of capped areas and limit future land use to commercial and industrial activities within the security fence. The cap would be constructed over both plots, consist of a 80-mil-thick, textured, high-density polyethylene (HDPE) geomembrane over an engineered fill base, drainage layer, a 24-inch-thick soil layer, and a 6-inch-thick vegetative soil layer.

10.1.5 Summary of Alternatives

Alternatives 3 and 4 are predicted to meet all remedial action objectives for the X-231A and X-231B Oil Biodegradation Plots. Alternatives 2.3, and 4 minimize long-term risks to human health and environmental receptors. However, Alternatives 2 and 3 do not meet RCRA performance standards and therefore do not meet ARARs. All four alternatives are readily implementable and have been proven to be reliable and effective. Table 3 summarizes the relative effectiveness and cost for each of the remedial alternatives evaluated.

10.2 Five-Unit Groundwater Investigative Area

The Five-Unit Groundwater Investigative Area contains a contaminant plume in the Berea Sandstone and Gallia sand and gravel consisting primarily of TCE. The plume extends south from the X-710 Technical Services Building to the X-230K South Holding Pond and east from the southwest corner of the X-326 Process Building Facility to the X-749A Classified Materials

866 **Table 3**

867 **Summary of Alternatives Analysis for X-231A and X-231B Oil Biodegradation Plots**

Alternative	Technical Analysis	Human Health Analysis	Environmental Analysis	Institutional Analysis	Capital Cost Analysis (Present Worth - $1,000s)	O&M Cost (Present Worth - $1,000s)
868						
869 - Institutional Controls	Readily implementable; deed restrictions and existing fencing would be reliable if site controls maintained	No short-term risk; long-term exposure of on-site workers	No risk to environmental indicators	Does not meet all remedial action objectives	No cost	155
870 !- Synthetic Covers	Readily implementable; caps are effective and proven technology for preventing intiltration of water	Short-term risk to remediation workers; long-term risk to on-site workers eliminated through elimination of migration pathway	No risk to environmental indicators; could initially disrupt ecological receptors but not expected to result in permanent effects	Does not meet all remedial action objectives	1,019	918
871 872 3 - VER Wells and Synthetic Covers	Readily implementable; VER wells an effective and proven technology for removing VOC contamination in soil	Short-term risk to remediation workers; long-term risk to on-site workers decreased through remediation of VOC contamination in soil	No risk to environmental indicators; could initially disrupt ecological receptors but not expected to result in permanent effects	Meets all soil remedial action objectives	2,633	4,192
873 i- Multimedia Cap	Readily implementable; caps are effective and proven technology for preventing infiltration of water	Short-term risk to remediation workers; long-term risk to on-site workers eliminated through elimination of migration pathway	No risk to environmental indicators; could initially disrupt ecological receptors but not expected to result in permanent effects	Substantive RCRA requirements met when multimedia cap is installed; meets all soil remedial action Objectives	3,244	956

Burial Ground (see Figure 7). Continuing sources of groundwater contamination in this area include soil at the X-231A and X-231B Oil Biodegradation Plots discussed in Section 10.1.

Various remedial alternatives have been evaluated for groundwater in the area. These alternatives are discussed below. All the alternatives presented except the "no action" and the "no further corrective action" alternatives were selected for their abilities to meet PRGs, address environmental problems, reduce overall risks, and protect human health and the environment. The PRGs for groundwater in the Berea Sandstone and Gallia sand and gravel at PORTS are summarized in Table 4.

10.2.1 Alternative 1 - No Action

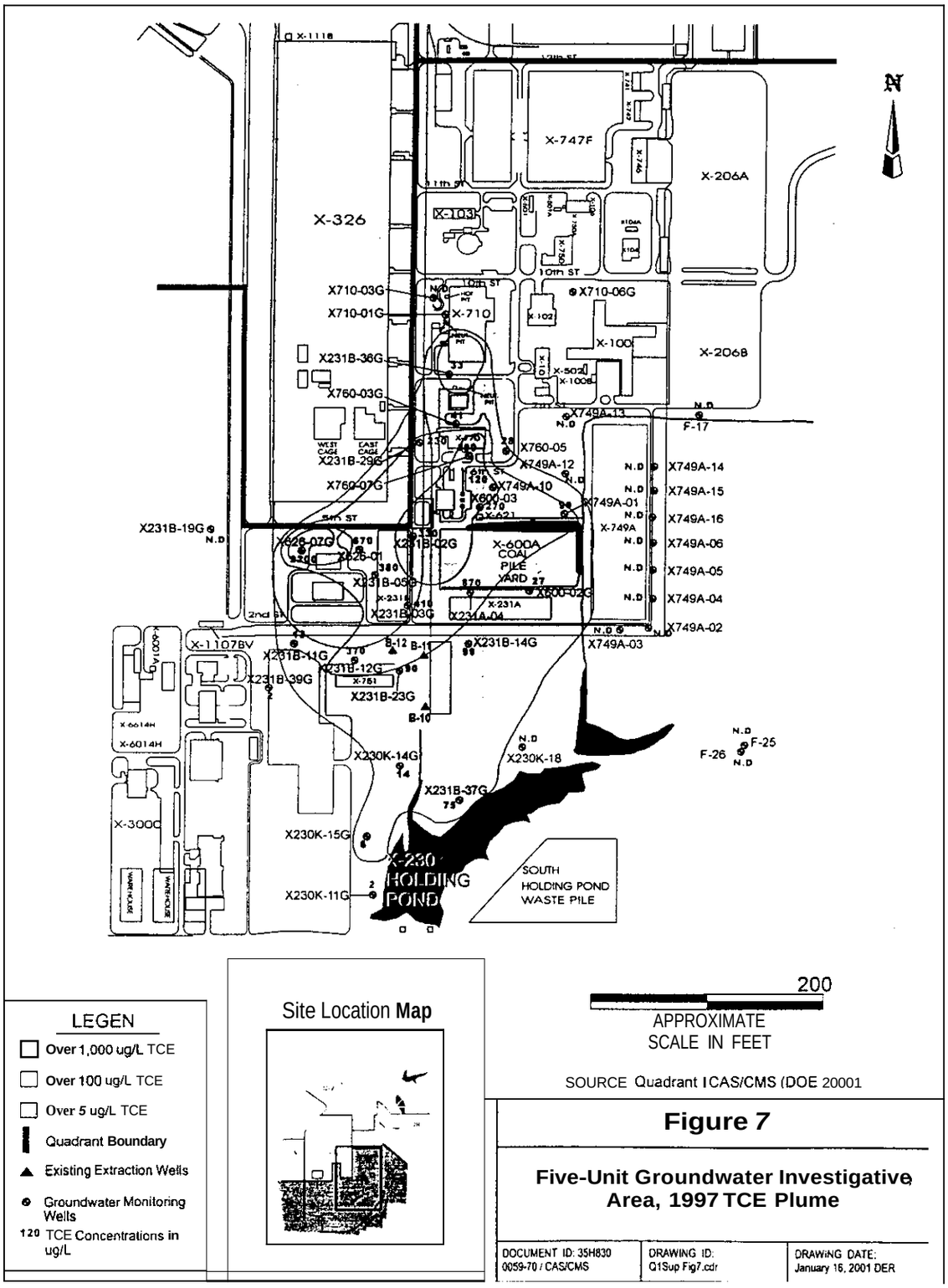
No actions are assumed to be taken under this alternative. No access or use restrictions maintenance, or monitoring would be conducted.

10.2.2 Alternative 2 - No Further Corrective Action

This alternative includes institutional controls, continued operation of the existing three-well extraction system, and groundwater monitoring. Institutional controls include access and use restrictions and maintenance.

10.2.3 Alternative 3 - Groundwater Extraction

This alternative includes institutional controls, a conventional 14-well groundwater extraction system, and groundwater monitoring. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.



SOURCE Quadrant ICAS/CMS (DOE 20001

Figure 7

Five-Unit Groundwater Investigative Area, 1997 TCE Plume

DOCUMENT ID: 35H830 0059-70 / CAS/CMS	DRAWING ID: Q1Sup Fig7.cdr	DRAWING DATE: January 16, 2001 DER

COC	Gallia Groundwater PRG (μg/L)
Manganese	14,300
Benzene	5
Bis(2-ethylhexyl)phthalate	
1,2-Dibromo-3-chloropropane	0.2
1,2-Dichloroethane	5
1,1-Dichloroethene	7
Chloroform	100
cis-1,2-Dichloroethene	70
Methylene chloride	5
Tetrachloroethene	5
1,1,2,2-Tetrachloroethane	0.8
1,1,1-Trichloroethane	200
1,1,2-Trichloroethane	5
TCE	5
Vinyl chloride	2
COC	**Berea Sandstone PRG (μg/L)**
TCE	5

10.2.4 Alternative 4 - Groundwater Extraction and Oxidant Injection

This alternative includes institutional controls, a conventional 14-well groundwater extraction system, initial contaminant reduction using oxidant injection, and groundwater monitoring. Initial contaminant reduction using oxidants in conjunction with groundwater extraction and reinjection will eliminate large areas of contamination in the first year of operation and will minimize the amount of extracted groundwater requiring treatment at on-site facilities. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.

10.2.5 Alternative 5 - VER Wells at X-231A and X-231B Oil Biodegradation Plots and Groundwater Extraction

This alternative consists of institutional controls, 19 VER wells installed in the X-231A and X-231B Oil Biodegradation Plots as described in Section 10.1.3, and a conventional nine-well groundwater extraction system. VER wells will dewater the Gallia sand and gravel aquifer and remove vadose zone contaminants beneath the X-231A and X-231B Oil Biodegradation Plots. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.

10.2.6 Alternative 6 - VER Wells at X-231A and X-231B Oil Biodegradation Plots, Oxidant Injection, and Groundwater Extraction

This alternative consists of institutional controls, multimedia caps over the X-231A and X-231B Oil Biodegradation Plots as discussed in Section 10.1.4, the 19 VER wells installed in the X-231A and X-231B Oil Biodegradation Plots as described in Section 10.1.3, oxidant injection, and a conventional nine-well groundwater extraction system. VER wells will dewater the Gallia sand and gravel aquifer and remove vadose zone contaminants beneath the X-231A and X-231B

plots. Initial contaminant reduction using oxidants in conjunction with groundwater extraction and reinjection will eliminate large areas of contamination in the first year of operation and will minimize the amount of extracted groundwater requiring treatment at on-site facilities. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.

10.2.7 *Summary*

Table 5 summarizes the relative effectiveness for each of the remedial alternatives evaluated, including the estimated TCE concentration and ELCR at 30 years and the remaining plume area exceeding PRGs after 30 years.

10.3 X-749/X-120 Area Groundwater Plume (groundwater only)

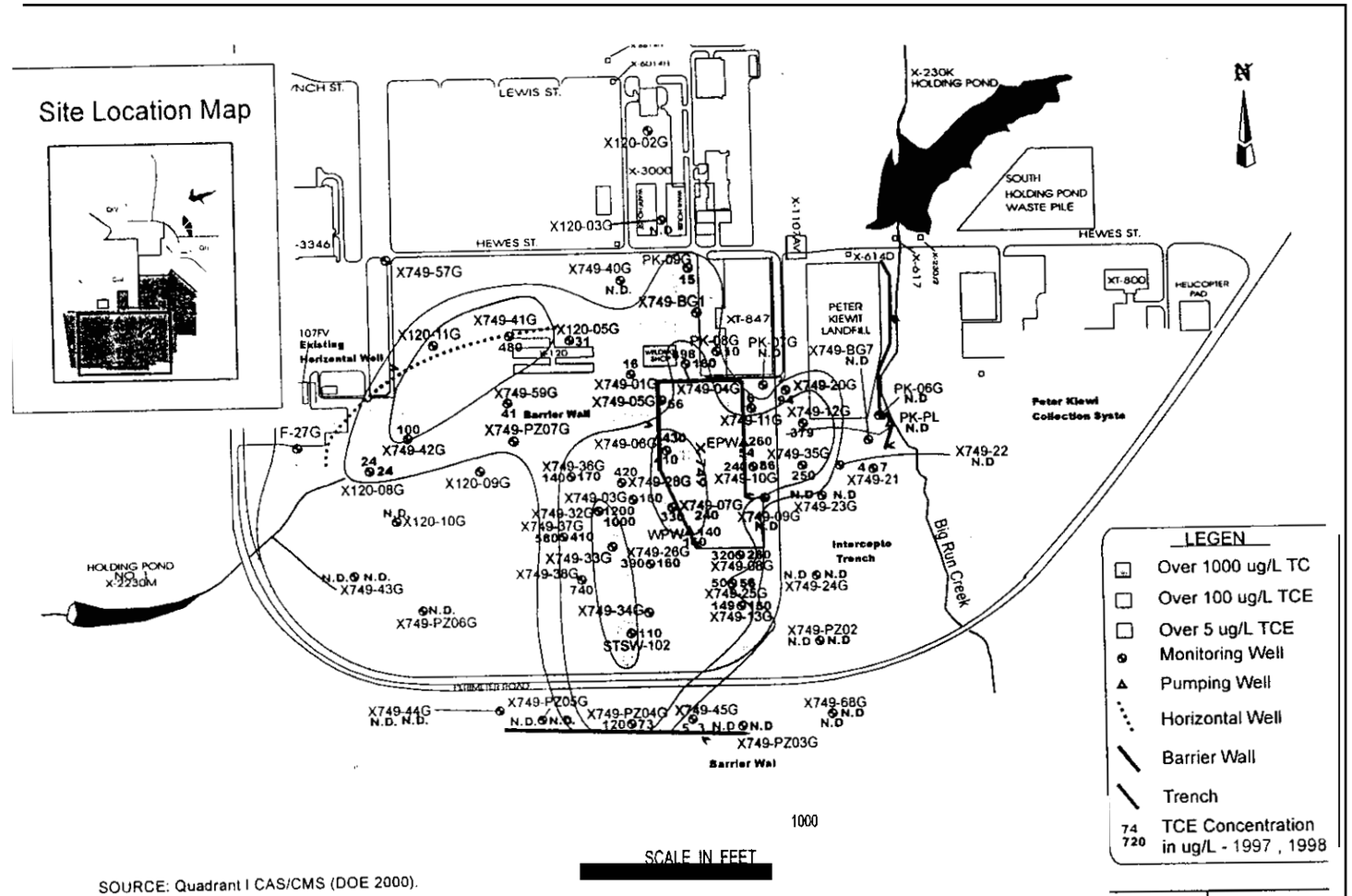
The X-749/X-120 Groundwater Plume consists mainly of TCE in the Gallia (see Figure 8). The plume extends from Hewes Street to immediately south of the reservation boundary, where it is contained by a barrier wall that extends to bedrock. The plume also extends east from the unnamed Southwest Drainage Ditch to the X-749B Peter Kiewit Landfill area. Two sources of groundwater contamination formerly existed, the X-749 Landfill and the X-120 Goodyear Training Facility. The X-120 facility is no longer in existence. The X-749 Landfill was closed in accordance with Ohio Hazardous and Solid Waste Regulations in 1993. The X-120 housed training facilities used during plant construction and startup. Solvents used during maintenance training activities may have been released. Soil samples collected in the X-120 area during the RFI show that contaminants are no longer present at concentrations above leaching levels established by the Ohio EPA, indicating that soil in this area is no longer a source of groundwater contamination.

A range of alternatives have been evaluated for groundwater in the X-749/X-120 Area. Model simulations indicate that it is not practicable to remediate the Gallia sand and gravel groundwater and associated saturated soil to concentrations less than PRGs in all areas of the plume area

Table 5

Sum ıary of Alte atives for Five-Un Groundwater ' 'estigative rea

Alternative	Technical Analysis	Human Health Analvsis	Environmental Analvsis	Institutional Analvsis	Estimated Maximum TCE oncentration at 30 Years (µg/L)	Estimated Maximum ELCR at 30 Years	Estimated Remaining 'lume Area Above PRGs (ft²)*	30-Year Present Vorth Costs Capital/ O&M ($1,000s)
- No Action	No implementation required	No short-term risk; long-term exposure of on-site workers	Risk to environmental receptors if contaminated groundwater infiltrates to surface water	Docs not meet remedial action objectives	258	5.0×10^{-5}	2,601,500	010
1 - No Further Corrective Action	Readily implementable; deed and land-use restrictions reliable if site Controls maintained; three-well groundwater extraction system and treatment facility currently operating	No shon-term risk	Risk to environmental receptors if contaminated groundwater infiltrates lo surface water	Meets remedial action objectives for on-site personnel and recreational visitors	161	3.2×10^{-5}	1,687,400	014,983
3 - Groundwater Extraelion	Readily implementable; institutional controls will be retained	Short-tern risk to on-site workers	Minimal shalt-tern risk to environmental receptors; no long-term risk to environmental receptors	Meets all remedial action objectives	<5	$<1.0 \times 10^{-4}$	0	1,05616,429
4 - Groundwater Extraction and Oxidant Injection	Extraction wells and upgrades to treatment facility readily implementable; oxidant injection less reliable; institutional controls will be retained	Short-term risk to on-site workers	Minimal short-term risk to environmental receptors; no long-term risk to environmental receptors	Meets all remedial action objectives	<5	$<1.0 \times 10^{-4}$	0	2,674/14,176
5 - VER Wells at X-23 IA and X-231B Oil Biodegradation Plots and Groundwater Extraction	Extraction wells and upgrades to treatment facility readily implementable, oxidant injection less reliable; institutional controls will be retained	Shon-term risk to on-site workers	Minimal shon-term risk to environmental receptors; no long-term risk to environmental receptors	Meets all remedial action objectives	<5	$<1.0 \times 10^{-4}$	0	2,21211 7,404
6 - VER Wells at X-231A and X-231B Oil Biodegradation Plots, Oxidant Injection, and Groundwater Extraction	VER wells, Conventional extraction wells, and upgrades to treatment facility readily implementable	Short-term risk to on-site workers	Minimal short-term risk to environmental receptors; no long-term risk to environmental receptors.	Meets all remedial action objectives except achieving groundwater PRGs	8	1.5×10^{-4}	11,444	3,989/27,529



SOURCE: Quadrant I CAS/CMS (DOE 2000).

Figure 8	X-749/X-120 Area and Groundwater Plum	DOCUMENT ID: 35H830 0131-95 / CAS/CMS	DRAWING ID: Q1Sup Fig8.cdr	DRAWING DATE: January 16, 2001 DER

within the targeted 30-year timeframe. PRGs for the COC detected in the Gallia sand and gravel in the X-749/X-120 Area are summarized in Table 6. Even with extensive application of BATs, hydrogeologic conditions indicate that groundwater contaminant levels would not reach the **risk** target level of 1×10^{-6} within 30 years. However, model simulations indicate that groundwater contaminant levels can be reduced to a risk level of 1×10^{-5}. This concentration is ALARA given hydrogeologic system constraints and the targeted timeframe for remediation. Various remedial alternatives have been evaluated for groundwater in the X-749/X-120 Area. These alternatives are discussed below. **All** of the alternatives evaluated except the "no action" and "no further corrective action" alternatives were selected for their abilities to achieve or meet PRGs, address environmental problems, reduce overall risks, and protect human health and the environment. Alternatives for the X-749/X-120 Area Groundwater Plume are summarized in Table 7.

10.3.1 Alternative 1 - No Action

No actions are assumed to be taken under this alternative. No access or use restrictions, maintenance, or monitoring would be conducted.

10.3.2 Alternative 2 - No Further Corrective Action

This alternative includes institutional controls and groundwater monitoring. Institutional controls include access and use restrictions and maintenance. This alternative includes continued operation of the existing X-120 horizontal well, the X-749 southwest and east trenches, and the X-749B Peter Kiewit collection trench.

10.3.3 Alternative 3 - Groundwater Pumping and Treatment

This alternative includes conventional groundwater extraction with treatment at on-site facilities. The existing X-120 horizontal well, the X-749B Peter Kiewit collection trench, and the southwest X-749 trench would continue operating. A barrier wall would be installed at the south

COC	Gallia Groundwater PRG (μg/L)
Chromium	100
1,1,1-Trichloroethane	200
1,1,2,2-Tetrachloroethane	0.83
1,1,2-Trichloroethane	5
1,1-Dichloroethene	7
1,2,3-Trichloropropane	0.0379
1.2-Dibromo-3-chloropropane	0.2
1.2-Dichloroethane	5
1.2-Dichloroethene	900
Acrylonitrile	0.431
Benzene	5
Bromoform	100
Carbon tetrachloride	5
Chloroform	100
cis-1,2-Dichloroethene	70
Methylene chloride	5
Tetrachloroethene	5
trans-1,2-Dichloroethene	100
TCE	5
Vinyl chloride	2
1,4-Dioxane	25.9

lote: ug/L = Microgram per liter

Table 7
Summary of Alternatives for the X-749/X-120 Area Groundwater Plume

Alternative	Technical Analysis	Long Term Risks	Environmental Analysis	Institutional Analysis	Estimated Highest TCE Concentration Remaining After 30 Years (μg/L)	Estimated Remaining Plume Area Above MCLs[a] (Million ft^2)	30-Year Present Worth Costs Capital/O&M ($1,000s)
1 - No Action	No implementation required	No short-term risk; long-term exposure of on-site workers	No risk to environmental indicators	Does not meet remedial action objectives	2,788	5.72	0/0
2 - No Further Corrective Action	Readily implementable; deed and land-use restrictions reliable if site controls maintained	No short-term risk	No risk to environmental indicators	Does not meet remedial action objectives	1,343	4.06	015,974
3 - Groundwater Pumping and Treatment	Readily implementable; installation of wells required	Short-term risk to on-site workers	Minimal short-term risk to environmental receptors	Meets all remedial action objectives	43	0.250	2,564112,149
4 - Pumping and Treatment with Phytoremediation	Readily implementable; installation of wells and planting of trees required	Short-term risk to on-site workers	Minimal short-term risk to environmental receptors	Meets all remedial action objectives	16	0.638	2,56411 1,623
5 - Phytorrmediatinn	Readily implementable; planting of trees required	Short-term risk to on-site workers	Minimal short-term risk to environmental receptors	Meets all remedial action objectives	48	0.273	60215,433
6 - Enhanced Bioremediation and Phytoremediation	Readily implementable; installation of wells and planting of trees required	Short-term risk to on-site workers	Minimal short-term risk to environmental receptors	Meets all remedial action objectives	50	1.2	5,228/10,182

Note: at the end of 30 years

end of X-749 and where the existing east X-749 collection trench is located, thereby effectively containing contamination within the landfill. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.

10.3.4 Alternative 4 - Pumping and Treatment with Phytoremediation

This alternative includes conventional groundwater extraction for 20 years and treatment of extracted groundwater at on-site facilities. A barrier wall would be installed on the south end of X-749 and where the existing east X-749 collection trench is located, thereby effectively containing contamination within the landfill. The existing X-120 horizontal well, the X-749B Peter Kiewit trench, and the southwest X-749 trench would continue operating. Implementation of phytoremediation would begin in the 21st year. Phytoremediation would involve planting approximately 27.5 acres of hybrid poplars. Upon implementation of phytoremediation, all active remedial measures except those at the southwest X-749 and X-749B Peter Kiewit collection trenches would be removed from operation. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.

10.3.5 Alternative 5 - Phytoremediation

Approximately 27.5 acres of hybrid poplar trees would be planted under this alternative, and a barrier wall would be installed on the south end and east side of X-749 and where the existing east X-749 collection is located, thereby effectively containing contamination within the landfill. The southwest X-749 and X-749B Peter Kiewit collection trenches would continue operating. Institutional controls include access and use restrictions, maintenance, and groundwater monitoring.

10.3.6 Alternative 6 - Enhanced Bioremediation and Phytoremediation

Alternative 6 combines planting hybrid poplar trees in selected portions of the X-749/X-120 area plume and injection of a compound into groundwater to enhance bioremediation. The X-749B

Peter Kiewit collection trench and the southwest X-749 trench would continue operating, but the X-120 horizontal well would operate for two years only and then be discontinued. A barrier wall would be installed on the south end of the X-749 area and where the existing east X-749 trench is located. Monitoring and deed restrictions are also part of this alternative.

11.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Ohio EPA relies on the public to ensure that the remedial alternative selected for a site meets the needs of the local community in addition to being an effective solution to the environmental problem. Ohio EPA formally presented the Preferred Plan for Quadrant I at a public availability session on November 30,2000. At this meeting, representatives from Ohio EPA discussed the RFI, CAS/CMS, and the Preferred Plan. In addition, Ohio EPA answered questions and received comments. Comments were solicited on all alternatives summarized in the Preferred Plan and evaluated in the CAS/CMS report. Responses to significant comments, criticisms, or new data received during the comments period and public meeting are included in the "Responsiveness *Summary,"* which is attached to this document as Appendix II.

This Decision Document presents the selected remedial actions for Quadrant I of the US DOE Portsmouth Facility. These actions *are* chosen in accordance with RCRA, CERCLA, and SARA, and to the extent practicable, the NCP, the HWSA of 1984, and applicable and appropriate State regulations. This decision is based on the administrative record for this response action.

All documents leading up to the Decision Document have been available for public review and comment **prior** to selection of the chosen remedies. Documents issued before the Decision Document include, but are not limited to Quadrant I Final RFI Report (DOE 1996), BERA, the AIR RFI (DOE 1997), the Background Sampling Investigation (DOE 1996), the Quadrant I CAS/CMS Final Report (DOE 2000), and the Quadrant I Preferred Plan (Ohio EPA 2000).

All documents regarding Quadrant I are available at the following locations:

U.S. Department of Energy
Environmental Information Center
3930 US Route 23
P. O. Box 693
Piketon, Ohio 45661
Telephone No.: (740) 289-3317

Ohio Environmental Protection Agency
2195 Front Street
Logan, Ohio 43138
Telephone No.: (740) 385-8501

12.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Under CERCLA, remedial alternatives are required to be evaluated against eight criteria. To select remedial alternatives for Quadrant I, Ohio EPA considered these eight criteria, which are described below.

1. Overall protection of human health and the environment addresses whether a remedy provides adequate protection through the elimination, reduction, or control of risks by treatment, engineering controls, or institutional controls.

2. Compliance with state. federal. and local laws and regulations addresses whether a remedy will meet all applicable state, federal, and local environmental statutes (ARARs). ARARs include chemical-, action-, and location-specific ARARs.

3. Long-term effectiveness and permanence refers to a remedial alternative's ability to protect human health and the environment over time once cleanup goals have been met.

4. Reduction of toxicity, mobility, or volume of contaminants through treatment is *the* anticipated performance of the treatment technologies to either (1) reduce the toxic characteristics of the COCs, **(2)** remove quantities of COCs to acceptable risk concentrations or regulatory limits, or **(3)** decrease the ability of contaminants to migrate through *the* environment.

5. Short-term effectiveness involves the period of time needed to achieve protection and considers adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of an alternative, including the availability of goods and services needed to implement the chosen remedial alternative.

7. Cost includes consideration of the capital and O&M costs.

8. Community acceptance includes review of the public comments received on the RFI report, the CAS/CMS report, and the Preferred Plan.

Alternatives selected reflect the scope and purpose of the actions being undertaken at Quadrant I and how the remedies relate to long-term comprehensive response. The following discussion summarizes the compliance of the alternatives with these criteria. SWMUs that require no further corrective action and those deferred to D&D are discussed first, followed by discussion of each area requiring remedial alternatives.

12.1 No Further Corrective Action and Deferral to D&D Alternatives

12.1.1 Overall Protection of Human Health and the Environment

The no further corrective action alternative is protective of human health and the environment for the 13 SWMUs for which this alternative was selected. These SWMUs do not pose unacceptable risks to human health or the environment. For some of the no further corrective action SWMUs, only soil requires no further corrective action because of completed remedial actions such as capping. SWMUs deferred to D&D, including the creeks, streams, and ponds, do not pose risks that warrant remedial action at this time. Remediation at the D&D deferred SWMUs at this time would not be prudent because these units are still in use and could therefore become recontaminated. In some cases, exposure controls will be in place for workers until D&D. Administrative controls will limit or prevent exposure of on-site workers and visitors.

12.1.2 Compliance with State, Federal, and Local Laws and Regulations

The no further corrective action alternative complies with all identified ARARs for the 13 SWMUs for which this alternative was selected. A list of federal and state preliminary ARARs is provided in Appendix I. ARARs will be developed for SWMUs deferred to D&D at the time of remedial action selection.

12.1.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence is not presently applicable to SWMUs deferred to D&D. These SWMUs will be evaluated for remedial alternatives when D&D commences or sooner, if feasible. Because cleanup objectives are met for SWMUs under the no further corrective action alternative, long-term effectiveness and permanence are expected to be met by this alternative.

12.1.4 Reduction of Toxicity, Mobility, or Volume

This criterion is not applicable to SWMUs requiring no further corrective action because the SWMUs were determined to meet risk guidelines. This criterion will apply to SWMUs deferred to D&D.

12.1.5 Short-Term Effectiveness

This criterion is applicable to SWMUs requiring no further corrective action and deferred to D&D because the SWMUs were determined to meet risk guidelines and therefore are protective in the short-term.

12.1.6 Implementability

Both the no further corrective action and D&D alternatives are easily implemented for Quadrant I SWMUs.

12.1.7 Cost

No additional costs are associated with the no further corrective action alternative. Costs for future remediation for SWMUs deferred to D&D will be evaluated at the time of plant closure.

12.1.8 Community Acceptance

Ohio EPA and US EPA evaluated state and local community acceptance during the public comment period. All comments pertinent to the preferred alternatives are addressed in the responsiveness summary of this Decision Document (Appendix II).

12.2 X-231A and X-231B Oil Biodegradation Plots

12.2.1 Overall Protection of Human Health and the Environment

Alternative 1, Institutional Controls, would not be protective of human health and the environment because it remains unclear if long-term land-use restrictions could be implemented at the SWMUs. In addition, contaminants are not prevented from leaching into groundwater, creating an exposure pathway for potential future users and leading to migration of contaminated groundwater to Big Run Creek.

Alternative **2,** Synthetic Covers, would be protective of human health and the environment because the covers would prevent contact with contaminants and infiltration of surface water as long as the synthetic covers remain intact. The synthetic covers would also reduce leaching of contaminants to groundwater, thus preventing contaminant migration to surface water and reducing exposure of potential environmental receptors as long as the covers are not compromised. This alternative does not meet the RCRA substantive requirements noted in the March 1999 DFF&Os for integration and therefore does not meet ARARs.

Alternative 3, VER Wells and Synthetic Covers. would be protective of human health and the environment. The synthetic covers would reduce infiltration of surface water and contaminant leaching into groundwater. The VER wells would remediate contaminated soil and groundwater at the oil biodegradation plots. Both the synthetic covers and VER wells would also greatly reduce potential exposure of human and environmental receptors.

Alternative **4,** Multimedia Caps, would be protective of human health and the environment. The multimedia cap system would prevent contact with contaminants and infiltration of surface water. The synthetic covers, along with the 30-inch-thick soil layers, would reduce or eliminate contaminants leaching into groundwater, thus preventing contaminant migration to surface water and reducing exposure of potential environmental receptors.

12.2.2 Compliance with State, Federal, and Local Laws and Regulations

Chemical-Specific ARARs: Alternative 1 would not comply with chemical-specific ARARs. Alternative 2 would not comply with RCRA ARARs and may not comply with chemical-specific ARARs if the viability of the synthetic covers are compromised in any way. Alternatives 3 and 4 are expected to comply with chemical-specific ARARs and would require US DOE to obtain an air permit to operate the VER wells.

Action-Specific ARARs: Under Alternative 3, an action-specific ARAR for this SWMU is the requirement that VOC-contaminated drill cuttings from installation of the VER wells be disposed of in a solid waste landfill or, if necessary, a hazardous waste facility.

Location-Specific ARARs: None of the alternatives evaluated would trigger location-specific ARARs. Therefore, these ARARs are not applicable for this SWMU.

12.2.3 Long-Term Effectiveness and Permanence

Alternative 1 may be effective in reducing exposure of future on-site workers if institutional controls can be maintained. Alternative 1 would not prevent potential exposure of environmental receptors or continuing contamination of groundwater.

Alternative 2 would not reduce contaminant mass but would eliminate infiltration of groundwater to surface water if the synthetic covers remain intact.

Alternatives 3 and 4 are both expected to meet the long-term effectiveness and permanence criterion. Alternative 3 would reduce the contaminant mass and prevent contaminant infiltration of surface water.

Alternative 4 would not reduce the contaminant mass but would prevent infiltration of groundwater to surface water.

12.2.4 Reduction of Toxicity, Mobility, or Volume of Contaminants

Alternative 1 would not reduce the toxicity, mobility, or volume of the soil contaminants. Alternatives 2 and 4 are containment options that also would not reduce the toxicity or volume of contaminants. Alternative **3** is expected to remove the contaminant mass, thereby reducing the toxicity, mobility, or volume of contaminants.

12.2.5 Short-Term Effectiveness

Alternative 1 would pose no short-term human exposure risks other than continued risks to on-site **workers.** Alternatives 2 and **4** may pose exposure risks to on-site personnel and workers during synthetic cover installation through fugitive dust emissions. Exposure could be controlled and greatly reduced by implementation of a site-specific health and safety plan. ALARA principles would be observed to limit and prevent exposure of workers to contaminants, Alternative 3 would involve the same potential exposure risks noted above for installation of the synthetic covers. In addition, on-site workers could be exposed to contaminants during monitoring of the VER wells. Implementation of a health and safety plan as well as ALARA principles should greatly reduce or prevent the exposure of on-site workers.

12.2.6 Implementability

Alternative 1 requires no remedial activities and could therefore be easily implemented. Alternative 2 requires the installation of synthetic covers. The time required to implement Alternative 2 is **9** to 11 months. This alternative is readily implementable. Alternative 3 requires the installation of VER wells and synthetic covers. This alternative could be implemented in

12 months. Alternative 4 requires the installation of an 80-mil-thick HDPE geomembrane liner over an engineered base with a drainage layer and 30 inches of additional soil, including a 6-inch-thick vegetative soil layer. This alternative would take 9 to 11 months to implement.

12.2.7 Cost

The cost for each alternative is broken down below. Costs are presented in descending order.

Alternative 3	Present worth capital cost	$2,633,000
	Present worth O&M cost	$4.192.000
	Total Cost	$6,825,000
Alternative 4	Present worth capital cost	$3,244,000
	Present worth O&M cost	$ 956.000
	Total Cost	$4,200,000
Alternative 2	Present worth capital cost	$1,019,000
	Present worth O&M cost	$ 918.000
	Total Cost	$1,937,000
Alternative 1	Present worth capital cost	$ 0
	Present worth O&M cost	$ 155.000
	Total Cost	$ 155,000

12.2.8 Community Acceptance

Ohio EPA and **US** EPA evaluated state and local community acceptance during the public comment period. All comments pertinent to the preferred alternatives were addressed in the responsiveness summary of this Decision Document (Appendix II).

12.3 Five-Unit Groundwater Investigative Area

The remedial action objectives for Five-Unit Groundwater Investigative Area are as follows:

- Achieve PRGs for groundwater whenever practicable
- Prevent migration of COCs at concentrations exceeding PRGs (human health and ecological) from groundwater to surface water
- Prevent exposure of future off-site residents to COCs in groundwater at concentrations exceeding residential PRGs
- Prevent exposure of on-site workers to COCs in groundwater at concentrations exceeding future on-site worker PRGs

12.3.1 Overall Protection of Human Health and the Environment

Alternative 1, No Action, would not be protective of human health and the environment and would not meet any of the cleanup objectives for this SWMU.

Alternative 2, No Further Corrective Action, includes deed and land-use restrictions with groundwater extraction and treatment. This alternative may reduce the likelihood of exposure of current and future on-site workers and the general public to contaminated groundwater. However, environmental receptors may be affected if contaminated groundwater enters the X-230K South Holding Pond.

Alternative 3, Groundwater Extraction, would significantly reduce both the size and concentration of the contaminant plume within a 30-year timeframe. This alternative is predicted to reduce the areal extent of the TCE plume exceeding the PRG to 3,600 ft^2 and the maximum

TCE concentration to 5.2 μg/L in 20 years. Institutional controls for Alternative 3 would effectively prevent exposure of on-site workers, and deed restrictions would prevent residential development.

Alternative 4, Groundwater Extraction and Oxidant Injection, would prevent exposure of on-site workers, and deed restrictions would prevent residential development at the SWMU. Future on-site workers would not be exposed to COCs in groundwater because institutional controls would prevent ingestion of groundwater in the short-term, and the alternative is expected to achieve PRGs within 20 years. Because groundwater COCs are expected to be achieved, surface water would not be affected.

Alternative 5, VER Wells at X-231A and X-231B Oil Biodegradation Plots and Groundwater Extraction, would effectively prevent both on-site workers and future off-site residents from exposure to groundwater COCs and prevent the migration of COCs from groundwater to surface water. The PRG for TCE in groundwater is predicted to be achieved in all portions of the SWMU in less than 30 years. Institutional controls should prevent exposure of on-site workers, and deed restrictions would prevent residential development in this area. The groundwater monitoring program would use existing monitoring wells to monitor contaminant fate and transport.

Alternative 6, VER Wells at X-231A and X-231B Oil Biodegradation Plots, Oxidant Injection, and Groundwater Extraction, would prevent exposure of both on-site workers and future off-site residents to COCs in groundwater and prevent migration of COCs from groundwater to surface water, thus preventing exposure of environmental receptors. This alternative is predicted to reduce the areal extent of the TCE plume to a maximum concentration of approximately 8 μg/L in 30 years (slightly above the PRG of 5 μg/L). Institutional controls would effectively prevent exposure of on-site personnel, and deed restrictions would prevent residential development at the SWMU. The groundwater monitoring program would use existing monitoring wells to monitor contaminant fate and transport.

12.3.2 Compliance with State, Federal, and Local Laws and Regulations

Chemical-Specific ARARs: Alternatives 1 and 2 would not comply with chemical-specific ARARs because they are not expected to meet the TCE PRG. Alternatives 3, 4, and **5** are expected to achieve chemical-specific ARARs. Alternative 6 would not achieve chemical-specific ARARs.

Action-Specific ARARs: Under Alternatives 3, 4, and **5**, an action-specific ARAR for the SWMU is the requirement that VOC-contaminated drill cuttings from installation of extraction or VER wells be disposed of in a solid waste landfill or, if necessary, to a hazardous waste facility. Also, for Alternatives 3, 4, 5, and 6, which may bring groundwater to the surface for treatment prior to discharge, NPDES permit requirements would apply. Air permits must be obtained for alternatives that utilize VER wells to treat soil and groundwater COCs.

Location-Specific ARARs: Location-specific ARARs do not apply to the alternatives evaluated for this SWMU.

12.3.3 Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence. Alternative 2 would not prevent exposure of environmental receptors and depends on institutional controls to prevent exposure of on-site and off-site residents as well as future on-site workers. This alternative is therefore less protective in long term compared to Alternatives 3 through 6. Institutional controls are only reliable if they can be maintained. Alternatives 3, 4, 5, and 6 would effectively reduce contaminant levels to PRGs or slightly above PRGs and prevent exposure of potential environmental receptors. These alternatives also rely on institutional controls to prevent exposure of current on-site workers. In addition, deed restrictions must be maintained to prevent future residential use of the SWMU.

12.3.4 Reduction of Toxicity, Mobility, and Volume

Alternative 1 would not meet any remedial action objectives. Alternative 2 would continue the operation of the three existing extraction wells in conjunction with treatment at the X-622 water treatment facility. This alternative would reduce contaminant toxicity, mobility, and total volume but would not meet all cleanup objectives. Alternative 3 would be effective at reducing contaminant toxicity, mobility, and volume through the installation of 11 extraction wells. Alternative 3 would meet all cleanup objectives. Alternative 4 would use in situ chemical oxidant injection in groundwater plume areas with the highest TCE concentrations and therefore would be effective in reducing the toxicity, mobility, and volume of the plume. Alternative 5 would use VER wells to remediate both groundwater and soil in the two known source areas in addition to extraction wells in other plume areas. Alternative 6 would combine VER wells, conventional extraction wells, and groundwater extraction to remediate the plume. Alternatives 5 and 6 would therefore effectively reduce the toxicity, mobility, and volume of the groundwater plume.

In terms ofenvironmental protection, Alternatives 1 and 2 may impact a jurisdictional wetland and the X-230K South Holding Pond. Alternatives 3 through 6 are predicted to eliminate the potential of off-site migration of contaminants. Construction associated with Alternatives 3 through 6 could initially disrupt environmental receptors but is not expected to result in permanent effects. None of the alternatives would have adverse effects on archaeological resources, cultural resources, flood elevations, or critical habitats. No socioeconomic effects are anticipated from implementation of any of the alternatives.

12.3.5 Short-Term Effectiveness

Alternatives that minimize the amount of contaminants in soil that on-site workers could be exposed to through installation of wells and other remedial activities would provide the greatest degree of short-term effectiveness. Alternatives 1 and 2 pose fewer risks in the short term

because no construction activities are associated with these alternatives. Alternatives 3 through 6 would pose greater risks in the short term because of construction activities. These risks can be greatly reduced through proper work safety procedures.

12.3.6 Implementability

All the alternatives are readily implementable and use off-the-shelf components, manpower requiring limited training, and well-understood operating parameters. Equipment and administrative controls range from those already in place to those taking up to 18 months to fully implement.

12.3.7 Cost

The cost for each alternative is broken down below. Costs are presented in descending order.

Alternative 6	Present worth capital costs	$3,989,000
	Present worth O&M costs	$27,529,000
	Total Cost	$31,918,000
Alternative 5	Present worth capital costs	$2,212,000
	Present worth O&M costs	$17,404,000
	Total Cost	$19,616,000
Alternative 4	Present worth capital costs	$2,674,000
	Present worth O&M costs	$14,176,000
	Total Cost	$16,850,000

Alternative 3	Present worth capital costs	$1,056,000
	Present worth O&M costs	$6,429,000
	Total Cost	$7,485,000
Alternative 2	Present worth capital costs	$ 0
	Present worth O&M costs	$4,983,000
	Total Cost	$4,983,000

Alternative 1 No costs are associated with this alternative.

12.3.8 Community Acceptance

Ohio EPA and US EPA evaluated state and local community acceptance during the public comment period. All comments pertinent to the preferred alternatives were addressed in the responsiveness summary of this Decision Document (Appendix II).

12.4 X-749/X-120 Area Groundwater Plume

The remedial action objectives for the X-749/X-120 Area Groundwater Plume are as follows:

- Achieve PRGs for groundwater whenever practicable
- Prevent migration of COCs at concentrations exceeding PRGs (human health and ecological) from groundwater to surface water
- Prevent exposure of future off-site residents to COCs in groundwater at concentrations exceeding residential PRGs

- Prevent exposure of on-site workers to COCs in groundwater at concentrations exceeding future on-site **worker** PRGs

12.4.1 Overall Protection of Human Health and the Environment

Alternative 1, No Action, would not be protective of human health and the environment and would not meet any of the cleanup objectives outlined above. The no action alternative serves as a baseline option and is retained to facilitate evaluation of the other active remedial measures.

Alternative 2, No further corrective action, involves deed and land-use restrictions in conjunction with current groundwater extraction and treatment. Alternative 2 would possibly reduce the likelihood of exposure of current and future on-site workers and the general public to contaminated groundwater. The useful life of this alternative depends on the ability to maintain and operate current remedial measures and enforcement of deed and land-use restrictions. The PRG for TCE would not be met. Environmental receptors could be exposed through migration of contaminated groundwater to surface water in the area.

Alternative 3, Groundwater Pumping and Treatment, includes a banier wall around the south end and east side of X-749 and institutional controls. Alternative 3 would achieve the cleanup objective for on-site workers through use of institutional controls to prevent exposure to contaminated groundwater. Deed restrictions would prevent development in the area as well as use of contaminated groundwater. This alternative would achieve acceptable risk levels currently proposed in CERCLA and RCRA corrective action guidance within 30 years but would not achieve the PRG for TCE. Alternative 3 would have minimal impacts on environmental receptors in the area and would have no effect on wetlands, archaeological and cultural resources, or critical habitats of threatened or endangered species.

Alternative 4, Pumping and Treatment with Phytoremediation, includes a barrier wall around the south end and east side of X-749 and institutional controls. Alternative 4 would be effective at

achieving the cleanup objective for on-site workers through the use of institutional controls to prevent exposure to contaminated groundwater. Deed restrictions would prevent development in this area as well as use of contaminated groundwater. Continued operation of this alternative is expected to achieve acceptable risk levels as currently proposed in CERCLA and RCRA corrective action guidance within 30 years but would not achieve the PRG for TCE.

Alternative 5, Phytoremediation, includes a barrier wall around the eastern and southern portion of X-749 and institutional controls. Alternative 5 would be effective at achieving the cleanup objective for on-site workers through the use of institutional controls to prevent exposure to contaminated groundwater. Access and land-use restrictions would limit exposure to contaminated groundwater. Continued operation of this alternative is expected to achieve acceptable risk levels as currently proposed in CERCLA and RCRA corrective action guidance within 30 years but would not achieve the PRG for TCE. Alternative 5 would not adversely affect environmental receptors in the area. Future risks would be reduced as contaminants are removed during remediation.

Alternative 6, Enhanced Bioremediation and Phytoremediation, would be effective at achieving the cleanup objective for on-site workers through the use of institutional controls to prevent exposure to contaminated groundwater. Access and land-use restrictions would limit exposure to contaminated groundwater. Continued operation of this alternative is expected to achieve acceptable risk levels as currently proposed in CERCLA and RCRA corrective action guidance but would not achieve the PRG for TCE. Alternative 6 would not adversely affect environmental receptors in the area. Future risks would be reduced as contaminants are removed during remediation.

12.4.2 Compliance with State, Federal, and Local Laws and Regulations

Chemical-Specific ARARs: Alternatives 1 and 2 would not achieve chemical-specific ARARs because they are not expected to meet the PRG for TCE. Alternatives 3, 4, 5, and 6 are not expected to achieve chemical-specific ARARs because the PRG for TCE is not expected to be met within 30 years.

Action-Specific **ARARs:** Under Alternatives 3, 4, 5, and 6, an action-specific ARAR is the requirement that VOC-contaminated drill cuttings from installation of extraction wells be disposed of in a solid waste landfill or, if necessary, a hazardous waste facility. Also, for Alternatives 3 and 4, which may bring groundwater to the surface for treatment prior to discharge, NPDES permit requirements would apply.

Location-Specific ARARs: Location-specific ARARs do not apply to the alternatives evaluated.

12.4.3 Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence. Alternative 2 would not prevent exposure of environmental receptors and depends on institutional controls to prevent exposure of on-site residents as well as future on-site workers. Institutional controls are only reliable if they can be maintained. Alternatives 3, 4, 5, and 6 would effectively reduce contaminant levels to acceptable risk-based levels or levels slightly exceeding groundwater PRGs. These alternatives would be effective in preventing exposure of potential environmental receptors. These alternatives also rely on institutional controls to prevent exposure of current on-site workers. In addition, deed restrictions must be maintained to prevent future residential use of the area.

12.4.4 Reduction of Toxicity, Mobility, and Volume

Alternative 1 would not meet any cleanup objectives. Alternative 2 would reduce the toxicity, mobility, and volume of the contaminant plume through natural attenuation only. A large portion of the plume exceeding the PRG for TCE in groundwater is expected to remain. Alternative **3** would reduce the toxicity, mobility, and volume of the contaminant plume through an active pump-and-treat system. Although a portion of the plume exceeding the PRG for TCE in groundwater (approximately 250,000 ft^2) is expected to remain, a large volume of the plume would be removed. Alternative 4 would also be effective at reducing the toxicity, mobility, and volume of the Contaminant plume. TCE levels are expected to be reduced to approximately 16 μg/L (less in 640,000 ft^2 of the plume).

Alternative **5** would reduce the toxicity, mobility, and volume of the contaminant plume through the use of phytoremediation (hybrid poplars). TCE levels are expected to remain in groundwater **after** 30 years at approximately 30 μg/L (270,000 ft^2 of the plume). Alternative 6 would reduce the toxicity, mobility, and volume of the contaminant plume through the combination of two technologies, enhanced bioremediation and phytoremediation. The combination of technologies is expected to reduce contaminants levels in groundwater. However, TCE levels in groundwater **are** expected to remain above the PRG after 30 years.

12.4.5 Short-Term Effectiveness

Alternatives that minimize the amount of contaminants in soil that on-site workers could contact during the installation of wells or other remedial activities would provide the greatest degree of short-term effectiveness. Alternatives 1 and 2 pose fewer risks in the short-term because no construction activities are associated with these alternatives. Alternatives 3 through 6 pose greater **risks** in the short term because of associated construction activities. These risks can be greatly reduced through proper **work** safety procedures.

12.4.6 Implementability

All the alternatives are readily implementable and use off-the-shelf components, manpower requiring limited training, and well-understood operating parameters. Equipment and administrative controls range from those already in place to those taking up to **I8** months to fully implement.

12.4.7 Cost

The cost for each alternative is broken down below. Costs are presented in descending order.

Alternative 6	Present worth capital cost	$ 5,228,000
	Present worth O&M cost	$10.182.000
	Total Cost	$15,410,000
Alternative 3	Present worth capital cost	$ 2,564,000
	Present worth O&M cost	$12.749.000
	Total Cost	$15,313,000
Alternative 4	Present worth capital cost	$2,564,000
	Present worth O&M cost	$11.623.000
	Total Cost	$14,187,000
Alternative **5**	Present worth capital cost	$ 602,000
	Present worth O&M cost	$5.433.000
	Total Cost	$6,035,000

Alternative 2	Present worth capital cost	$ 0
	Present worth O&M cost	$5.974.000
	Total Cost	$5,974,000

Alternative 1 No costs are associated with this alternative,

12.4.8 Community Acceptance

Ohio EPA and US EPA evaluated state and local community acceptance during the public comment period. All comments pertinent to the preferred alternatives were addressed in the responsiveness *summary* of this Decision Document (Appendix II).

13.0 OHIO EPA'S SELECTED ALTERNATIVES FOR QUADRANT I

Ohio EPA has selected a no further corrective action alternative, deferral to D&D, and active remedial alternatives for the Quadrant I SWMUs. Each of these categories of alternatives is briefly discussed below, along with the SWMUs within the category. US EPA concurred with Ohio EPA for all of the Quadrant I selected alternatives presented in this section. The active alternatives are for the X-231A and X-231B Oil Biodegradation Plots, X-749/X-120 Area Groundwater Plume, and the Five-Unit Groundwater Investigative Area for Quadrant I. SWMUs deferred to D&D remain under the auspices of Section VII of the Ohio Consent Decree. Deferral of these SWMUs to D&D requires US DOE to re-evaluate and remediate these SWMUs at the time of D&D as warranted rather than potentially eliminating these SWMUs from further consideration.

If site conditions change and the remedial actions selected in this Decision Document do not appear to be meeting cleanup objectives, modifications to the remedial alternatives may be necessary. For example, additional extraction wells may be installed to help remediate the

groundwater plume in the Five-Unit Groundwater Investigative Area. In some cases, it may be necessary to implement alternatives not presented in this Decision Document.

13.1 No Further Corrective Action Alternative

Ohio EPA **has** selected a no further corrective action remedial alternative for SWMUs that achieve the risk goals outlined in CERCLA and RCRA corrective action guidance. The 13 SWMUs falling into this category are listed below:

- GCEP USTs
- X-103 Auxiliary Office Building
- X-104A Indoor Firing Range
- X-120 Old Training Facility Site (soil only)
- X-710 Technical Services Building and Neutralization Pit (soil only)
- X-741 Oil Drum Storage Facility
- X-747F Miscellaneous Material Storage Yard
- X-749 Contaminated Materials Disposal Facility* (soil only)
- X-749A Classified Material Burial Ground*
  X-749B Peter Kiewit Landfill*
- X-750 Mobile Equipment Maintenance Shop, Fuel Station, and Waste Oil Tank
  X-751 Mobile Equipment Garage
- X-760 Pilot Investigation Building and Neutralization Pit (soil only)

* The landfill caps at these units will be maintained in accordance with the approved O&M plans for these units. Groundwater will be monitored per the IGWMP.

13.2 SWMUs Deferred to D&D

The following five SWMUs have been deferred to D&D:

- X-600 Coal-Fired Steam Plant
- X-600A Coal Pile Yard
- X-621 Coal Pile Runoff Treatment Facility
- X-626 Recirculating Cooling Water Pump House and Cooling Tower
- X-770 Mechanical Testing Facility

In addition to these five SWMUs, the following ponds and creek will also be re-evaluated during D&D:

- Big Run Creek
- X-230K South Holding Pond
- X-2230M Southwest Holding Pond

Available sampling data suggest the following:

1. HI values for media-specific total non-carcinogenic risks under the on-site worker scenarios of generally less than 1; and

2. On-site worker scenario ELCR values within the risk range generally 1×10^{-4} to 1×10^{-6}; or

3. Contaminants present generally immobile; or

4. SWMUs identified are within current production areas and operational facilities, and remedial activities may interrupt operations; also, such areas likely will become recontaminated from ongoing production of enriched uranium.

Contaminants are not expected to be currently released to the environment from ongoing production areas. If a release occurs, proper action will be taken to prevent exposure of human and environmental receptors. However, there may be some instances where contaminants may be leaching from soils to groundwater for some of the deferred units in the production areas. In most instances the contaminants are being addressed through remedial actions selected for groundwater. It was not considered necessary for the SWMUs deferred to D&D to meet all of the four criteria listed above. In some cases, the total risk level may have fallen outside the acceptable risk range for current on-site workers based on BRA data in the RFI report. However, US DOE has implemented administrative controls at PORTS to ensure that workers do not excavate soil or contact sediment or surface water without proper environmental and health and safety controls. Such controls include the wearing of proper protective clothing prior to working in S W U areas and require notification of US DOE personnel prior to soil excavation activities. US DOE has installed fencing at PORTS in some areas to control entry of current on-site workers. Ohio EPA will continue to monitor these areas to ensure that workers are not exposed to potential contaminants in soil, sediment, or surface water.

13.3 SWMUs Requiring Remedial Alternatives

The alternatives chosen for the three SWMUs requiring remediation are summarized below.

13.3.1 X-231A and X-231B Oil Biodegradation Plots (soil only)

Ohio EPA's preferred alternative for the X-231A and X-231B Oil Biodegradation Plots is Alternative 4, Multimedia Caps. Alternative 4 consists of engineered caps that will meet the RCRA substantive requirements as noted in OAC 3745-67-80. Completion of all remedial

activities associated with this unit will meet the substantive requirements of RCRA as noted in the Ohio EPA's March 1999 DFF&Os for integration, Section VI, Paragraph 2. The caps, combined with berms and ditches, will direct surface water around the caps and into the drainage ditch that flows to the X-230K South Holding Pond. Although the caps will not meet the design requirements of a RCRA Subtitle C or D cap, they will limit surface water infiltration, thereby preventing or limiting contaminants from leaching to groundwater. Thus, based on the unique conditions and limitations at this SWMU, the caps will meet the RCRA substantive requirements of OAC 3745-67-80. Plant administrative controls will require excavation permits before excavation begins. Control measures such as silt fences, erosion control, and dust prevention will be implemented to ensure that environmental receptors and habitats surrounding PORTS are not affected by construction activities.

Alternative 4 will provide the best balance of trade-offs considering the criteria used to evaluate the alternatives presented in the CAS/CMS report. This alternative will be protective of human health and the environment in the short and long terms and is considered permanent as long as the integrity of the caps is maintained. US DOE will periodically inspect the caps to ensure that they are performing as required. This alternative also will meet ARARs, be cost-effective, and provide long-term effectiveness. This alternative may be modified as needed to ensure that the cleanup objectives for the SWMU are met.

13.3.2 Five-Unit Groundwater Investigative Area

Ohio EPA's preferred alternative for the Five-Unit Groundwater Investigative Area is Alternative 3, Groundwater Extraction. Alternative 3 will use the three existing extraction wells and require installation of an additional 11 conventional extraction wells throughout the contaminant plume. Extracted groundwater will be treated at the X-622 facility. In areas of the plume where TCE concentrations are predicted to fall below 5 μg/L, wells will be turned off at 5, 10, and 15 years to facilitate movement of contaminated groundwater to the wells still in operation. Extraction wells and their predicted periods of operation are summarized in Table 8.

Table 8
Extraction Wells and Periods of Operation
for Five-Unit Groundwater Investigative Area

Well Identification No.	0 to 5 Years	6 to 10 Years	11 to 15 Years	16 to 20 Years
EW-1	X			
EW-2	X	X		
EW-3	X			
EW-4	X	X		
EW-5	X			
EW-6	X			
EW-7	X	X		
EW-8	X	X		
EW-9	X	X	X	X
EW-10	X	X	X	X
EW-11	X	X	X	
X231B-PW10	X	X		
X-231B-PW11	X	X	X	
X231B-PW12	X	X		

Institutional controls will effectively prevent exposure of on-site workers during the time this alternative is in operation. Deed and land-use restrictions will limit future land use, place limitations on excavation depths, and prohibit development of groundwater for use as a potable water supply. The groundwater monitoring program will use existing monitoring wells to monitor contaminant fate and transport. Groundwater will be monitored at least semiannually or as needed during the start of the remedial process. The frequency of groundwater monitoring will be evaluated in the approved corrective measures implementation plan, and the monitoring results will be reported in the Integrated Groundwater Monitoring Annual Report for Quadrant I.

The IGWMP will include sampling parameters and frequency. The parameters and frequency of monitoring may change as remediation progresses.

Alternative 3 will provide the best balance of trade-offs considering the criteria used to evaluate the alternatives presented in the CASICMS report. Ohio EPA believes that this remedy will be protective of human health and the environment both in the short term and over the long term. This alternative will meet ARARs, be cost-effective, and provide long-term effectiveness. This alternative will meet RCRA substantive requirements noted in the March 1999 DFF&Os for integration, Section VI, Paragraph 2, when the remedial action objectives are met for groundwater.

Future Ground Water Monitoring

Groundwater in this area will continue to be monitored throughout the remedial process. Five years after the installation of the selected remedial alternative, (Groundwater Extraction), Ohio EPA in conjunction with US EPA will evaluate its effectiveness based on the data collected and submitted via the IGWMP as well as any other groundwater reports. If the selected remedy dies not reduce contaminant levels to below 5 parts per billion (ppb) in wells EW-1, EW-3, EW-5, and EW-6 as well as lower the concentration to below 100 ppb in wells EW-10, X-231B-PW12, EW-4, EW-8, and EW-7 as noted in the approved Quadrant I CAS/CMS Report, alternative remedial measures may be evaluated. Additional extraction wells may be required to expedite groundwater remediation. Ohio EPA and US EPA may also consider other additional alternatives which were not evaluated in the approved CAS/CMS Report.

13.3.3 X-749/X-120 Area Groundwater Plume

Ohio EPA's preferred alternative for the X-749/X-120 Area Groundwater Plume is Alternative 5, Phytoremediation. Alternative 5 consists of planting approximately 27.5 acres of hybrid poplar trees, constructing a barrier wall around the eastern and southern portion of the X-749 landfill, institutional controls, deed restrictions, operation of the X-749 and X-749B Peter Kiewit

collection trenches, and groundwater monitoring. The trees will be planted in seven separate areas, however, the selected remedy may require a phased tree planting approach to ensure proper tree growth. Trees will be initially planted east and southeast of the X-749 landfill area and monitored for good growth before the remaining six areas are planted. The phased approach in tree planting will not detract from the ultimate 30 year goal of Alternative 5. The X-749 and X-749B Peter Kiewit collection trenches surrounding the landfill will contain the groundwater plume in the immediate vicinity of the landfill. Groundwater in the trenches will be treated in an on-site groundwater treatment facility. Groundwater will continue to be monitored to insure that the remedy contains the plume on-site.

Alternative 5 is predicted to reduce the areal extent of the TCE plume exceeding the PRG to 270,000 ft^2 within 30 years. Phytoremediation uses the natural growth process of biological systems to attenuate and reduce contaminants in groundwater. During growth, the trees' root systems provide oxygen and sugar while uptaking groundwater minerals and contaminants. The sugars and oxygen serve as nutrients for bacteria in soil, and the enzymes produced during growth can break down and incorporate waste into new plant material. The bacteria, promoted by tree growth, aid in the biodegradation of contaminants By breaking down organic contaminants, the bacteria obtain carbon and energy to sustain reproduction and maintenance processes. The enzymes have demonstrated a capability for reducing chlorinated solvents such as TCE. Studies show that the root systems of the hybrid poplar reach 20 to 30 feet bgs and may uptake 50 to 350 gallons of water per tree per day.

Groundwater will continue to be monitored throughout the remediation process. Additional groundwater wells may be installed to monitor remediation progress. Groundwater will be monitored at least semiannually or as needed during the start of the remedial process. The frequency of groundwater monitoring will be evaluated in the approved corrective measures implementation plan, and the monitoring results will be reported in the IGWMP for Quadrant I. The IGWMP will include sampling parameters and frequency. The parameters and frequency of monitoring may change as remediation progresses.

Implementation of this alternative would have no adverse effects on wetlands, archaeological resources, cultural resources, or critical habitats of threatened or endangered species. Deed and land-use restrictions would limit future land use, place limitations on excavation depth, and prohibit development of groundwater for use as a potable water supply.

Alternative 5 will provide the best balance of trade-offs considering the criteria used to evaluate the alternatives presented in the CAS/CMS report. This alternative will be protective of human health and the environment in the short and long terms. This alternative also will meet ARARs, be cost-effective, and provide long-term effectiveness.

Future Groundwater Monitoring

Groundwater in this area will continue to be monitored throughout the remedial process. Five years after the installation of the first phase of trees to the east and south east of the plume groundwater data will be evaluated in this area to evaluate the effectiveness of the selected remedy, Phytoremediation. This five year evaluation will be conducted for each phase of the planting, throughout the life span of the remedy. Groundwater contaminant levels should show a decrease between 10 and 30 percent by the end of five years for each area planted. US DOE may be required to install pressure transducers in monitoring wells throughout the plume to demonstrate that the remedy is effectively interacting with the contaminated groundwater. Over time, should Phytoremediation fail to adequately address the plume in this area, alternative remedial measures may be evaluated such as bio-remediation, or groundwater extraction. Other alternatives not evaluated in the approved Quadrant I CAS/CMS Report may also be considered.

14.0 CONCURRENCE

US EPA has provided Ohio EPA with concurrence for all of the selected remedial alternatives for Quadrant I outlined above.

APPENDIX I - ARAR'S FOR THE QUADRANT I

1.0 INTRODUCTION

This appendix provides a discussion pertinent to federal and state applicable or relevant and appropriate requirements (ARARs) which may be considered for corrective measures proposed for the 5-Unit Groundwater Investigative Area, X-231A Southeast Oil Biodegradation Plot, X-231B Southwest Oil Biodegradation Plot, and the X-749/X-120 area located in Quadrant I at the Portsmouth Gaseous Diffusion Plant (PORTS) in Piketon, Ohio.

In the absence of federal- or state-promulgated regulations, certain criteria, advisories, guidance values, and proposed standards, although not legally binding, may serve to supplement an ARAR provision by providing useful guidance for setting protective cleanup levels. These are not potential ARARs but are **"to be considered" (TBC)** guidance.

2.0 REGULATORY HISTORY OF PORTS

A Cleanup Alternative Study/Corrective Measures Study (CAS/CMS) being conducted for PORTS is intended to develop alternatives for remediating hazardous and radioactive contamination present in PORTS groundwater and soil as a result of plant operations. PORTS, which is owned by the United States Department of Energy (U.S. DOE), currently enriches uranium for electrical power generation and until 1991 provided highly enriched uranium to the U.S. Navy.

The environmental restoration program at PORTS is the subject of two enforcement actions. The State of Ohio issued a Consent Decree August 31, 1989, requiring a CAS. An Administrative Order by Consent (AOC) between the U.S. Environmental Protection Agency (U.S. EPA) and DOE under the authority of Section 3008(h) of Resource Conservation and Recovery Act (RCRA) and Sections 104 and 106(a) of the CERCLA Act of 1980 was issued effective September 27, 1989, and amended May 11, 1994 and in August 1997. The U.S. EPA AOC includes requirements for a CMS for solid waste management units (SWMUs) that parallel requirements of the state of Ohio Consent Decree. Tasks in the AOC are patterned after the proposed RCRA corrective action process to be promulgated in Title 40 *Code of Federal Regulations* (CFR) Part 264 Subpart S. The AOC also suggests that CERCLA requirements be integrated into the corrective action process as ARARs or regulatory drivers to address releases of hazardous substances that are not hazardous waste. The intent of implementing CERCLA guidance at PORTS is to supplement policies and decisions not specifically included under RCRA.

CERCLA on-site remedial response actions must comply only with the substantive requirements of a regulation and not the administrative requirements to obtain federal, state, or local permits [CERCLA §121(e)]. To ensure that CERCLA response actions proceed as rapidly as possible, the U.S.

EPA has reaffirmed this position in the final National Contingency Plan (NCP) (55 Federal Register (FR) 8756). **Substantive requirements** pertain directly to the actions or conditions at a site. **Administrative requirements** facilitate the implementation of those substantive requirements. Although these administrative requirements are not ARARs under the CERCLA process, compliance with all administrative requirements (not summarized in this appendix) is necessary until PORTS is listed on the National Priorities List (NPL). Section 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with ARARs or standards under federal and state environmental laws.

3.0 DEFINITION OF TERMS

The terms defined in the following sections of the appendix are those essential to understanding the information in the appendix.

Applicable requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site" (40 CFR 300.5).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting 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" (40 CFR 300.5).

3.1 Chemical, Location, and Action-Specific ARARs

ARARs will govern remediation activities, generation and management of waste streams, and final disposition of waste streams. To-be-considered guidance will be integrated with ARARs as non-promulgated standards. The following paragraphs provide brief explanations of chemical-, location-, and action-specific ARARs.

3.2 Chemical-Specific ARARs

Chemical-specific requirements set health or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, pollutants, or contaminants (53 FR 51394). Although limited in number, chemical-specific standards have been established under several statutes, including RCRA, Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), and Clean Air Act (CAA). These requirements generally set protective cleanup levels for the chemicals of concern in the designated media or else indicate a safe level of discharge that may be incorporated when considering a specific remedial activity.

3.3 Location-Specific ARARs

Location-specific requirements set restrictions upon the concentration of hazardous substances or the conduct of activities solely because these substances or activities are in special locations (53 FR 51394). Location characteristics that trigger ARARs include the presence of sensitive resources such as wetlands, flood plains, cultural resources, historic sites, and endangered or threatened species.

3.4 Action-Specific ARARs

Performance, design, or other action-specific requirements set controls or restrictions on particular types of activities related to the management of hazardous waste (53 FR 51394). Selection of a particular remedial action at a site will invoke the appropriate action-specific ARARs. These ARARs may specify particular performance standards or technologies as well as specific environmental cleanup levels for discharged or residual chemicals remaining after treatment or following remedial activities.

4.0 ARARs STATUS

ARARs will govern the remediation activities, generation and management of waste streams, and final disposition of waste streams. To ensure protection of human health and the environment, and to ensure proper management of waste, the Ohio EPA and DOE are establishing a list of Federal and State of Ohio promulgated standards, requirements, and cleanup criteria that will be met during the implementation of the remedial activities. The Federal and State of Ohio promulgated standards, requirements, and cleanup criteria presented in Table B.1 include requirements from the Ohio Administrative Code (OAC), Ohio Revised Code (ORC), U.S. EPA Guidance, DOE Orders and Title 40 *Code of Federal Regulations* (CFR). To-be-considered (TBC) guidance will be integrated with ARARs as non-promulgated standards.

This list of ARARs is preliminary in nature and provides a broad spectrum of ARARs for consideration in the Preferred Plan. After the selected remedial action alternative for Quadrant I is chosen, a final list of ARARs will be negotiated and incorporated into the CMI. The preliminary list of ARARs and TBC guidance is presented in Table B.1.

[Note: a list of acronyms is included at the end of Table B.1.]

Table B.1 Preliminary ARARs for Quadrant I

Action	Requirement	Prerequisites	Citation
Historic Preservation (Location)	DOE must take into account the effect of an undertaking on Historic Properties and accord the Advisory Council on Historic Preservation a reasonable opportunity to comment. Historic properties are defined as any prehistoric or historic district, building, site, structure, or object included or eligible for inclusion in, the National Register of Historic Places.	This requirement will include the terms associated with artifacts, records, and persons released to and located within such properties. Historic properties that are to be substantially altered or demolished must be recorded for future use and reference - **applicable.**	National Historic Preservation Act 16 U.S.C. 470C (Federal) Consideration of Historic Properties 36 CFR Part 800
Archeological resource recovery and preservation (Action/Location)	Upon discovery that a project may cause irreparable loss, destruction, significant scientific finding, prehistoric finding, or loss of historical or archeological data, DOE must notify the Department of Interior in writing and provide appropriate information concerning the project. DOE must, with possible assistance from State Historical Preservation Officer (SHPO), undertake recovery, protection and preservation of the data. Prior to any Federal undertaking which may directly and adversely affect any National Historic Landmark, the Director of Ohio EPA of the responsible agency shall, to the extent possible, minimize the harm to such landmark.	No person shall excavate, remove, damage, or otherwise alter or deface or attempt to excavate, remove, damage, or otherwise alter or deface any archeological resource located on public lands unless such activity is pursuant to a permit. If an EPA activity may cause irreparable loss or destruction of significant scientific, prehistoric, historic, or archeological data, the responsible official or the Secretary of the Interior is authorized to undertake data recovery and preservation activities - **applicable.** [NOTE: The National Environmental Policy Act requires that federal projects be evaluated to consider adverse effects on archeological and historical sites.]	Archeological and Historic Preservation Act 16 U.S.C. 469, 470 Procedures for Implementing the National Environmental Policy Act (NEPA) 40 CFR 6.301(a),(h)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Protection of wetlands (Location)	Federal agencies conducting certain activities must avoid, to the extent possible, the adverse effects and impacts associated with destruction or loss of wetlands and to avoid support of new construction in wetlands when a practicable alternative exist.	Consideration will be given by DOE to protect wetlands associated with the area near the sites undergoing remediation in Quadrant I - **applicable.**	Procedure for Implementing NEPA 40 CFR 6.302(a) Executive Order 11990
Flood plain management (Location)	Federal agencies must evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects with the direct or indirect development of a floodplain.	DOE must consider floodplain areas located within or effected by the Quadrant I remedial action - **applicable.**	Procedures for Implementing NEPA 40 CFR 6.302(b) Executive Order 11988
Floodplain (Location)	The limits of solid waste placement and the leachate management system cannot be located in a regulatory floodplain, unless deemed necessary by the Director of Ohio EPA.	Measures will be taken to ensure that the regulatory requirements identified as applicable or relevant and appropriate under this regulation will be adhered to - **applicable.**	OAC 3745-27-20(c)(2)
Floodplain/wetlands (Location)	DOE shall exercise leadership and take action to: (1) avoid to the extent possible long- and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of floodplain and wetlands, and avoid direct and indirect support of floodplain and wetlands	DOE will 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. DOE will identify, evaluate, and as appropriate, implement alternative actions which may avoid or mitigate	DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR 1022.3(a),(b)(1),(2),(3),(5),(6),(c),(d),(e), 1022.5(b),(h), and 1022.11(a),(b),(c)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Floodplain/wetlands (Location) (Continued)	development wherever there is a practicable alternative. (2) incorporate floodplain management goals and wetlands protection considerations into its planning, regulatory, and decision-making processes and shall to the extent practicable: (a) reduce the hazard and risk of flood loss. (b) minimize the impact of floods on human safety, health and welfare. (c) restore and preserve natural and beneficial values served by the floodplain. (d) minimize the destruction, loss or degradation of wetlands. (e) preserve and enhance the natural and beneficial values of wetlands.	adverse floodplain/wetlands impacts. DOE will provide opportunity for early review of any plans or proposals for actions in floodplain and new construction in wetlands. DOE must consider wetlands and areas located within or effected by the Quadrant I remedial action - **applicable.**	
Best Management Practices Program (BMP) (Action)	BMP programs shall be developed in accordance with good engineering practices and: (1) be documented in a narrative form, including necessary plot plans, drawings, and maps, (2) establish specific objectives for the control of toxic and hazardous pollutants, and	The substantive portions of this regulation may apply to the remedial action(s) undertaken - **applicable.**	40 CFR 125.104 Subpart K

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Best Management Practices Program (BMP)(Action) (Continued)	(3) establish specific best management practices to meet the specific objectives for control of toxic and hazardous pollutants to the waters of the United States.		
Noise control (Action)	The public must be protected from noises that jeopardize health and welfare.	Because vehicles and equipment would be involved in certain aspects of the remedial action, all substantive requirements of the act are applicable - **applicable.**	Noise Control Act, as amended 42 U.S.C. 4901 et. seq. Noise Pollution and Abate Act 42 U.S.C. 7641
Solid waste closure regulations (RCRA Subtitle D Municipal) (Action)	RCRA Subtitle D regulations cover the location, operation, and closure of municipal solid waste landfills. Subpart F of 40 CFR 258 covers closure and post-closure.	The substantive portions of 40 CFR 258 Subpart F are identified due to capping requirements - **relevant and appropriate.**	RCRA Subtitle D Municipal Solid Waste Closure Regulations 40 CFR 258 Subpart F
RCRA corrective actions (Action)	The following promulgated requirements are Federal statutory requirements for RCRA corrective actions.	The remedial action(s) are being conducted pursuant to RCRA and CERCLA requirements - **applicable.**	RCRA Corrective Actions - Sections 3004(u), 3005(c)(3), 3008(h), and 7003
Radiation protection of public and environment (Chemical)	DOE Orders relating to radiation dose limit, as low as reasonably achievable policy, control of residual radioactive material, management and control of radioactive material, management and control of radioactive materials in liquid discharges, radiation	Management of any materials during remedial action(s) that are contaminated with radioactive compounds should consider the criteria and guidelines established in this DOE Order - **TBC.**	DOE Order 5400.5

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Radiation protection of public and environment (Chemical) (Continued)	protection of public and the environment, and derived concentration guides for radionuclides contain criteria and guidelines to be considered for management of radioactive material.		
Management of low-level radioactive waste (Chemical)	DOE Order 5820.2A states "low-level radioactive waste may be disposed by methods appropriate to achieve the performance objectives of the disposal facility." Low-level radioactive waste must be disposed of on-site, if possible.	Management of any materials that may be considered low-level radioactive waste should consider the criteria and guidelines established in this DOE Order. If on-site disposal capacity for LLW is insufficient, off-site disposal must be at another DOE facility. An exemption is required for disposal of LLW off-site - **TBC.**	DOE Order 5820.2A (III)
RCRA corrective actions (proposed regulations) (Action)	RCRA corrective actions are the proposed regulations identified for implementation.	The proposed Subpart S regulations pertaining to RCRA corrective actions are to be considered during remedial actions - **TBC.**	40 CFR 264 Subpart S
Mixed LLW (Chemical)	To ensure that inappropriate shipments of mixed waste are not occurring, the DOE Office of Environment Restoration and Waste Management issued a Performance Objective for Certification of Nonradioactive Hazardous Waste. In accordance with DOE Order 5820.2A, mixed waste is to be disposed of on the site where it was generated, if possible.	The basic premise of the performance objective is that no mixed waste is to be shipped off-site to a facility not specifically licensed for the radioactive component of the waste - **TBC.** The waste must be shipped to an off-site treatment/disposal facility holding both a RCRA permit and a NRC permit - **TBC.**	DOE Order 5820.20A

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
RCRA corrective action (Action)	Guidance from EPA on conducting RCRA corrective actions.	The RCRA Corrective Action Plan guidance is to be considered for the remedial action - **TBC.**	RCRA Corrective Action Plan OSWER Directive No. 9902.3-2A
Chemicals in drinking water (Solid Waste Disposal Facility) (Chemical)	A solid waste disposal facility shall not contaminate an underground drinking water source beyond the solid waste boundary (outermost perimeter of the waste). The concentration of chemicals shall not exceed background levels or listed maximum contaminant levels (MCLs), whichever is higher.	These requirements would be relevant and appropriate because the SWMUs contains several of the constituents and/or chemicals listed in the regulation - **relevant and appropriate.**	40 CFR 257.4
Classification of solid waste disposal facilities and practices (Chemical)	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.	The practices shall not result in the destruction or adverse modification of critical habitat of endangered or threatened species identified in 50 CFR Part 17 - **applicable.**	40 CFR 257.3-2
Endangered and threatened species and plants (Location)	All Federal agencies must ensure 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 conservation of a listed species within a defined critical habitat.	Additional requirements could apply if it is determined that the remedial action could adversely affect these species or their habitat - **applicable.**	Endangered Species Act 16 U.S.C. 1531, et. Seq. Endangered and Threatened Wildlife and Plants 50 CFR 17.21, 17.31, 17.61, 17.71 and 17.94 Interagency Cooperation-Endangered Species Act 50 CFR 402.01

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Sanitary landfill groundwater protection - Quality Assessment Program - Corrective Measures Program (Action)	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 program must be capable of determining concentration, rate, and extent of leachate constituents in groundwater, while evaluating all practical remediation measures capable of controlling and/or eliminating further release.	Establishes minimum requirements to ensure landfill operations are such that releases to groundwater are eliminated or minimized. Applies in order to ensure proper operation and maintenance is maintained at the unit, and that wells have been installed both upgradient and downgradient. Sampling and analysis procedures required by this rule shall be incorporated into site procedures - **relevant and appropriate.**	OAC 3745-27-10(B)(C)(D)(E)(F)
Use of wells for disposal - (Action)	It is prohibited to inject or re-inject material into the ground without the proper permits.	**Relevant and appropriate.**	OAC 3745-9-11
Final closure of sanitary landfill facilities (Action)	Final closure standards will require the closure of a landfill in a manner which minimizes the need for post-closure maintenance and minimizes post-closure release of leachate or explosive gases to air, soil, groundwater or surface water, specifies acceptable cap design, soil, barrier layer, granular drainage layer, soil and vegetative layer. Will also provide for use of comparable materials to those specified with approval of Director of Ohio EPA.	Although these requirements apply to new solid waste landfills being created on-site, any expansion of existing solid waste landfills on-site and any existing areas of contamination that are capped in place per the solid waste rules - **relevant and appropriate.**	OAC 3745-27-11(B)(G)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Sanitary landfill-explosive gas monitoring (Action/Chemical)	Establishes requirements for an explosive gas monitoring plan which is required for solid waste landfills. Specifies the minimum information required in such a plan, including detailed engineering plans, specifications, information on gas generation potential, sampling and monitoring procedures, etc. Establishes minimum threshold limits for implementation of contingency plans for remediation of explosive gas exceedences.	Pertains to any site which has had or will have putrescible solid waste placed on-site and which has a residence or other occupied structure located within 1000 feet of the emplaced solid waste - **relevant and appropriate.** Parameters and schedule for explosive gas monitoring must be identified for any disposal site where explosive gas may be a threat - **relevant and appropriate.**	OAC 3745-27-12 (A)(B)(D)(E)(K)(M)(N)(O) OAC 3745-27-12(I)(J)
Disturbance where hazardous or solid waste facility was operated (Action)	Requires that a detailed plan be provided to describe how any proposed filling, grading, excavation, building, drilling, or mining on land where a hazardous water facility or solid waste facility was operated will be accomplished. This information must demonstrate that proposed activities will not create a nuisance or adversely affect the public health or the environment. Special terms to conduct such activities may be imposed by the Director of Ohio EPA to protect the public and the environment.	Pertains to any site at which hazardous or solid waste has been managed, either intentionally or otherwise. Does not apply to areas that have had one-time leaks or spills - **relevant and appropriate.**	OAC 3745-27-13(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Post-closure care of sanitary landfill facilities (Action)	Specifies the required post-closure care for solid waste facilities. Includes continuing operation of any leachate or surface water management systems, maintenance of the cap systems, and groundwater monitoring.	Although these requirements apply to new solid waste landfills being created on-site, any expansion of existing solid waste landfills on-site and any existing areas of contamination that are capped in place per the solid waste rules are covered under these requirements. The requirement applies to ensure proper operation and maintenance is maintained at the unit - **relevant and appropriate.**	OAC 3745-27-14(A) 40 CFR 267.23
Ambient air quality standards and guidelines (Action/Chemical)	Establishes specific air quality standards for carbon monoxide, ozone, and non-methane hydrocarbons.	Pertains to any site that will emit carbon oxides, ozone or non-methane hydrocarbons. Considered for sites that will undergo water treatment, incineration and fuel burning [waste fuel recovery] - **applicable.**	OAC 3745-21-02(A)(B)
Methods of ambient air quality measurement (Action)	Specifies measurement methods to determine ambient air quality for the following constituents, carbon monoxide, ozone and non-methane hydrocarbons.	Pertains to any site which will emit carbon monoxide, ozone or non-methane hydrocarbons. Considered for sites where treatment systems will result in air emissions - **applicable.**	OAC 3745-21-03(B)(C)

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Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Exemptions to solid waste regulations (Action)	Defines exemptions to solid waste regulations and establishes limitations on temporary storage of putrescible waste or any solid waste which causes a nuisance or health hazard. Storage of putrescible waste beyond seven days is considered open dumping.	Pertains to any site at which waste will be managed. Consider especially for old landfills where solid waste may be excavated and/or consolidated - **applicable.**	OAC 3745-27-03(B)
Authorized, limited and prohibited solid waste disposal (Action)	Establishes allowable methods of solid waste disposal, sanitary landfill incineration, and composting. Prohibits management by open burning and open dumping.	Pertains to any site which solid wastes will be managed by open burning or open dumping - **applicable.**	OAC 3745-27-05(A)(B)(C)
Required technical information for sanitary landfills (Action)	Specifies the minimum technical information required of solid waste permit to install. Included are hydrogeologic investigation report, leachate production and migration information, surface water discharge information, design calculations and plan drawings.	This ARAR will present substantive requirements of a solid waste permit to install. Pertains to any new solid waste disposal facility created on-site and expansions of existing solid waste landfills. Pertains to existing areas of contamination that are capped per solid waste regulations. The regulations establish the minimum information required during the remedial design stage - **applicable.**	OAC 3745-27-06(B)(C)
Location criteria for solid waste disposal permit (Location)	Specifies the location(s) where solid waste landfills are not to be sited. Includes floodplains, sand or gravel pits, limestone or sandstone quarries, areas above sole source aquifers, wetlands, etc.	No new solid waste landfills and/or expansions of existing solid waste landfills will occur in certain unfavorable locations. Prohibits leaving waste in-place in certain unfavorable locations - **applicable.**	OAC 3745-27-07(A)(B)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Additional criteria for sanitary landfill approval (Action/Location)	Siting requirements with respect to geology, water supplies, occupied properties, parklands and mine subsidence areas.	Pertains to new sanitary landfills for solid waste disposal and expansions of existing facilities - **applicable.**	OAC 3745-27-07(D)(F)(G)(H)
Construction specifications for sanitary landfills (Action)	Specifies the minimum requirements for the soil/clay layers.	Pertains to any new solid waste disposal facility located on-site and any expansions to existing solid waste landfills. Requirements applicable to areas of contamination that are capped per solid waste regulations - **applicable.**	OAC 3745-27-08(C), (D thru H)
Sanitary landfill operations - leachate management, final cover, and surface waste management. (Action)	Includes requirements for the final cap system for areas at final elevations.	Although these requirements apply to new solid waste landfills being created on-site, any expansion of existing solid waste landfills on-site and any existing areas of contamination that are capped in place per the solid waste rules - **relevant and appropriate.**	OAC 3745-27-19(H)
	Surface water must be diverted from areas where solid waste is being, or has been, deposited. Also requires run-on and run-off to be controlled to minimize infiltration through the cover material and to minimize erosion of the cap system.	Pertains to new solid waste disposal facilities to be created on-site and existing landfills that will be expanded during remediation. Applies to existing areas of contamination that will be capped in-place per solid waste rules - **relevant and appropriate.**	OAC 3745-27-19(I)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Sanitary landfill operation - leachate management, fill cover, and surface water management. (Action)	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.	Applies in order to ensure that proper operation and maintenance is maintained at the unit - **relevant and appropriate.**	OAC 3745-27-19(K)
Sanitary landfill general operational requirements (Action)	Specifies general operations requirements for solid waste landfills. Includes preparation for operating during inclement weather; management to minimize dust and odors and vectors, etc.	Pertains to new solid waste disposal facilities to be created on-site and existing landfills that will be expanded during remediation. Applies to existing areas of contamination that will be capped in-place per solid waste rules - **applicable.**	OAC 3745-27-19(E)(J)
Sanitary landfill operations construction compliance (Action)	The owner or operator must implement measures to attain compliance with the requirements of the regulations in the event that testing indicates that a component or portion of the landfill has not been constructed in accordance with the regulations.	Pertains to new solid waste disposal facilities to be created on-site and existing landfills that will be expanded during remediation. Requirements also pertain to construction of final cover systems - **applicable.**	OAC 3745-27-19D(2)
Sanitary landfill operations daily and intermediate cover (Action)	Includes requirements for daily cover and intermediate cover for temporary inactive areas.	Pertains to new solid waste disposal facilities to be created on-site and existing landfills that will be expanded during remediation - **relevant and appropriate.**	OAC 3745-27-19(F)(G)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Permit information required for all hazardous waste facilities (Action)	Establishes the substantive hazardous waste land disposal permit requirements necessary for Ohio EPA to determine compliance. Includes information such as facility description, waste characteristics, equipment descriptions, and contingency plan, etc.	Pertains to any site which will have treatment, storage or disposal of hazardous waste contamination on-site that will be capped in-place. - relevant and appropriate.	OAC 3745-50-44(A)
Permit information required for all hazardous waste land disposal facilities (Action)	Establishes the substantive hazardous waste land disposal permit requirements necessary for Ohio EPA to determine adequate protection of the groundwater. Includes information such as groundwater monitoring data, information on interconnecting aquifers, plumes of contamination and plans and reports on the condition of the groundwater monitoring program.	Pertains to any facility which will have hazardous waste disposed of on-site or has existing areas of hazardous waste contamination on-site that will be capped in-place - applicable.	OAC 3745-50-44(B)
Permit information: hazardous waste storage/treatment in containers (Action)	Substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of container storage. Includes information such as containment systems, detailed drawings, etc. See also OAC 3745-55-70 through 3745-55-78 for additional container requirements.	Pertains to sites which will have hazardous waste stored on-site in containers (i.e., waste and contaminated soils that are stored prior to treatment or disposal) - applicable.	OAC 3745-50-44C(1)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Permit information: hazardous waste storage/treatment in tanks (Action)	Substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of tank treatment and storage units. Includes information such as assessment of structural integrity, detailed plans of tank systems etc. See also OAC 3745-55-90 through 3745-55-99 for additional container requirements.	Pertains to sites which will have hazardous waste stored on-site in tanks (i.e., storage prior to treatment or disposal) - **applicable.**	OAC 3745-50-44C(2)
Permit information: hazardous waste storage/treatment in Surface Impoundments (Action)	Surface impoundments requirements necessary for Ohio EPA to determine adequacy of waste piles 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.	Pertains to sites which have hazardous waste stored on-site in surface impoundments - **applicable.**	OAC 3745-50-44C(3)
Permit information: hazardous waste storage/treatment in Waste Piles (Action)	Substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of waste piles 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.	Pertains to sites which will have hazardous waste stored on-site in waste piles - **applicable.**	OAC 3745-50-44C(4)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Permit information: hazardous waste treatment/disposal by land treatment (Action)	Substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of land treatment to treat or dispose of hazardous waste. Includes information such as waste characteristics, detailed design measure to maximize treatment, dimensions of treatment zone, design of unit, etc. See also OAC 3745-56-70 through 3745-56-83 for additional surface impoundment requirements.	Pertains to sites in which treatment will be used to treat or dispose of hazardous waste stored on-site via land treatment - **applicable.**	OAC 3745-50-44C(5)
Permit information: environmental performance standards (Action)	Substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of surface impoundments, waste piles, land treatment units, landfills, and underground injection wells used to treat, store, or dispose of hazardous waste. Includes information such as waste characteristics, detailed design plans and reports, control of run-on and run-off, closure information, etc. See also OAC 3745-57-01 for additional requirements.	Pertains to sites at which hazardous waste will be or has been stored, treated, or disposed of in surface impoundments, waste piles, land treatment units, landfills, or underground injection wells - **applicable.**	OAC 3745-50-44C(6)
Hazardous waste facility permit conditions (Action)	Establishes general permit conditions applied to all hazardous waste facilities in Ohio. Includes O&M, site access, etc.	Pertains to all alternatives that will incorporate treatment, storage and disposal of hazardous waste - **applicable.**	OAC 3745-50-58(E)(I)(J)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Security for hazardous waste facilities (Action)	Hazardous waste facilities must have security that prevents unauthorized visitors from entering the site.	Pertains to all sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-14(A)(B)(C)
Inspection requirements for hazardous waste facilities (Action)	Hazardous waste facilities must be inspected regularly to detect malfunctions, deteriorations, operational errors and discharges. Any malfunctions or deteriorations detected shall be remediated expeditiously.	Pertains to all sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-15(A)(C)
Hazardous Waste Rule: Personnel Training (Action)	Ensures that personnel of a hazardous waste permitted facility completes formalized training in operational and emergency procedures.	Personnel are required to participate in an annual review of the initial training. Records of training must be maintained at least three years from date employee last worked at the facility - **relevant and appropriate.**	OAC 3745-54-16
Requirements for ignitable, reactive, or incompatible hazardous waste (Action, Location)	Precautions will be taken to prevent accidental ignition or reaction of ignitable, reactive or incompatible waste.	Pertains to any sites at which potentially reactive, ignitable or incompatible waste are present - **relevant and appropriate.**	OAC 3745-54-17(A)(B)(C)
Location standards for hazardous waste TSD facilities (Action)	Prohibits the siting of hazardous waste facilities in areas of seismic activity or floodplains.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-18(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Design and operation of hazardous waste facilities (Action)	Hazardous waste facilities must be designed to prevent the possibility of fire, explosion or release of hazardous waste or hazardous constituents to the air, soil, or surface water.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-31
Required equipment for hazardous waste facilities (Action)	Hazardous waste facilities must be equipped with emergency equipment, such as alarm systems, fire control equipment, and a telephone or radio.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-32(A)(B)(C)(D)
Testing and maintenance of equipment: hazardous waste facilities (Action)	The emergency equipment will be tested and maintained in good working condition.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-33
Access to communications or alarm systems: hazardous waste facilities (Action)	When handling hazardous waste, all personnel shall have immediate access to an internal alarm or emergency communication device.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-34
Required aisle space at hazardous waste facilities (Action)	Adequate aisle space shall be maintained to allow unobstructed movement of personnel, fire equipment, spill control and decontamination equipment into any area of the facility operation in the event of an emergency.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of. Considered for sites where waste will be stored in containers - **relevant and appropriate.**	OAC 3745-54-35

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Arrangements/agreements with local authorities (Action)	Arrangements/agreements with local authorities, such as police, fire department and emergency response teams must be made. Documentation of the cooperation or non-cooperation of the local authorities should be recorded.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-37(A)(B)
Content of Contingency Plan: hazardous waste facilities (Action)	Unplanned releases of hazardous waste or hazardous constituents into the air, soil, or surface water must be addressed in a Contingency Plan.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-52(A) thru (F)
Copies of the Contingency Plan: hazardous waste facilities (Action)	Per OAC 3745-54-50, copies of the Contingency Plan must be maintained at the facility and submitted to the police, fire department, hospitals and local emergency response teams and the Ohio EPA. The Contingency Plan will be amended if it fails in an emergency. Also, the Contingency Plan will be amended if, the facility changes in its design, construction, maintenance or operation, or if the list of emergency coordinators and/or equipment changes.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-53(A)(B) OAC 3745-54-54(A)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Emergency Coordinator: hazardous waste facilities (Action)	There should be at least one employee either on the premises or on call at all times to coordinate all emergency response measures.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-55
Emergency procedures: hazardous waste facilities (Action)	The regulations specifies the procedures to be followed in the case of an emergency.	Pertains to any sites at which hazardous waste is to be treated, stored, or disposed or has been disposed of - **relevant and appropriate.**	OAC 3745-54-56(A) thru (I)
Design and operating requirements for waste piles (Action)	The requirement specifies the design and operation requirements for waste piles, includes liner systems, leachate collection and removal system, wind dispersal prevention and run-on and run-off.	Pertains to any site at which hazardous waste will be either stored or treated in waste piles - **relevant and appropriate.**	OAC 3745-56-51(A) thru (F)
Monitoring and inspection of waste piles (Action)	Waste piles must be monitored during construction or installation and operation.	Pertains to any site at which hazardous waste will be either stored or treated in waste piles - **relevant and appropriate.**	OAC 3745-56-54(A)(B)
Waste pile requirements for ignitable/reactive waste (Action/Chemical)	Precautions taken when dealing with potentially ignitable or reactive hazardous waste that are stored or treated in waste piles.	Pertains to any site at which potentially ignitable or reactive hazardous waste will be either stored or treated in waste piles - **relevant and appropriate.**	OAC 3745-56-56(A)(B)
Waste pile requirements for incompatible waste piles (Action/Chemical)	Precautions taken when dealing with potentially incompatible waste that are stored or treated in waste piles.	Pertains to any site at which potentially incompatible waste will be either stored or treated in waste piles - **relevant and appropriate.**	OAC 3745-56-57(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Closure and post-closure care for waste piles (Action)	Specifically identifies the closure and post-closure care requirements for waste piles.	Pertains to any site at which hazardous waste will be either stored or treated in waste piles - **applicable.**	OAC 3745-56-58(A)(B)(C)
Construction inspections for waste piles (Action)	Allows Ohio EPA the opportunity to inspect waste piles during construction.	Pertains to any site at which hazardous waste will be either stored or treated in waste piles - **relevant and appropriate.**	OAC 3745-56-59(A)
Landfill design and operating requirements (Action)	Specifies design and operating requirements for landfills, includes liner and leachate collection and removal; includes run-on and run-off, etc.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. These requirements address existing land-based areas of contamination - **relevant and appropriate.**	OAC 3745-57-03(A) thru (I)
Monitoring and inspection of landfills (Action)	Requires inspection of landfills during construction or installation and operation.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. These requirements address existing land-based areas of contamination - **relevant and appropriate.**	OAC 3745-57-05(A)(B)
Landfill requirements for ignitable/reactive waste (Action/Chemical)	Prohibits the disposal of ignitable or reactive waste in a landfill, unless the waste is treated, rendered or mixed so that the resultant material no longer meets the definition of ignitable or reactive waste.	Pertains to all sites at which ignitable or reactive hazardous waste may be landfilled - **relevant and appropriate.**	OAC 3745-57-12(A)(B)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Landfill requirements for incompatible waste piles (Action/Chemical)	Prohibits the disposal of incompatible waste in the same cell of a landfill.	Pertains to all sites at which incompatible waste may be landfilled - **relevant and appropriate.**	OAC 3745-57-13
Landfill requirements for bulk and containerized liquids (Action)	The placement of bulk or non-containerized liquid hazardous waste or hazardous waste containing free liquids (whether or not absorbents have been added) in any landfill is prohibited.	Pertains to all sites at which a liquid hazardous waste containing free liquids are considered for landfills - **relevant and appropriate.**	OAC 3745-57-14(A) thru (D)
Landfill requirements for containers (Action)	Unless they are very small containers, they must be at least 90% full when placed in the landfill or crushed/shredded prior to placement in the landfill.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded and containers are to be disposed of in the landfill - **relevant and appropriate.**	OAC 3745-57-15(A)(B)
Disposal of small containers of hazardous waste in overpacks (Action)	Lab packs containing hazardous waste may be placed in a landfill if certain requirements are met.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded and lab packs are to be disposed of in the landfill - **relevant and appropriate.**	OAC 3745-57-16(A) thru (E)
Construction inspections for landfills (Action)	Allows Ohio EPA the opportunity to inspect landfills during construction.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. Pertains to existing land-based areas of contamination - **applicable.**	OAC 3745-57-17(A)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Environmental performance standards for miscellaneous units (Action/Chemical)	Establishes location, design, construction, operation and maintenance, and closure requirements for miscellaneous units used to treat, store or dispose of hazardous waste.	Pertains to any alternative that incorporates treatment, storage or disposal of hazardous waste in miscellaneous units - **relevant and appropriate.**	OAC 3745-57-91(A)(B)(C)
Water/air permit criteria for decision by the Director of Ohio EPA (Action)	A permit to install (PTI) or plans must demonstrate best available technology (BAT) and shall not interfere with or prevent that attainment or maintenance of applicable air quality standards.	Pertains to any site that will discharge to on-site surface water or will emit contaminants into the air. Surface water may be discharged to waters of the state before and after construction in accordance with the CWA requirements - **applicable.**	OAC 3745-31-05
Water quality criteria for decision by the Director of Ohio EPA (Action)	Specifies substantive requirement and criteria for Section 401 water quality criteria for dredging, filling, obstructing or altering waters of the state.	Pertains to any site that has or will affect waters of the state. The potential exist for discharge to waters of the state before or after construction in accordance with the CWA requirements. There is also a possibility that the remedial alternative chosen may require state waterways to be altered - **applicable.**	OAC 3745-32-05
Monitoring frequency for radioactivity (Chemical)	Presents monitoring requirements for radioactivity.	Pertains to any site which has contaminated groundwater or surface water that is either being used, or has the potential for use, as a drinking water source - **applicable.**	OAC 3745-81-26(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Location of new groundwater wells (Action/Location)	Maintains that groundwater wells be: (1) located and maintained so as to prevent contaminants from entering well (2) located as to be accessible for cleaning and maintenance.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975. Would pertain to new wells constructed for treatability studies during Feasibility Studies - **relevant and appropriate.**	OAC 3745-9-04(A)(B)
Construction of new groundwater wells (Action)	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, and contaminant entry.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975. Would pertain to new wells constructed for treatability studies during Feasibility Studies - **relevant and appropriate.**	OAC 3745-9-05(A)1, (B) thru (H)
	Establishes specific requirements for well casings, such as suitable material, diameters and condition.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975. Would pertain to new wells constructed for treatability studies during Feasibility Studies - **relevant and appropriate.**	OAC 3745-9-06(A)(B)(D)(E)
Surface design of new groundwater wells (Action)	Establishes specific surface design requirements, such as height above ground, well vents, well pumps, etc.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975. Would pertain to new wells constructed for treatability studies during Feasibility Studies - **relevant and appropriate.**	OAC 3745-9-07(A) thru (F)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Start-up and operation of groundwater wells (Action)	Requires the disinfection of new wells and use of potable water for priming pumps.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975. Would pertain to new wells constructed for treatability studies during Feasibility Studies - **relevant and appropriate.**	OAC 3745-9-08(A)(C)
Maintenance and operation of new groundwater wells (Action)	Establishes specific maintenance and modification requirements for casing, pump, and wells in general.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975. Would pertain to new wells constructed for treatability studies during Feasibility Studies - **relevant and appropriate.**	OAC 3745-9-09(A) thru (C), D(1), (E) thru (G)
Abandonment of test holes and wells (Action)	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.	Applies to the installation of groundwater monitoring well(s) to prevent the contamination of the well. Water well standards are incorporated into PORTS SOPs - **relevant and appropriate.**	OAC 3745-9-10(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Endangered plant species (Location)	Prohibits removal or destruction of endangered plant species. No person shall root up, injure, destroy, remove 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.	Applies to remediation sites where chemicals may harm endangered species. Clearly establishes that receptor plant species must be considered in risk assessments. This act may require consideration for displacement of large volumes of surface soils. Appropriate action will be taken in the event that an endangered or threatened species is discovered - **applicable.**	OAC 1501-18-1(03)(A) ORC 1518.02
Endangered animal species (Location)	No person shall take or possess any native species of wild animal, or any eggs or offspring thereof, that is threatened with site-wide extinction.	Applies to remediation sites where chemicals may harm endangered species. May apply at sites where remediation could disturb existing habitats - **applicable.**	OAC 1501-31-23(01) OAC 1501-31-23(A) thru (B) ORC 1531.25
Standard for active asbestos waste site (Action/Chemical)	Establishes operating standards for an active asbestos waste disposal site.	Pertains to sites where asbestos has come to be located and must be consolidated on-site. The remedial action undertaken will implement control measures to prevent disturbance and release to the atmosphere of any asbestos containing material - **applicable.**	OAC 3745-20-06(A)(B)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Standard for inactive asbestos waste site (Action/Chemical)	Establishes operating standards for an inactive asbestos waste disposal site.	Pertains to sites where asbestos has been located. This requirement will also consider inadequate cover or areas where asbestos will be consolidated. The remedial action undertaken will implement control measures to prevent disturbance and release to the atmosphere of any asbestos containing material - **applicable.**	OAC 3745-20-07(A)(B)(C)
Institutional controls (Action)	Controls recommended include restrictions on land use, deed restrictions, well drilling prohibitions, well use advisories, and deed notices.	Long-term management of contamination left in place - **applicable.**	40 CFR 300.430(e)(3)
	Controls include but are not limited to periodic monitoring, appropriate shielding, physical barriers (i.e., fences, warning signs) to prevent access, inspection and repair of coverings, temporary dikes, drainage courses, and appropriate radiological safety measures to ensure protection during activities at the site.	Interim management of residual radioactive material above guidelines, including but not limited to that material left in accessible locations - **TBC.**	DOE Order 5400.5(IV)(6)(c)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Groundwater protection: (applicability) (Action)	The groundwater program, including monitoring requirements and associated activities will be consistent with the PORTS groundwater protection program, remedial action objectives (RAOs), and selected remedial alternative(s).	The selected remedial alternative will be designed to achieve regulatory compliance with the established groundwater protection standard(s) - **applicable.**	OAC 3745-54-90
Operational - groundwater protection (Action)	Requires the establishment of detection, compliance, and corrective action monitoring program to ensure protection of groundwater by assessing the performance of the TSD facility during operation.	The groundwater monitoring program is required to be performed during the post-closure period for land disposal facilities where hazardous waste remain after closure. The post-closure monitoring needs to be conducted for a period of 30 years unless the regulatory agency approves an earlier termination date or requires that monitoring period be extended - **applicable.**	40 CFR 264, (all applicable requirements of Subpart F - OAC 3745-54-91 thru 3745-54-99)
Groundwater corrective action program (Action/Chemical)	Presents the requirements of a groundwater corrective action program that prevents hazardous constituents from exceeding their respective concentration limits at compliance point either by removal or treatment of the constituents.	Remedial action is currently being conducted or being developed to address the contaminants and/or constituents in groundwater at PORTS which exceed their concentration limits - **relevant and appropriate.**	OAC 3745-55-01

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Content of closure plan: hazardous waste facilities (Action)	Specifies the minimum information required in a closure plan for Ohio EPA to determine the adequacy of the plan.	The substantive requirements will pertain to any site at which hazardous waste is to be treated, stored, or disposed of, or has been treated, stored or disposed of - **relevant and appropriate.**	OAC 3745-55-12(B)
Post-closure plan (Action)	Specifies the minimum information necessary for Ohio EPA to determine the adequacy of the closure plan.	Pertains to all sites with land-based hazardous waste units (landfills and surface impoundments, waste piles, land treatment units and tanks) that meet requirements of landfills after closure. This includes existing land-based areas of contamination - **relevant and appropriate.**	OAC 3745-55-18(B)
Notice to local land authority (Action)	Requires that a record of the type, location, and quantity of hazardous waste disposed in each unit be submitted to the local land authority and the Director of Ohio EPA. A notation on the deed to the property be made indicating that the land was used to manage hazardous waste and that certain use restrictions may apply to the property.	Pertains to all sites with land-based hazardous waste units (landfills and surface impoundments, waste piles, land treatment units and tanks) that meet requirements of landfills after closure. This includes existing land-based areas of contamination - **relevant and appropriate.**	OAC 3745-55-19(B)
Water quality certification (Action)	Specifies substantive criteria for Section 401 water quality criteria for dredging, filling, obstructing or altering waters of the state.	During and/or after construction resulting from remedial action(s), surface water may be discharged to waters of the state - **applicable.**	OAC 3745-32-05

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Acts of pollution prohibited (Action)	Pollution of waters of the state will be prohibited. Establishes regulations requiring compliance with national effluent standards which may have a point source discharge.	Pertains to any site which has contaminated on-site groundwater or surface water or will have a discharge to on-site surface water or groundwater - **applicable.**	OAC 6111.04 OAC 6111.04.2
The "Five Freedoms" for surface water (Chemical)	All surface water of the state shall be free from: (1) objectional suspended solids (2) floating debris, oil, and scum (3) materials that create a nuisance (4) toxic, harmful, or lethal substances (5) nutrients that create nuisance growth.	Pertains to both discharges to surface water and any on-site surface waters affected by site conditions during and/or after remedial action(s) - **applicable.**	OAC 3745-1-04(A)(B)(C)(D)(E)
Antidegradation policy for surface water (Chemical)	Prevents degradation of surface water quality below designated use or existing water quality. Existing instream uses shall be maintained and protected. The most stringent controls for treatment shall be required by the Director of Ohio EPA to be employed for all new and existing point source discharges. Prevents any degradation of "State Resource Waters".	Requires that best available technology (BAT) be used to treat surface water discharges. This requirement may be applied to set standards when existing water quality is better than the designated use - **relevant and appropriate.**	OAC 3745-1-05(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Mixing zone for surface water (Chemical)	Presents the criteria for establishing non-thermal mixing zones for point source discharges, and presents the criteria for establishing thermal mixing zones.	This requirement would pertain to an alternative which could result in a point source discharge to waters of the state or when establishing an alternative discharge point - **applicable.**	OAC 3745-1-06(A)(B)
Water quality standards and criteria (Action)	Specifies analytical methods and collection procedures for surface water discharges.	Surface water may be discharged into waters of the state during remedial actions. The required analytical and collection techniques are to be incorporated into the site standard operating procedures (SOPs) - **applicable.**	OAC 3745-1-03 40 CFR Part 136
	May be applicable to pollutants which do not have specific numerical or narrative criteria identified in Tables 7-1 thru 7-15 of this rule.	Surface water may be discharged into waters of the state during remedial action. Pertains to both discharges to surface waters as a result of the remedial action and any surface waters affected by site conditions - **applicable.**	OAC 3745-1-07(C)
Water use designation for Scioto River (Action/Location)	Establishes water use designations for stream segments within the Scioto River Basin.	Pertinent if stream or stream segment is on-site and is either affected by site conditions or if selected remedial alternative includes direct discharge. Waste load allocations may have to be established and/or modified - **applicable.**	OAC 3745-1-09

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Stormwater discharge associated with industrial activity (Action)	A discharge composed entirely of stormwater associated with industrial activities is required to obtain a NPDES permit. These categories of facilities are considered engaging in "industrial activity": (1) Landfills, land application sites, and open dumps that receive or have received any industrial waste (waste that is received from any of the facilities described under this section) including those that are subject to regulation under Subtitle D of RCRA. (2) also includes construction activities including clearing, grading, and excavation activities that disturbs five acres or more of total area.	Sediment and erosion controls and BMP must be used to control run-off from installation and construction activities. Control of stormwater discharge associated with construction activities at industrial sites that result in a disturbance of greater than five acres of total land area - **applicable.** For those sites with less than five acres affected - **relevant and appropriate.**	40 CFR 122.26(a)(1)(ii) 40 CFR 122.26(b)(14)(v)(x)
Water pollution control (Action)	No discharge to waters of the state that will exceed discharge limits presented in the NPDES Permit shall occur. All discharges to waters of the state resulting from treatment systems such as a pump-and-treat system will meet the substantive requirements for discharge permits.	Prohibits failure to comply with requirements of sections 6111.01 to 6111.08 or any rules, permit or order issued under those sections - **applicable.**	ORC 6111.07(A)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
"Digging" where hazardous or solid waste facility was located (Action/Location)	Filling, grading, excavating, building, drilling or mining on land where a hazardous or solid waste facility was operated is prohibited without prior authorization from the Director of Ohio EPA.	Pertains to any site at which hazardous or solid waste has come to be located. Certain alternatives include potential excavation activities which may uncover solid and/or hazardous waste. Should remedial activities require the management of such waste, an exemption to permitting and other requirements may be warranted - **applicable.**	ORC 3734.02(H)
Exemptions to solid and hazardous waste TSD requirements (Action)	Provides authority and conditions by which the Director of the Ohio EPA may exempt any person from permitting or other requirements governing the generation, storage, treatment, transport or disposal of solid or hazardous waste.	Pertains to any site at which solid or hazardous waste has come to be located. Certain alternatives include excavation activities which may uncover solid and/or hazardous waste. Should remedial activities require the management of solid or hazardous waste on-site than an exemption to permitting and other requirements may be warranted - **applicable.**	ORC 3734.02(G)
Air emissions from hazardous waste facilities (Action/Chemical)	No hazardous waste facility shall emit any particulate matter, dust, fumes, smoke, vapor or odorous substance that interfere with the comfortable enjoyment of life or property.	Pertains to any site at which hazardous waste will be managed or where air emissions may occur. Consider sites that will undergo movement of earth or incineration - **applicable.**	ORC 3734.02(I)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Handling low-level radioactive waste prohibited (Action/Chemical)	Prohibits commingling of low-level radioactive waste with any other type of solid waste, hazardous waste or infectious waste. No owner or operator of a solid, infectious or hazardous waste facility shall accept radioactive waste for transfer, storage, treatment or disposal.	Pertains to all sites at which low-level radioactive waste has come to be located - **applicable.**	ORC 3734.02.7(A)(B)
Prohibits open burning or dumping (Action/Location)	Prohibits open burning or open dumping of solid waste or treated or untreated infectious waste.	Pertains to any site at which solid waste has come to be located or will be generated during remedial action - **applicable.**	ORC 3734.03
Hazardous waste facility environmental impact (Action/Location)	A hazardous waste facility installation and operation permit shall not be approved unless it proves that the facility represents the minimum adverse environmental impact, considering the state of available technology, the nature and economics of various alternatives and other pertinent considerations.	Pertains to any site at which solid waste has come to be located and/or at which hazardous waste will be treated, stored or disposed of. May be used as siting criteria - **applicable.**	ORC 3734.05D(6)(c)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Hazardous waste siting criteria (Action/Location)	A hazardous waste facility installation and operation permit shall not be approved unless it proves that the facility represents the minimum risk of all of the following: (1) contamination of groundwater (2) fires and explosions from the treatment, storage and disposal methods (3) accident during transportation (4) impact on public health and safety (5) air pollution (6) soil contamination	Pertains to any site at which hazardous waste has come to be located and/or at which hazardous waste will be treated, stored or disposed of. May be used as siting criteria - **applicable.**	ORC 3734.05D(6)(d)
Hazardous waste siting criteria (Action/Location)	Prohibits the following locations for treatment, storage or disposal of acute hazardous waste: (1) within 2000 feet of a residence, school, hospital, jail or prison (2) any naturally occurring wetland (3) any flood hazard area (4) within any state park, national park or recreation area	Pertains to any site at which hazardous waste has come to be located and/or at which hazardous waste will be treated, stored or disposed of. May be used as siting criteria - **applicable.**	ORC 3734.05(g)(h)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Conditions for disposal of acute hazardous waste (Action/Chemical)	Prohibits the disposal of acute hazardous waste unless it: (1) cannot be treated, recycled or destroyed (2) has been reduced to its lowest level of toxicity (3) has been completely encapsulated or protected to prevent leaching	Pertains to any site at which acute hazardous waste has come to be located - **applicable.**	ORC 3734.14.1
Explosive gas monitoring (Action/Location)	Several SWMUs may require explosive gas monitoring plans prior to any construction activities. The Director of Ohio EPA may order an owner or operator of a facility to implement an explosive gas monitoring and reporting plan should one not already be established.	Pertains to sanitary landfills except for those that dispose of non-putrescible waste - **relevant and appropriate.**	ORC 3734.04.1
Protection of human health and the environment (Action)	The Director of the Ohio EPA shall adopt and may modify, suspend, or repeal rules for 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, or create a health hazard, or violate 40 CFR 237.3-2 or 257.3-8.	A waiver for this requirement may be required - **relevant and appropriate.**	ORC 3734.02(A)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Additional permit information: hazardous waste TSD in miscellaneous units (Action)	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 3745-57-90 to 3745-57-93 for additional requirements for miscellaneous units.	Pertains to sites where hazardous waste may be stored, treated or disposed in miscellaneous units. This requirement will apply to ensure that proper operation and maintenance is maintained at the unit - **relevant and appropriate.** [NOTE: This requirement will be fulfilled through the CMS/CMI process including and not limited to the remedial design phase.]	OAC 3745-50-44(C)(9)
Waste determination and hazardous waste analysis (Action/Chemical)	Any person who generates a solid waste must determine if that waste is hazardous by using procedures identified in 40 CFR 262.11. An overview of the hazardous waste determination procedures is presented in 40 CFR 260 Appendix I.	The specific project will assess the selected alternative for hazardous waste by reviewing the RFI database, reviewing process/historical records, and performing sampling and analysis (as required). A task-specific sampling and analysis plan will be developed to guide the required waste characterization activities - **applicable.**	OAC 3745-52-11 OAC 3745-54-13
Hazardous waste container management (Action)	Containers of RCRA hazardous waste will be: (1) maintained in good condition, (2) compatible with other waste streams to be stored, (3) closed during storage, and (4) managed to prevent spills or rupture.	During the remedial action, containers of various types of waste streams could be generated. Containers will be inspected and records of the inspections will be kept. Containers will be stored per applicable containment requirements - **relevant and appropriate.**	OAC 3745-55-71, 73 to 78

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Residues of hazardous waste in empty containers (Action)	Exempts residues from empty containers when these residues have resulted from remedial action alternatives requiring storage of containers on-site.	Pertains to any alternative that incorporates storage of hazardous waste on-site in containers - **relevant and appropriate.**	OAC 3745-51-07
Compatibility of hazardous waste with containers (Action)	Containers holding hazardous waste must not react with the container material or liner material.	Pertains to any site at which hazardous waste will be stored in containers. The requirement is being considered relevant and appropriate because hazardous waste pending analysis may be stored at the remediation site - **relevant and appropriate.**	OAC 3745-55-72
Hazardous waste accumulation time (Action)	A generator may accumulate hazardous waste on-site for 90 days or less without a permit or without having interim status.	During the remedial action, various waste streams could be generated, segregated, and temporarily staged pending analysis. The containers will be managed accordingly until disposal. The applicable requirements will be adhered to - **relevant and appropriate.**	OAC 3745-52-34

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
General closure performance standard: hazardous waste facilities (Action)	Requires that all hazardous waste facilities be closed in a manner that minimizes the need for further maintenance, controls, minimizes, eliminates or prevents post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off or hazardous waste decomposition products to the ground or surface water or the atmosphere.	Pertains to any site at which hazardous waste is to be treated, stored, or disposed of or has been treated, stored, or disposed of - **applicable.**	OAC-3745-55-11(A)(B)(C)
Inspection of tank systems (Action)	Inspections will be performed once each operating day.	Pertains to any site at which hazardous waste will be either treated or stored in tanks - **relevant and appropriate.**	OAC 3745-55-95(A)(B)(C)(D)
Response to leaks or spills of tank systems (Action)	Tanks should not be used if they are not in good condition to prevent releases. Major repairs must be certified by a P.E.	Pertains to any site at which hazardous waste will be either treated or stored in tanks - **relevant and appropriate.**	OAC 3745-55-96(A) thru (E)
Tank requirements for reactive/ignitable waste (Action)	Precautions will be taken to prevent accidental ignition or reaction of ignitable or reactive waste that are treated or stored in tanks.	Pertains to any site at which ignitable or reactive waste will either be treated or stored in tanks - **relevant and appropriate.**	OAC 3745-55-98
Tank requirements for incompatible waste (Action)	Precautions will be taken when dealing with incompatible waste that are treated or stored in tanks.	Pertains to any site at which incompatible waste will either be treated or stored in tanks - **relevant and appropriate.**	OAC 3745-55-99(A)(B)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Disposal/decontamination of equipment, structures and soils (Action)	Requires that all contaminated equipment, structures and soils be properly disposed of or decontaminated.	Pertains to any site at which hazardous waste is to be treated, stored, or disposed of or has been treated, stored, or disposed of- **applicable.**	OAC 3745-55-14
Landfill closure and post-closure requirements (Action)	Specifies closure and post-closure requirements for hazardous waste landfills, including and not limited to final cover and maintenance.	Pertains to existing land-based areas of contamination - **applicable.**	OAC 3745-57-10
Hazardous waste restricted from land disposal (Action)	Provides specific requirements pursuant to hazardous wastes that are restricted from land disposal.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - **applicable.**	OAC 3745-59-01(C)(E)
Dilution prohibited as treatment (Action)	Prohibits dilution of restricted waste or residuals resulting from treatment of restricted waste (as a substitute for adequate treatment) in order to land disposed a restricted waste.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - **relevant and appropriate.**	OAC 3745-59-03(A)(B)
Hazardous waste analysis (Action)	Generators shall test the waste or test extract of the waste according to the frequency and test methods described in the rule to determine if the waste is restricted from land disposal.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - **relevant and appropriate.**	OAC 3745-59-07(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Restricted waste that exhibit a characteristic (Action/Chemical)	Prohibits land disposal of characteristic waste unless the waste complies with treatment standards of listed waste. If the waste is both listed and characteristic, the treatment standard for the listed waste will operate in lieu of the standard for the characteristic waste.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - **relevant and appropriate.**	OAC 3745-59-09
Prohibition on storage of restricted waste (Action)	Prohibits on-site storage of hazardous waste restricted from storage beyond a specified time frame stated in the rule.	Pertains to any site in which storage of hazardous waste will occur on-site to facilitate proper recovery, treatment or disposal. The PORTS site has been granted an extension to store restricted waste beyond the regulatory suggested time frame - TBC.	OAC 3745-59-50(A)(B)(C)(D)(E)
Waste specific prohibitions - California List (Chemical)	Prohibits land disposal of the following waste: (1) liquid waste with pH < 2 or pH = 2 (2) liquid waste containing PCBs with concentrations > or = 50 ppm (3) liquid waste with halogen organic loading of > or = 100 mg/l and < 10,000 mg/l	Pertains to any site in which on-site land disposal of PCB or HOC contaminated waste may be disposed as part of an alternative. However, there will be no California waste disposed of at the PORTS site during and/or after any remedial action - **applicable.**	OAC 3745-59-32(A)(D)(E)(F)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
First Third, Second Third, and Third Third prohibited (Chemical)	Prohibits on-site land disposal of first-, second-, third-third waste unless requirements of paragraph D, E, F, and G are met.	Pertains to any site in which on-site land disposal of first-, second-, third-third hazardous waste may be disposed as part of an alternative. However, there will be no first-, second-, or third-third waste disposed of at the PORTS site during and/or after any remedial action - **applicable.**	OAC 3745-59-33 (A)(B)(C)(D)(E)(F)(G) OAC 3745-59-34 (A) thru (H) OAC 3745-59-35 (A) thru (I)
Corrective action for waste management units (Action)	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 the waste was placed in the unit.	Pertains to all sites with land-based hazardous waste units (surface impoundments, waste piles, land treatment units, landfills). This includes existing land-based areas of contamination - **applicable.** [**NOTE:** Corrective action will also be implemented during the Corrective Measure Implementation (CMI) process.]	OAC 3745-55-011(A)(C)
Environmental performance standards: land-based units (Action)	Specifies location, design, construction, operation, maintenance and closure requirements for landfills, waste piles, surface impoundments, and underground injection wells.	Pertains to all sites with land-based hazardous waste units (surface impoundments, waste piles, land treatment units, landfills). This includes existing land-based areas of contamination - **relevant and appropriate.**	OAC 3745-57-01(A) thru (D) 40 CFR 267.10

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Transportation for off-site disposal (Action)	EPA requires that all off-site shipments of CERCLA waste be to a properly permitted treatment, storage, and disposal facility.	In addition, all off-site shipments must comply with the administrative as well as substantive requirements of legally applicable regulations - **TBC.**	40 CFR 300.400
Hazardous waste shipping requirements: manifest, packaging, labeling, and placarding (Action)	A generator who transports, or offers for transportation, hazardous waste for offsite treatment, storage or disposal shall prepare and meet all hazardous waste manifesting requirements.	Prior to any offsite transportation of hazardous waste materials, all manifesting, packaging, labeling, marking, and placarding requirements shall be met - **applicable.** [NOTE: If on-site transportation of hazardous waste, then - **relevant and appropriate.**]	OAC 3745-52-20, 22, 23, 30, 31, 32 and 33
Containment of RCRA waste left in place (Action)	When a cap is being paced over waste (e.g., closing of a landfill), design and construct a cover to: (1) minimize migration of liquids through the capped area, over the long term; (2) function with minimum maintenance; (3) promote drainage and minimize erosion or abrasion of the cover; and (4) accommodate settling and subsidence so that the cover's integrity is maintained.	Applicable to RCRA hazardous waste placed at site after November 19, 1980; relevant and appropriate to waste left in place before 1980 - **applicable.**	40 CFR 264.310(a) OAC 3745-68-10

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Post-closure care (Action)	Restrict post-closure use of property as necessary to prevent damage to the cover. Ensure that post-closure care includes: (1) maintenance of the integrity and effectiveness of the final cover; (2) maintenance and monitoring of the groundwater system and compliance with all applicable parts of Subpart F, "Releases from Solid Waste Management Units;" and (3) prevention of the damage to the cover from run-on and run-off cover.	**Relevant and appropriate** to final closure of a facility with some hazardous materials or residues left in place. **Applicable** to closure of RCRA - permitted hazardous waste facilities. **Relevant and appropriate** to final closure of a SWMU with some hazardous materials or residues left in place. [**NOTE:** See also 40 CFR 264.228(b), 40 CFR 264.310(b)]	OAC 3745-55-17 OAC 3745-68-10
Particulate ambient air quality standards (Chemical)	Establishes the specific standards for total suspended particulates. The primary standard for National Ambient Air Quality Standards (NAAQs) for particulate matter is 50 ug/m^3 annual (averaging time) and 150 ug/m^3 per 24 hours (averaging time).	Fugitive dust will be generated during loading, unloading, transportation and grading of cover material - **applicable.**	OAC 3745-17-02(A)(B)(C) 40 CFR Section 50

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Air pollution nuisances prohibited (Action)	Defines air pollution nuisance as 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.	Fugitive dust may be generated during loading or unloading, transportation and grading of cover material. There are minimal activities anticipated that will result in an air pollution nuisance - **applicable.**	OAC 3745-15-07(A)
Air discharges (fugitive dust) (Chemical/Location)	The significant deterioration of air quality is prohibited.	Wind dispersal of any debris or stockpiled soil resulting from activities associated with an alternative will be controlled - **applicable.**	OAC 3745-17-05
Emission Restrictions (Action)	For any fugitive dust source that may cause such a public nuisance, fugitive dust control measures must be implemented.	These controls include use of water or other suitable dust suppressants and the covering at all times of open-bodied vehicles when transporting materials likely to become airborne. Canvas or other suitable coverings must be used. Small sources of fugitive emissions are exempt from air-permitting requirements if the emissions of air contaminants can demonstrably be held to less than 10 lb per day - **applicable.**	OAC 3745-17-08(B)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Emission Restrictions (Action) (Continued)		All emissions of dust shall be controlled. Considered for all sites which may undergo grading, loading operations, demolition, clearing and construction - **applicable.**	OAC 3745-17-08A(1) thru A(2) OAC 3745-17-08(D)
Emission of radionuclides to atmosphere (NESHAP) (Chemical)	Subpart H of 40 CFR 61 addresses atmospheric radionuclide emissions from DOE facilities and may be applicable to airborne emissions during remedial activities. EPA has issued a final NESHAP for amounts that would not cause any member of the public to receive an effective dose equivalent of 10 mrem/year or more.	Title 40 CFR 61.93(b)(4)(I) requires radiological emission measurements at all release points that could discharge radionuclides into the air in quantities that could cause an effective dose equivalent in excess of 1% of the standard 0.1 mrem/year. All radionuclides that contribute greater than 10% of the standard 1 mrem/year for a release point shall be measured - **applicable.**	40 CFR 61
Control of emissions of organic materials from stationary sources (Action)	All air discharges resulting from equipment or other stationary sources that may emit VOCs to the atmosphere will meet substantive requirements as permitted.	No persons shall cause or allow emissions of an air contaminant to the atmosphere without a permit - **applicable.**	OAC 3745-21-07 ORC 3704.05
Prohibition of nuisance (Action/Chemical)	Prohibits noxious exhalations or smells and the obstruction of waterways.	Pertains to any site which may have obnoxious smells or obstruction of waterways - **relevant and appropriate.**	ORC 3767.13

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Prohibition of nuisance (Action/Chemical)	Prohibits against throwing refuse, oil, or filth into lakes, streams or drains.	Pertains to any site located adjacent to lakes, streams or drains - **relevant and appropriate.**	ORC 3767.14
Conservancy District (Action)	The Board of Director of Ohio EPAs of a Conservancy District may make and enforce rules and regulations pertaining to channels, ditches, pipes, and sewers, etc.	This statute pertains to any site which may affect a construction within a conservancy district - **relevant and appropriate.**	ORC 6101.19
Worker health and safety (Action)	Response actions under the NCP will comply with the provisions for response action worker safety and health in 29 CFR 1910.120.	All governmental agencies and private employers are directly responsible for the health and safety of their own employees - **relevant and appropriate.**	40 CFR 300.150
Occupational-worker protection (TBC)	The safety and health standards for general construction presented in 29 CFR 1926 will be followed. The OSHA standards are incorporated into DOE Order 483.1A. The specific requirement will be identified in the task-specific health and safety plan.	The proposed remedial action alternative will be implemented in accordance with applicable OSHA general construction standards. The OSHA standards will apply on their own merit as required through DOE Order 5483.1A - **TBC.**	29 CFR 1910.120
Occupational worker protection health and safety documentation (TBC)	Employers shall maintain and implement a written safety and health program for their employees involved in hazardous waste operations. All occupational safety and health requirements of 29 CFR 1910 and 1926 are to be followed. In case of a conflict or overlap, the most protective provision will apply.	The proposed remedial action alternative will be implemented in accordance with the provisions of DOE and Portsmouth Gaseous Diffusion Plant Comprehensive Occupational Safety and Health Program. As specified in 29 CFR 1910.120(b)(4), a task-specific health and safety plan will be developed - **TBC.**	29 CFR 1910.120(b)(4)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Radiation protection of the public (TBC)	Exposures of members of the public to radiation sources as a consequence of all routine DOE activities will not cause, in a year, an effective dose equivalent greater than 100 mrem from all exposure pathways.	Precautions will be taken through the use of appropriate controls to minimize exposure to the public - **TBC**.	DOE Order 5400.5, Chapter II, Section 1.A
	Specific authorizations may be received for a temporary increase of the dose limit up to 500 mrem in a year.	The DCG values for internal exposure are based on a committed effective dose equivalent of 100 mrem for the radionuclide taken into the body by ingestion or inhalation during one year - **TBC**.	DOE Order 5400.5 Chapter III
	The derived concentration guides (DCGs) are provided as reference values for conducting radiological environmental protection programs at operational DOE facilities and sites. DCG values are presented in DOE Order 5400.5 for the following exposures modes: (1) ingestion of water (2) inhalation of air (3) immersion in a gaseous cloud		
Maximum contaminant levels for inorganic chemicals (Action/Chemical)	Presents maximum contaminant levels for inorganics.	Pertains to any site which storage of hazardous waste will occur on-site to facilitate proper recovery, treatment or disposal. In some cases storage of restricted waste beyond one year is allowed - **relevant and appropriate.**	OAC 3745-81-11(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant I (Continued)

Action	Requirement	Prerequisites	Citation
Maximum contaminant levels for organic chemicals (Action/Chemical)	Presents MCLs for organics.	Pertains to any site which has contaminated groundwater or surface water that is either being used, or has the potential for use, as drinking water source - **relevant and appropriate.**	OAC 3745-81-12(A)(B)(C)
Maximum contaminant levels (MCL) for radium 226, 228, gross alpha particle (Action/Chemical)	Presents MCLs for radium 226, radium 228, and gross alpha particle activity.	Pertains to any site which has contaminated groundwater or surface water that is either being used, or has the potential for use, as drinking water source - **relevant and appropriate.**	OAC 3745-81-15(A)(B)
MCLs for beta, particle and photon radioactivity (Action/Chemical)	Presents MCLs for beta, particle, and photon radioactivity from man-made radionuclides.	Pertains to any site which has contaminated groundwater or surface water that is either being used, or has the potential for use, as drinking water source - **relevant and appropriate.**	OAC 3745-81-16(A)(B)
Analytical techniques (Chemical)	Presents the requirements for analytical techniques for MCLs.	Pertains to sites with contaminated groundwater or surface water that either being used or may have the potential of being used for a potable drinking water source - **relevant and appropriate.**	OAC 3745-81-27(A) thru (E)
Container management (Closure/Action)	Specifies closure requirements for containers and containment system.	Pertains to any site at which hazardous waste will be stored in containers. There is a potential that waste generated from remedial actions will have to be temporarily stored in containers - **relevant and appropriate.**	OAC 3745-55-78

Table B.1 Preliminary ARARs for Quadrant I

ARARs	Applicable or Relevant and Appropriate Requirements
BAT	Best Available Technology
CAA	Clean Air Act
CAS/CMS	Cleanup Alternatives Study/Corrective Measures Study
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
CWA	Clean Water Act
DCG	Derived Concentration Guides
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HOC	Halogenated Organic Compounds
LDR	Land Disposal Restrictions
LLW	Low-level radioactive waste
MCL	Maximum Contaminant Level
NAAQs	National Ambient Air Quality Standards
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
O&M	Operations & Maintenance
OAC	Ohio Administrative Code
ORC	Ohio Revised Code
OSHA	Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PORTS	Portsmouth Gaseous Diffusion Plant
ppm	parts per million
PTI	Permit to Install
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SHPO	State Historical Preservation Officer
SOPs	Standard Operating Procedures
SWMU	Solid Waste Management Unit
TBC	To be considered
TSCA	Toxic Substances Control Act
TSD	Treatment Storage and Disposal
USC	United States Congress

APPENDIX II - RESPONSIVENESS SUMMARY

SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

This responsiveness summary responds to significant comments submitted on the preferred plan for Quadrant I of the Portsmouth Gaseous Diffusion Plant and is intended to be consistent with Sections 113(k) (2) (B) (iv) and 117 (B) fo 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 respond"... to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on the preferred plan. US DOE provided comments describing typographical and grammatical errors which have been addressed. No other comments written or oral were received by Ohio EPA regarding the Quadrant I Preferred Plan.

The Public Notice alerting the public of their opportunity to comment on the Quadrant I Preferred Plan was placed in the ***Portsmouth Daily Times*** on November 19, 2000 and in the ***Pike County News Watchman*** on November 5, 2000 and November 19, 2000. The public meeting was held on November 30, 2000 at the Pike County Joint Vocational School in Piketon, Ohio.

BECHTEL JACOBS
Bechtel Jacobs Company LLC

COMMITMENT TRACKING

REQUEST

Date: 03/23/01 (received 3/30/01)	RMDC # 6490010108	Source Contact: Kristi Wiehle
		Source Ref.: UE-54-9968
		Assigned To: Don Wilkes
Subject/Activity: Quadrant I Decision Document		
cc: Jim McMaster, Rosemary Richmond, Raymond Rea		
BJC Due Date: 4/23/01	DOE Due Date: 04/24/01	EPA Due Date:

INTERNAL TRACKER

Responsible Person	Description	Scheduled Date	Date Completed

CLOSURE

BJC		DOE		EPA	
Date		Date		Date	
Doc.		Doc.		Doc.	

cc: Carol Mains (letter only)

cc/att: RMDC Center