OHIO ENVIRONMENTAL PROTECTION AGENCY'S DECISION DOCUMENT FOR QUADRANT III OF THE PORTSMOUTH GASEOUS DIFFUSION PLANT

MARCH 1999

OhioEPA
State of Ohio Environmental Protection Agency

Southeast District Office
2195 Front Street
Logan, Ohio 43138-9031
(740) 385-8501
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George V. Voinovich
Governor

May 18, 1999

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

Eugene W. Gillespie
Site Manager
U.S. Department of Energy
Portsmouth Enrichment Office
P.O. Box 700
Piketon, Ohio 45661-0700

Dear Mr. Gillespie:

RE: QUADRANT III DECISION DOCUMENT

Enclosed is Ohio EPA's Decision Document for Quadrant III. U.S. EPA has concurred with this Decision Document.

If you have any questions, please contact me.

Sincerely,

Maria Galanti
Site Coordinator
Division of Emergency and Remedial Response

MG/mr

Enclosure

cc: Kristi Wiehle, U.S. DOE
Janie Croswait, U.S. DOE Environmental Information Center

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 30 1999

REPLY TO THE ATTENTION OF: SE-6J

Ms. Cindy Hafner, Acting Chief
Division of Emergency and Remedial Response
Ohio Environmental Protection Agency
Lazarus Government Center
Post Office Box 1049
Columbus, Ohio 43216-1049

Subject: **Quadrant III Decision Document for the U.S. Department of Energy Portsmouth Gaseous Diffusion Plant, Piketon, Ohio**

Dear Ms. Hafner:

The United States Environmental Protection Agency, Region 5 agrees with the remedy described in the March 1999 Ohio Environmental Protection Agency's Decision Document for Quadrant III of the Portsmouth Gaseous Diffusion Plant. If you have any questions, please contact Gene Jablonowski of my staff at (312) 886-4591.

Sincerely,

Kenneth A. Tuchfarber for W.E.M.

William E. Muno, Director
Superfund Division

OHIO EPA

State of Ohio Environmental Protection Agency Director's Office Number _____

COVER MEMO

( ) For Director's Signature
( ) For Assistant Director's Signature
( ) For Deputy Director's Signature
(X) For Division Chief's Signature
( ) DRAFT for the Governor's Signature

Subject: (MCR# ____) Decision Document for Quadrant III of the US DOE Portsmouth Site

Prepared by: _____ Division: Emergency and Remedial Response Date: March 22, 1999

Blind copies: _____

NECESSARY APPROVALS	APPROVED BY	DATE
( ) Assistant Director		/ /
( ) Deputy Director, Legal		/ /
( ) Deputy Director, Programs		/ /
( ) Deputy Director, Policy		/ /
( ) Deputy Director, Communications		/ /
(X) Legal	Fran Kovac	3/29/99
(X) Other - OFFO Chief	Graham Mitchell	3/25/99
( ) Other		/ /

99 APR -1 AM 10:04 U.S.E.P.A. S.E.D.O.

District Personnel Information			Division Personnel Information		
Approvals:		Date:	Approvals:		Date:
Supervisor		/ /	Unit Supervisor		/ /
Manager	Ken Dewey	03/23/99	Section Manager (CRES)	Heidi Sorin	3/30/99
Assistant Dist. Chief		/ /	Assistant Chief		/ /
District Chief		/ /	Chief	Cindy Hafner	3/30/99
Other-Site Coordinator	Maria Galanti	03/22/99	Other		/ /
			Section Manager (TPPS)	Ray Beaumier	03/30/99
Date Sent:			Date Sent:		
District Number:			Division Number:		

99 APR -1 AM 10:04 U.S.E.P.A. S.E.D.O.

RETURN ALL SUPPORTING DOCUMENTS TO: Southeast District Office

Name: Maria Galanti Division: DERR

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List of Acronyms

ARARs:	Applicable or Relevant and Appropriate Requirements
Bedford:	Bedford shale
BERA:	Baseline Ecological Risk Assessment
BRA:	Baseline Risk Assessment
CERCLA :	Comprehensive Environmental Response, Compensation and Liability Act (Superfund Law)
Ci/hr:	Curies per hour
cm^2/sec:	Square centimeters per second
CMS:	Corrective Measures Study
CAS:	Cleanup Alternatives Study
COC:	Chemicals of Concern
COPC:	Chemicals of Potential Concern
Cuyahoga:	Cuyahoga Shale
D&D:	Decontamination and Decommissioning
DDAGW	Division of Drinking and Ground Water
DHWM	Division of Hazardous Waste Management
DOCC:	Description of Current Conditions
ED:	Exposure Duration
ELCR:	Excess Lifetime Cancer Risk Level
fissile:	Refers to a shale that easily splits or cleaves
ft^2:	Square foot
ft^3:	Cubic foot
ft/d:	Feet per Day
ft^2/d:	Square feet per day
ft^3/d:	Cubic feet per day
Gallia:	Gallia sand and gravel
gal/month:	Gallons per month
gal/yr:	gallons per year
GC:	Gas chromatograph
gpd:	Gallons per day
gpm:	Gallons per minute
IGWMP	Integrated Ground Water Monitoring Plan
in/yr:	inches per year

IRM:	Interim Remedial Measure
kg/yr:	Kilograms per year
lbs:	Pounds
LBC:	Little Beaver Creek
LMUS:	Lockheed Martin Utility Services
m^3/day:	Cubic meters per day
mg/l:	Milligrams per liter
mg/kg:	Milligrams per kilogram
mg/m^3:	Milligrams per cubic meter
mgd:	Million gallons per day
Minford:	Minford silt and clay
NCP:	National Oil and Hazardous Substances Pollution Contingency Plan
ND:	Not detected
NDD:	North Drainage Ditch
NEDD:	North East Drainage Ditch
NEPA:	National Environmental Policy Act
NPDES:	National Pollution Discharge Elimination System
OAC:	Ohio Administrative Code (Rules/Regulations developed as directed by law)
Ohio EPA:	Ohio Environmental Protection Agency
PAHs:	Polycyclic (or polynuclear) aromatic hydrocarbons
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene
***p*Ci/l**:	Picocuries per liter
PERA:	Preliminary Ecological Risk Assessment
PORTS:	Portsmouth Gaseous Diffusion Plant
ppb:	Parts per billion
ppm:	Parts per million
Preferred Plan:	The plan developed by Ohio EPA and US EPA that identifies the preferred alternative for cleanup at a SWMU
PRG	Preliminary Remedial Goal
Q I	Quadrant I (Q II = Quadrant II, etc.)
RAGS	Risk Assessment Guidance for Superfund
RCRA:	Resource Conservation and Recovery Act
RFI:	RCRA Facility Investigation

RME:	Reasonable Maximum Exposure
Sunbury:	Sunbury shale
SVOCs:	Semivolatile Organic Compounds
SWMUs:	Solid Waste Management Unit
Tc-99:	Technetium-99
TCE:	Trichloroethylene - A volatile organic compound commonly used in industrial degreasing operations.
TSCA	Toxic Substance Control Act
***ug*/hr**:	Micrograms per hour
***ug*/kg**:	Micrograms per kilogram
***ug*/l**:	Micrograms per liter
***ug/m*^{3}**:	Micrograms per cubic meter
U.S. DOE:	United States Department of Energy
U.S. EPA:	United States Environmental Protection Agency
VOCs:	Volatile Organic Compounds
VC	Vinyl Chloride
yd^3	Cubic Yards

PART 1: DECLARATION STATEMENT

DECLARATION STATEMENT

SITE NAME AND LOCATION

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

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial actions for the Portsmouth Gaseous Diffusion Plant (PORTS), Quadrant III, 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, 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), the Hazardous and Solid Waste amendments (HWSA) of 1984, and State of Ohio rules and regulations. These Decisions are based on the administrative record for this response action. The US DOE site is being cleaned up under a Consent Decree between US DOE and the State of Ohio, and an Administrative Order by Consent (AOC) signed by US DOE and the United States Environmental Protection Agency (US EPA). Both legal agreements were signed in 1989.

Documentation for the selection of these remedial actions are contained in the administrative record maintained at 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 III Final RFI Report (Q III RFI) (DOE 1996), the Baseline Ecological Risk Assessment (BERA) (DOE 1994), the Air RFI (DOE 1994), the Background Sampling Investigation of Soil and Groundwater (DOE 1996) and the Ohio EPA Preferred Plan (Preferred

Plan) (Ohio EPA 1998), and other documents contained in the administrative record file for this response action.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from Quadrant III, 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 III occupies the western portion of the PORTS Reservation (Please refer to Figure 2). The boundaries of Quadrant III were established with respect to the surface-water and groundwater flow and drainage patterns. Quadrant III contains nineteen solid waste management units **(SWMUs)** which were investigated as part of the RFI (Please refer to Figure 3). After careful review of the data in the RFI report and risk assessment, the SWMUs were placed into three categories in the approved Corrective Alternatives Study/Corrective Measurers Study (CAS/CMS) Report; **1)** SWMUs which have been determined to fall within the risk goals as outlined in CERCLA **(SWMUs Requiring No Further Corrective Action)** ; 2) SWMUs which will be addressed when the gaseous diffusion plant is no longer in operation: Most of these SWMUs pose minimal risk, are still in operation and are part of the operational plant infrastructure. **(SWMUs Referred to Decontamination and Decommissioning (D&D))**; and 3) SWMUs which will be evaluated and remediated in the CAS/CMS Process: These SWMUs are considered to pose an unacceptable risk to human health or the environment **(SWMUs Requiring Alternatives Developed in the CAS/CMS)**. Although the approved CAS/CMS Report discusses a "referral" option, Ohio EPA has determined that the term "deferral" is more appropriate for SWMUs which fall into that category. The units addressed in this section remain under the auspices of Section VII of the Ohio Consent Decree. Deferring these units 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. Further more, "referring" these units to D&D implies that US DOE PORTS has a D&D process in place. "Deferral" more accurately reflects that these units will be addressed at sometime in the future when a D&D process exists at Portsmouth. Outlined below are the SWMUs from Quadrant III and the category to which they fall and referenced in the Corrective Action Study/Corrective Measure Study Report:

SWMUs Requiring No Further Corrective Action

These SWMUs do not pose an unacceptable risk to human health and the environment as described in the Baseline Risk Assessment (BRA) in the approved RFI. These SWMUs are described in detail in the approved RFI Report and Preferred Plan for Quadrant III. The SWMUs listed below were determined to meet the risk guidelines for No Further Action:

- X-616 Effluent Control Facility/Former Chromium Sludge Lagoons
- X-744S, T, and U Warehouses
- X-6619 Sewage Treatment facility
- Don Marquis Substation;

SWMUs Deferred to Decontamination and Decommissioning (D&D)

There were four criteria that were used to identify SWMUs as appropriate for "referral" to the D&D process in the CAS/CMS Report. However, based on the reasoning discussed above, these SWMUs will now be "deferred" to the D&D process. The four criteria are as follows:

(1) HI values for media-specific total non-cancer risks under the industrial worker scenarios are generally less than 1.

(2) The industrial worker scenario ELCR values were within the risk range of 1×10^{-4} to 1×10^{-6}.

(3) Evaluation of the contaminants present indicate that they are generally immobile.

(4) The SWMUs identified are within current production areas and operational facilities. Remedial activities may interrupt facility operations and such areas may likely become re-contaminated due to on going industrial activities.

The units listed below are "deferred" to D&D in the CAS/CMS Report:

The D&D of the facility will require remediation in accordance with DOE orders (and applicable state and federal regulations, orders, agreements and a new set of legal and technical tools outside beyond the scope of the existing Ohio Consent Decree and AOC) 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 use risk levels in accordance with ALARA principles. Ongoing worker health and safety programs and 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-230J3 West Environmental Sampling Building and Intermittent Containment Basin;
- X-230J5 West Holding Pond and Oil Separation Basin;
- X-326 Process Building;
- X-330 Process Building;
- X-530A Switchyard, X-530B Switch House, X-530C Test and Repair Building, X-530D Oil House, X-530E/X-530F Valve House, X-530G Gaseous Centrifuge Enrichment Process oil pumping Station;
- X-615 Abandoned Sanitary Sewer Treatment Facility;
- X-744N, P, and Q Warehouses associated Old Construction Headquarters;
- X-745C West Cylinder Storage Yard;
- X-2230N West Holding Pond No. 2;

- X-7725 Recycling and Assembly Building, X-7745R Recycling and Assembly Storage Yard, and Initial Construction Bulk Fuel Storage Area (Bulk Fuel Storage SWMU); and
- West Drainage Ditch.

SWMUs Requiring Alternative Development in the CAS/CMS Reports

The SWMUs in this section pose an unacceptable risk for contaminants of concern as described in the RFI. In this case only one SWMU in the quadrant required the development of alternatives for consideration due to volatile contaminants in the groundwater:

The X-740 Waste Oil Handing Facility (groundwater only).

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 action, and are cost-effective. The remedies use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy selected for the X-740 SWMU satisfies the statutory preference in CERCLA and SARA for treatment as a principal element. However, remedies for other SWMUs 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 X-740 groundwater remedial action.

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 & RCRA. Those SWMUs which have been deferred (Please refer to Section 9 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 remedy at X-740 is easily accomplished, cost effective and is expected to provide both long and short term effectiveness. The selected remedy at X-740 will reduce the toxicity, mobility and volume of groundwater contaminants by treatment. The mobility of the contaminants will be contained through the ability of the selected remedial alternative to 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 often than every five (5) years after commencement of the remedial actions to insure that the remedies selected continue to provide adequate protection of human health and the environment.

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 U.S. DOE. The active portion of the PORTS plant occupies approximately 1,000 acres of a 3,714-acre U.S. DOE reservation in south central Ohio, approximately 80 miles south of Columbus, 20 miles north of Portsmouth, and 1 mile east of U.S. Route 23, near Piketon (Please refer to 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 5 miles north of the facility on U.S. Route 23. Piketon had an estimated population of 1,717 in 1990. The county's largest community, Waverly, has approximately 4,500 residents and is situated 12 miles north of the facility.

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

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

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

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

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The principal process at the PORTS facility is the separation of uranium isotopes via gaseous diffusion. The PORTS facility has been operating since 1954 enriching uranium for use in commercial reactors and for use by the U.S. Navy in power reactors. Production of enriched uranium for use by the Navy was ceased in 1991. The production facilities are owned by U.S. DOE and are leased by the United States Enrichment Corporation which was formed in 1993 as a government-owned corporation by the Energy Policy Act of 1992. The company became private in July 1998. Other portions of the site are leased to the Ohio National Guard and the Defense Logistics Agency. U.S. DOE remains the owner of the property.

Support operations for the production of enriched uranium include the feed and withdrawal of material from the primary process, water treatment for sanitary and cooling purposes, decontamination of equipment removed from the primary process, or maintenance, or replacement, and recovery of uranium from various waste materials. The construction, operation and maintenance of this facility requires the use of a wide range of commercially available chemicals. Continuous operation of this facility since 1954 has resulted in the generation of inorganic, organic and low level radioactive waste materials.

In 1989, U.S. DOE and the State of Ohio entered into a Consent Decree that outlined the requirements for handling hazardous waste generated at the PORTS facility and for conducting investigation and corrective measures studies at the site. U.S. EPA and U.S. DOE entered into a similar agreement, the AOC, in September 1989. This agreement was negotiated between U.S. EPA Region V and U.S. DOE. The AOC requires that the PORTS facility conduct a RCRA Facility Investigation (RFI) and a Corrective Measures Study (CMS), select remedies, and implement them according to a Corrective Measures Implementation (CMI) plan. A schedule is attached to each agreement outlining a submittal schedule to Ohio EPA and U.S. EPA for documents pertaining to the investigation and corrective measures studies. A recent schedule for completion of remedial activities was approved by Ohio EPA on December 11, 1998.

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

2.1 HISTORY OF QUADRANT III

The Quadrant III RFI was conducted in two phases. Phase I of the investigation was conducted from April to August 1992. Phase II of the investigation was conducted from April to July

1994. The initial RFI report was submitted to Ohio EPA for review on December 12, 1992. The final version of the RFI report was submitted on December 12, 1996. The Quadrant III RFI received final approval from Ohio EPA on September 5, 1997. The draft Quadrant III CAS/CMS was received in Ohio EPA on April 4, 1998. The Quadrant III CAS/CMS Report was approved on July 13, 1998. Nineteen SWMUs were investigated during Phases I and II of the Quadrant III RFI. The investigation included analysis of soil, sediment, surface water and groundwater where appropriate. Ecological data was collected during the RFI to help support the *Baseline Ecological Risk Assessment* (BERA) approved by Ohio EPA on February 7, 1997. Additional data was collected for the *Air RFI* which was approved by Ohio EPA on August 28, 1996 and the *Background Sampling Investigation of Soil and Groundwater* approved by Ohio EPA on May 16, 1996. Data from all three reports was used to support the development of the Quadrant III CAS/CMS Document. Outlined below is a brief description of the Quadrant III SWMUs and the remedial alternative under which they fall. A more detailed description of each SWMU can be found in the approved RFI and CAS/CMS reports.

3.0 RISK ASSESSMENT

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

The risk assessment for contaminated sites on the **DOE-PORTS** site consists of a Human Health Risk Assessment and an Ecological Risk Assessment. The Ecological Risk Assessment was conducted separately. The Human Health Risk Assessment is conducted in the RFI assuming that no institutional controls such as fencing are in place, that the area within the security fence will not remain industrial in the future and the use of the site outside of the security fence will be either residential or recreational in the future. Groundwater is assumed to be used for drinking and bathing purposes both inside and outside of the security fence. The industrial use scenario is considered to be the most likely future use at the US DOE site for areas inside the security fence. This use scenario was developed after the completion of the BRA in the RFI report. Additionally, an on site commercial use scenario was also developed after the completion of the BRA. The initial risk assessment conducted for the site assumes that no future cleanup action is taken and is referred to as the Baseline Risk Assessment. The Baseline Risk Assessment consists of numerous steps as follows:

3.1 Identification of Chemicals of Concern

After data collected during the RFI was evaluated, those chemicals that were detected during lab analysis were retained as **Chemicals of Potential Concern (COPC)**. Some data not appropriate for certain exposure pathways was excluded. For example, deep contaminated soils, (greater than 10 feet), would not be expected to be available for possible ingestion by children or adults and is only a threat to ground water contamination. Therefore, this data was not included in the

assessment of soil ingestion. As part of the CAS/CMS process, COPCs that present an unacceptable risk to humans through any pathway of concern were retained as **Chemicals of Concern (COC)**.

3.2 Exposure Assessment

This step involves the evaluation of potential human exposures 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.**

3.2.1 Characterization of the Exposure Setting

This step involves modeling or simulating those exposure scenarios considered possible on the site both for current use and future use. The following scenarios were included in the baseline risk assessment:

3.2.1.1 Current Use Scenarios

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

The on-site worker scenario describes potential exposures to environmental media at **PORTS** for a worker engaged in normal day-to-day activities throughout the quadrant. The recreational population scenario was developed to assess potential exposures to surface water and sediment from streams and ponds on the PORTS reservation and to fish and game eaten by local recreational anglers and hunters. In estimating exposure for both current off-site resident and recreational populations, any significant direct access to environmental media within the Quadrant

being evaluated was considered unlikely. Exposures were assumed to result from contaminants that could potentially migrate off-site.

As stated above, future use scenarios were developed consistent with the reasonable maximum exposure. The area within the security fence is expected to remain industrial in the future. Areas inside and outside the Perimeter road within the reservation were evaluated for a future recreational/commercial use. For the future use conditions, the following scenarios were developed:

3.2.1.2 Future Use Scenarios

- **On-site commercial use (developed after approval of BRA)**
- **On-site recreational population**
- **On-site industrial worker**
- **Off-site resident**
- **Off-site recreational population.**

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

3.2.2 Identification of Human Exposure Pathways

The above exposure scenarios were developed to model or simulate possible exposure situations found at the site. It is also necessary to determine the most likely **exposure pathways** as well. An example of an exposure pathway is the ingestion of contaminated groundwater by on-site

workers in the future. The following exposure pathways were evaluated for both the current and future worker as well as the recreational visitor:

- **Exposure to Groundwater via ingestion of drinking water, and dermal contact and inhalation of volatiles while showering; (for future on-site worker only)**

- **Exposure to soil via incidental ingestion and dermal contact, and via external gamma radiation from radionuclides present in soil;**

- **Exposure to sediment via incidental ingestion and dermal contact;**

- **Exposure to surface water via incidental ingestion and dermal contact;**

- **Exposure to air via inhalation of vapors and particulates;**

- **Exposure via ingestion of local game contaminated by grazing on land affected by plant operations;**

- **Exposure via ingestion of fish.**

3.2.3 Estimation of Environmental Concentrations

In this step, concentrations of chemicals and radionuclides in various environmental media from which exposure may occur are estimated via sampling results and mathematical modeling.

3.2.4 Estimation of Human Intake

This step involves calculating the amount of a substance received by an individual through exposure to chemicals and radionuclides in the various environmental media. Chemical intakes (referred to as **chronic daily intakes or CDIs**) are typically expressed in terms of the amount of material in contact with the body for a certain time period, and are calculated as a function of chemical concentration in the soil or water, how often the exposure occurs and how long (exposure frequency), body weight, and the portion of a lifetime that exposure occurs. The generic equation for calculating the **CDI** is as follows:

$$\mathbf{CDI} = \frac{\mathbf{CxCRxEFxED}}{\mathbf{BwxAT}}$$

where:

CDI	=	Chronic daily intake, 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 when calculating air inhalation and radiological exposures.

3.3 Toxicological Assessment

The toxicological assessment involves the identification of 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 U.S. EPA has conducted such assessments on 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 can be found in the RFI Reports.

3.4 Risk Characterization

This step involves calculating estimates of carcinogenic (cancer causing) and non-carcinogenic risks from chemicals of concern for different exposure pathways. Cancer risk is defined as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen in addition to the probability of cancer risks from all other causes. As a benchmark in developing clean-up goals at contaminated sites, an acceptable range of **excess cancer risk (ECR)** from one in one million ($1x10^{-6}$) to one in ten thousand (1×10^{-4}) has been established. The point of departure or program goal for risk remaining after a site is cleaned up is $1x10^{-6}$ (i.e. a one in one million excess lifetime cancer risk, above and beyond risks from other unrelated causes) and is the risk goal for the U. S. DOE-PORTS site.

The **"Hazard Quotient" (HQ)** is used to determine the severity of non-cancerous hazards posed at a site. The **HQ** is determined by dividing the **Chronic Daily Intake (CDI)** by the **Reference dose (RfD).** The reference dose is the amount of material that is determined to cause a toxic effect. If the **HQ** is less than or equal to 1, then 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 1, indicates that a toxic effect may result. To assess the cumulative effect of similar noncancerous substances, the **HQ** for all of the substances being assessed at a site are added, with the result being the **Hazard Index (HI)**.

3.5 Conclusions

The risks estimated for substances evaluated at a SWMU and in the quadrant, are compared to target risk levels and general conclusions are made regarding the potential risks associated with these substances.

TABLE I

Groundwater Clean-up objectives for on-site worker, at X-740

Contaminants of Concern	Selected Gallia PRG (ug/L)	Basis	Selected Berea PRG (ug/L)	Basis
1,1 - Dichlorethene	7.0	MCL	7.0	MCL
1,2 - Dichloroethane	5.0	MCL	5.0	MCL
Tetrachloroethene	5.0	MCL	5.0	MCL
1,1,1 - trichloroethane	200	MCL	200	MCL
Trichloroethene (TCE)	5.0	MCL	5.0	MCL

MCL= maximum concentration limit per the Safe Drinking Water Act; ug/L=micrograms per liter

There are no Ecological Risks identified for this unit.

4.0 DISCUSSION OF SWMUs IN QUADRANT III

Discussed below are the SWMUs in Quadrant III and how they were categorized in the CAS/CMS Report.

SWMUs Requiring No Further Corrective Action

X-616 Effluent Control Facility/Former chromium Sludge Lagoons

Cooling water containing a chromium-based corrosion inhibitor was processed through the X-616 Effluent Control Facility until 1993. Treatment of the blow down through pH adjustment using slaked lime and polymer coagulant resulted in 230,000 gal/year of lime sludge that contained hydrated chromium hydroxide [$Cr(OH)_3$]. After the precipitate settled, it was transferred to associated surface impoundments. The sludge was allowed to compact and the supernatant was rerouted to the reduction precipitation process. Approximately 1,540,000 lb. of dried trivalent chromium sludge was stored at the X-616. The removal of the chromium-contaminated sludges and soils from the X-616 surface impoundments was completed on June 21, 1992 per the requirements of the Division of Hazardous Waste Management (DHWM) of the Ohio EPA. The material was removed per the approved closure plan for X-616 surface impoundments. The closure plan was approved by Ohio EPA on July 14, 1989 and amended on March 4, 1992.

Risk Analysis

SOILS - No VOCs, Semi-volatile Organic Compound (SVOCs), or Polychlorinated Biphenyls (PCBs) were detected in the soil associated with this unit after sludge and soil removal was completed. These results indicate that organic constituents have not been released to the soil. Analysis of the RFI data and results of the remediation activities at this unit show no

contamination that could act as a continuing source of groundwater contamination by means of leaching from the vadose zone soils.

GROUNDWATER - Groundwater will continue to be monitored as part of the Integrated Groundwater Monitoring Plan (IGWMP) for the Quadrant and the Site.

X-744 S, T and U Warehouses

Approximately 80,000 yd^3 of lithium hydroxide is stored in the X-744S, X-744T, and X-744U warehouses. Before 1988, lithium hydroxide was containerized in as many as 3,500 cardboard drums weighing approximately 425 pounds each. In 1984, storage deficiency notices were issued by Ohio EPA and U.S. DOE because the lithium hydroxide had spilled from deteriorated cardboard drums. In 1988, the lithium hydroxide was re-packed in 75-gallon steel drums and the warehouses were painted.

A soil gas survey conducted in 1988 indicated the presence of hydrocarbons in the vicinity of the construction field office southwest of X-744T. An unknown quantity of paint thinner was reportedly spilled into the soil in the warehouse area in 1989 after the warehouses were painted.

Risk Analysis

Data from the RFI suggest that VOCs, PCBs and possibly SVOCs have been released to the soils of this unit. The Quadrant III RFI Baseline Risk Assessment identified a total non-cancer HI of less than 1 for both current and future land use scenarios. A total ELCR of 2×10^{-6} was identified for both current and future on-site workers in the RFI. This ELCR is driven by exposure to PCBs and PAHs in the soil. None of the detections exceeds action levels established by the site wide PAH and PCB position papers. The risk estimate reveals minimal risk and therefore no further action for soils is warranted.

GROUNDWATER - The VOCs detected in soils associated with this unit are not a source of contamination of the groundwater in this area. No groundwater contamination was found down-gradient from this unit, therefore, no further action is warranted at this time.

X-6619 Sewage Treatment Facility

The X-6619 Sewage Treatment Facility was constructed in 1980 and became operational in 1981. Raw sewage from the entire site is treated at this facility. This facility can process approximately 800,000 gal/day of sanitary sewage using an activated sludge treatment process. The treated effluent is discharged to the Scioto River through an underground pipeline. The effluent is monitored under a NPDES permit.

Risk Analysis

SOIL AND GROUNDWATER - The Quadrant III RFI base line risk assessment identified a total non-cancer HI of less than 1 for all the scenarios detailed for this unit. The ELCR risk identified for current on-site workers and future on-site workers was acceptable based on U.S. EPA risk guidance. Media specific total ELCR risks of $1x10^{-5}$ and $9x10^{-5}$ were identified for current on-site workers and future on-site workers, respectively. The ELCR for the future on site worker is driven by the exposure to arsenic in the soil and groundwater. The levels of arsenic in the groundwater maybe elevated due to sampling technique. Low flow pumps have been installed on many wells on the site and the levels of arsenic and other metals are shown to be greatly reduced. Based on this data for all risk scenarios, both present and future, no further action is warranted at this unit.

Don Marquis Substation

The Don Marquis Substation is a high-voltage substation occupying approximately 26 acres. Two tiers of electrical power stations, each containing a series of large transformers, are surrounded by secondary containment berms. The lower tier is drained by three subsurface

drains. The larger, upper tier slopes to the northwest and a drainage ditch runs intermittently along its western side.

Rainwater and discharges from the transformers are captured in the bermed areas and drained into three small asphalt-lined ponds adjacent to the Don Marquis Substation. Runoff from the bermed area surrounding the lower tier of transformers drains into the northeast ponds. Runoff from the upper tier transformer bermed area drains into both the north and south ponds. Outlet drains in a reactor-oil drain pit installed at the Southwest corner of the substation discharge into the Northwestern tributary to the Little Beaver Creek. In addition, a drainage ditch parallels the western side of the upper tier substation. An outlet from the ditch carries drainage westward away from the substation and to an unnamed tributary of the Little Beaver Creek.

Risk Analysis

Environmental media sampled during the RFI include surface water, sediment, surface soil (0-2 feet), and shallow soil (2-10 feet), and groundwater.

The initial RFI indicated that there was potential inorganic contamination in the sediments in the retention basins that would require remedial action. Additional surface water and sediment sampling was conducted in May 1997. The results of the additional sampling indicated that the levels of contaminants detected did not pose an unacceptable risk for the current use and most probable future use of the site. Therefore, no further action is required at this unit. However, due to the current status of the unit an evaluation for additional action may be conducted during D&D. The sampling results for both phases of the investigation can be found in the approved RFI and CAS/CMS documents.

4.1 SWMUs DEFERRED TO GASEOUS DIFFUSION PLANT D&D PROGRAM

The CAS/CMS Report identified the following SWMUs to be "referred" to the upcoming D&D process. However, the Ohio EPA considers a deferral option more appropriate for the units listed below.

The X-230J3 West Environmental Sampling Building and Intermittent Containment Basin

The X-230J3 West Environmental Sampling building is an approximately 150 ft^2 structure that houses monitoring equipment and controls for the gates of the intermittent containment basin. Upon receiving notification of a spill, the emergency gates can be closed to impound the flow of the West Drainage Ditch before it crosses under Perimeter Road.

Risk Analysis

The initial phase of the RFI investigation and the approved BRA indicated that there was unacceptable risk due to nitrobenzene detected in the soil. Nitrobenzene was detected in one soil sample during the initial investigation. Based on that one sample the HI was calculated to be well above 1. To evaluate if nitrobenzene or other contaminants were present in the soils around X-230J3, additional soil samples were taken in May 1997. Based on that sampling event no additional contamination was detected. The recalculated HI was below one. The ELCR was outside the risk range for PAHs in soil and for ingestion of groundwater based on elevated levels of arsenic and beryllium. The PAH risk will be re-evaluated during D&D. The elevated levels of arsenic and beryllium in the groundwater detected during the RFI may be due to sampling technique rather than actual conditions at the site. Additional sampling of groundwater was collected using low-flow pumps from wells located in areas of the plant that have historically had high metals results in groundwater. Based on these results, the metals in groundwater previously detected at this unit appear to be the result of turbidity due to previous sampling techniques.

Risk Reduction Actions- As part of ongoing risk reduction actions at the site the X-230J3 was included as part of the West Drainage Ditch soil removal action for elevated radiological parameters. The X-230J3 SWMU is part of the West Drainage Ditch which under went a risk reduction action in May 1997. Measured radiological levels in the X-230J3 area indicated that no soil required removal. (Please refer to Chapters 1 & 2 of the approved CAS/CMS Document).

The X-230J5 West Holding Pond and Oil Separation Basin

The X-230J5 West Holding Pond and Oil Separation Basin covers an area of about 0.5 acres. The Holding pond was constructed to capture sediment and control storm water run off from the northern and central branches of the West Drainage Ditch and one-pass cooling water from the air conditioning system that discharges to the storm water system. An oil-skimming boom across the West Holding Pond directs floating debris and oily water to the adjacent secondary Oil Separation Basin

Risk Analysis

SEDIMENT - The risk assessment suggests that SVOCs, PAHs, PCBs, technetium and possibly VOCs have been released at this unit. However, the HI calculated for this unit for all current and future use scenarios is less than 1. This unit does not pose an unacceptable risk to human health under the current use scenario. A total ELCR of $8x10^{-5}$ was identified in the RFI for current on-site workers. This ELCR is driven by exposure to PAHs and arsenic in sediment by means of ingestion and dermal absorption. Any sampling of sediments in this area will require appropriate personal protection for current workers. For the future recreational populations the ELCR identified is 2×10^{-4}. The ELCR presented in the BRA indicated that there was potential risk to a future recreational population who may come in contact with arsenic and PAHs in the sediments. Prior to releasing this area for any intended future use, the sediments will be evaluated for potential remedial action during D&D. Removal of contaminants in the sediments at this unit at this time is not considered economically wise due to the fact that the unit is still operational and

may become re-contaminated. To ensure contaminants are not released offsite, surface water is monitored under a NPDES permit.

SOIL - The data collected for the RFI indicate that SVOCs, PCBs, and technetium have been released to the soil below the sediments at this unit. However, the baseline risk assessment identified an total non-cancer HI of less than 1 for all applicable current and future land-use scenarios. Constituents detected in surface soil at X-320J5 that were above background were not considered carcinogenic by U.S. EPA. Therefore, a total ELCR for the current on-site worker was not calculated. The ELCR of 4×10^{-6} was calculated for the excavation worker. Risk calculated for this unit for current and potential future use indicates that there was not unacceptable risk associated with this unit at this time.

GROUNDWATER - Potential releases to groundwater was not considered probable because X-230J5 is underlain by the Bedford Shale which is not considered a water bearing unit. Therefore, risk was not calculated for groundwater at this unit.

Risk Reduction Actions - The X-230J5 SWMU is part of the West Drainage Ditch which under went a risk reduction action in May 1997. Measured radiological levels in X-230J5 indicated that no soil required removal. (Please refer the approved Quadrant III CAS/CMS Report Chapters 1 & 2)

X-326 Process Building

The X-326 process building is 2,230 ft long 552 ft wide, and 62 ft high and contains 58 acres of floor space. The building is totally enclosed with a built-up roof, transit walls, and concrete floors. This building contains 2,340 diffusion stages previously used for enriching ^{235}U to assays above 15 wt % and 60 purge stages designed to remove light gases. To date only about 1/3 of the building remains operational for the production of lower-assay uranium.

Six areas of the building, totaling approximately 31,888 ft^2 are permitted for the storage of containerized RCRA waste. Radioactively contaminated PCB wastes are stored in five areas, totaling approximately 11,600 ft^2. Many, smaller areas, located throughout the building, are used to store radioactive waste and materials. A troughing network has been installed in the process buildings to collect and contain oil drops potentially contaminated with PCBs from the joints in the ventilation system duct work.

Risk Analysis

Environmental media sampled at this unit during the RFI are surface soil (0 to 2ft), shallow soil (0 to 10 ft), and groundwater. No surface water or sediment was collected for this unit.

SOIL - The baseline risk assessment showed that the total non cancer HI for this unit was less than 1 for the excavation worker scenario. No non-cancer HI or total ELCR was calculated for the current or future on-site worker scenarios for exposure to surface soils and shallow soils. No inorganic constituents were detected at levels above background.

GROUNDWATER - The risk assessment identified a total non-cancer HI of 2 for future on-site worker populations. In the future on-site worker scenario, the HI is driven by exposure to chloroform in the groundwater by means of ingestion of drinking water. The data collected to date indicates that the source for the VOC contaminants Trichloroethane and Chloroform are believed to be the Q I Investigative area and the Quadrant III sewer system respectively. The groundwater plume in the Q I area is currently being evaluated and addressed. Ohio EPA and US DOE will continue to monitor the groundwater to ensure that the plume does not continue to migrate. Remedial activities at this time, due to ongoing operations probably would not provide any greater protection to human health and the environment and would interfere with daily operational functions.

The X-330 Process Building

The X-330 Process Building is 2,176 by 640 by 66 ft and houses 1,100 diffusion cascade stages that are part of the intermediate phase of the ^{235}U enrichment process. The enriched stream of ^{235}U is introduced in the X-326 Process building for further concentration and a depleted stream (tails) is withdrawn at the Tails Withdrawal Facility in the northeast corner of X-330.

The X-330 Process Building contains storage areas for radioactively contaminated soil and dried sewage treatment sludge containing PCBs. A troughing network has been installed in the process buildings to collect and contain oil drops potentially contaminated with PCBs from the joints in the ventilation system duct work.

Risk Analysis

SOIL - The Quadrant III RFI Baseline Risk Assessment identified a total non-cancer HI of less than 1 for the excavation worker scenario. No non-cancer HI nor total ELCR were calculated for the current or future on-site worker scenarios for exposure to soil. No inorganic constituents were detected at levels above background. The soil will be investigated at the time of D&D and remedial actions will occur if determined to be necessary.

GROUNDWATER- The Quadrant III RFI Baseline Risk Assessment identified an unacceptable risk to future on site workers based on ingestion of groundwater due to elevated levels of arsenic. The elevated levels of arsenic detected in groundwater may be due to sampling technique rather than an actual indication of contamination. Additional sampling of groundwater was collected using low-flow pumps from wells located in areas of the plant that have historically had high metals results in groundwater. Based on these results, the metals in groundwater previously detected at this unit appear to be the result of turbidity due to previous sampling techniques. The evaluation of groundwater site wide will continue via the IGWMP. If at any time it appears that contaminants are above acceptable levels, appropriate action will be taken.

X-530A Switchyard, X-530 B Switch House, X-530C Test and Repair Building, X-530D Oil House, X-530E Valve House, X-530F Valve House, and X-530G GCEP Oil Pumping Station

The Switchyard contains electrical transformers and circuit breakers, some of which contain PCB oil. The bed of the switchyard has 1 to 3 ft of 2 to 3 inch-diameter lime cobbles underlain by a grounding grid. Discharge from the underlying french drains flows into Storm Sewers A and B. The switchyard is used to store about 650,000 gallons of PCB-based transformer oil. Transformer oil that contains PCBs has been released to the limestone gravel bed through leaking transfer lines and the overfilling of circuit breakers.

Risk Analysis

Environmental media sampled at this unit during the RFI are surface soil (0-2 ft), shallow soil (2-10 ft), and groundwater. No surface water or sediment data were collected for this unit.

SOIL - Sampling results indicate that VOCs, SVOCs, PAHs, and PCBs have been released at this unit. The calculated risk in the baseline risk assessment (BRA) indicates that there is no unacceptable risk under current use scenarios to human health and the environment. Based on the data collected there is a potential risk to future workers from exposure to soil and groundwater. The levels at which PCBs associated with this SWMU have been detected are below the proposed clean-up goal of 25 ppm (please refer to the PCB Position Paper (9/11/97).

GROUNDWATER - Trichloroethene was detected at 22 ug/l in one well west of this unit. VOCS have been released to groundwater at this location. The current data in the baseline risk assessment (BRA) suggest that there is unacceptable risk to future on site workers as a result of ingestion of arsenic in groundwater. The arsenic levels detected are below the background upper tolerance limit of 92 µg/l for arsenic in Gallia groundwater. Additional sampling of groundwater was collected using low-flow pumps from wells located in areas of the plant that have historically had high metals results in groundwater. Based on these results, the metals in groundwater previously detected at this unit appear to be the result of turbidity due to previous sampling

612 techniques. Remediation at this unit would not be productive at this time, due to the high voltage
613 electricity in the switch yard, and the fact that the switch yard is an integral part of continued
614 operation of the facility. Remediation of the switch yard while still in operation poses an
615 unnecessary risk to human health. Additionally, it is unrealistic for U.S. DOE to consider
616 shutting down the facility to complete remediation since such a shut down will cause the
617 enrichment program to cease. Remediation of this SWMU will be completed during D&D.
618 Groundwater will continued to be monitored as part of the Integrated Groundwater Monitoring
619 Plan (IGWMP) for the site.

620 *The X-615 Abandoned Sanitary Sewer Treatment Facility*

621 The X-615 Abandoned Sanitary Sewer Treatment Facility treated most of the sanitary sewage
622 before it was deactivated in 1982. Effluent was piped to the Scioto River through an
623 underground pipeline. Sludge generated at the X-615 was treated in an anaerobic digester and
624 dried in three drying beds. The concrete-bermed, 2 feet deep, sludge-drying beds were filled with
625 sand and gravel for the dewatering process. Filtered water was then pumped back into the
626 sewage treatment plant. Following deactivation of the X-615, approximately 1,210,000 lb of
627 contaminated digester and drying-bed materials and underlying soils were removed, containerized,
628 and stored in the X-330 and X-333 Process Buildings.

629 **Risk Analysis**

630 Environmental media sampled at this unit during the RFI are surface soil (0 to 2 ft) and shallow
631 soil (2 to 10 ft). No surface water or sediment are present at this unit.

632 **SOIL** - The baseline risk assessment identified a total non-cancer HI of 1 and is within the
633 acceptable risk range for all applicable current and future land-use scenarios. The ELCR for
634 future and current workers was calculated to be 7×10^{-5}. This ELCR is driven by exposure to
635 beryllium and Aroclor-1260 in soil by means of ingestion and dermal absorption. The calculated

ELCR for both current and future on site workers is within the acceptable range as indicated by US EPA risk guidance, although it does not meet the 1 x 10^{-6} risk goal (point of departure). This unit will be remediated if necessary at the time of D&D. It was not economically feasible to remediate this unit at this time. Since site deferral criteria are met it is reasonable to address this unit at the same time the surrounding area is in D&D.

GROUNDWATER - TCE was detected at a level below or at the laboratory detection limit in one sample from one well associated with this unit. This well, however, is adjacent to and down gradient of the X-616 and therefore the VOC release is not related to the X-615 facility. Based on the data collected for the RFI report it appears that no contaminant releases to groundwater occurred from this unit.

This unit will be re-evaluated during D&D of the facility and groundwater will continue to be monitored in the X-616 area as stated in the IGWMP.

The X-744N, P, and Q warehouses and Associated Old Construction Headquarters

The X-744N, P, and Q Warehouses served as Peter Kiewit Contractor headquarters and vehicle parking area during construction of PORTS. The area next to this SWMU was used for soil borrow and fill and contains a considerable amount of construction debris. In the early 1980's, dewatered sludge from the X-2230N West Holding Pond and the X-2230M Southwest Holding Pond was spread west of the perimeter Road and south of the warehouses. Lithium hydroxide is currently stored in drums at the warehouses.

Risk Analysis

Environmental media sampled at this unit during the RFI are surface soil (0 to 2 ft), shallow soil (2 to 10 ft), and groundwater. No surface water or sediment data were collected for this unit.

SOIL - During Phase I RFI sampling, VOCs were detected at or near laboratory detection Limits

and SVOCs (including PAHs) were detected below or near laboratory detection limits in the soil associated with this unit. Because no plant process uses PAHs, identification of specific sources is not feasible. Potential sources of PAHs in the surface soil include runoff from roadways and nearby units. During Phase II sampling, VOCs were detected below or near laboratory detection limits. SVOCs were not detected in the soil. Previous sampling results suggest that VOCs and possibly SVOCs have been released to the soil at this unit. An ELCR of $2x10^{-5}$ for current workers and $3x10^{-6}$ for future on-site workers was calculated. Based on the results of the sampling the risk as calculated do not exceed current US EPA risk guidance. This unit will be re-evaluated at D&D to determine if the soils warrant remediation.

GROUNDWATER - The detection of PAHs at levels below or near laboratory detection limits in one Gallia groundwater sample indicates a potential or possible release of PAHs to groundwater at this unit. However, PAHs have been found to be naturally occurring in Berea wells surrounding PORTS. The Quadrant III Baseline Risk Assessment identified a total non-cancer HI of 1 for the future on-site worker population as a result of exposure to inorganic compounds in the groundwater associated with X-744N. The total ELCR for both future and current use scenarios did not exceed $1x10^{-6}$. Additional sampling of groundwater was collected using low-flow pumps from wells located in areas of the plant that have historically had high metals results in groundwater. Based on these results, the metals in groundwater previously detected at this unit appear to be the result of turbidity due to previous sampling techniques.

The X-745C West Cylinder Storage Yard

The X-745C West Cylinder Yard is 550,000 ft^2 and is located west of the X-330 building. Fourteen-ton cylinders of depleted UF_6 are stored in X-745C. The western portion of the storage yard is paved with concrete; the remainder is covered with crushed stone.

Risk Analysis

The environmental media; sampled at this unit during the RFI are surface soil (0 to 2 ft) and

shallow soil (2 to 10 ft). No surface-water, sediment, or groundwater data were collected specifically for this unit.

SOIL - VOCs, SVOCs, and PAHs have been detected, at levels above and below, at or near laboratory detection limits, in the surface soil associated with this unit. Previous sampling results suggest that VOCs, SVOCs, and PAHs may have been released to the surface soils at this unit. The Quadrant III RFI BRA identified that the soils at this SWMU did not pose an unacceptable risk to current or future on site workers.

The cylinders are currently being addressed by Ohio EPA in Director's Findings and Orders dated February 24, 1998.

The X-2230N West Holding Pond

The X-2230 N West Holding Pond No. 2 was constructed in 1978 to control erosion and sediment transported in stormwater run-off from the northern half of the former GCEP construction site.

Risk Analysis

Environmental media sampled at this unit during the RFI are surface water, sediment, surface soil (0 to 2 feet), and shallow soil (2 to 10 feet). No groundwater data were collected for this unit.

SURFACE WATER AND SEDIMENT- No organic or radiological parameters were detected in the surface water sampled at this unit. Sampling has indicated that SVOCs, PCBs, technetium, and possibly VOCs and PAHs have been released to the sediment at this unit.

The baseline risk assessment (BRA) for Quadrant III identified a total non-cancer HI of less than 1 for all applicable current and future land-use scenarios. Total ELCRs of 1×10^{-5} and 3×10^{-5} were identified in the RFI for current and future on-site workers, respectively. Based on the

completed risk assessment, surface water and sediment at this SWMU do not exceed acceptable risk to current workers as proposed by current US EPA guidance. However, the sediment will be reevaluated during D&D to determine if their is sufficient risk to warrant a remedial action.

SOIL- Sampling during the RFI indicated that PAHs, technetium, and possibly VOCs have been released to the soil at this unit.

The RFI baseline risk assessment identified a total non-cancer HI of less than 1 for all applicable current and future land-use scenarios. A total ELCR of 1×10^{-6} was identified in the RFI for excavation workers. This ELCR is driven by exposure to chromium be means of inhalation of soil particulates. There is no unacceptable risk to workers from the exposure to soils at this unit.

GROUNDWATER- The elevation of the unit is below the base of the Berea and Gallia water-bearing units and the Bedford Shale, therefore, groundwater was not evaluated as part of the RFI process.

During D&D sediments and soils surrounding the holding pond will be further evaluated to update the assessment of potential risks to ecological receptors.

The X-7725 Recycle and Assembly Building, The X-7745R Recycle and Assembly Storage Yard, and Initial construction Bulk Fuel Storage Area (Bulk Fuel Storage SWMU)

The X-7725 Recycle and Assembly Building covers approximately 400,000 ft^2. This GCEP support Facility was used to assemble new centrifuges used in the ^{235}U enrichment process and to rebuild failed centrifuges. The X-7725 SWMU is now a RCRA-permitted storage facility and also contains solid waste, LLW, and PCBs.

The X-7745R Recycle Assembly Storage Yard consists of approximately six acres. It functioned as a storage facility for new centrifuge machine casings during operations at GCEP. The X-7745 is now used as an LLW storage pad. The Bulk Fuel Storage Area located near the southwestern

corner of the X-7725 Recycle Assembly Building was used for storage and dispensing of gasoline and diesel fuel for construction vehicles and equipment during construction of PORTS.

Risk Analysis

Environmental media sampled at this unit during the RFI include surface soil (0 to 2 ft), shallow soil (2 to 10 ft), and groundwater. No surface water or sediment data were collected for this unit.

SOIL - During Phase I and Phase II RFI sampling, VOCs were detected at levels above or near laboratory detection limits and PAHs were detected at levels below or near laboratory detection limits in the soils associated with this unit. During Phase II sampling, SVOCs (including PAHs) were detected at levels below or near laboratory detection limits in the soil. Potential sources of PAHs include runoff from roadways and nearby units. Previous sampling results suggest that VOCs and possibly SVOCs have been released to soils in localized areas at this unit.

The Quadrant III RFI BRA identified total non-cancer HIs of 2 and 6 for future on-site worker and excavation worker populations, respectively, as a result of exposure to groundwater, soil, and soil vapors. In the future on-site worker scenario, the soil HI of 1 is driven by exposure to inorganic compounds by means of incidental ingestion and absorption. In the excavation worker scenario, the soil HI of 4 is primarily driven by exposure to arsenic by means of ingestion and to vinyl acetate by means of inhalation. Note that vinyl acetate was detected in only one sample out of 24, but to be conservative, the RFI BRA assumed vinyl acetate to be uniformly present throughout the SWMU. Therefore, the risk associated with this unit may be over estimated.

A total ELCR of 3×10^{-5} was identified in the RFI for current on-site workers.
A total ELCR of 4×10^{-5} was identified for excavation workers in the RFI.

GROUNDWATER- No VOCs, SVOCs, or PCBs were detected in groundwater associated with this unit.

Although the HI for this unit is elevated, Ohio EPA does not recommend remediation at this time due to the fact that the facility is currently in use and may be recontaminated. Furthermore, unauthorized excavation is not expected, and adequate worker exposure protection should be utilized if soil excavation is deemed necessary. Such protection measures are specified un US DOE's health and safety plan. The soils surrounding this unit will be evaluated for current and potential future risk during D&D.

West Drainage Ditch

The West Drainage Ditch consists of four small drainage ditches: one northern, one southern, and two central. Storm Sewers A and B discharge into the northern and central drainages, respectively. Flow from the northern and central drainages discharges into the X-230J3 Intermittent Containment Basin, then to the X-230J5 West Holding Pond, and finally into the lower West Drainage Ditch. The southern drainage ditch receives discharge from Storm Sewer J and then discharges into the X-2230N West Holding Pond No. 2 and subsequently into the lower West Drainage Ditch.

Risk Analysis

Environmental media sampled at this unit during the RFI are surface water, sediment, and surface soil (0 to 2 ft.). A "hot spot" risk analysis was conducted for surface water collected from groundwater seeps along the bank of the West Drainage Ditch. No shallow soil (2 to 10 ft) or groundwater data were collected from wells for this unit.

SURFACE WATER AND SEDIMENT - VOCs and SVOCs were detected at levels below or near laboratory detection limits in the surface water associated with this unit. Previous sampling results suggest that VOCs and SVOCs may have been released to the surface water at this unit.

VOCs, SVOC (predominantly PAHs), and PCBs were detected at levels above or near laboratory detection limits in the sediment associated with this unit. Technetium was also detected in the

sediment at this unit. Previous sampling results suggest that VOCs, SVOCs, PCBs, and technetium have been released to the sediment at this unit. Although the estimated risk for both future on site workers and a recreational population is not acceptable based on current risk guidelines, remediation of the sediments at this time would not be practicable. Due to the nature of on going plant operations it is likely that the surface water and sediments may become recontaminated. The sediments and surface water will be re-evaluated at D&D and remedial decisions will be made at that time.

SOIL - One VOC, chlorobenzene, was detected at levels below its PQL in one soil sample. Previous sampling results suggest that VOCs may have been released to the soil at this unit. During the summer of 1996, an extensive radiological survey was performed on the West Drainage Ditch and its tributaries. As a result of this survey, 14 localized areas of technetium-contaminated soil were identified. In autumn of 1996, a soil removal action eliminated the 14 localized areas, reducing the current and future risk.

The Quadrant III RFI BRA identified a total non-cancer HI that is acceptable for all current and future land-use scenarios. No carcinogens above background levels were detected at this unit.

Discussion of Risk Analysis

Threshold risk levels associated with the West Drainage Ditch are not exceeded for current use scenarios. The detected levels of PCBs associated with this SWMU are above the proposed cleanup goal of 1 ppm for areas outside the Perimeter Road based on future use, however, they do not pose an undue health threat under the current use scenarios. This unit will be re-evaluated during D&D.

GROUNDWATER SEEPS - The Quadrant III RFI baseline risk assessment (BRA) identified an acceptable risk for all applicable current and future land-use scenarios.

4.2 SWMUs Requiring Active Remedial Actions

The X-740 Waste Oil Handling Facility (groundwater only)

The X-740 Waste Oil Handling Facility is approximately 50 feet by 120 feet and consists of a diked concrete pad with a roof and sheet metal walls on the north, south, and west sides. (See Figure #4 in Appendix II) The east side of the facility is open-sided, with plastic sheeting windbreaks to protect the interior from weather. An oil-stained concrete pad for temporary drum storage is located approximately 200 feet northeast of the facility. During its period of operation from 1982 to 1992, the facility was used as a drum-staging area for approximately 8,000 gal/year of non-radionuclide-contaminated waste oils and 500 gal/year of nonradionuclide-contaminated waste solvents generated by various plant site activities. The drums were staged at the facility pending analysis of their contents before their final disposition. Empty drums that resulted from combining partially full drums were crushed in a hydraulic drum crusher in the northwest corner of the facility and disposed of at the X-735 Landfill. Effluent from the drum crusher was discharged to a tank/sump that was installed in early 1986 and is located beneath the drum crusher pad.

Summary of Risk Analysis

Environmental media sampled at this unit during the RFI include surface soil (0 to 2 ft), shallow soil (2 to 10 ft), and groundwater. No sediment or surface-water samples were collected for this unit.

SOIL - Subsequent to the RFI sampling, additional sampling has been performed to support the risk-based RCRA closure of this unit. These data were included in the May 1996 risk-based RCRA closure plan for the X-740.VOCs and SVOCs were detected at levels at or near laboratory detection limits in soil. PAHs were detected at levels below or near laboratory detection limits and up to 2,900 μg/kg (naphthalene). Because no plant process uses PAHs, identification of specific sources is not feasible. Potential sources of PAHs in the surface soil

include runoff from roadways and nearby units. No PCBs or pesticides were detected in the soil. Total uranium was detected at concentrations ranging from 2.3 to 2.9 mg/kg. No other radiological parameters were detected in the soil.

The Quadrant III RFI baseline risk assessment (BRA) identified a total non-cancer HI of 0.02 and a total ELCR of 1×10^{-6}. The human health risks from residual contamination in soil at the X-740 facility (building and tank) do not exceed the Ohio EPA target risk values for RCRA closures. In addition, analysis and evaluation of the PORTS soil leaching model demonstrated that the residual soil contamination does not pose a threat to groundwater.

GROUNDWATER - A VOC groundwater plume is present in the Gallia and Berea west of the X-740 Building (Please refer to Figure 5). The primary constituent is TCE. All other constituents (primarily TCE breakdown products) occur within the boundaries of the TCE plume. TCE groundwater concentrations are highest approximately 100 ft. west of the X-740 building (the maximum concentration was 11,000 μg/L at X740-03G sampled in November 1993 and 3,100 μg/L at X740-03G sampled in September 1994 and further decreased to 1,200 μg/L in September 1997) and decrease radially in all directions to below detection limits. The Gallia groundwater plume extends west of the X-740 building. The Gallia groundwater plume is well defined and extends approximately 700 feet west of the X-740 building.

VOCs, primarily TCE, were also detected in Berea groundwater immediately underlying the center of the Gallia groundwater plume, where TCE concentrations are highest. A TCE concentration of 1,200 μg/L was detected at X740-09B when it was originally sampled during the Phase II investigation. In February 1998 the concentration was 2,400 μg/L. As noted in the Quadrant III RFI Final Report, the Sunbury confining unit is absent in this part of the PORTS site and the Gallia and Berea groundwater are in connection. Berea groundwater flows predominately westward towards the Berea outcrops in the West Drainage Ditch.

5.0 ENFORCEMENT ACTIVITIES

A RCRA Closure Plan for the X-740 was submitted by DOE in 1993 and approved by Ohio EPA in June 1994. The closure included decontamination of the floor and walls of the facility and the removal of the tank/sump and the surrounding contaminated soil. The initial closure activities were performed from September 1993 through November 1993.

6.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Ohio EPA relies on the public to ensure that each remedial alternative selected at PORTS meets the needs of the local community, in addition to being an effective solution to the problem. The Quadrant III Preferred Plan was released to the public in December 1998. This document is available to the public in the administrative record, maintained at the Environmental Information Center, P.O. Box 693, Piketon, Ohio and at the Ohio EPA Southeast District Office, 2195 Front Street, Logan, Ohio. Notice of the availability of the Preferred Plan was published in the Pike County News Watchman December 7, 1998.

The groundwater at the X-740 SWMU is the principal threat to human health and the environment in Quadrant III. The remedial action selected for groundwater at X-740 fits into the overall clean-up strategy for the PORTS facility by reducing mobility, toxicity, and eliminating the exposure pathways that may present a current or future risk to human or ecological receptors. The selected remedy also addresses the potential for contaminant release and off-site migration.

Ohio EPA formally presented the Preferred Plan for Quadrant III at a public availability session held on January 5, 1999. At this meeting representatives from Ohio EPA discussed the RFI, CAS/CMS, and the Preferred Plan, and answered questions and received comments related to Quadrant III and the remedial alternatives under consideration. Responses to significant

comments, criticisms, or new data received during the comment period and public meeting are included in the "Responsiveness Summary," which is attached to this Decision Document.

This decision document presents the selected remedial actions for Quadrant III of the US DOE Portsmouth Facility. These actions are 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), the Hazardous and Solid Waste Amendments (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 the Preferred Plan have been available for public review and comment prior to selection of the chosen remedies. Documents issued before the Preferred Plan include, but are not limited to the Quadrant III Final RFI Report (DOE 1996), The Baseline Ecological Risk Assessment (DOE 1994), The Air RFI (DOE 1997), the Background Sampling Investigation (DOE 1996), the Quadrant III CAS/CMS Report (DOE 1998).

7.0 SCOPE AND ROLE OF THE RESPONSE ACTION

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

The scope of remedial actions implemented at the PORTS facility is to eliminate or reduce (to acceptable levels) any risks to human health or the environment posed by releases and/or potential

releases of contaminants from the SWMUs at ports. SWMUs at the PORTS facility are in various stages of the remedial action process; however, remedial actions preformed at the SWMUs are coordinated to achieve overall risk reduction and complete remediation of the entire facility. It is also desirable that remedial actions implemented restore and enhance the areas being remediated.

Nineteen SWMUs were investigated in Quadrant III. Four SWMUs (X-616, X-744S, T, and U Warehouses, X-6619 Sewage treatment Facility, and the Don Marquis Substation) did not pose any unacceptable current or future risks to human health and the environment. Therefore, no active remedial corrective action is necessary. Eleven SWMUs (X-230J3, X-230J5, X-326, X-330, X-530, X-615, X-744(N, P, Q), X-745C, X-230N, X-7725, and the West Drainage Ditch) have been deferred to D&D. These SWMUs will be evaluated for active remedial measures when the facility is no longer in operation.

Only one SWMU will require an active remedial measure X-740 (groundwater only). The principle threat identified at the X-740 is from the potential future use and ingestion of groundwater contaminated with TCE. The remedial action selected for the X-740 SWMU fits into the overall clean-up strategy for the PORTS facility by active remediation and or eliminating the exposure pathways that may lead to present and future risk to human and ecological receptors.

8.0 SUMMARY OF QUADRANT CHARACTERISTICS

Several investigative studies were conducted to determine the nature and extent of contamination within the Quadrant. The investigation is detailed in the final Quadrant III RFI and Quadrant III CAS/CMS Report. The following were investigated as part of the Quadrant III Investigation:

- Soil
- Groundwater
- Surface Water &
- Sediments.

8.1 POTENTIAL SOURCES OF CONTAMINATION

There is only one SWMU in Quadrant III which requires active remedial measures (X-740 ground water only) to prevent potential exposure to contaminants at this time. Those SWMUs which have been deferred to D&D will be evaluated for active remedial measures at the time the facility is no longer in operation. Although the approved CAS/CMS Report discusses a referral option, as well as the text above, Ohio EPA has determined that SWMUs which fall into that category shall be deferred to D&D. It is Ohio EPA's opinion that deferring these units to D&D shall require 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.

The Quadrant III risk assessment identified TCE, 1,1 dichloroethene, 1,2 dichloroethane, and 1,1,1 trichloroethane as contaminants of concern (COC). Metals were also identified but additional groundwater data, collected with a low flow pump, since the conclusion of the RFI and the CAS/CMS has shown that metals were no longer a chemical of concern.

A VOC groundwater plume is present in the Gallia and Berea west of the X-740 Building (Please refer to Figure #5). The primary constituent is TCE. All other constituents (primarily TCE breakdown products) occur within the boundaries of the TCE plume. TCE groundwater concentrations are highest approximately 100 ft. west of the X-740 building (the maximum concentration was 11,000 μg/L at X740-03G sampled in November 1993, 3,100 μg/L at X740-03G sampled in September 1994 and levels further decreased to 1,200 μg/L in September 1997). Trichloroethene concentrations decrease radially in all directions to below detection limits. The Gallia groundwater plume extends west of the X-740 building. The Gallia groundwater plume is well defined and extends approximately 700 feet west of the X-740 building.

VOCs, primarily TCE, were also detected in Berea groundwater immediately underlying the center of the Gallia groundwater plume, where TCE concentrations are highest. A TCE concentration of 1,200 μg/L was detected at X740-09B when it was originally sampled during the

Phase II investigation. In February 1998 the concentration was 2,400 μg/L. As noted in the Quadrant III RFI Final Report, the Sunbury confining unit is absent in this part of the PORTS site and the Gallia and Berea groundwater are in connection. Berea groundwater flows predominately westward towards the Berea outcrops in the West Drainage Ditch.

Inorganic constituents, including radiological parameters, in Gallia and Berea groundwater have been evaluated. Groundwater in this area does not appear to have been impacted by inorganic constituents. Additional sampling of groundwater was collected using low-flow pumps from wells located in the X-740 area. Based on these results, the metals in groundwater previously detected at this unit appear to be the result of turbidity due to previous sampling techniques. The further evaluation of inorganics will be performed as part of the Integrated Groundwater Monitoring Plan (IGWMP). Contaminants could potentially migrate through the groundwater into the west drainage ditch and off site.

9.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

The CAS/CMS was conducted to identify and screen technologies and clean-up alternatives to address the COCs in Quadrant III.

9.1 *Development of Alternatives for X-740 SWMU - CAS/CMS Study*

The CAS/CMS was conducted to screen technologies for the remediation of units in Quadrant III. Only one SWMU, the X-740 Waste Oil Handling Facility, required the development and evaluation of cleanup alternatives. The alternatives were developed to evaluate remedies for the groundwater plume. Seven alternatives were evaluated (1, 2, 3, 4a, 4b, 5a and 5b) which are described in detail below:

Risk at the X-740 SWMU

The Quadrant III RFI BRA identified a total non-cancer HI of 4 and a total ELCR of 5×10^{-3} for a future on-site worker. This exposure scenario assumed that on-site workers could potentially drink contaminated groundwater. For the purpose of the CAS/CMS, VOC groundwater contamination at this unit has been sufficiently defined to support an evaluation of remedial alternatives.

Discussion of Risk Analysis

Based on the levels of TCE contamination in the groundwater, remediation at this unit is considered to be necessary. No PCBs or pesticides were detected in soils.

ALTERNATIVE 1- NO ACTION

The No Action Alternative provides a basis for comparison with other alternatives. Under this alternative no land use restrictions would be imposed and no active measures would be taken to reduce potential exposure to contaminants in the groundwater. No time frame is associated with implementation of the alternative. No present or future restrictions on access or land use would be imposed. Natural attenuation of the contaminants in the groundwater is assumed to continue.

COST ANALYSIS: ALTERNATIVE #1 - NO ACTION

There is no cost associated with this alternative.

ALTERNATIVE 2- INSTITUTIONAL CONTROLS AND MONITORING

Alternative 2 is considered a limited action alternative and consist of the three measures listed below:

1) Institutional Controls - The X-740 area is within the security fence of the site. Security would be maintained to prevent unauthorized access to the site. The fence is maintained as part of overall site security.

2) Deed Restrictions - Deed Restrictions would prevent residential development and use of the groundwater for any purpose that could lead to exposure to contaminants of concern.

3) Groundwater Monitoring - Groundwater monitoring would be initiated to assess the potential migration of contaminants in groundwater beyond the current plume boundaries (Please refer to Figure IV) and the effectiveness of natural attenuation (NA). The groundwater monitoring program would use the existing wells and would require the installation of 5 additional wells. The wells would be sampled semi-annually for the first year and annually for the years 2 through 12 to 15 for the contaminants of concern. Monitoring would continue as needed after year 15.

COST ANALYSIS: ALTERNATIVE #2 -INSTITUTIONAL CONTROLS AND GROUNDWATER MONITORING

The total present worth cost for alternative #2 are:

Capital Costs	$110,000
The O & M costs	$493,000
Total	$603,000

ALTERNATIVE #3 - INSTITUTIONAL CONTROLS AND IN SITU TREATMENT (PHYTOREMEDIATION)

Alternative #3 consists of two major elements

1) Deed restrictions and Institutional Controls; and
2) In situ treatment-phytoremediation.

Deed restrictions and Institutional Controls are similar to Alternative #2 listed above. The In-Situ Phytoremediation consists of planting approximately 2,400 poplar trees on approximately 2.64 acres. Individual tree spacing would be 5 ft. in each row and rows would be spaced 10 ft. apart. Phytoremediation is considered an emerging technology which uses plants and their associated rhizospheric microorganisms to remove, degrade, or contain contaminants in soil and groundwater. The trees used in phytoremediation are used as a biological pump. Phytoremediation uses the natural growth process of biological systems to attenuate and reduce contaminants in groundwater. During growth, the root system provides oxygen and sugars while up taking trace minerals and groundwater contaminants in the water. The sugars and oxygen provided by the tree serve as nutrients for bacteria in soil. The enzymes produced during growth can break down and incorporate waste into new plant material. The enzymes have also shown a capability to reduce chlorinated solvents such as TCE. The process assumes that the five following conditions are met:

1) One-year old hybrid poplars (Populus trichocarpa x P. deltoides) will be planted some five to ten feet apart to facilitate good root development.
2) The poplar trees will develop a mature root system within two years.
3) During growth and root development the plume will continue to naturally attenuate and the contaminant levels will decrease.
4) Current groundwater sampling has indicated that there is no inorganic contamination in this area, therefore metal accumulation in the leaves is not expected to be a problem.
5) Water consumption by the trees is assumed to be between 3,000 to 10,000 gallons per acre of trees/day. Actual consumption of water may be greater.

COST ANALYSIS: ALTERNATIVE #3 INSTITUTIONAL CONTROLS AND PHYTOREMEDIATION

The total present worth cost for Alternative #3 are:

Capital Costs	$268,000
The O&M costs	$360,000
Total	$628,000

ALTERNATIVE 4 (a & b)- INSTITUTIONAL CONTROLS, REMOVAL/DELIVERY (EXTRACTION WELLS), AND EX SITU TREATMENT

Alternative 4 contains four major elements for the remediation of groundwater contaminants. The four major elements are as follows:

1) Institutional controls-deed restrictions, land use restrictions, and groundwater monitoring;
2) Removal/delivery-two extraction wells;
3) Ex situ treatment-air stripping/carbon polishing; and
4) Discharge-discharge to on site stream.

Deed restrictions would prevent groundwater development in the vicinity of X-740. Access and use restrictions would limit exposure to contaminated groundwater by requiring excavation permits and stipulating the maximum depth of excavations permissible in the area. Groundwater monitoring would be initiated to document any migration of groundwater contamination beyond the X-740 plume area. The groundwater monitoring program would use existing and newly installed monitoring wells to assess contaminant fate and transport as noted in Alternative #2.

Alternative 4a - The pump and treatment system would utilize standard extraction wells. Groundwater would be pumped to the surface, stored in a temporary storage tank, transported in tanker trucks to an on site existing treatment facility. This option would require a heated storage building to house the storage tank to prevent the water from freezing during the winter months.

Alternative 4b- Alternative 4b is essentially the same as Alternative #4a except a new treatment facility would be built at the X-740 SWMU to avoid transporting the contaminated groundwater to an on site facility. The treatment facility would include air stripping/carbon polishing that would remove VOCs from the groundwater. Carbon filtration is an adsorption technology that uses a solid material of high surface area to selectively adsorb organic contaminants from aqueous streams. New permits would be required from Ohio EPA for this alternative, if selected. A permit to install, a permit to operate the water treatment system as well as permits for discharge to air and water would be obtained as needed.

COST ANALYSIS: ALTERNATIVE 4a/b -INSTITUTIONAL CONTROLS, EXTRACTION WELLS, TRANSPORTING THE CONTAMINATED WELLS TO AN ON SITE TREATMENT FACILITY/TO A NEW FACILITY AT X-740 SWMU

The total present worth costs for Alternative 4a are: Capital Costs $641,000
The O & M costs. $869,000
Total $1,510,000

The total present worth cost for Alternative 4b are: Capital Costs . .$620,000
The O & M costs. . .$508,000
Total..$1,128,000

ALTERNATIVE 5a & b -INSTITUTIONAL CONTROLS, REMOVAL/DELIVERY (VACUUM ENHANCED RECOVERY), AND EX SITU TREATMENT

Alternative #5a & b consists of three parts as follows:

1) Institutional controls-deed restrictions, land use restrictions, and groundwater monitoring;
2) Removal/Delivery-VER wells;
3) Ex situ treatment-air stripping/carbon polishing.

Deed restrictions would prevent the use of groundwater development in the vicinity of X-740. Access and use restrictions would limit exposure to contaminated groundwater by requiring excavation permits and stipulating the maximum depth of excavations permissible in the area. Groundwater monitoring would be initiated to determine if contaminated groundwater is migrating beyond the X-740 plume area. The groundwater monitoring would be described in the Integrated Groundwater Monitoring Plan (IGWMP) and consist of existing and newly installed wells as described in Alternative #2.

The Vacuum-Enhanced Recovery (VER) process was developed for the remediation of VOCs and other contaminants in low to moderate permeability subsurface formations. VER extracts both groundwater and soil vapor. Negative pressures applied to the pumping wells result in increased pumping rates and greater drawdowns. Soluble VOCs present in the extracted groundwater are removed more quickly than with traditional pump and treat methods. The increased pumping rates and draw downs also more effectively dewater the saturated materials, thereby creating a larger unsaturated zone for the application of the soil vapor extraction process. Stripping and removal of volatile compounds sorbed on the previously saturated soil are facilitated.

A VER pilot study was completed for the site in to determine the key parameters necessary to design an effective system. The parameters needed to evaluate such a system are an effective well vacuum, groundwater and vapor radii of influence, and groundwater and soil vapor extraction flow rates.

Extracted vapor would be filtered through a carbon bed prior to discharge. Groundwater extracted via a vacuum would be contained in a tank and periodically transported to an existing on-site permitted treatment facility (5a) or pumped to a new air-stripper /carbon polishing unit installed at X-740 specifically for treatment of TCE-contaminated groundwater (5b).

COST ANALYSIS: ALTERNATIVE 5a/b INSTITUTIONAL CONTROLS, VACUUM ENHANCED RECOVERY AND GROUNDWATER TREATMENT AT AN EXISTING ON SITE FACILITY (5a)/ GROUNDWATER TREATMENT AT A FACILITY BUILT AT X-740 (5b)

The total present worth cost for Alternative 5a are Capital Costs . $1,962,000
The O&M costs _ $1,563,000
Total . $3,525,000

The total present worth cost for Alternative 5b are: Capital Costs $2,006,000
The O&M costs $524,000
Total $2,530,000

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting the remedial alternative, the Ohio EPA will consider the following eight criteria.

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

2. **Compliance with all State, Federal and local laws and regulations** addresses whether or not a remedy will meet all of the applicable State, Federal, and Local environmental statutes.

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

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

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

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

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

8. **Community acceptance** will be assessed in the Decision Document following review of the public comments received on the CAS/CMS Report and the Preferred Plan.

Ohio EPA evaluated each alternative using the above eight criteria. The following discussion summarizes the compliance of the alternatives with these criteria.

1. Overall Protection of Human Health and the Environment

The No Further Corrective Action Alternative is protective of human health and the environment for those units which have been evaluated in Quadrant III and were found to fall into the acceptable risk range as identified by US EPA risk guidance. The SWMUs in this category fall

into the risk goals outlined by CERCLA and RCRA. In some instances deed restrictions may be necessary to ensure that there is no change in use. In addition to the No Further Corrective Action Alternative, Ohio EPA evaluated a deferral to D&D Alternative. These SWMUs do not pose a sufficient risk to warrant remediation at this time, considering active remedial measures would not be prudent due to the fact that these facilities are still operating and may become re-contaminated. These facilities will be monitored periodically to ensure that they do not pose an unacceptable risk to human health and the environment, while the facility is still on operation.

The clean-up objectives for the groundwater plume at the X-740 SWMU are listed in Table I and are reached in each of the alternatives evaluated for this SWMU. The major differences between the alternatives is the amount of time needed to remediate the groundwater in order to meet these clean-up objectives. Alternative #1 however, does not provide any deed restriction or institutional controls which may allow for exposure to future construction workers or site employees. Alternatives #1 and #2 provide no assurance that contaminants would not contaminate a surface water tributary located to the west of the X-740 area and migrate off site potentially exposing environmental receptors. Alternatives #3, and #5 are active remedial procedures which will restore groundwater and meet clean-up objectives several years faster than the Alternatives #1 and #2. Alternative #4 is expected to meet remedial objectives in the Gallia aquifer within 10 years however, it is estimated that the Berea aquifer would not meet clean-up objectives for 22.5 years. Alternative #3 is predicted to meet clean-up objectives within 10.5 years after the trees mature. Alternative #5 has been projected to meet clean-up objectives for both aquifers within 12.5 years. Alternative #2 is predicted to meet clean-up objectives for both aquifers in approximately 23 years.

2. Compliance with all State, Federal and Local Laws and Regulations

Selected remedial actions on the U. S. DOE site must comply with applicable Federal, State, and Local laws and regulations. Examples of these include, but are not limited to, the Clean Air Act, Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Water Act, the Resource

Conservation and Recovery Act, Ohio Revised Code (ORC) 6111, ORC 3734, and Ohio Administrative Code 3745. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that remedial actions meet legally applicable or relevant and appropriate requirements (**ARARs**) of other environmental laws. "Applicable requirements" means those cleanup standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site. "Relevant and appropriate" requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that, while not legally "applicable" to a hazardous substance, pollutant, remedial action or circumstance at a site, their use and application is well suited to the situation at a site. An example of a situation where a law would be relevant and appropriate is the treatment of waste not lawfully deemed "hazardous" but identical to chemicals currently deemed hazardous under the Resource Conservation and Recovery Act (RCRA). A list of Ohio's ARARs for the X-740 solid waste management unit is provided in Appendix B of the CAS/CMS Report.

ARARs are divided into three different categories:

- **Chemical-Specific ARARs**
- **Action-Specific ARARs**
- **Location-Specific ARARs**

Chemical-Specific ARARs are health or risk-based numerical values which establish the acceptable amount or concentration of a chemical that may be found in the environment. An example of chemical-specific requirements are maximum contaminant levels (**MCL's**) established for certain chemicals under the Safe Drinking Water Act. No Further Corrective Action and referral to D&D remedial actions comply with chemical specific ARARs for those units noted to fall into these categories. All of the remedial alternatives evaluated except for Alternative #1 (No

Action) for the groundwater at the X-740 SWMU are expected to comply with chemical-specific ARARs. Alternatives 4 &5 where groundwater is expected to be brought to the surface and treated prior to discharge are subject to regulation under the National Pollutant Discharge Elimination System (NPDES) program. Alternatives #1 and #2 do not contain remedial measures or operation and maintenance. Additionally, Alternative #1 does not meet all identified ARARs or TBC guidance.

Action-Specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to generated wastes. An example of an action-specific requirement would be the requirement for treatment of hazardous waste to approved standards before it is land disposed. Action specific ARARs do not apply for the selected No Further Corrective Action and the deferral to D&D remedial actions. An action-specific ARAR for the X-740 SWMU is the requirement to dispose of any VOC contaminated drill cuttings from installation of monitoring wells to a solid waste landfill or if necessary a hazardous waste facility.

Location-Specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in a specific location. An example of location-specific requirements are laws forbidding the placement of an incinerator near a hospital or school or the placement of waste in a wetland area. The alternatives evaluated for Quadrant III and active remediation of the groundwater plume at the X-740 SWMU do not trigger location-specific ARARs.

3. Long-term Effectiveness and Permanence

Long term effectiveness and permanence is not presently applicable to those SWMUs deferred to D&D. Those SWMUs deferred to D&D will be evaluated for remedial alternatives at the time of plant closure. Since cleanup objectives are met for those selected SWMUs within the No Further Corrective Action Alternative, long term effectiveness and permanence is expected to be met.

All of the remedial alternatives described above for the X-740 SWMU are expected to eventually meet clean-up objectives within the time frame evaluated. This assumption is based on current groundwater data and modeling conducted in the CAS/CMS report. Alternative #1 does not meet all ARARs and will no longer be considered as a viable alternative for comparison. However, Alternatives #2 does nothing to prevent the potential migration of contaminants to a surface water body exposing off site receptors within the time frame specified for restoration of the aquifer. Alternative #5 is predicted to reduce the contaminants to meet clean-up objectives 12.5 years. Alternative #3 has been predicted to be able to meet clean-up objectives within 10.5 years of the trees maturing. It has been estimated that it may take two years for the trees to mature. Alternative #3 (Phyto-remediation) has been proven effective at other sites removing and destroying VOC contaminants. Alternative #4 uses readily available technology. Alternative #4 is predicted to meet clean-up objectives within the Gallia aquifer within 10 years and 22.5 years for the Berea. Alternatives #1 and #2 would meet clean-up objectives within both aquifers in 23 years. Alternative #2 depends solely on institutional controls to prevent exposure during the 23 years needed until the clean-up goals are achieved. Alternative #1 is provided as an alternative so that the reviewer can compare the effectiveness of active remedial actions at this site, and does not meet identified ARARs or TBC guidance.

4. Reduction of Toxicity, Mobility and Volume through Treatment

This criteria is not applicable to the No Further Corrective Action since the risk goals are met for those units which fall into this category in Quadrant III. This criteria will be evaluated for those units deferred to D&D at the time the facility is no longer in operation. Each of the alternatives for the X-740 groundwater plume effectively reduce toxicity, mobility and volume of the contaminant plume. The clean-up objectives are predicted to be obtained for each of the alternatives described above. Not all alternatives (Alternatives #1 and #2) rely on active treatment of the groundwater contamination. Alternative #3 is the most effective in reducing toxicity, mobility and volume of TCE in the groundwater. It is estimated that clean-up goals can be obtained within 10.5 years after the trees mature. Alternative #5 is predicted to remediate the

plume to clean-up objectives within 12.5 years. Alternative #4 will reach clean-up objectives in 22.5 years for both aquifers, however the predicted clean-up time for the Gallia aquifer is 10 years. Alternative #1 and #2 will reach clean-up objectives within 23 years but do not rely on active treatment. These alternatives are considered less effective in reducing toxicity and mobility due to the fact that the plume may migrate to a tributary to the west and allow the contaminants to potentially reach off site receptors.

5. Short-term Effectiveness

This criteria is not applicable to the units meeting the No Further Corrective Action criteria. This criteria will be evaluated for those units deferred to D&D at the time the facility is no longer in operation. Those alternatives evaluated for the X-740 groundwater plume which minimize the amount of contaminants in soils that on site workers could contact due to installation of wells or remedial systems are expected to provide greatest degree of short term effectiveness. Alternative #2 provides the greatest level of protection from short term risk due to the fact that it does not require any intrusive practices potentially exposing remediation workers, or on site workers to contaminated soil or groundwater. Alternatives 3, 4, and 5 present minimal short term risk to remediation workers and current on-site workers during construction activities, however, these risks can be readily addressed through proper worker safety procedures. (Alternative #1 was provided as a comparison in which to evaluate all other alternatives and does not meet ARARs.)

6. Implementability

Both the No Further Corrective Action and deferral to D&D remedial solutions are easily implemented. Varying degrees of implementability are expected from each alternative. Those alternatives which require installation of wells and other remedial equipment are expected to be slightly more difficult. However, much of the technology is readily available and should not pose significant problems to implement for the X-740 SWMU. Alternative #1 involves no implementation time frames. Alternative #2 requires limited remedial activities related to the installation of five new monitoring wells. Alternative #2 would be easiest of alternatives to implement. Alternative #3 requires the planting of trees which involves soil preparation, irrigation

and routine maintenance to ensure that the trees remain healthy. Alternatives #4 and #5 are both easily implemented. The extraction and monitoring well equipment in Alternatives #4 and #5 could be installed within months of Agency approval. Also, should it not be deemed feasible to treat waste at an on site groundwater treatment facility, additional time would be needed to design a treatment system for Alternatives #4b and #5b.

7. **Cost**

There are no costs associated with the No Further Corrective Action alternative. The cost for future remediation for those units deferred to D&D will be evaluated at the time that the PORTS facility is no longer in operation. Below are the costs for the various alternatives in descending order:

The most expensive alternative to be evaluated for the X-740 groundwater plume was Alternative #5a VER with groundwater treatment at an existing facility:

The Present Worth Capital Costs	$1,962,000
The Present Worth O&M Costs	$1,563,000
The Total Costs	$3,525,000

This high cost for O & M is due to the labor cost involved with trucking the pumped groundwater to a treatment facility.

#5b -VER with groundwater treatment and construction of a new on site treatment facility. The cost associated with Alternative #5b:

The Present Worth Capital Costs:	$2,006,000
The Present Worth O & M Costs	$ 524,000
The Total Costs:	$ 2,530,000

Alternative #4a-Groundwater extraction wells with groundwater treatment at an existing facility;

The Present Worth Capital Costs:	$ 641,000
The Present Worth O & M Costs	$ 869,000
Total Costs:	$1,510,000

Alternative #4b- Groundwater extraction wells with construction of a new on site treatment facility;

The Present Worth Capital Costs	$620,000
The Present Worth O & M Costs	$508,000
Total Costs:	$ 1,128,000

Alternative #3-Phytoremediation;

The Present Worth Capital Costs	$268,000
The Present Worth O & M Costs	$360,000
Total Costs:	$628,000

Alternative #2-Institutional Controls, monitoring of natural attenuation;

The Present Worth Capital Costs	$110,000
The Present Worth O & M Costs	$493,000
Total Costs:	$603,000

Alternative #1-No Action; *No costs are associated with this alternative.*

11.0 OHIO EPA'S SELECTED ALTERNATIVES FOR QUADRANT III

Ohio EPA has selected two alternatives as remedial solutions and a deferral option for Quadrant III. For those SWMUs which fall into the risk goals as outlined by CERCLA and RCRA, a No Further Action Corrective Remedial Alternative is selected. The four SWMUs which fall into this category are:

- X-616 Effluent Control Facility/Former Chromium Sludge Lagoons (Soils)
- X-744S, T, and U Warehouses
- X-6619 Sewage Treatment facility
- Don Marquis Substation;

In addition to the No Further Action Alternative, there were eleven SWMUs which have been deferred to decontamination and decommissioning (D&D). Although the approved CAS/CMS Report discusses a referral option, as well as the text above, Ohio EPA has determined that SWMUs which fall into that category shall be deferred to D&D. It is Ohio EPA's opinion that deferring these units to D&D shall require 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. There were four criteria used to make that decision.

(1) HI values for media-specific total non-cancer risks under the industrial worker scenarios are generally less than 1.

(2) The industrial worker scenario ELCR values were within the risk range of 1×10^{-4} to 1×10^{-6}.

(3) Evaluation of the contaminants present indicate that they are generally immobile.

(4) The SWMUs identified are within current production areas and operational facilities. Remedial activities may interrupt facility operations and such areas may likely become re-contaminated due to on going production of enriched uranium.

The units listed below have been deferred to D&D:

- X-230J3 West environmental Sampling Building and Intermittent Containment Basin;
- X-230J5 West Holding Pond and Oil Separation Basin;
- X-326 Process Building;
- Z-330 Process Building;
- X-530A Switchyard, X-530B Switch House, X-530C Test and Repair Building, X-530D Oil House, X-530 Valve House, X-530G Gaseous Centrifuge Enrichment Process oil pumping Station;
- X-615 Abandoned Sanitary Sewer Treatment Facility;
- X-616 Effluent Control Facility/Former Chromium Sludge Lagoons (groundwater)
- X-744N, P, and Q Warehouses associated Old Construction Headquarters;
- X-745C West Cylinder Storage Yard;
- X-2230N West Holding Pond No. 2;
- X-7725 Recycling and Assembly Building, X-7745 Recycling and Assembly Storage Yard, and Initial Construction Bulk Fuel Storage Area (Bulk Fuel Storage SWMU); and
- West Drainage Ditch.

X-740 (groundwater only)

The Ohio EPA's preferred remedial alternative for the X-740 SWMU (groundwater) is Alternative #3, Phytoremediation. Although Phytoremediation is an emerging technology, it has been shown to remediate TCE under controlled experimental settings at several Department of Defense and Superfund sites. One such site where phytoremediation is currently being evaluated is the

Carswell Air Force Base in Texas. Alternative #3 consists of Institutional controls-deed restrictions, land use restrictions, groundwater remediation, and in situ treatment-phytoremediation. Phytoremediation is an in situ technology that relies on the natural growth process of vegetation (in this case trees) to remediate groundwater. Hybrid Poplar trees (*Populus trichocarpa x P. deltoides*) approximately one year old will be planted in rows approximately 10 feet apart. Each tree will be spaced approximately 5 feet apart over an area of 2.64 acres. The trees can be planted in a matter of 4 months. The number of trees, the spacing and the acreage to be planted may be modified during design should additional data collected prior to implementation of the remedy indicate such a modification is necessary.

The poplar trees are expected to have a mature root system within 2 years. Prior to the development of the mature root system, natural attenuation of the plume is expected to occur. Once the trees mature the water consumption is expected to be between 3,000 to 10,000 gallons per day per acre of trees. Organic compounds are expected to be captured and removed from the groundwater. Bioaccumulation of organic compounds has been proven not to occur in the trees. Metal contamination has been shown not to be present at this area therefore, bioaccumulation of metals is not considered a problem. The Capital Costs for implementation for Alternative #3 is $268,000. The present worth value of the O & M costs is $360,000

Remedial action objectives would be met by including institutional controls to prevent exposure of on site personnel to contaminated groundwater. Other controls to limit exposure to remediation workers would be set in place to limit contact with contaminated groundwater or soils. It is estimated that based on a water consumption of 6,000 gal per day per acre of trees that clean-up objectives would be obtained 10.5 years after root maturation. Studies have shown that the root systems of the hybrid poplar will reach 20 to 30 feet below the ground surface, and may up take between 50 to 350 gallons of water per tree per day. During growth, the root system provides oxygen and sugars while up taking trace minerals and groundwater contaminants in the water. The sugars and oxygen provided by the tree serve as nutrients for bacteria in the soil. The bacteria, promoted by the tree growth, aid in the biodegradation of contaminants. By breaking

down organic contaminants, bacteria obtain carbon and energy to help sustain bacterial reproduction and maintenance processes.

Groundwater will continued to be monitored throughout the process. Additional groundwater wells may be installed to monitor the progress of the remediation. Groundwater will be monitored at least semi-annually or as needed during the start of the remedial process. The frequency of groundwater monitoring will be evaluated in the approved CMI (Corrective Measure Implementation Plan) and the results will be reported in the Integrated Groundwater Monitoring Annual Report for the site. The IGWMP will include the parameters for sampling as well as the frequency for monitoring well sampling. The parameters and frequency of monitoring may change as the remediation progresses. Air monitoring may occur during the planting of trees. Fugitive dust emissions will be monitored during construction.

The implementation of Alternative #3 will protect human health and the environment by eliminating contaminants from the groundwater. This alternative complies with all state and federal regulations. No known local regulations exist that would be violated by this alternative. Migration of contaminants to the western tributary and off site may occur in the future should active remedies fail to contain and eliminate the groundwater plume. Exposure to contaminants via dermal contact with surface water will most likely occur should no remediation take place at this unit. Environmental receptors could be exposed via ingestion of contaminated surface water should no active remedy be put in place. The remedy is easily implementable using standard construction equipment. The remedy will be effective in the long term since it will eliminate the groundwater contamination and meet all the clean-up objectives. It will be effective in the short term by following careful construction practices and isolation of the area to prevent exposure to contaminants from drill cuttings or groundwater. In comparing Alternative #3 with the other alternatives for this SWMU, both short-term and long term risk reductions are expected to be realized. Alternative #3 provides the best balance between overall risk reduction (both human health and ecological risks), restoration of the groundwater in the X-740 area, and costs.

Although there are little or no costs associated with Alternatives #1 and#2 and both alternatives will reach clean-up goals, these remedies do not prevent the potential migration of contaminants off site within time frames specified for these alternatives to meet clean-up objectives. Also, Alternative #1(No Action) does not meet ARARs. Alternative #5 is considerably more costly than any of the alternatives and no more effective. Alternative #4 is more costly than Alternative #3, and requires more years to achieve the clean-up objectives. Alternative #3 will meet all ARARs and is expected to restore groundwater in both aquifers 10.5 years, after the trees mature. The trees are expected to mature within two years after planting.

Future Groundwater Monitoring

The groundwater in this area will continued to be monitored throughout the remedial process. US DOE will prepare a yearly groundwater report discussing the progress of the selected remedy. The report will contain data describing the current contaminant concentrations, extent of contaminations as well as other data as deemed necessary by Ohio EPA. Five years after the installation of the selected alternative (phytoremediation) Ohio EPA will evaluate its effectiveness based on the data collected and submitted via the Integrated Groundwater Monitoring Annual Report and other groundwater reports. After five years, Ohio EPA will evaluate the effectiveness of the proposed remedy. If phytoremediation does not reduce contaminant levels to approximately one hundred and fifty (150) percent of the average predicted five year attainment value of 330 ppb TCE in the Gallia as described in the approved CAS/CMS, alternative remedial measures may be evaluated, to be installed in conjunction with the remedy already in place. Alternatives such as pump and treat as described in Alternative #4 may be considered, however, Ohio EPA may also consider other remedial alternatives which were not evaluated in the CAS/CMS document.

APPENDIX I

ARAR LIST

QUADRANT III DECISION DOCUMENT

Table 1. Potential Action-specific ARARs for Remedial Alternative 2–Institutional Controls, Monitoring, and Natural Attenuation

Action	Requirement	Prerequisites	Citation
Institutional controls	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, as appropriate; appropriate shielding; physical barriers (i.e., fences, warning signs) to prevent access; inspection and repair of coverings; temporary dikes; drainage courses; appropriate radiological safety measures to ensure protection during activities at the site.	Interim management of residual radioactive material above guidelines left in accessible locations – TBC	DOE Order 5400.5(IV)(6)(c)
Groundwater monitoring	A detection groundwater monitoring program must be developed to ensure that the specified groundwater protection standards are attained. The monitoring program is to consist of a list of monitoring parameters and associated limits, monitoring frequency, and sampling and analytical procedures, all of which are associated with the objectives of the remedy. Groundwater monitoring wells are sampled at desired intervals.	The project-specific or existing sitewide groundwater monitoring program will be used to ensure that the groundwater protection standards are not exceeded – applicable	40 CFR 264, Subpart F OAC 3745 54-90 to 99

Table 1. Potential Action-specific ARARs for Remedial Alternative 2–Institutional Controls, Monitoring, and Natural Attenuation

Action	Requirement	Prerequisites	Citation
Water Pollution Control	No discharge to waters of the state shall occur which will exceed discharge limits presented in the NPDES Permit. All discharges to waters of the state resulting from treatment systesms such as a pump-and-treat system will meet the substantive requirements for discharge permits.	Prohibits surface water discharges without permits. All waters or waterbodies of the state including those waterways of the Scioto River Basins are protected by use designation and water quality standards–**applicable**	ORC 6111.04 OAC 3745-1-09
Control of emissions of organic materials from stationary sources	All air discharges resulting from equipment, or other stationary sources, which may emit VOCs to the atmosphere will meet substantive requirements as permitted	No person(s) shall cause or allow emission(s) of an air contaminant to the atmosphere–**applicable**	OAC 3745-21-07 ORC 3704.05
Waste determination	Any waste generated during corrective action activities including contaminated soil, treatment residuals, etc., must be characterized to determine wheter they contain RCRA-characteristic or RCRA-listed waste.	Samples of the groundwater waste stream(s) will be obtained for laboratory analysis to determine if RCRA constituents are present –**applicable**	3745-52-11 40CFR 262.11

Table 2. Potential Action-specific ARARs for Remedial Alternative 3-Institutional Controls and Phytoremediation (Continued)

Action	Requirement	Prerequisites	Citation
Institutional controls	Same as Table 1.		
Surface water runoff	Sediment and erosion controls and best management practices must be used to control runoff from installation and construction activities.	Control of stormwater discharge associated with construction activities at industrial sites that result in a disturbance of greater than 5 acres of total land area-applicable At those sites with less than 5 acres affected-relevant and appropriate	40 CFR 122.26 (a)(i)(ii) 40CFR122.26(b) (14)(v)(x)
Water Pollution Control	No discharge to waters of the state shall occur which will exceed discharge limits presented in the NPDES Permit. All discharges to waters of the state resulting from treatment systesms such as a pump-and-treat system will meet the substantive requirements for discharge permits.	Prohibits surface water discharges without permits. All waters or waterbodies of the state (the Scioto River Basins) are protected by use designation and water quality standards-applicable	ORC 6111.04 OAC 3745-1-09
Management of sediment and erosion events	Sediment and erosion controls and best management practices BMP must be utilized to control runoff from construction activities.	Soils during tree-planting activities, monitoring well installation, and other construction activities will be properly maintained to control surface water run on and runoff and dispersion by means of wind-relevant and appropriate	40 CFR 125.104 Subpart K

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Management of soils	Soils, associated debris, and similar waste streams placed in a pile will be properly managed or covered so that protection from precipitation is adequate. Neither runoff nor leachate will be generated.	Management of soils in small piles is not subject to regulation under 40 CFR 264.251 or under Subpart F of this part– **applicable**	OAC 3745-56-50
	Material stockpiles or transportation vehicles must be covered with canvas or other suitable coverings to prevent release of fugitive emissions.	Non-point-source air emissions– **applicable**	
Management of residual contamination	Management and free release of waste, residues, structures, equipment and other property shall adhere to the radiological protection requirements and guidelines described in DOE	Appropriate radiological surveys will be performed before releasing any potentially contaminated materials off-site–**TBC**	DOE Order 5400.5 (Chapter IV)
Groundwater monitoring	Same as Table 1		
Container management	Containers of non-RCRA and RCRA hazardous waste will be (1) maintained in good condition (2) compatible with other waste streams to be stored (3) closed during storage (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 kept. Containers will be stored per applicable containment requirements –**applicable**	40 CFR 264, Subpart I OAC 3745-55-74

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Residues of hazardous waste empty containers	Exempts the residues from empty containers that 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 40 CFR 261.7
Compatibility of waste with containers	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. Requirement is being considered relevant and appropriate because hazardous waste may be present pending analysis or hazardous waste may be stored at the remediation site– relevant and appropriate.	OAC 3745-55-72 40 CFR 264.172
Hazardous waste accumulation time	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. Containers will be managed accordingly until disposal. Applicable requirements identified under 40 CFR 262.34 and OAC 3745-52-34 will be adhered to–relevant and appropriate	OAC 3745-52-34 40 CFR 262.34

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Air discharge	The emission or escape into open air from any source whatsoever in such a manner or in such amounts as to endanger the health, safety, or welfare of the public or to cause unreasonable injury or damage to property shall be declared a public nuisance and is prohibited.	Visible emissions will be mitigated during any construction activities or remedial actions by using standard construction practices–applicable	OAC 3745-15-07
Air discharge (fugitive dust)	The significant deterioration of air quality shall be prohibited.	Wind dispersal of any debris or stockpiled soil resulting from activities associated with this alternative will be controlled–applicable	OAC 3745-17-05
Control of emissions of organic materials from stationary sources	All air discharges resulting from equipment, or other stationary sources, which may emit VOCs to the atmosphere will meet substantive requirements as permitted	No person(s) shall cause or allow emission(s) of an air contaminant to the atmosphere–applicable	OAC 3745-21-07 ORC 3704.05
Waste determination	A person who generates a solid waste must determine if that waste is hazardous 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 groundwater media specific project will assess for hazardous waste by review of RFI database, review of process/historical records, and sampling and analysis (as required). A task-specific sampling and analysis plan will developed to guide the required characterization activities–applicable.	OAC 3745-54-13 40 CFR 262.11

Table 3. Potential Action-specific ARARs for Remedial Alternative 4-Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Air discharges (fugitive dust)	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 utilized. 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)
Worker health and safety	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-TBC	40 CFR 300.150
Occupational worker protection	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 general construction standards of the OSHA. The OSHA standards will apply on their own merit as required through DOE Order 5483.1A-TBC	29 CFR 1910.120
	In the case of conflict or overlap, the most protective provision will apply.	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	

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Radiation protection of the public	Exposures of members of the public to radiation sources as a consequence of all routine DOE activities will not cause, in 1 year, an effective dose equivalent greater than 100 mrem from all exposure pathways. Specific authorizations may be received for a temporary increase of the dose limit up to 500 mrem in 1 year.	Precautions will be taken to minimize exposure to the public by using appropriate controls–TBC	DOE 5400.5, Chapter II, Section 1.A
	The derived concentration guides are provided as reference values for conducting radiological environmental protection programs at operational DOE facilities and sites. Devised concentration guide values are presented in DOE Order 5400.5 for the following exposure modes: (1) ingestion of water (2) inhalation of air (3) immersion in a gaseous cloud	The devised concentration guide 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
Hazardous waste shipment requirements: Manifest, Packaging, Labeling, and Placarding	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 waste materials, all packaging labeling, marking, and placarding requirements shall be met–if offsite–applicable; if onsite–revelant and appropriate	40 CFR 262.20, 21, 22, 23, 30, 31, 32, and 33 OAC 3745-52-20, 22, 23, 30, 31, 32, and 33

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells

Action	Requirement	Prerequisites	Citation
Institutional controls	Same as Table 1.		
Surface-water runoff	Same as Table 2.		
Water pollution control	Same as Table 1		
Management of solid waste	Same as Table 2.		
Management of sediment and erosion events	Same as Table 2.		
Management of soils	Same as Table 2.		
Management of residual contamination	Same as Table 2.		
Radiation protection of the public	Same as Table 2.		

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Groundwater monitoring	Although the groundwater is not considered a public drinking water source, assessment monitoring will be performed pursuant to the groundwater monitoring program established for the remedial alternative to assess the performance of the remedy.	Monitoring will be conducted to assess the effectiveness of the multi-phased extraction unit and to provide analytical data to verify that the remediation goals have been met–applicable The provisions of CERCLA Section 121(c), 40 CFR 300.430(f)(ii), and 40 CFR 300.435(f) could be considered an ARAR for Alternative 4–TBC	CERCLA Section 121(c) 40 CFR 300.430(f)(ii), and 40 CFR 300.435(f)
Air discharge	Same as Table 2.		
Air discharge (fugitive dust)	Same as Table 2.		
Control of emission of organic materials from stationary sources	Same as Table 1.		
Occupational worker protection	Same as Table 2.		
Container management	Same as Table 2.		
Residues of hazardous waste empty containers	Same as Table 2.		

Table 3. Potential Action-specific ARARs for Remedial Alternative 4–Institutional Controls and Extraction Wells (Continued)

Action	Requirement	Prerequisites	Citation
Compatibility of waste with containers	Same as Table 2.		
Hazardous waste accumulation time	Same as Table 2.		
Waste determination	Same as Table 1.		
Hazardous waste shipment requirements: Manifest, Packaging, Labeling, and Placarding	Same as Table 2.		

Table 4. Potential Action-specific ARARs for Remedial Alternative 5–Institutional Controls and Multiphased Extraction

Action	Requirement	Prerequisites	Citation
Institutional controls	Same as Table 1.		
Surface-water runoff	Same as Table 2.		
Water Pollution Control	Same as Table 1.		
Management of solid waste	Same as Table 2.		
Management of sediment and erosion events	Same as Table 2.		
Management of soils	Same as Table 2.		
Management of residual contamination	Same as Table 2.		
Radiation protection of the public	Same as Table 2.		

Table 4. Potential Action-specific ARARs for Remedial Alternative 5-Institutional Controls and Multiphased Extraction (Continued)

Action	Requirement	Prerequisites	Citation
Groundwater monitoring	Although the groundwater is not considered a public drinking water source, assessment monitoring will be performed pursuant to the groundwater monitoring program established for the remedial alternative to assess the performance of the remedy.	Monitoring will be conducted to assess the effectiveness of the multi-phased extraction unit and to provide analytical data to verify that the remediation goals have been met. The provisions of CERCLA Section 121(c), 40 CFR 300.430(f)(ii), and 40 CFR 300.435(f) could be considered an ARAR for the alternative–TBC	CERCLA Section 121(c) 40 CFR 300.430(f)(ii), and 40 CFR 300.435(f)
Air discharge	Same as Table 2.		
Air discharge (fugitive dust)	Same as Table 2.		
Control of emission of organic materials from stationary sources	Same as Table 1.		
Occupational worker protection	Same as Table 2.		
Container management	Same as Table 2.		
Residues of hazardous aste empty containers	Same as Table 2.		

Table 4. Potential Action-specific ARARs for Remedial Alternative 5-Institutional Controls and Multiphased Extraction (continued)

Action	Requirement	Prerequisites	Citation
Compatibility of waste with containers	Same as Table 2.		
Hazardous waste accumulation time	Same as Table 2.		
Waste determination	Same as Table 1.		
Hazardous waste shipment requirements: Manifest, Packaging, Labeling, and Placarding	Same as Table 2.		

APPENDIX II

FIGURES I-V

QUADRANT III DECISION DOCUMENT

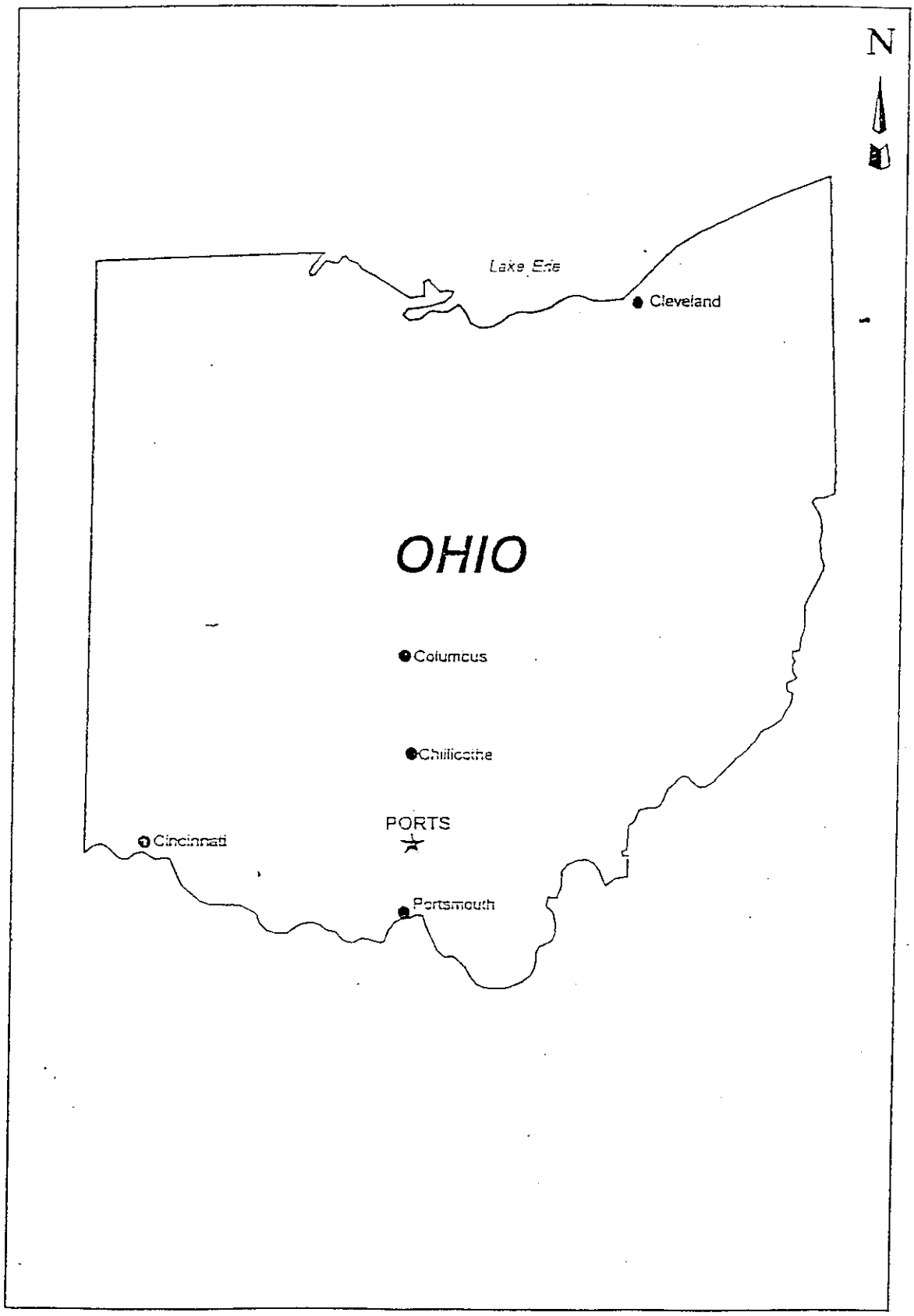

N
Lake Erie
Cleveland
OHIO
Columbus
Chillicothe
PORTS
Cincinnati
Portsmouth

Figure #1

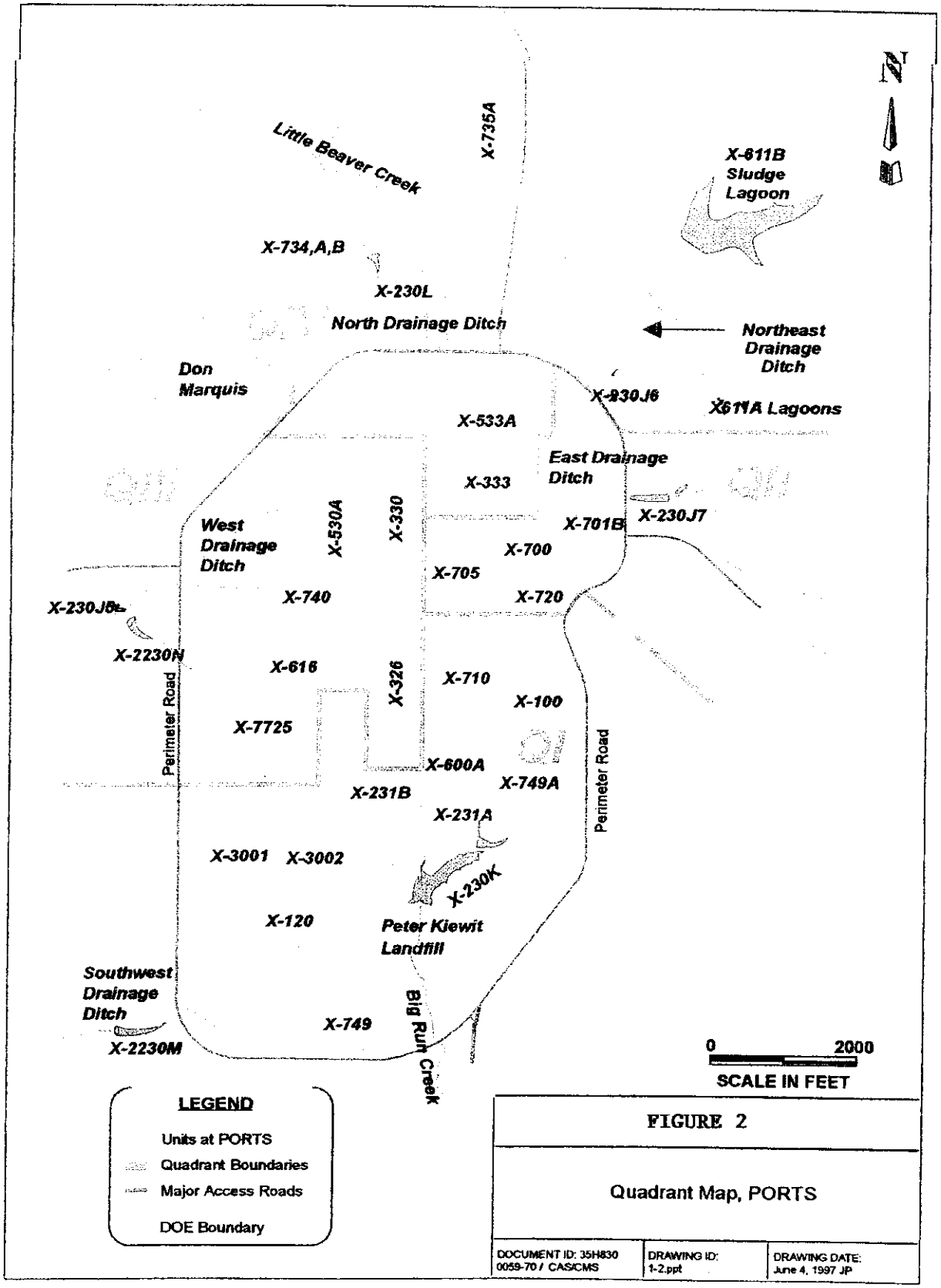


FIGURE 2

Quadrant Map, PORTS

DOCUMENT ID: 35H830 0059-70 / CAS/CMS	DRAWING ID: 1-2.ppt	DRAWING DATE: June 4, 1997 JP

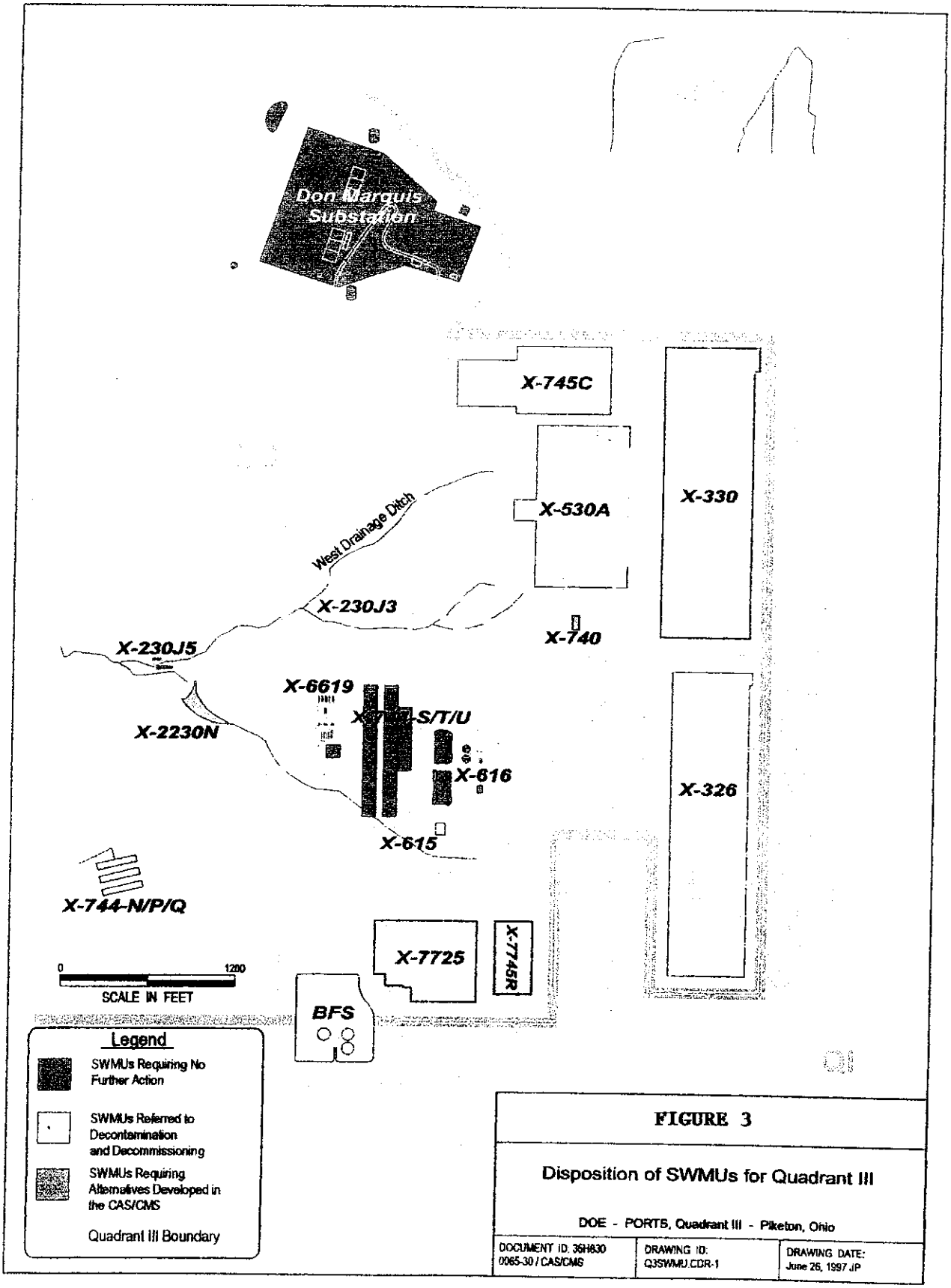
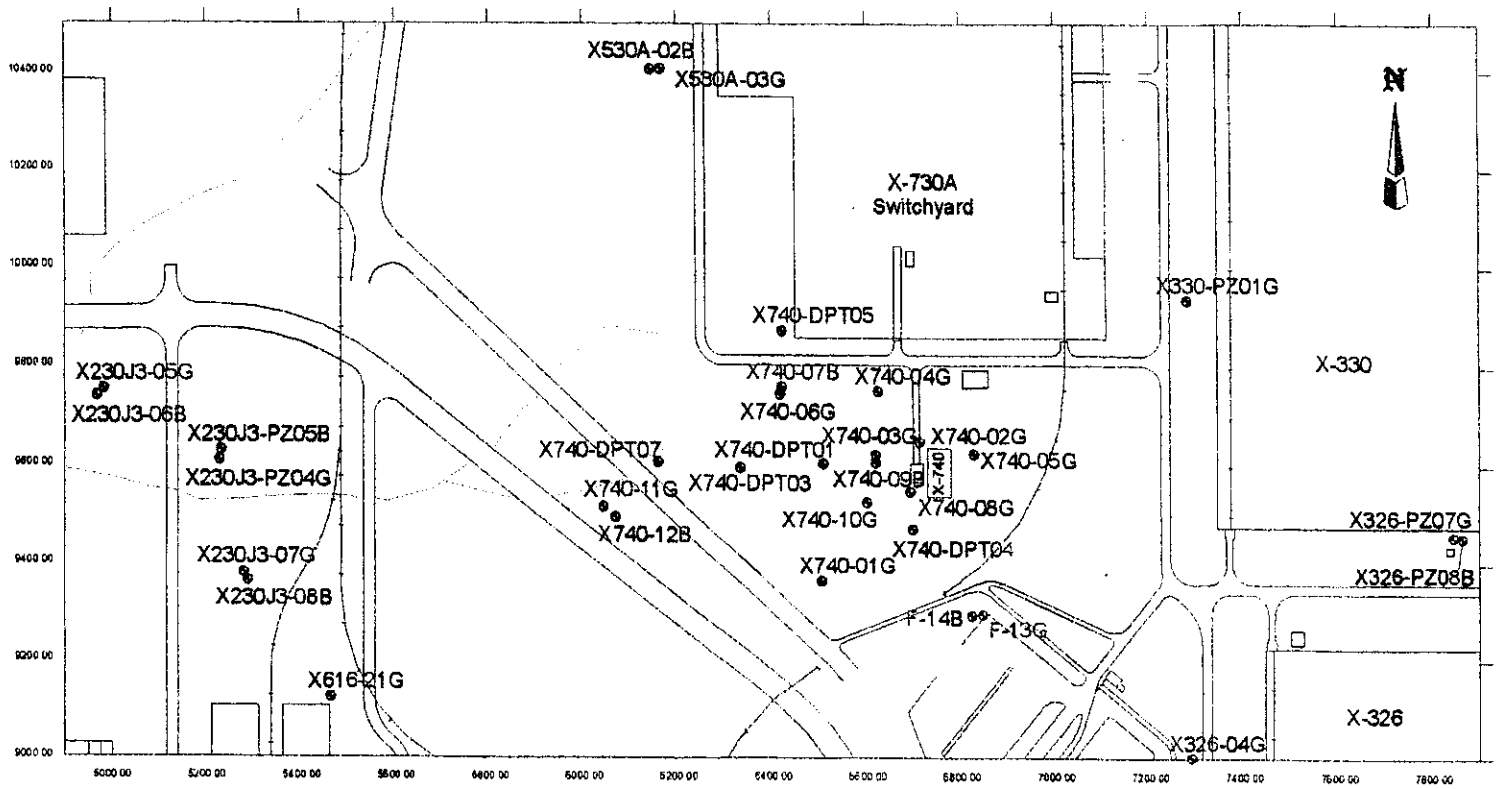


FIGURE 3

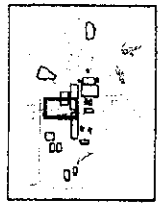
Disposition of SWMUs for Quadrant III

DOE - PORTS, Quadrant III - Piketon, Ohio

DOCUMENT ID: 36H830 0065-30 / CAS/CMS	DRAWING ID: Q3SWMU.CDR-1	DRAWING DATE: June 26, 1997 JP



Location Map



Legend

X616-21G Groundwater Monitoring Well

FIGURE 4	Groundwater Monitoring Locations in the X-740 Area	DOCUMENT ID: 35H830 0059-70 / CAS/CMS	DRAWING ID: 6_1 CDR-1	DRAWING DATE: March 23, 1998 JP

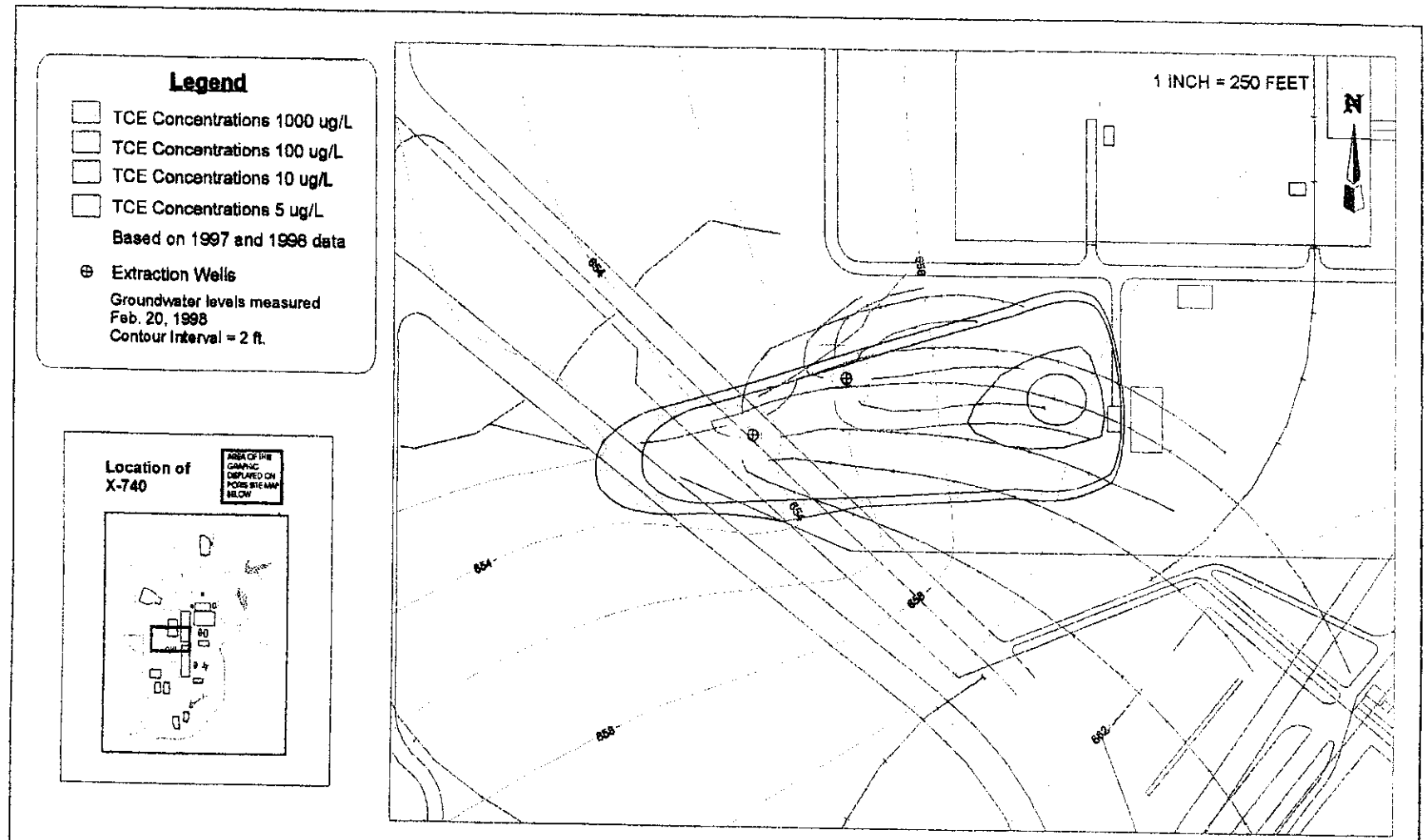


FIGURE 5	Capture Zone and Flow Paths, Alternative 4 (Institutional Controls and Extraction Wells) DOE - PORTS, Quadrant III - Piketon, Ohio	DOCUMENT ID: 35H830 0059-70 / CAS/CMS	DRAWING ID: 6_8b.CDR-1	DRAWING DATE: March 25, 1998 JP

APPENDIX III

RESPONSIVENESS SUMMARY

QUADRANT III DECISION DOCUMENT

RESPONSIVENESS SUMMARY FOR QUADRANT III FOR THE US DOE PORTSMOUTH GASEOUS DIFFUSION PLANT

1.0 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

1.1 Overview

This responsiveness summary responds to significant comments submitted on the preferred plan for Quadrant III of the Portsmouth Gaseous Diffusion Plant and is intended to be consistent with Sections 113(k) (2) (B) (iv) and 117(B) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This section requires that Agency respond "... to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on the preferred plan. One comment was made during the public comment period that does not pertain to the proposed remedial action at for Quadrant III. This comment was addressed since it was the only comment made during the public meeting on January 5, 1999. US DOE submitted three comments to Ohio EPA and each comment is addressed below.

The administrative record index for the U.S. Department of Energy (U.S. DOE) site which includes the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), the Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) and the Preferred Plan is available to the public at the US DOE Environmental Information Center located in Piketon, Ohio. The final Quadrant III RFI was submitted to Ohio EPA and U.S. EPA on December 13, 1996. The RFI was approved on September 5, 1997. The CAS/CMS Report was submitted on April 9, 1998 and was approved on July 13, 1998. The public notice alerting the public of their opportunity to comment on the preferred plan was placed in the ***Waverly Watchman*** and the ***Portsmouth Times*** on December 17, 1998. The public comment period closed on February 19, 1999. A public meeting to discuss the preferred plans was held on January 5, 1999 at the Governor's Lodge in Waverly, Ohio.

1.2 Summary of Comments

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

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

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

2.0 COMMENTS FROM THE COMMUNITY

1. One commenter questioned US DOE's use of outside contractors for construction activities ongoing at the site rather than using available site personnel.

Ohio EPA Response: Ohio EPA does not have any control over whom US DOE determines to use for ongoing remedial construction activities. Ohio EPA will forward this concern to US DOE.

3.0 Comments from US DOE

1. It was DOE's intent that the "referred units" fall exclusively under the auspices of DOE's decontamination and decommissioning (D&D) program. US DOE believes that the facilities that were placed in the "referred to D&D" category based on decision team determinations should not be subject to "further corrective or remedial action" requirements for the following reasons:

(1) The presence of polynuclear aromatic Hydrocarbons (PAHs) at PORTS are not the result of releases associated with production activities at the site but are present because they are constituents found in much of the infrastructure at the site. The presence of PAHs in soil at PORTS will continue as long as infrastructure such as parking lots, paved roads, and buildings remain, even when the site is re-industrialized after D&D. The ditches and ponds are performing as designed to prevent contaminants from leaving the site. Due to the fact the PORTS infrastructure will not be removed, the remediation of PAHs is unwarranted.

(2) Groundwater data collected during the RFI indicated sporadic detection of metals at concentrations that exceeded acceptable risk levels associated with the "referred units". These samples were collected using techniques that caused the samples to be turbid and resulted in the data not being representative of actual groundwater quality. Recent data acquired using low-flow sampling techniques indicate that metals are not present above acceptable levels in groundwater. Therefore, no further action with regard to groundwater is needed for these units and groundwater quality will continue to be monitored and evaluated under the Ohio EPA approved Integrated Groundwater Monitoring Plan.

(3) Risk calculations in the RFI were based on the highest detection of a single constituent and did not take into account that other samples taken within the same unit did not contain

detectable concentrations of the same contaminant or were present at significantly lower risk levels. In many cases, constituents that the RFI indicated as driving risk at a unit have subsequently been determined to be present at concentrations below PRGs.

(4) Ingestion of groundwater in the manner simulated in the exposure scenarios is unreasonable given the capacity of the existing water supply system fed from an offsite well field and the inability of the onsite Gallia water bearing zone to produce adequate volumes of water for future industrial or commercial needs.

(5) Units currently indicated as being referred to D&D should be reassigned to the no further action category because releases are not presently occurring, there is little potential for future releases, and the units pose no threat to the public welfare or the environment.

Ohio EPA Response: Ohio EPA will respond to each of US DOE's individual concerns listed above:

(1) US DOE stated that the presence of PAHs at PORTS are not the result of releases from processes associated with production activities at the site but are present because of constituents found in much of the infrastructure associated with the site. While the majority of PAH contamination detected on site may be due to infrastructure the approved PAH position paper also notes the PAH contamination may possibly be due to air emissions and run off from the coal-fired steam plant. The coal fired steam plant is not considered to be part of the infrastructure at PORTS (i.e. roads, parking lots etc.) but is considered necessary for the enrichment process. The steam plant may not be necessary when the plant is no longer operating in its current capacity. Contamination associated with this unit including PAHs must be investigated and addressed should preliminary remedial goals established during D&D be exceeded.

US DOE also stated that the ditches and ponds are performing as designed to prevent contaminants from leaving the site. The approved (5/8/97) PAH Position Paper notes that many of the highest detections of PAHs in sediment were samples collected in holding ponds. According to the position paper the system of holding ponds will remain in place as long as PORTS is an operating facility. At the time of D&D the facility will no longer be operating in its current capacity therefore the sediments in the holding ponds will require re-evaluation to determine if there is a risk to potential human and ecological receptors. Finally, the approved PAH position paper recommended that any action for PAHs in surface soil, surface water and sediment be deferred until plant decontamination and decommissioning when the sources can be addressed.

(2) Groundwater contamination at the PORTS facility is currently being addressed by the Ohio Consent Decree and US EPA Consent Order. US DOE must evaluate the rate and extent of

contamination per Section VII of the Ohio Consent Decree. Organic contaminants such as TCE are being remediated at various units on site. Inorganic or metal contamination at various units have been questionable due to sampling techniques. While Ohio EPA is in agreement that the new low-flow sampling techniques have indicated that the elevated metals detected during the RFI may be due to sampling technique, further analysis may be necessary. Additionally, there are areas of the site where sampling was not feasible due to ongoing operations. Interference from utilities prevented monitoring well installation at some units. These areas will be evaluated once the site is in the US DOE D&D program to determine if the groundwater has been contaminated from Portsmouth operations.

(3) Although risk calculations for certain areas of the facility were based on the highest detection of a single constituent and did not take into account other samples taken within the same unit, the RFI workplan to which US DOE agreed, required the analysis of risk to be conducted in this manner to ensure that a conservative estimate of risk for each unit be determined. Also, due to interference with utilities and on going plant operations it was not always possible to take more than one sample in an area to evaluate risk. During the D&D process a more thorough evaluation of the rate and extent of contamination will be made. Once the data is collected a risk calculation will be performed to determine if additional remediation of soils and groundwater is warranted. Remedial goals at the site during D&D will reflect the reasonably anticipated future uses of the area.

(4) DOE stated that the ingestion of groundwater simulated for risk assessment purposes is unreasonable given the capacity of the existing Gallia water bearing zone to produce adequate volumes of water for future industrial or commercial needs. Continuous operation of the site since 1954 has resulted in at least six groundwater contaminant plumes. The plumes consist of organic, inorganic and radiological contamination. Current groundwater plumes have migrated to creeks and streams adjacent to and beyond the current US DOE Portsmouth Reservation. Ohio EPA, US DOE and area stakeholders have agreed that the area within the security fence will likely remain industrial in the near future. The Gallia may not be able to supply large volumes of water for future commercial or industrial use, however, it is necessary to remediate the groundwater to meet RCRA regulatory and CERCLA-NCP mandates and to prevent migration of contaminants to areas beyond the security fence. The area beyond the security fence may be used in the future for recreational, residential or agricultural purposes. The argument to require no further action for remediation of groundwater is contrary to agreements US DOE has made with the Ohio and US EPA to evaluate remedial technologies to clean-up groundwater contamination at Portsmouth.

In a letter dated September 6, 1996, Ohio EPA provided US DOE with guidance pertaining to why the Gallia and the Berea Sandstone are considered regional aquifers and should be addressed as necessary considering the potential for potable use in the future. US DOE did not dispute the letter and agreed to move forward with remediation of the groundwater at PORTS. Remediation of the groundwater is an essential component for the completion of the requirements of the Consent Decree. The Ohio Consent Decree required US DOE to

"Establish site-specific objectives for the response based on public health and environmental concerns, information gathered during the facility investigation, and the requirements of any applicable Federal or State statutes." Each of the approved CAS/CMS documents have included preliminary remedial goals for groundwater. These clean-up goals are based on risk factors primarily for the ingestion of groundwater and are incorporated into all previous preferred plans and decision documents issued by Ohio and US EPA. Finally, the National Contingency Plan (NCP) states, "EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site"

(5) US DOE believes that the units being referred to D&D should be addressed in the "no further action" category because releases are not presently occurring, there is little potential for future releases, and the units pose no threat to the public welfare or the environment. This statement is inaccurate. In some instances the soils surrounding these facilities have shown risk greater than acceptable levels to current and potential future workers. The reasoning for postponing the remediation for such units, at this time, is the interference with current ongoing facility operations. US DOE has noted that unauthorized soil excavation is not expected and requires adequate worker exposure protection be utilized per US DOE's health and safety plan. Exposures to contaminated soils may occur in the future when US DOE is no longer operating the facility. The soils surrounding these units will be evaluated for current and most probable future risk during D&D and remediated as appropriate. The majority of units deferred to D&D are the process buildings and other such units which are directly related to the process of enriching uranium.

The Ohio Consent Decree states "US DOE shall conduct investigations necessary to characterize the site and its actual or potential hazards to public health and the environment, both on-site and off-site." In some instances a full investigation of a unit was not completed due to interference from on site utilities or investigation of the unit would either harm the investigator or cause difficulties with the ongoing production of uranium. For instance, the switch yards contain soils contaminated with PCBs. These units were not adequately investigated during the RFI to determine the rate and extent of PCB or other contamination due to the fact workers could become injured due to the high electrical voltage. Only after the facility is no longer operating and the switch yards are no longer necessary will an adequate investigation to evaluate the rate and extent of contamination be completed. Additionally the process buildings contain piping with PCBs and other hazardous material which can be released to the environment, especially during D&D. During a recent fire at the facility in one of the process buildings water containing hydraulic fluid and other materials were released to the environment. This clearly indicates that these units can pose a threat to public welfare and the environment. Furthermore, the rate and extent of contaminated materials within the process buildings is unknown. Once the Portsmouth facility is in the D&D process these buildings and other areas can be investigated and properly remediated for potential future use. Finally, Section VII of the Ohio Consent decree requires a Facility Investigation and Cleanup Alternatives Study for each Waste Unit at the site. Waste units are defined in the Consent

Decree as ".. all areas which have been used for the treatment, storage or disposal of the solid waste component of radioactive waste and other solid waste, all areas used for the treatment or disposal or waste oils, all areas which are contaminated by spills or leaks of materials which are, or when spilled or leaked become hazardous wastes, industrial wastes or other wastes ..."

Ohio EPA has determined that all units which were "referred" to D&D should be addressed under Section VII of the Ohio Consent Decree. Ohio EPA believes it is not appropriate to "refer" these units but to "defer" them to D&D based on the criteria established in the CAS/CMS Report. Referral implies that a D&D process exists at PORTS and thus the fate of the units in question is known. Since this is not true, it is more appropriate to "defer" the units to some future D&D process at PORTS.

3.1 US DOE Comment #2

Please delete the sentence on line 435, page 17 referring to potential additional remedial action at the ditches and ponds of the Don Marquis Substation during D&D.

Ohio EPA Response: US DOE agreed to evaluate all ponds and ditches at the time of D&D for potential remedial action. Therefore, this line will not be deleted.

3.2 US DOE Comment #3

Because contaminants are not currently being released from this facility (X-530 Switchyard and associated units), and due to the need to provide electrical power for reindustrialization of the site, no further action on this SWMU is necessary.

Ohio EPA Response: US DOE can not predict the future electrical needs of this facility after D&D. Additionally, there are other switchyards at the site which may be utilized while this unit is being remediated. Due to the current use of this unit an adequate investigation of soils and groundwater was not possible. (See comment above). During D&D this unit will be investigated to determine the need for remedial activity. Therefore, this unit will not be re-classified under the "no further action" alternative.

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PORTSMOUTH DOCUMENT RELEASE FORM

DOCUMENT DESCRIPTION (TO BE COMPLETED BY REQUESTER)

DOCUMENT NUMBER None DRAFT ☐ FINAL ☐ DOCUMENT DATE 03/99

DOCUMENT TITLE/IDENTIFIER Ohio Environmental Protection Agency's Decision Document for Quadrant III Of the Portsmouth Gaseous Diffusion Plant

AUTHOR(S) (NAME AND AFFILIATION) Ohio Environmental Protection Agency

PURPOSE OF RELEASE For a Public Request at the Environmental Information Center

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