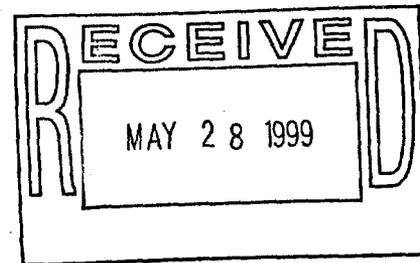


**OHIO ENVIRONMENTAL PROTECTION AGENCY'S
DECISION DOCUMENT FOR QUADRANT III OF THE
PORTSMOUTH GASEOUS DIFFUSION PLANT**

MARCH 1999



RECORD COPY



State of Ohio Environmental Protection Agency

Southeast District Office

2195 Front Street
Logan, Ohio 43138-9031
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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 Crowait, U.S. DOE Environmental Information Center



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

APR 30 1999

99 MAY 17 PM 12:28
U.S.E.P.A.
S.E.D.O.

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

REPLY TO THE ATTENTION OF:

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,

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 Division Chief's Signature
- For Assistant Director's Signature
- DRAFT for the Governor's Signature
- For Deputy Director'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
<input type="checkbox"/> Assistant Director	_____	___/___/___
<input type="checkbox"/> Deputy Director, Legal	_____	___/___/___
<input type="checkbox"/> Deputy Director, Programs	_____	___/___/___
<input type="checkbox"/> Deputy Director, Policy	_____	___/___/___
<input type="checkbox"/> Deputy Director, Communications	_____	___/___/___
<input checked="" type="checkbox"/> Legal	<u>Francis M. Kovac</u> Fran Kovac	<u>3/29/99</u>
<input checked="" type="checkbox"/> Other - OFFO Chief	<u>Graham Mitchell for</u> Graham Mitchell	<u>3/25/99</u>
<input type="checkbox"/> Other	_____	___/___/___

99 APR -1 AM 10:04
 U.E.P.A.
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District Personnel Information

Division Personnel Information

Approvals:	Date:
Supervisor _____	___/___/___
Manager <u>Ken Dewey</u>	<u>03/23/99</u>
Assistant Dist. Chief _____	___/___/___
District Chief _____	___/___/___
Other-Site Coordinator <u>Maria Galanti</u>	<u>03/22/99</u>

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Section Manager (CRES) <u>Heidi Sorin</u>	<u>3/13/99</u>
Assistant Chief _____	___/___/___
Chief <u>Andy Hafner</u>	<u>3/20/99</u>
Other _____	___/___/___
Section Manager (TPPS) <u>Ray Beaumier</u>	<u>03/13/99</u>

Date Sent: _____
 District Number: _____

Date Sent: _____
 Division Number: _____

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
cm²/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
ft²:	Square foot
ft³:	Cubic foot
ft/d:	Feet per Day
ft²/d:	Square feet per day
ft³/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
m³/day:	Cubic meters per day
mg/l:	Milligrams per liter
mg/kg:	Milligrams per kilogram
mg/m³:	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
pCi/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/m³:	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
yd³	Cubic Yards

PART 1: DECLARATION STATEMENT

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

29 ASSESSMENT OF THE SITE

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

33 DESCRIPTION OF THE SELECTED REMEDIES

34 Quadrant III occupies the western portion of the PORTS Reservation (Please refer to Figure 2).
35 The boundaries of Quadrant III were established with respect to the surface-water and
36 groundwater flow and drainage patterns. Quadrant III contains nineteen solid waste management
37 units (SWMUs) which were investigated as part of the RFI (Please refer to Figure 3). After
38 careful review of the data in the RFI report and risk assessment, the SWMUs were placed into
39 three categories in the approved Corrective Alternatives Study/Corrective Measurers Study
40 (CAS/CMS) Report; 1) SWMUs which have been determined to fall within the risk goals as
41 outlined in CERCLA (**SWMUs Requiring No Further Corrective Action**); 2) SWMUs
42 which will be addressed when the gaseous diffusion plant is no longer in operation. Most of
43 these SWMUs pose minimal risk, are still in operation and are part of the operational plant
44 infrastructure. (**SWMUs Referred to Decontamination and Decommissioning (D&D)**); and
45 3) SWMUs which will be evaluated and remediated in the CAS/CMS Process: These SWMUs
46 are considered to pose an unacceptable risk to human health or the environment (**SWMUs
47 Requiring Alternatives Developed in the CAS/CMS**). Although the approved CAS/CMS
48 Report discusses a "referral" option, Ohio EPA has determined that the term "deferral" is more
49 appropriate for SWMUs which fall into that category. The units addressed in this section remain
50 under the auspices of Section VII of the Ohio Consent Decree. Deferring these units to D&D
51 requires US DOE to re-evaluate and remediate these SWMUs at the time of D&D as warranted,

52 rather than potentially eliminating these SWMUs from further consideration. Further more,
53 “referring” these units to D&D implies that US DOE PORTS has a D&D process in place.
54 “Deferral” more accurately reflects that these units will be addressed at sometime in the future
55 when a D&D process exists at Portsmouth. Outlined below are the SWMUs from Quadrant III
56 and the category to which they fall and referenced in the Corrective Action Study/Corrective
57 Measure Study Report:

58 **SWMUs Requiring No Further Corrective Action**

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

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

67 **SWMUs Deferred to Decontamination and Decommissioning (D&D)**

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

- 71 (1) HI values for media-specific total non-cancer risks under the industrial worker scenarios
72 are generally less than 1.
- 73 (2) The industrial worker scenario ELCR values were within the risk range of
74 1×10^{-4} to 1×10^{-6} .
- 75 (3) Evaluation of the contaminants present indicate that they are generally immobile.

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

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

80 The D&D of the facility will require remediation in accordance with DOE orders (and applicable
81 state and federal regulations, orders, agreements and a new set of legal and technical tools outside
82 beyond the scope of the existing Ohio Consent Decree and AOC) to prepare the facility for future
83 use. The D&D actions at each SWMU will further reduce or eliminate any residual contaminants
84 to acceptable future use risk levels in accordance with ALARA principles. Ongoing worker health
85 and safety programs and routine monitoring in place at the facility and the required
86 implementation of the D&D program are intended to protect human health and the environment
87 and provide an efficient approach to final disposition of the subject SWMUs. Should it become
88 apparent that an imminent threat to human health and the environment is identified for units which
89 are currently being deferred to D&D, immediate action will be taken to eliminate the threat.

- 90 ▶ X-230J3 West Environmental Sampling Building and Intermittent Containment
91 Basin;
- 92 ▶ X-230J5 West Holding Pond and Oil Separation Basin;
- 93 ▶ X-326 Process Building;
- 94 ▶ X-330 Process Building;
- 95 ▶ X-530A Switchyard, X-530B Switch House, X-530C Test and Repair Building,
96 X-530D Oil House, X-530E/X-530F Valve House, X-530G Gaseous Centrifuge
97 Enrichment Process oil pumping Station;
- 98 ▶ X-615 Abandoned Sanitary Sewer Treatment Facility;
- 99 ▶ X-744N, P, and Q Warehouses associated Old Construction Headquarters;
- 100 ▶ X-745C West Cylinder Storage Yard;
- 101 ▶ X-2230N West Holding Pond No. 2;

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

106 **SWMUs Requiring Alternative Development in the CAS/CMS Reports**

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

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

111 **STATUTORY DETERMINATIONS AND REMEDY SELECTION STANDARDS**

112 The selected remedies meet the CERCLA statutory determination because they are protective of
113 human health and the environment, comply with federal and State of Ohio requirements that are
114 legally applicable or relevant and appropriate to the remedial action, and are cost-effective. The
115 remedies use permanent solutions and alternative treatment technologies or resource recovery
116 technologies to the maximum extent practicable. The remedy selected for the X-740 SWMU
117 satisfies the statutory preference in CERCLA and SARA for treatment as a principal element.
118 However, remedies for other SWMUs do not satisfy the statutory preference for treatment as a
119 principal element.

120 The selected remedies comply with RCRA remedial selection standards because they protect
121 human health and the environment; control the source of releases so as to reduce or eliminate, to
122 the extent practicable, further releases that may pose a threat to human health and the
123 environment; and comply with applicable standards for management of wastes. Media cleanup

124 levels were established for the X-740 groundwater remedial action.
125 Implementation of the No Further Corrective Action Alternative for those SWMUs within acceptable
126 risk levels is protective of human health and the environment because those SWMUs fall into the risk
127 goals outlined by CERCLA & RCRA. Those SWMUs which have been deferred (Please refer to
128 Section 9 of this report.) to D&D pose minimal risk to human health and the environment. These
129 units are currently still operating and may become re-contaminated if remediated due to ongoing
130 production of enriched uranium. Implementation of the selected remedy at X-740 is easily
131 accomplished, cost effective and is expected to provide both long and short term effectiveness. The
132 selected remedy at X-740 will reduce the toxicity, mobility and volume of groundwater contaminants
133 by treatment. The mobility of the contaminants will be contained through the ability of the selected
134 remedial alternative to reduce the levels of contaminants in groundwater. These remedies may result
135 in some hazardous substances remaining on site above health-based levels for a period of time;
136 therefore, a review will be conducted no less often than every five (5) years after commencement of
137 the remedial actions to insure that the remedies selected continue to provide adequate protection of
138 human health and the environment.

PART 2: DECISION SUMMARY

DECISION SUMMARY

140

141

1.0 SITE NAME, LOCATION, AND DESCRIPTION

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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.

152

153

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155

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).

156

157

158

159

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.

160

161

162

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

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

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

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

179 **2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES**

180
181 The principal process at the PORTS facility is the separation of uranium isotopes via gaseous
182 diffusion. The PORTS facility has been operating since 1954 enriching uranium for use in
183 commercial reactors and for use by the U.S. Navy in power reactors. Production of enriched
184 uranium for use by the Navy was ceased in 1991. The production facilities are owned by U.S.
185 DOE and are leased by the United States Enrichment Corporation which was formed in 1993 as a
186 government-owned corporation by the Energy Policy Act of 1992. The company became private
187 in July 1998. Other portions of the site are leased to the Ohio National Guard and the Defense
188 Logistics Agency. U.S. DOE remains the owner of the property.

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

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

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

211 2.1 HISTORY OF QUADRANT III

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

214 1994. The initial RFI report was submitted to Ohio EPA for review on December 12, 1992. The
215 final version of the RFI report was submitted on December 12, 1996. The Quadrant III RFI
216 received final approval from Ohio EPA on September 5, 1997. The draft Quadrant III
217 CAS/CMS was received in Ohio EPA on April 4, 1998. The Quadrant III CAS/CMS Report was
218 approved on July 13, 1998. Nineteen SWMUs were investigated during Phases I and II of the
219 Quadrant III RFI. The investigation included analysis of soil, sediment, surface water and
220 groundwater where appropriate. Ecological data was collected during the RFI to help support
221 the *Baseline Ecological Risk Assessment* (BERA) approved by Ohio EPA on February 7, 1997.
222 Additional data was collected for the *Air RFI* which was approved by Ohio EPA on August 28,
223 1996 and the *Background Sampling Investigation of Soil and Groundwater* approved by Ohio
224 EPA on May 16, 1996. Data from all three reports was used to support the development of the
225 Quadrant III CAS/CMS Document. Outlined below is a brief description of the Quadrant III
226 SWMUs and the remedial alternative under which they fall. A more detailed description of each
227 SWMU can be found in the approved RFI and CAS/CMS reports.

3.0 RISK ASSESSMENT

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

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

247 3.1 Identification of Chemicals of Concern

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

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

256 **3.2 Exposure Assessment**

257 This step involves the evaluation of potential human exposures to site chemicals. There are
258 basically four separate tasks necessary in the Exposure Assessment. These steps are: **(a) The**
259 **Characterization of the Exposure Setting; (b) Identification of Exposure Pathways; (c)**
260 **Estimation of Environmental Concentrations; and (d) Estimation of Human Intake.**

261 **3.2.1 Characterization of the Exposure Setting**

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

265

266 **3.2.1.1 Current Use Scenarios**

- 267 ● **on-site worker**
- 268 ● **off-site resident**
- 269 ● **off-site recreational population**

270

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

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

279
280 As stated above, future use scenarios were developed consistent with the reasonable maximum
281 exposure. The area within the security fence is expected to remain industrial in the future. Areas
282 inside and outside the Perimeter road within the reservation were evaluated for a future
283 recreational/commercial use. For the future use conditions, the following scenarios were
284 developed:

285 **3.2.1.2 Future Use Scenarios**

- 286 ● **On-site commercial use (developed after approval of BRA)**
- 287 ● **On-site recreational population**
- 288 ● **On-site industrial worker**
- 289 ● **Off-site resident**
- 290 ● **Off-site recreational population.**

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

296 **3.2.2 Identification of Human Exposure Pathways**

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

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

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

- 305 ● **Exposure to soil via incidental ingestion and dermal contact, and via external**
306 **gamma radiation from radionuclides present in soil;**
307

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

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

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

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

- 313 ● **Exposure via ingestion of fish.**

314 **3.2.3 Estimation of Environmental Concentrations**

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

317 **3.2.4 Estimation of Human Intake**

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

325

326
$$\text{CDI} = \frac{\text{C} \times \text{CR} \times \text{EF} \times \text{ED}}{\text{Bw} \times \text{AT}}$$

327

328 where:

329

- 330 **CDI** = Chronic daily intake, mg/kg/day
331 **C** = Chemical concentration in soil or water, e.g. mg/kg soil
332 **CR** = Contact Rate, e.g., kg soil/day
333 **EF** = Exposure frequency, days/year
334 **ED** = Exposure Duration, years
335 **BW** = Body Weight, kg
336 **AT** = Averaging Time; portion of lifetime over which exposure is
337 averaged (days).

338 Variations of this equation are used when calculating air inhalation and radiological exposures.

339

340 **3.3 Toxicological Assessment**

341 The toxicological assessment involves the identification of adverse health effects associated with
342 exposure to a chemical or radionuclide and the relationship between the extent of exposure and

343 the likelihood and/or severity of adverse effects. The U.S. EPA has conducted such assessments
344 on many frequently occurring environmental chemicals and radionuclides and has developed
345 toxicity values based on these assessments for use in risk assessments. Further information
346 regarding the toxicological assessment can be found in the RFI Reports.

347 3.4 Risk Characterization

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

357 The "**Hazard Quotient**" (**HQ**) is used to determine the severity of non-cancerous hazards posed
358 at a site. The **HQ** is determined by dividing the **Chronic Daily Intake (CDI)** by the **Reference**
359 **dose (RfD)**. The reference dose is the amount of material that is determined to cause a toxic
360 effect. If the **HQ** is less than or equal to 1, then the estimated exposure to a substance
361 represented by the **CDI**, is judged to be below the threshold that could result in a toxic effect.
362 An **HQ** greater than 1, indicates that a toxic effect may result. To assess the cumulative effect of
363 similar noncancerous substances, the **HQ** for all of the substances being assessed at a site are
364 added, with the result being the **Hazard Index (HI)**.

365 **3.5 Conclusions**

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

369 **TABLE I**

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

371	Contaminants of Concern	Selected Gallia PRG (ug/L)	Basis	Selected Berea PRG (ug/L)	Basis
372	1,1 - Dichlorethene	7.0	MCL	7.0	MCL
373	1,2 - Dichloroethane	5.0	MCL	5.0	MCL
374	Tetrachloroethene	5.0	MCL	5.0	MCL
375	1,1,1 - trichloroethane	200	MCL	200	MCL
376	Trichloroethene (TCE)	5.0	MCL	5.0	MCL

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

379 There are no Ecological Risks identified for this unit.

380 **4.0 DISCUSSION OF SWMUs IN QUADRANT III**

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

383 **SWMUs Requiring No Further Corrective Action**

384 **X-616 Effluent Control Facility/Former chromium Sludge Lagoons**

385 Cooling water containing a chromium-based corrosion inhibitor was processed through the X-
386 616 Effluent Control Facility until 1993. Treatment of the blow down through pH adjustment
387 using slaked lime and polymer coagulant resulted in 230,000 gal/year of lime sludge that
388 contained hydrated chromium hydroxide [Cr(OH)₃]. After the precipitate settled, it was
389 transferred to associated surface impoundments. The sludge was allowed to compact and the
390 supernatant was rerouted to the reduction precipitation process. Approximately 1,540,000 lb. of
391 dried trivalent chromium sludge was stored at the X-616. The removal of the chromium-
392 contaminated sludges and soils from the X-616 surface impoundments was completed on June
393 21, 1992 per the requirements of the Division of Hazardous Waste Management (DHWM) of the
394 Ohio EPA. The material was removed per the approved closure plan for X-616 surface
395 impoundments. The closure plan was approved by Ohio EPA on July 14, 1989 and amended on
396 March 4, 1992.

397 **Risk Analysis**

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

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

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

406 *X-744 S, T and U Warehouses*

407 Approximately 80,000 yd³ of lithium hydroxide is stored in the X-744S, X-744T, and X-744U
408 warehouses. Before 1988, lithium hydroxide was containerized in as many as 3,500 cardboard
409 drums weighing approximately 425 pounds each. In 1984, storage deficiency notices were issued
410 by Ohio EPA and U.S. DOE because the lithium hydroxide had spilled from deteriorated
411 cardboard drums. In 1988, the lithium hydroxide was re-packed in 75-gallon steel drums and the
412 warehouses were painted.

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

416 **Risk Analysis**

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

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

427 *X-6619 Sewage Treatment Facility*

428 The X-6619 Sewage Treatment Facility was constructed in 1980 and became operational in 1981.
429 Raw sewage from the entire site is treated at this facility. This facility can process approximately
430 800,000 gal/day of sanitary sewage using an activated sludge treatment process. The treated
431 effluent is discharged to the Scioto River through an underground pipeline. The effluent is
432 monitored under a NPDES permit.

433 *Risk Analysis*

434 **SOIL AND GROUNDWATER** - The Quadrant III RFI base line risk assessment identified a
435 total non-cancer HI of less than 1 for all the scenarios detailed for this unit. The ELCR risk
436 identified for current on-site workers and future on-site workers was acceptable based on U.S.
437 EPA risk guidance. Media specific total ELCR risks of 1×10^{-5} and 9×10^{-5} were identified for
438 current on-site workers and future on-site workers, respectively. The ELCR for the future on site
439 worker is driven by the exposure to arsenic in the soil and groundwater. The levels of arsenic in
440 the groundwater maybe elevated due to sampling technique. Low flow pumps have been installed
441 on many wells on the site and the levels of arsenic and other metals are shown to be greatly
442 reduced. Based on this data for all risk scenarios, both present and future, no further action is
443 warranted at this unit.

444 *Don Marquis Substation*

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

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

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

458 Risk Analysis

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

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

469 **4.1 SWMUs DEFERRED TO GASEOUS DIFFUSION PLANT D&D PROGRAM**

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

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

474 The X-230J3 West Environmental Sampling building is an approximately 150 ft² structure that
475 houses monitoring equipment and controls for the gates of the intermittent containment basin.
476 Upon receiving notification of a spill, the emergency gates can be closed to impound the flow of
477 the West Drainage Ditch before it crosses under Perimeter Road.

478 **Risk Analysis**

479 The initial phase of the RFI investigation and the approved BRA indicated that there was
480 unacceptable risk due to nitrobenzene detected in the soil. Nitrobenzene was detected in one soil
481 sample during the initial investigation. Based on that one sample the HI was calculated to be well
482 above 1. To evaluate if nitrobenzene or other contaminants were present in the soils around X-
483 230J3, additional soil samples were taken in May 1997. Based on that sampling event no
484 additional contamination was detected. The recalculated HI was below one. The ELCR was
485 outside the risk range for PAHs in soil and for ingestion of groundwater based on elevated levels
486 of arsenic and beryllium. The PAH risk will be re-evaluated during D&D. The elevated levels of
487 arsenic and beryllium in the groundwater detected during the RFI may be due to sampling
488 technique rather than actual conditions at the site. Additional sampling of groundwater was
489 collected using low-flow pumps from wells located in areas of the plant that have historically had
490 high metals results in groundwater. Based on these results, the metals in groundwater previously
491 detected at this unit appear to be the result of turbidity due to previous sampling techniques.

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

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

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

504 **Risk Analysis**

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

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

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

527 **GROUNDWATER** - Potential releases to groundwater was not considered probable because X-
528 230J5 is underlain by the Bedford Shale which is not considered a water bearing unit. Therefore,
529 risk was not calculated for groundwater at this unit.

530 **Risk Reduction Actions** - The X-230J5 SWMU is part of the West Drainage Ditch which under
531 went a risk reduction action in May 1997. Measured radiological levels in X-230J5 indicated that
532 no soil required removal. (Please refer the approved Quadrant III CAS/CMS Report Chapters 1
533 & 2)

534 **X-326 Process Building**

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

540 Six areas of the building, totaling approximately 31,888 ft² are permitted for the storage of
541 containerized RCRA waste. Radioactively contaminated PCB wastes are stored in five areas,
542 totaling approximately 11,600 ft². Many, smaller areas, located throughout the building, are used
543 to store radioactive waste and materials. A troughing network has been installed in the process
544 buildings to collect and contain oil drops potentially contaminated with PCBs from the joints in
545 the ventilation system duct work.

546 **Risk Analysis**

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

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

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

563 The X-330 Process Building

564 The X-330 Process Building is 2,176 by 640 by 66 ft and houses 1,100 diffusion cascade stages
565 that are part of the intermediate phase of the ^{235}U enrichment process. The enriched stream of
566 ^{235}U is introduced in the X-326 Process building for further concentration and a depleted stream
567 (tails) is withdrawn at the Tails Withdrawal Facility in the northeast corner of X-330.

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

572 Risk Analysis

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

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

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

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

595 Risk Analysis

596 Environmental media sampled at this unit during the RFI are surface soil (0-2 ft), shallow soil (2-
597 10 ft), and groundwater. No surface water or sediment data were collected for this unit.

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

604 **GROUNDWATER** - Trichloroethene was detected at 22 ug/l in one well west of this unit.
605 VOCs have been released to groundwater at this location. The current data in the baseline risk
606 assessment (BRA) suggest that there is unacceptable risk to future on site workers as a result of
607 ingestion of arsenic in groundwater. The arsenic levels detected are below the background upper
608 tolerance limit of 92 µg/l for arsenic in Gallia groundwater. Additional sampling of groundwater
609 was collected using low-flow pumps from wells located in areas of the plant that have historically
610 had high metals results in groundwater. Based on these results, the metals in groundwater
611 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

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

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

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

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

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

655 **Risk Analysis**

656 Environmental media sampled at this unit during the RFI are surface soil (0 to 2 ft), shallow soil
657 (2 to 10 ft), and groundwater. No surface water or sediment data were collected for this unit.

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

659 and SVOCs (including PAHs) were detected below or near laboratory detection limits in the soil
660 associated with this unit. Because no plant process uses PAHs, identification of specific sources
661 is not feasible. Potential sources of PAHs in the surface soil include runoff from roadways and
662 nearby units. During Phase II sampling, VOCs were detected below or near laboratory detection
663 limits. SVOCs were not detected in the soil. Previous sampling results suggest that VOCs and
664 possibly SVOCs have been released to the soil at this unit. An ELCR of 2×10^{-5} for current
665 workers and 3×10^{-6} for future on-site workers was calculated. Based on the results of the
666 sampling the risk as calculated do not exceed current US EPA risk guidance. This unit will be re-
667 evaluated at D&D to determine if the soils warrant remediation.

668 **GROUNDWATER** - The detection of PAHs at levels below or near laboratory detection limits
669 in one Gallia groundwater sample indicates a potential or possible release of PAHs to
670 groundwater at this unit. However, PAHs have been found to be naturally occurring in Berea
671 wells surrounding PORTS. The Quadrant III Baseline Risk Assessment identified a total non-
672 cancer HI of 1 for the future on-site worker population as a result of exposure to inorganic
673 compounds in the groundwater associated with X-744N. The total ELCR for both future and
674 current use scenarios did not exceed 1×10^{-6} . Additional sampling of groundwater was collected
675 using low-flow pumps from wells located in areas of the plant that have historically had high
676 metals results in groundwater. Based on these results, the metals in groundwater previously
677 detected at this unit appear to be the result of turbidity due to previous sampling techniques.

678 *The X-745C West Cylinder Storage Yard*

679 The X-745C West Cylinder Yard is 550,000 ft² and is located west of the X-330 building.
680 Fourteen-ton cylinders of depleted UF₆ are stored in X-745C. The western portion of the storage
681 yard is paved with concrete; the remainder is covered with crushed stone.

682 **Risk Analysis**

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

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

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

691
692 *The cylinders are currently being addressed by Ohio EPA in Director's Findings and Orders*
693 *dated February 24, 1998.*

694 *The X-2230N West Holding Pond*

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

698 **Risk Analysis**

699 Environmental media sampled at this unit during the RFI are surface water, sediment, surface soil
700 (0 to 2 feet), and shallow soil (2 to 10 feet). No groundwater data were collected for this unit.

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

704 The baseline risk assessment (BRA) for Quadrant III identified a total non-cancer HI of less than
705 1 for all applicable current and future land-use scenarios. Total ELCRs of 1×10^{-5} and 3×10^{-5}
706 were identified in the RFI for current and future on-site workers, respectively. Based on the

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

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

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

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

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

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

723 The X-7725 Recycle and Assembly Building covers approximately 400,000 ft². This GCEP
724 support Facility was used to assemble new centrifuges used in the ²³⁵U enrichment process and to
725 rebuild failed centrifuges. The X-7725 SWMU is now a RCRA-permitted storage facility and
726 also contains solid waste, LLW, and PCBs.

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

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

732 **Risk Analysis**

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

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

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

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

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

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

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

759 West Drainage Ditch

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

767 Risk Analysis

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

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

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

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

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

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

792 **Discussion of Risk Analysis**

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

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

800 **4.2 SWMUs Requiring Active Remedial Actions**

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

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

815 **Summary of Risk Analysis**

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

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

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

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

833 **GROUNDWATER** - A VOC groundwater plume is present in the Gallia and Berea west of the
834 X-740 Building (Please refer to Figure 5). The primary constituent is TCE. All other
835 constituents (primarily TCE breakdown products) occur within the boundaries of the TCE plume.
836 TCE groundwater concentrations are highest approximately 100 ft. west of the X-740 building
837 (the maximum concentration was 11,000 $\mu\text{g/L}$ at X740-03G sampled in November 1993 and
838 3,100 $\mu\text{g/L}$ at X740-03G sampled in September 1994 and further decreased to 1,200 $\mu\text{g/L}$ in
839 September 1997) and decrease radially in all directions to below detection limits. The Gallia
840 groundwater plume extends west of the X-740 building. The Gallia groundwater plume is well
841 defined and extends approximately 700 feet west of the X-740 building.

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

849 **5.0 ENFORCEMENT ACTIVITIES**

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

854 **6.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION**

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

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

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

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

873 This decision document presents the selected remedial actions for Quadrant III of the US DOE
874 Portsmouth Facility. These actions are chosen in accordance with the Resource Conservation and
875 Recovery Act (RCRA) of 1976, the Comprehensive Environmental Response, Compensation, and
876 Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and
877 Reauthorization ACT (SARA) of 1986, and to the extent practicable, the National Oil and
878 Hazardous Substances Pollution Contingency Plan (NCP), the Hazardous and Solid Waste
879 Amendments (HWSA) of 1984, and applicable and appropriate State regulations. This decision is
880 based on the administrative record for this response action.

881 All Documents leading up the Preferred Plan have been available for public review and comment
882 prior to selection of the chosen remedies. Documents issued before the Preferred Plan include,
883 but are not limited to the Quadrant III Final RFI Report (DOE 1996), The Baseline Ecological
884 Risk Assessment (DOE 1994), The Air RFI (DOE 1997), the Background Sampling Investigation
885 (DOE 1996), the Quadrant III CAS/CMS Report (DOE 1998).

886 **7.0 SCOPE AND ROLE OF THE RESPONSE ACTION**

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

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

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

899 Nineteen SWMUs were investigated in Quadrant III. Four SWMUs (X-616, X-744S, T, and U
900 Warehouses, X-6619 Sewage treatment Facility, and the Don Marquis Substation) did not pose
901 any unacceptable current or future risks to human health and the environment. Therefore, no
902 active remedial corrective action is necessary. Eleven SWMUs (X-230J3, X-230J5, X-326, X-
903 330, X-530, X-615, X-744(N, P, Q), X-745C, X-230N, X-7725, and the West Drainage Ditch)
904 have been deferred to D&D. These SWMUs will be evaluated for active remedial measures when
905 the facility is no longer in operation.

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

911

912 8.0 SUMMARY OF QUADRANT CHARACTERISTICS

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

- 916 ◆ Soil
- 917 ◆ Groundwater
- 918 ◆ Surface Water &
- 919 ◆ Sediments.

920 **8.1 POTENTIAL SOURCES OF CONTAMINATION**

921 There is only one SWMU in Quadrant III which requires active remedial measures (X-740 ground
922 water only) to prevent potential exposure to contaminants at this time. Those SWMUs which
923 have been deferred to D&D will be evaluated for active remedial measures at the time the facility
924 is no longer in operation. Although the approved CAS/CMS Report discusses a referral option,
925 as well as the text above, Ohio EPA has determined that SWMUs which fall into that category
926 shall be deferred to D&D. It is Ohio EPA's opinion that deferring these units to D&D shall
927 require US DOE to re-evaluate and remediate these SWMUs at the time of D&D as warranted,
928 rather than potentially eliminating these SWMUs from further consideration.

929 The Quadrant III risk assessment identified TCE, 1,1 dichloroethene, 1,2 dichloroethane, and
930 1,1,1 trichloroethane as contaminants of concern (COC). Metals were also identified but
931 additional groundwater data, collected with a low flow pump, since the conclusion of the RFI
932 and the CAS/CMS has shown that metals were no longer a chemical of concern.

933 A VOC groundwater plume is present in the Gallia and Berea west of the X-740 Building
934 (Please refer to Figure #5). The primary constituent is TCE. All other constituents (primarily
935 TCE breakdown products) occur within the boundaries of the TCE plume. TCE groundwater
936 concentrations are highest approximately 100 ft. west of the X-740 building (the maximum
937 concentration was 11,000 $\mu\text{g/L}$ at X740-03G sampled in November 1993, 3,100 $\mu\text{g/L}$ at X740-
938 03G sampled in September 1994 and levels further decreased to 1,200 $\mu\text{g/L}$ in September 1997).
939 Trichloroethene concentrations decrease radially in all directions to below detection limits. The
940 Gallia groundwater plume extends west of the X-740 building. The Gallia groundwater plume is
941 well defined and extends approximately 700 feet west of the X-740 building.

942 VOCs, primarily TCE, were also detected in Berea groundwater immediately underlying the
943 center of the Gallia groundwater plume, where TCE concentrations are highest. A TCE
944 concentration of 1,200 $\mu\text{g/L}$ was detected at X740-09B when it was originally sampled during the

945 Phase II investigation. In February 1998 the concentration was 2,400 $\mu\text{g/L}$. As noted in the
946 Quadrant III RFI Final Report, the Sunbury confining unit is absent in this part of the PORTS
947 site and the Gallia and Berea groundwater are in connection. Berea groundwater flows
948 predominately westward towards the Berea outcrops in the West Drainage Ditch.
949 Inorganic constituents, including radiological parameters, in Gallia and Berea groundwater have
950 been evaluated. Groundwater in this area does not appear to have been impacted by inorganic
951 constituents. Additional sampling of groundwater was collected using low-flow pumps from
952 wells located in the X-740 area. Based on these results, the metals in groundwater previously
953 detected at this unit appear to be the result of turbidity due to previous sampling techniques. The
954 further evaluation of inorganics will be performed as part of the Integrated Groundwater
955 Monitoring Plan (IGWMP). Contaminants could potentially migrate through the groundwater
956 into the west drainage ditch and off site.

957 **9.0 DESCRIPTION OF REMEDIAL ALTERNATIVES**

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

960 ***9.1 Development of Alternatives for X-740 SWMU - CAS/CMS Study***

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

966 Risk at the X-740 SWMU

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

972 **Discussion of Risk Analysis**

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

975 ALTERNATIVE 1- NO ACTION

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

981 COST ANALYSIS: ALTERNATIVE #1 - NO ACTION

982 There is no cost associated with this alternative.

983 ALTERNATIVE 2- INSTITUTIONAL CONTROLS AND MONITORING

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

- 986 1) Institutional Controls - The X-740 area is within the security fence of the
987 site. Security would be maintained to prevent unauthorized access to the
988 site. The fence is maintained as part of overall site security.
- 989 2) Deed Restrictions - Deed Restrictions would prevent residential
990 development and use of the groundwater for any purpose that could lead to
991 exposure to contaminants of concern.
- 992 3) Groundwater Monitoring - Groundwater monitoring would be initiated to
993 assess the potential migration of contaminants in groundwater beyond the
994 current plume boundaries (Please refer to Figure IV) and the effectiveness
995 of natural attenuation (NA). The groundwater monitoring program would
996 use the existing wells and would require the installation of 5 additional
997 wells. The wells would be sampled semi-annually for the first year and
998 annually for the years 2 through 12 to 15 for the contaminants of concern.
999 Monitoring would continue as needed after year 15.

1000 **COST ANALYSIS: ALTERNATIVE #2 - INSTITUTIONAL CONTROLS AND**
1001 **GROUNDWATER MONITORING**

1002	The total present worth cost for alternative #2 are: <u>Capital Costs</u>	\$110,000
1003		The O & M costs <u>\$493,000</u>
1004		Total \$603,000

1005 ***ALTERNATIVE #3 - INSTITUTIONAL CONTROLS AND IN SITU TREATMENT***
1006 ***(PHYTOREMEDIATION)***

1007 Alternative #3 consists of two major elements

- 1008 1) Deed restrictions and Institutional Controls; and
1009 2) In situ treatment-phytoremediation.

1010 Deed restrictions and Institutional Controls are similar to Alternative #2 listed above. The In-Situ
1011 Phytoremediation consists of planting approximately 2,400 poplar trees on approximately 2.64
1012 acres. Individual tree spacing would be 5 ft. in each row and rows would be spaced 10 ft. apart.
1013 Phytoremediation is considered an emerging technology which uses plants and their associated
1014 rhizospheric microorganisms to remove, degrade, or contain contaminants in soil and
1015 groundwater. The trees used in phytoremediation are used as a biological pump.
1016 Phytoremediation uses the natural growth process of biological systems to attenuate and reduce
1017 contaminants in groundwater. During growth, the root system provides oxygen and sugars while
1018 up taking trace minerals and groundwater contaminants in the water. The sugars and oxygen
1019 provided by the tree serve as nutrients for bacteria in soil. The enzymes produced during growth
1020 can break down and incorporate waste into new plant material. The enzymes have also shown a
1021 capability to reduce chlorinated solvents such as TCE. The process assumes that the five
1022 following conditions are met:

- 1023 1) One-year old hybrid poplars (*Populus trichocarpa* x *P. deltoides*) will be
1024 planted some five to ten feet apart to facilitate good root development.
- 1025 2) The poplar trees will develop a mature root system within two years.
- 1026 3) During growth and root development the plume will continue to naturally
1027 attenuate and the contaminant levels will decrease.
- 1028 4) Current groundwater sampling has indicated that there is no inorganic
1029 contamination in this area, therefore metal accumulation in the leaves is not
1030 expected to be a problem.
- 1031 5) Water consumption by the trees is assumed to be between 3,000 to 10,000
1032 gallons per acre of trees/day. Actual consumption of water may be greater.

1033 **COST ANALYSIS: ALTERNATIVE #3 INSTITUTIONAL CONTROLS AND**
1034 **PHYTOREMEDIATION**

1035 The total present worth cost for Alternative #3 are: Capital Costs \$268,000
1036 The O&M costs \$360,000
1037 Total \$628,000

1038 *ALTERNATIVE 4 (a & b)- INSTITUTIONAL CONTROLS, REMOVAL/DELIVERY*
1039 *(EXTRACTION WELLS), AND EX SITU TREATMENT*

1040 Alternative 4 contains four major elements for the remediation of groundwater contaminants. The
1041 four major elements are as follows:

- 1042 1) Institutional controls-deed restrictions, land use restrictions, and
1043 groundwater monitoring;
1044 2) Removal/delivery-two extraction wells;
1045 3) Ex situ treatment-air stripping/carbon polishing; and
1046 4) Discharge-discharge to on site stream.

1047 Deed restrictions would prevent groundwater development in the vicinity of X-740. Access and
1048 use restrictions would limit exposure to contaminated groundwater by requiring excavation
1049 permits and stipulating the maximum depth of excavations permissible in the area. Groundwater
1050 monitoring would be initiated to document any migration of groundwater contamination beyond
1051 the X-740 plume area. The groundwater monitoring program would use existing and newly
1052 installed monitoring wells to assess contaminant fate and transport as noted in Alternative #2.

1053 Alternative 4a - The pump and treatment system would utilize standard extraction wells.
1054 Groundwater would be pumped to the surface, stored in a temporary storage tank, transported in
1055 tanker trucks to an on site existing treatment facility. This option would require a heated storage
1056 building to house the storage tank to prevent the water from freezing during the winter months.

1057 Alternative 4b- Alternative 4b is essentially the same as Alternative #4a except a new treatment
1058 facility would be built at the X-740 SWMU to avoid transporting the contaminated groundwater
1059 to an on site facility. The treatment facility would include air stripping/carbon polishing that
1060 would remove VOCs from the groundwater. Carbon filtration is an adsorption technology that
1061 uses a solid material of high surface area to selectively adsorb organic contaminants from
1062 aqueous streams. New permits would be required from Ohio EPA for this alternative, if selected.
1063 A permit to install, a permit to operate the water treatment system as well as permits for
1064 discharge to air and water would be obtained as needed.

1065 **COST ANALYSIS: ALTERNATIVE 4a/b -INSTITUTIONAL CONTROLS,**
1066 **EXTRACTION WELLS, TRANSPORTING THE CONTAMINATED WELLS TO AN**
1067 **ON SITE TREATMENT FACILITY/TO A NEW FACILITY AT X-740 SWMU**

1068 The total present worth costs for Alternative 4a are: Capital Costs \$641,000
1069 The O & M costs. \$869,000
1070 Total \$1,510,000

1071 The total present worth cost for Alternative 4b are: Capital Costs . \$620,000
1072 The O & M costs. . \$508,000
1073 Total..\$1,128,000

1074 *ALTERNATIVE 5a & b -INSTITUTIONAL CONTROLS, REMOVAL/DELIVERY*
1075 *(VACUUM ENHANCED RECOVERY), AND EX SITU TREATMENT*

1076 Alternative #5a & b consists of three parts as follows:

- 1077 1) Institutional controls-deed restrictions, land use restrictions, and
1078 groundwater monitoring;
1079 2) Removal/Delivery-VER wells;
1080 3) Ex situ treatment-air stripping/carbon polishing.

1081 Deed restrictions would prevent the use of groundwater development in the vicinity of X-740.
1082 Access and use restrictions would limit exposure to contaminated groundwater by requiring
1083 excavation permits and stipulating the maximum depth of excavations permissible in the area.
1084 Groundwater monitoring would be initiated to determine if contaminated groundwater is
1085 migrating beyond the X-740 plume area. The groundwater monitoring would be described in the
1086 Integrated Groundwater Monitoring Plan (IGWMP) and consist of existing and newly installed
1087 wells as described in Alternative #2.

1088 The Vacuum-Enhanced Recovery (VER) process was developed for the remediation of VOCs
1089 and other contaminants in low to moderate permeability subsurface formations. VER extracts
1090 both groundwater and soil vapor. Negative pressures applied to the pumping wells result in
1091 increased pumping rates and greater drawdowns. Soluble VOCs present in the extracted
1092 groundwater are removed more quickly than with traditional pump and treat methods. The
1093 increased pumping rates and draw downs also more effectively dewater the saturated materials,
1094 thereby creating a larger unsaturated zone for the application of the soil vapor extraction process.
1095 Stripping and removal of volatile compounds sorbed on the previously saturated soil are
1096 facilitated.

1097 A VER pilot study was completed for the site in to determine the key parameters necessary to
1098 design an effective system. The parameters needed to evaluate such a system are an effective well
1099 vacuum, groundwater and vapor radii of influence, and groundwater and soil vapor extraction
1100 flow rates.

1101 Extracted vapor would be filtered through a carbon bed prior to discharge. Groundwater
1102 extracted via a vacuum would be contained in a tank and periodically transported to an existing
1103 on-site permitted treatment facility (5a) or pumped to a new air-stripper /carbon polishing unit
1104 installed at X-740 specifically for treatment of TCE-contaminated groundwater (5b).

1105 **COST ANALYSIS: ALTERNATIVE 5a/b INSTITUTIONAL CONTROLS, VACUUM**
1106 **ENHANCED RECOVERY AND GROUNDWATER TREATMENT AT AN EXISTING**
1107 **ON SITE FACILITY (5a)/ GROUNDWATER TREATMENT AT A FACILITY BUILT**
1108 **AT X-740 (5b)**

1109 The total present worth cost for Alternative 5a are Capital Costs . \$1,962,000
1110 The O&M costs _ \$1,563,000
1111 Total . \$3,525,000

1112 The total present worth cost for Alternative 5b are: Capital Costs \$2,006,000
1113 The O&M costs \$524,000
1114 Total \$2,530,000

1115 **10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

1116 In selecting the remedial alternative, the Ohio EPA will consider the following eight criteria.

- 1117 1. **Overall protection of human health and the environment** addresses
1118 whether or not a remedy provides adequate protection, and describes how
1119 risks are eliminated, reduced or controlled through treatment, engineering
1120 controls, and/or institutional controls.
- 1121 2. **Compliance with all State, Federal and local laws and regulations**
1122 addresses whether or not a remedy will meet all of the applicable State,
1123 Federal, and Local environmental statutes.
- 1124 3. **Long-term effectiveness and permanence** refers to the ability of a
1125 remedy to maintain reliable protection of human health and the
1126 environment over time once clean-up goals have been met.

- 1127 4. Reduction of toxicity, mobility, or volume through treatment is the
1128 anticipated performance of the treatment technologies to yield a permanent
1129 solution. This includes the ability of the selected alternative to reduce the
1130 toxic characteristics of the chemicals of concern or remove the quantities of
1131 those chemicals to an acceptable risk concentration or regulatory limit
1132 and/or decrease the ability of the contaminants to migrate through the
1133 environment.
- 1134 5. Short-term effectiveness involves the period of time needed to achieve
1135 protection and any adverse impacts on human health and the environment
1136 that may be posed during the construction and implementation period until
1137 clean-up goals are achieved.
- 1138 6. Implementability is the technical and administrative feasibility of a
1139 remedy, including the availability of goods and services needed to
1140 implement the chosen solution.
- 1141 7. Cost includes capital and operation and maintenance costs.
- 1142 8. Community acceptance will be assessed in the Decision Document
1143 following review of the public comments received on the CAS/CMS
1144 Report and the Preferred Plan.

1145 Ohio EPA evaluated each alternative using the above eight criteria. The following discussion
1146 summarizes the compliance of the alternatives with these criteria.

1147 1. Overall Protection of Human Health and the Environment

1148 The No Further Corrective Action Alternative is protective of human health and the environment
1149 for those units which have been evaluated in Quadrant III and were found to fall into the
1150 acceptable risk range as identified by US EPA risk guidance. The SWMUs in this category fall

1151 into the risk goals outlined by CERCLA and RCRA. In some instances deed restrictions may be
1152 necessary to ensure that there is no change in use. In addition to the No Further Corrective Action
1153 Alternative, Ohio EPA evaluated a deferral to D&D Alternative. These SWMUs do not pose a
1154 sufficient risk to warrant remediation at this time, considering active remedial measures would
1155 not be prudent due to the fact that these facilities are still operating and may become re-
1156 contaminated. These facilities will be monitored periodically to ensure that they do not pose an
1157 unacceptable risk to human health and the environment, while the facility is still on operation.

1158 The clean-up objectives for the groundwater plume at the X-740 SWMU are listed in Table I and
1159 are reached in each of the alternatives evaluated for this SWMU. The major differences between
1160 the alternatives is the amount of time needed to remediate the groundwater in order to meet these
1161 clean-up objectives: Alternative #1 however, does not provide any deed restriction or
1162 institutional controls which may allow for exposure to future construction workers or site
1163 employees. Alternatives #1 and #2 provide no assurance that contaminants would not
1164 contaminate a surface water tributary located to the west of the X-740 area and migrate off site
1165 potentially exposing environmental receptors. Alternatives #3, and #5 are active remedial
1166 procedures which will restore groundwater and meet clean-up objectives several years faster than
1167 the Alternatives #1 and #2. Alternative #4 is expected to meet remedial objectives in the Gallia
1168 aquifer within 10 years however, it is estimated that the Berea aquifer would not meet clean-up
1169 objectives for 22.5 years. Alternative #3 is predicted to meet clean-up objectives within 10.5
1170 years after the trees mature. Alternative #5 has been projected to meet clean-up objectives for
1171 both aquifers within 12.5 years. Alternative #2 is predicted to meet clean-up objectives for both
1172 aquifers in approximately 23 years.

1173 **2. Compliance with all State, Federal and Local Laws and Regulations**

1174 Selected remedial actions on the U. S. DOE site must comply with applicable Federal, State, and
1175 Local laws and regulations. Examples of these include, but are not limited to, the Clean Air Act,
1176 Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Water Act, the Resource

1177 Conservation and Recovery Act, Ohio Revised Code (ORC) 6111, ORC 3734, and Ohio
1178 Administrative Code 3745. The Comprehensive Environmental Response, Compensation, and
1179 Liability Act (CERCLA) requires that remedial actions meet legally applicable or relevant and
1180 appropriate requirements (ARARs) of other environmental laws. "Applicable requirements"
1181 means those cleanup standards of control, and other substantive environmental protection
1182 requirements, criteria, or limitations promulgated under Federal or State law that specifically
1183 address a hazardous substance, pollutant, contaminant, remedial action, location, or other
1184 circumstance at a site. "Relevant and appropriate" requirements are cleanup standards, standards
1185 of control, and other substantive environmental protection requirements, criteria or limitations
1186 promulgated under Federal or State law that, while not legally "applicable" to a hazardous
1187 substance, pollutant, remedial action or circumstance at a site, their use and application is well
1188 suited to the situation at a site. An example of a situation where a law would be relevant and
1189 appropriate is the treatment of waste not lawfully deemed "hazardous" but identical to chemicals
1190 currently deemed hazardous under the Resource Conservation and Recovery Act (RCRA). A list
1191 of Ohio's ARARs for the X-740 solid waste management unit is provided in Appendix B of the
1192 CAS/CMS Report.

1193 ARARs are divided into three different categories:

- 1194 ● **Chemical-Specific ARARs**
- 1195 ● **Action-Specific ARARs**
- 1196 ● **Location-Specific ARARs**

1197 **Chemical-Specific ARARs** are health or risk-based numerical values which establish the
1198 acceptable amount or concentration of a chemical that may be found in the environment. An
1199 example of chemical-specific requirements are maximum contaminant levels (MCL's) established
1200 for certain chemicals under the Safe Drinking Water Act. No Further Corrective Action and
1201 referral to D&D remedial actions comply with chemical specific ARARs for those units noted to
1202 fall into these categories. All of the remedial alternatives evaluated except for Alternative #1 (No

1203 Action) for the groundwater at the X-740 SWMU are expected to comply with chemical-specific
1204 ARARs. Alternatives 4 & 5 where groundwater is expected to be brought to the surface and
1205 treated prior to discharge are subject to regulation under the National Pollutant Discharge
1206 Elimination System (NPDES) program. Alternatives #1 and #2 do not contain remedial measures
1207 or operation and maintenance. Additionally, Alternative #1 does not meet all identified ARARs
1208 or TBC guidance.

1209 **Action-Specific ARARs** are usually technology or activity based requirements or limitations on
1210 actions taken with respect to generated wastes. An example of an action-specific requirement
1211 would be the requirement for treatment of hazardous waste to approved standards before it is land
1212 disposed. Action specific ARARs do not apply for the selected No Further Corrective Action and
1213 the deferral to D&D remedial actions. An action-specific ARAR for the X-740 SWMU is the
1214 requirement to dispose of any VOC contaminated drill cuttings from installation of monitoring
1215 wells to a solid waste landfill or if necessary a hazardous waste facility.

1216 **Location-Specific ARARs** are restrictions placed on the concentration of hazardous substances
1217 or the conduct of activities solely because they occur in a specific location. An example of
1218 location-specific requirements are laws forbidding the placement of an incinerator near a hospital
1219 or school or the placement of waste in a wetland area. The alternatives evaluated for Quadrant
1220 III and active remediation of the groundwater plume at the X-740 SWMU do not trigger location-
1221 specific ARARs.

1222 **3. Long-term Effectiveness and Permanence**

1223 Long term effectiveness and permanence is not presently applicable to those SWMUs deferred to
1224 D&D. Those SWMUs deferred to D&D will be evaluated for remedial alternatives at the time of
1225 plant closure. Since cleanup objectives are met for those selected SWMUs within the No Further
1226 Corrective Action Alternative, long term effectiveness and permanence is expected to be met.

1227 All of the remedial alternatives described above for the X-740 SWMU are expected to eventually
1228 meet clean-up objectives within the time frame evaluated. This assumption is based on current
1229 groundwater data and modeling conducted in the CAS/CMS report. Alternative #1 does not meet
1230 all ARARs and will no longer be considered as a viable alternative for comparison. However,
1231 Alternatives #2 does nothing to prevent the potential migration of contaminants to a surface water
1232 body exposing off site receptors within the time frame specified for restoration of the aquifer.
1233 Alternative #5 is predicted to reduce the contaminants to meet clean-up objectives 12.5 years.
1234 Alternative #3 has been predicted to be able to meet clean-up objectives within 10.5 years of the
1235 trees maturing. It has been estimated that it may take two years for the trees to mature.
1236 Alternative #3 (Phyto-remediation) has been proven effective at other sites removing and
1237 destroying VOC contaminants. Alternative #4 uses readily available technology. Alternative #4 is
1238 predicted to meet clean-up objectives within the Gallia aquifer within 10 years and 22.5 years for
1239 the Berea. Alternatives #1 and #2 would meet clean-up objectives within both aquifers in 23
1240 years. Alternative #2 depends solely on institutional controls to prevent exposure during the 23
1241 years needed until the clean-up goals are achieved. Alternative #1 is provided as an alternative so
1242 that the reviewer can compare the effectiveness of active remedial actions at this site, and does
1243 not meet identified ARARs or TBC guidance.

1244 4. Reduction of Toxicity, Mobility and Volume through Treatment

1245 This criteria is not applicable to the No Further Corrective Action since the risk goals are met for
1246 those units which fall into this category in Quadrant III. This criteria will be evaluated for those
1247 units deferred to D&D at the time the facility is no longer in operation. Each of the alternatives
1248 for the X-740 groundwater plume effectively reduce toxicity, mobility and volume of the
1249 contaminant plume. The clean-up objectives are predicted to be obtained for each of the
1250 alternatives described above. Not all alternatives (Alternatives #1 and #2) rely on active treatment
1251 of the groundwater contamination. Alternative #3 is the most effective in reducing toxicity,
1252 mobility and volume of TCE in the groundwater. It is estimated that clean-up goals can be
1253 obtained within 10.5 years after the trees mature. Alternative #5 is predicted to remediate the

1254 plume to clean-up objectives within 12.5 years. Alternative #4 will reach clean-up objectives in
1255 22.5 years for both aquifers, however the predicted clean-up time for the Gallia aquifer is 10
1256 years. Alternative #1 and #2 will reach clean-up objectives within 23 years but do not rely on
1257 active treatment. These alternatives are considered less effective in reducing toxicity and mobility
1258 due to the fact that the plume may migrate to a tributary to the west and allow the contaminants
1259 to potentially reach off site receptors.

1260 **5. Short-term Effectiveness**

1261 This criteria is not applicable to the units meeting the No Further Corrective Action criteria. This
1262 criteria will be evaluated for those units deferred to D&D at the time the facility is no longer in
1263 operation. Those alternatives evaluated for the X-740 groundwater plume which minimize the
1264 amount of contaminants in soils that on site workers could contact due to installation of wells or
1265 remedial systems are expected to provide greatest degree of short term effectiveness. Alternative
1266 #2 provides the greatest level of protection from short term risk due to the fact that it does not
1267 require any intrusive practices potentially exposing remediation workers, or on site workers to
1268 contaminated soil or groundwater. Alternatives 3, 4, and 5 present minimal short term risk to
1269 remediation workers and current on-site workers during construction activities, however, these
1270 risks can be readily addressed through proper worker safety procedures. (Alternative #1 was
1271 provided as a comparison in which to evaluate all other alternatives and does not meet ARARs.)

1272 **6. Implementability**

1273 Both the No Further Corrective Action and deferral to D&D remedial solutions are easily
1274 implemented. Varying degrees of implementability are expected from each alternative. Those
1275 alternatives which require installation of wells and other remedial equipment are expected to be
1276 slightly more difficult. However, much of the technology is readily available and should not pose
1277 significant problems to implement for the X-740 SWMU. Alternative #1 involves no
1278 implementation time frames. Alternative #2 requires limited remedial activities related to the
1279 installation of five new monitoring wells. Alternative #2 would be easiest of alternatives to
1280 implement. Alternative #3 requires the planting of trees which involves soil preparation, irrigation

1281 and routine maintenance to ensure that the trees remain healthy. Alternatives #4 and #5 are both
1282 easily implemented. The extraction and monitoring well equipment in Alternatives #4 and #5
1283 could be installed within months of Agency approval. Also, should it not be deemed feasible to
1284 treat waste at an on site groundwater treatment facility, additional time would be needed to design
1285 a treatment system for Alternatives #4b and #5b.

1286 7. Cost

1287 There are no costs associated with the No Further Corrective Action alternative. The cost for
1288 future remediation for those units deferred to D&D will be evaluated at the time that the PORTS
1289 facility is no longer in operation. Below are the costs for the various alternatives in descending
1290 order:

1291 The most expensive alternative to be evaluated for the X-740 groundwater plume was Alternative
1292 #5a VER with groundwater treatment at an existing facility:

1293	<u>The Present Worth Capital Costs</u>	\$1,962,000
1294	The Present Worth O&M Costs	<u>\$1,563,000</u>
1295	The Total Costs	\$3,525,000

1296 This high cost for O & M is due to the labor cost involved with trucking the pumped groundwater
1297 to a treatment facility.

1298 #5b -VER with groundwater treatment and construction of a new on site treatment facility. The
1299 cost associated with Alternative #5b:

1300	<u>The Present Worth Capital Costs:</u>	\$2,006,000
1301	The Present Worth O & M Costs	<u>\$ 524,000</u>
1302	The Total Costs:	\$ 2,530,000

1303 Alternative #4a-Groundwater extraction wells with groundwater treatment at an existing facility;

1304 The Present Worth Capital Costs: \$ 641,000

1305 The Present Worth O & M Costs \$ 869,000

1306 Total Costs: \$1,510,000

1307 Alternative #4b- Groundwater extraction wells with construction of a new on site treatment
1308 facility;

1309 The Present Worth Capital Costs \$620,000

1310 The Present Worth O & M Costs \$508,000

1311 Total Costs: \$ 1,128,000

1312 Alternative #3-Phytoremediation;

1313 The Present Worth Capital Costs \$268,000

1314 The Present Worth O & M Costs \$360,000

1315 Total Costs: \$628,000

1316 Alternative #2-Institutional Controls, monitoring of natural attenuation;

1317 The Present Worth Capital Costs \$110,000

1318 The Present Worth O & M Costs \$493,000

1319 Total Costs: \$603,000

1320 Alternative #1-No Action; *No costs are associated with this alternative.*

1321

11.0 OHIO EPA'S SELECTED ALTERNATIVES FOR QUADRANT III

1322

Ohio EPA has selected two alternatives as remedial solutions and a deferral option for Quadrant

1323

III. For those SWMUs which fall into the risk goals as outlined by CERCLA and RCRA, a No

1324

Further Action Corrective Remedial Alternative is selected. The four SWMUs which fall into this

1325

category are:

1326

▶ X-616 Effluent Control Facility/Former Chromium Sludge Lagoons (Soils)

1327

▶ X-744S, T, and U Warehouses

1328

▶ X-6619 Sewage Treatment facility

1329

▶ Don Marquis Substation;

1330

In addition to the No Further Action Alternative, there were eleven SWMUs which have been

1331

deferred to decontamination and decommissioning (D&D). Although the approved CAS/CMS

1332

Report discusses a referral option, as well as the text above, Ohio EPA has determined that

1333

SWMUs which fall into that category shall be deferred to D&D. It is Ohio EPA's opinion that

1334

deferring these units to D&D shall require US DOE to re-evaluate and remediate these SWMUs

1335

at the time of D&D as warranted, rather than potentially eliminating these SWMUs from further

1336

consideration. There were four criteria used to make that decision.

1337

(1) HI values for media-specific total non-cancer risks under the industrial worker

1338

scenarios are generally less than 1.

1339

(2) The industrial worker scenario ELCR values were within the risk range of

1340

1×10^{-4} to 1×10^{-6} .

1341

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

1342

(4) The SWMUs identified are within current production areas and operational

1343

facilities. Remedial activities may interrupt facility operations and such areas may

1344

likely become re-contaminated due to on going production of enriched uranium.

1345 *The units listed below have been deferred to D&D:*

- 1346 ▶ X-230J3 West environmental Sampling Building and Intermittent
- 1347 Containment Basin;
- 1348 ▶ X-230J5 West Holding Pond and Oil Separation Basin;
- 1349 ▶ X-326 Process Building;
- 1350 ▶ Z-330 Process Building;
- 1351 ▶ X-530A Switchyard, X-530B Switch House, X-530C Test and Repair
- 1352 Building, X-530D Oil House, X-530 Valve House, X-530G Gaseous
- 1353 Centrifuge Enrichment Process oil pumping Station;
- 1354 ▶ X-615 Abandoned Sanitary Sewer Treatment Facility;
- 1355 ▶ X-616 Effluent Control Facility/Former Chromium Sludge Lagoons
- 1356 (groundwater)
- 1357 ▶ X-744N, P, and Q Warehouses associated Old Construction Headquarters;
- 1358 ▶ X-745C West Cylinder Storage Yard;
- 1359 ▶ X-2230N West Holding Pond No. 2;
- 1360 ▶ X-7725 Recycling and Assembly Building, X-7745 Recycling and
- 1361 Assembly Storage Yard, and Initial Construction Bulk Fuel Storage Area
- 1362 (Bulk Fuel Storage SWMU); and
- 1363 ▶ West Drainage Ditch.

1364 *X-740 (groundwater only)*

1365 The Ohio EPA's preferred remedial alternative for the X-740 SWMU (groundwater) is Alternative
1366 #3, Phytoremediation. Although Phytoremediation is an emerging technology, it has been shown
1367 to remediate TCE under controlled experimental settings at several Department of Defense and
1368 Superfund sites. One such site where phytoremediation is currently being evaluated is the

1369 Carswell Air Force Base in Texas. Alternative #3 consists of Institutional controls-deed
1370 restrictions, land use restrictions, groundwater remediation, and in situ treatment-
1371 phytoremediation. Phytoremediation is an in situ technology that relies on the natural growth
1372 process of vegetation (in this case trees) to remediate groundwater. Hybrid Poplar trees (*Populus*
1373 *trichocarpa x P. deltoides*) approximately one year old will be planted in rows approximately 10
1374 feet apart. Each tree will be spaced approximately 5 feet apart over an area of 2.64 acres. The
1375 trees can be planted in a matter of 4 months. The number of trees, the spacing and the acreage to
1376 be planted may be modified during design should additional data collected prior to implementation
1377 of the remedy indicate such a modification is necessary.

1378 The poplar trees are expected to have a mature root system within 2 years. Prior to the
1379 development of the mature root system, natural attenuation of the plume is expected to occur.
1380 Once the trees mature the water consumption is expected to be between 3,000 to 10,000 gallons
1381 per day per acre of trees. Organic compounds are expected to be captured and removed from the
1382 groundwater. Bioaccumulation of organic compounds has been proven not to occur in the trees.
1383 Metal contamination has been shown not to be present at this area therefore, bioaccumulation of
1384 metals is not considered a problem. The Capital Costs for implementation for Alternative #3 is
1385 \$268,000. The present worth value of the O & M costs is \$360,000
1386

1387 Remedial action objectives would be met by including institutional controls to prevent exposure of
1388 on site personnel to contaminated groundwater. Other controls to limit exposure to remediation
1389 workers would be set in place to limit contact with contaminated groundwater or soils. It is
1390 estimated that based on a water consumption of 6,000 gal per day per acre of trees that clean-up
1391 objectives would be obtained 10.5 years after root maturation. Studies have shown that the root
1392 systems of the hybrid poplar will reach 20 to 30 feet below the ground surface, and may up take
1393 between 50 to 350 gallons of water per tree per day. During growth, the root system provides
1394 oxygen and sugars while up taking trace minerals and groundwater contaminants in the water.
1395 The sugars and oxygen provided by the tree serve as nutrients for bacteria in the soil. The
1396 bacteria, promoted by the tree growth, aid in the biodegradation of contaminants. By breaking

1397 down organic contaminants, bacteria obtain carbon and energy to help sustain bacterial
1398 reproduction and maintenance processes.

1399 Groundwater will continued to be monitored throughout the process. Additional groundwater
1400 wells may be installed to monitor the progress of the remediation. Groundwater will be monitored
1401 at least semi-annually or as needed during the start of the remedial process. The frequency of
1402 groundwater monitoring will be evaluated in the approved CMI (Corrective Measure
1403 Implementation Plan) and the results will be reported in the Integrated Groundwater Monitoring
1404 Annual Report for the site. The IGWMP will include the parameters for sampling as well as the
1405 frequency for monitoring well sampling. The parameters and frequency of monitoring may
1406 change as the remediation progresses. Air monitoring may occur during the planting of trees.
1407 Fugitive dust emissions will be monitored during construction.

1408 The implementation of Alternative #3 will protect human health and the environment by
1409 eliminating contaminants from the groundwater. This alternative complies with all state and
1410 federal regulations. No known local regulations exist that would be violated by this alternative.
1411 Migration of contaminants to the western tributary and off site may occur in the future should
1412 active remedies fail to contain and eliminate the groundwater plume. Exposure to contaminants
1413 via dermal contact with surface water will most likely occur should no remediation take place at
1414 this unit. Environmental receptors could be exposed via ingestion of contaminated surface water
1415 should no active remedy be put in place. The remedy is easily implementable using standard
1416 construction equipment. The remedy will be effective in the long term since it will eliminate the
1417 groundwater contamination and meet all the clean-up objectives. It will be effective in the short
1418 term by following careful construction practices and isolation of the area to prevent exposure to
1419 contaminants from drill cuttings or groundwater. In comparing Alternative #3 with the other
1420 alternatives for this SWMU, both short-term and long term risk reductions are expected to be
1421 realized. Alternative #3 provides the best balance between overall risk reduction (both human
1422 health and ecological risks), restoration of the groundwater in the X-740 area, and costs.

1423 Although there are little or no costs associated with Alternatives #1 and #2 and both alternatives
1424 will reach clean-up goals, these remedies do not prevent the potential migration of contaminants
1425 off site within time frames specified for these alternatives to meet clean-up objectives. Also,
1426 Alternative #1 (No Action) does not meet ARARs. Alternative #5 is considerably more costly than
1427 any of the alternatives and no more effective. Alternative #4 is more costly than Alternative #3,
1428 and requires more years to achieve the clean-up objectives. Alternative #3 will meet all ARARs
1429 and is expected to restore groundwater in both aquifers 10.5 years, after the trees mature. The
1430 trees are expected to mature within two years after planting.

1431 **Future Groundwater Monitoring**

1432 The groundwater in this area will continue to be monitored throughout the remedial process.
1433 US DOE will prepare a yearly groundwater report discussing the progress of the selected remedy.
1434 The report will contain data describing the current contaminant concentrations, extent of
1435 contaminations as well as other data as deemed necessary by Ohio EPA. Five years after the
1436 installation of the selected alternative (phytoremediation) Ohio EPA will evaluate its effectiveness
1437 based on the data collected and submitted via the Integrated Groundwater Monitoring Annual
1438 Report and other groundwater reports. After five years, Ohio EPA will evaluate the
1439 effectiveness of the proposed remedy. If phytoremediation does not reduce contaminant levels to
1440 approximately one hundred and fifty (150) percent of the average predicted five year attainment
1441 value of 330 ppb TCE in the Gallia as described in the approved CAS/CMS, alternative remedial
1442 measures may be evaluated, to be installed in conjunction with the remedy already in place.
1443 Alternatives such as pump and treat as described in Alternative #4 may be considered, however,
1444 Ohio EPA may also consider other remedial alternatives which were not evaluated in the
1445 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	<p>Controls recommended include restrictions on land use, deed restrictions, well drilling prohibitions, well use advisories, and deed notices.</p>	<p>Long-term management of contamination left in place - applicable</p>	<p>40 CFR 300.430(e)(3)</p>
	<p>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.</p>	<p>Interim management of residual radioactive material above guidelines left in accessible locations - TBC</p>	<p>DOE Order 5400.5(IV)(6)(c)</p>
Groundwater monitoring	<p>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.</p>	<p>The project-specific or existing sitewide groundwater monitoring program will be used to ensure that the groundwater protection standards are not exceeded - applicable</p>	<p>40 CFR 264, Subpart F OAC 3745 54-90 to 99</p>

B-10

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 systems 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 whether 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

B-11

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

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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

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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
	<p>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:</p> <ul style="list-style-type: none"> (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-relevant 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

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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 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.		

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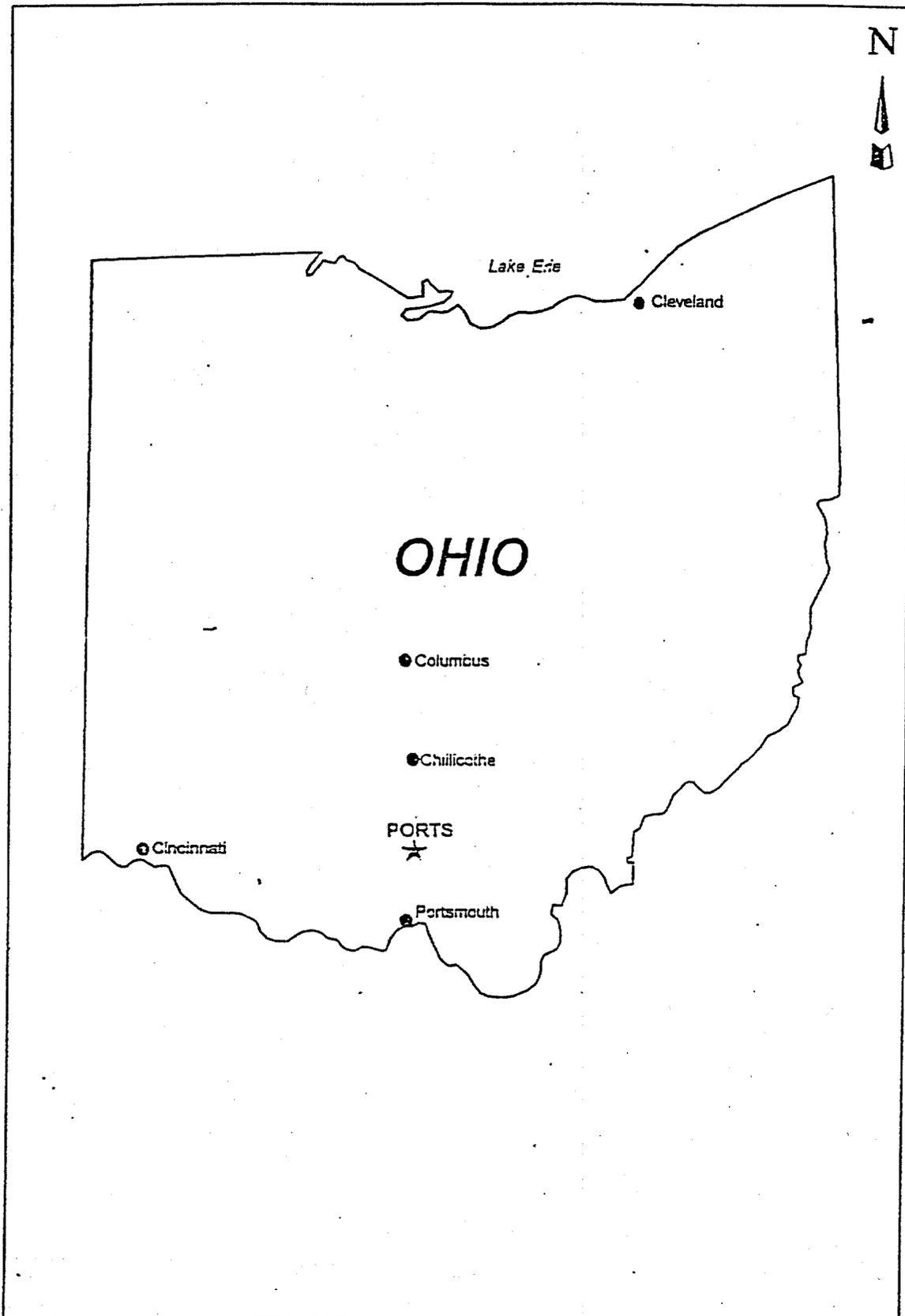
Table 4. Potential Action-specific ARARs for Remedial Alternative 5-Institutional Controls and Multiphased Extraction (continued)

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



1-2

Figure #1

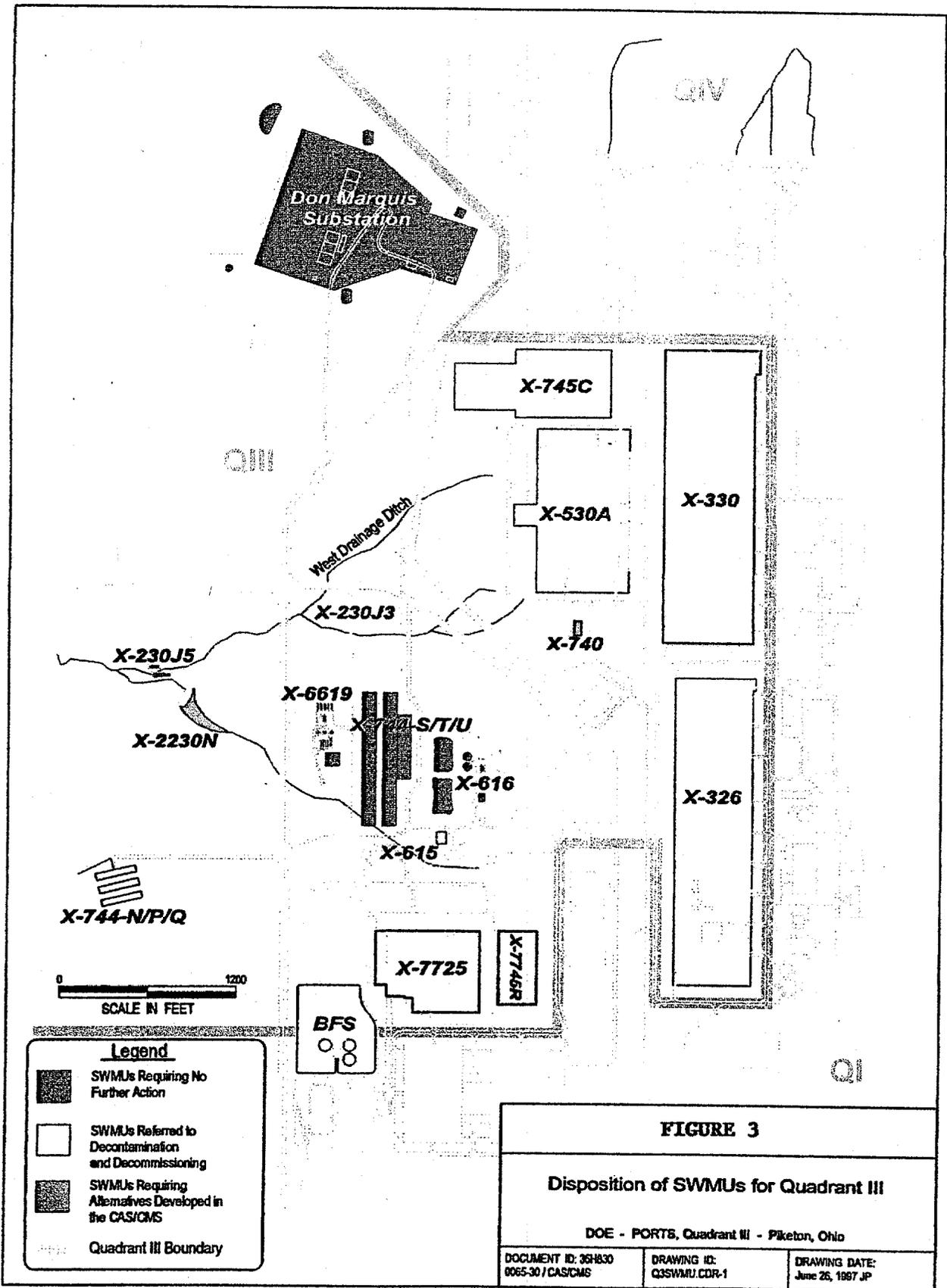


FIGURE 3

Disposition of SWMUs for Quadrant III

DOE - PORTS, Quadrant III - Piketon, Ohio

DOCUMENT ID: 35H830
0065-30 / CAS/CMS

DRAWING ID:
Q3SWMU.CDR-1

DRAWING DATE:
June 26, 1987 JP

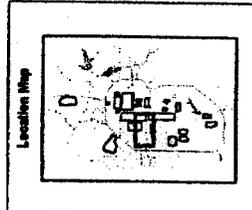
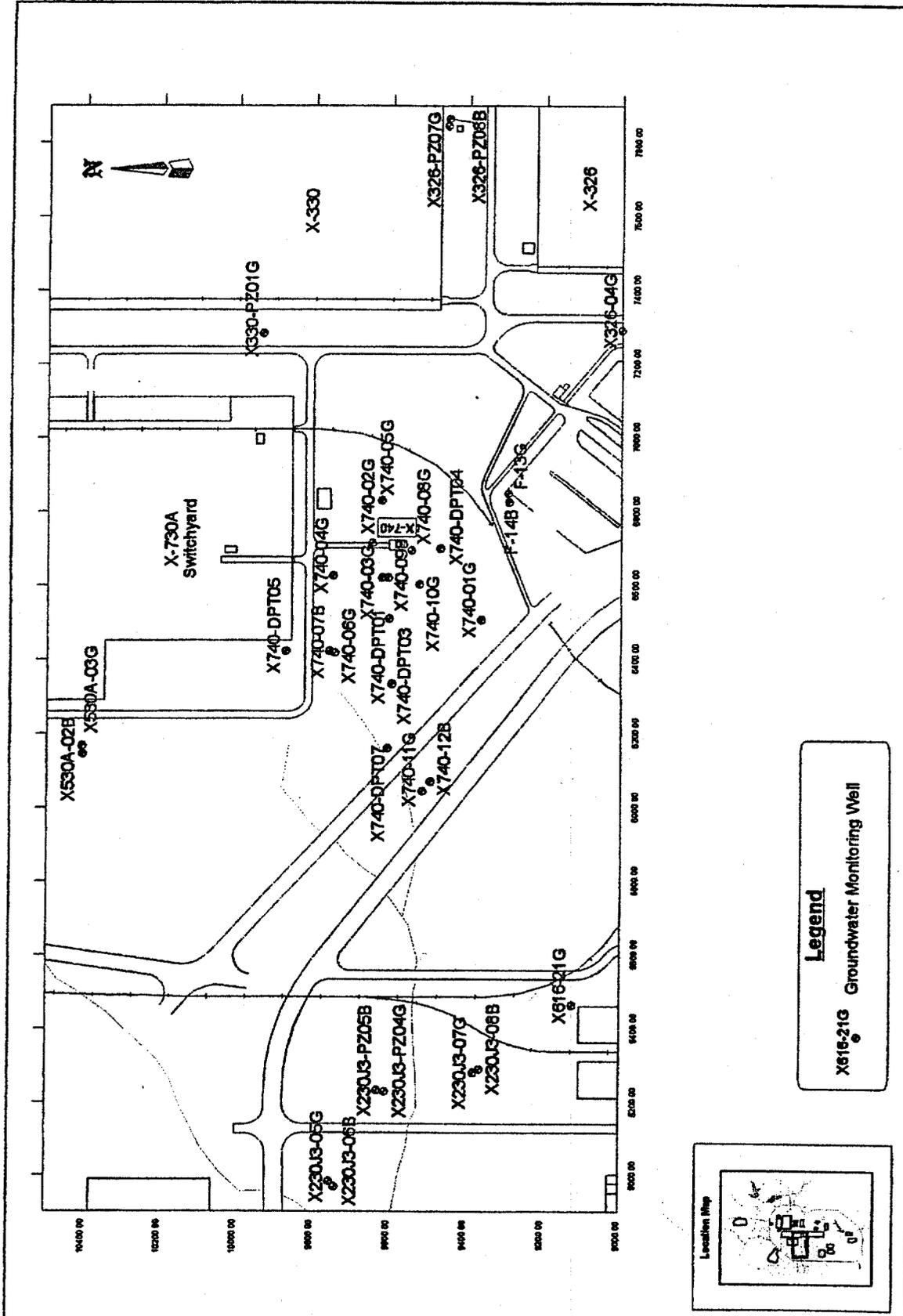
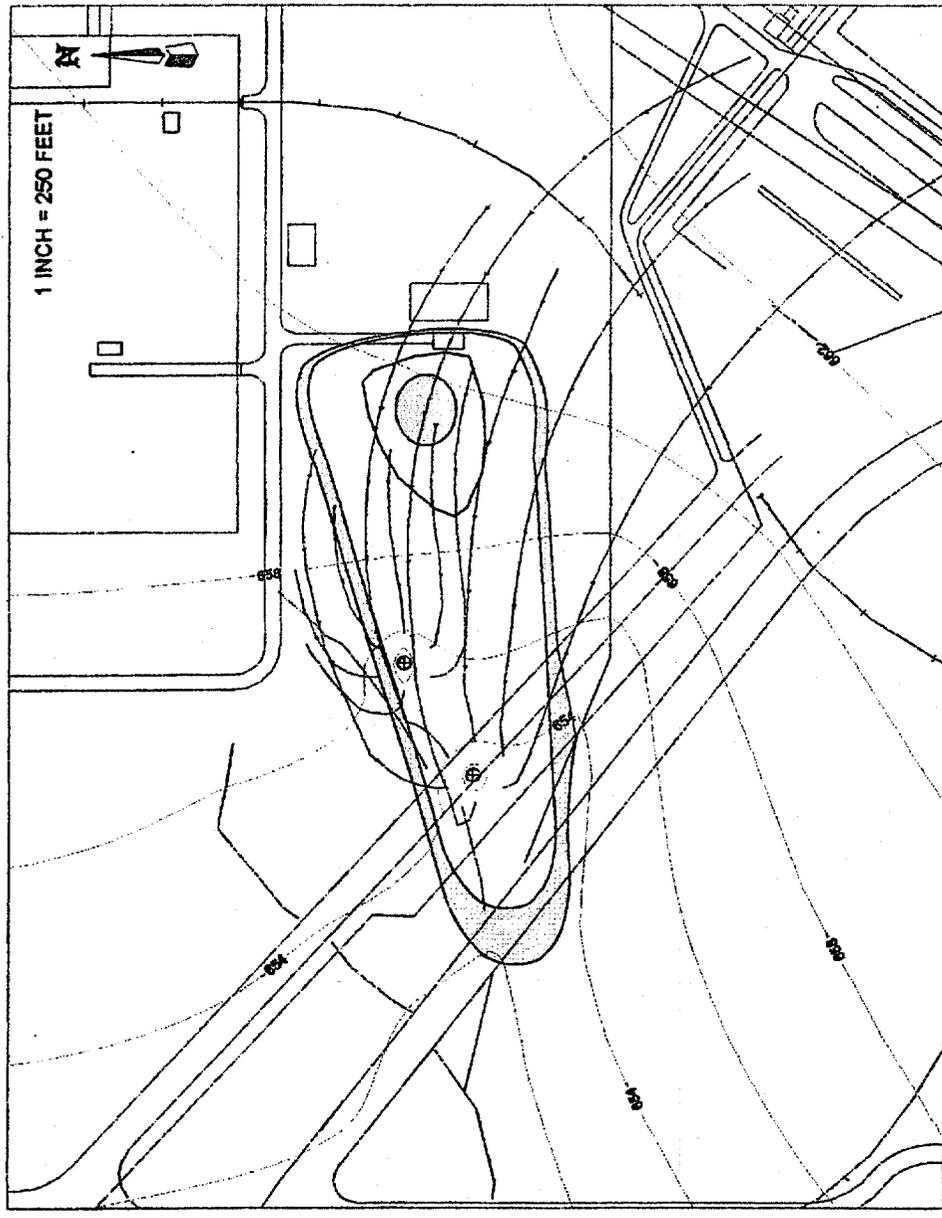


FIGURE 4 Groundwater Monitoring Locations in the X-740 Area

DOCUMENT ID: 35-HEO
009-70/CASICKS

DRAWING ID:
6.1 CDR-1

DRAWING DATE:
March 23, 1988 JP



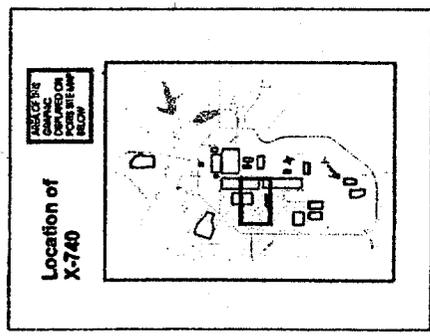
Legend

- TCE Concentrations 1000 ug/L
- TCE Concentrations 100 ug/L
- TCE Concentrations 10 ug/L
- TCE Concentrations 5 ug/L

Based on 1997 and 1998 data

- Extraction Wells

Groundwater levels measured
Feb. 20, 1998
Contour Interval = 2 ft.



**Capture Zone and Flow Paths, Alternative 4
(Institutional Controls and Extraction Wells)**
DOE - PORTS, Quadrant III - Pleasant, Ohio

DRAWING DATE:
March 23, 1998 JP

DRAWING ID:
E_BJ_CDR-1

DOCUMENT ID: 35HR30
0069-70/CASCANS

FIGURE 5

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.