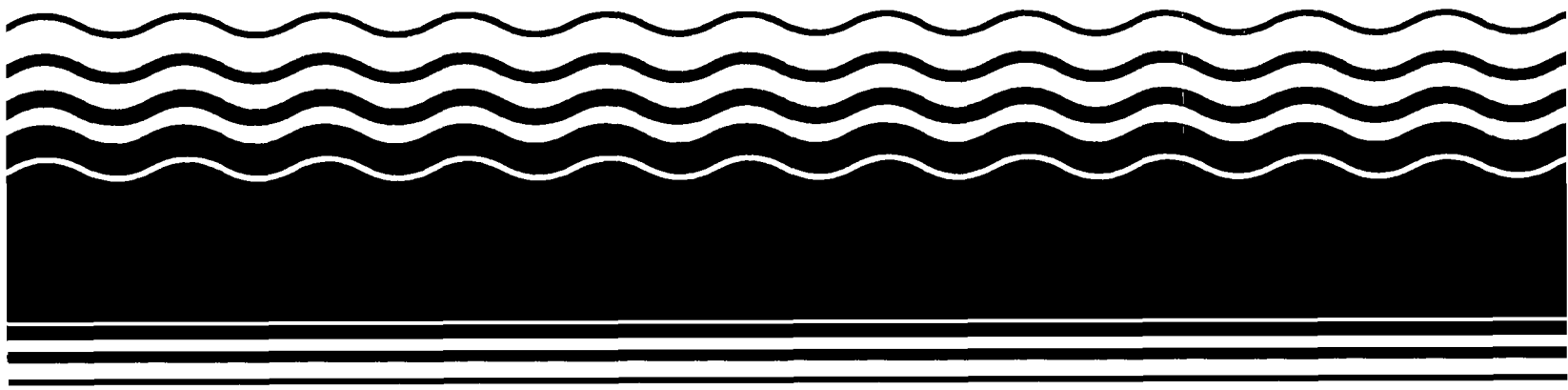
EPA/ROD/R04-95/235
September 1995

EPA Superfund Record of Decision:

US DOE Paducah Gas Diffusion Plant, Solid Waste Management Units 2 & 3 of Waste Area Group 22, KY 8/22/95



DOE/OR/06-1351&D1

Record of Decision for Interim Remedial Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant Paducah, Kentucky

July 1995

CLEARED FOR PUBLIC RELEASE

CERTIFICATION

Document Identification: Record of Decision for Interim Remedial Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

U. S. Department of Energy
Owner and Operator

Jimmie C Hodges

Jimmie C. Hodges, Paducah Site Manager
Paducah Site Office
U. S. Department of Energy

7-13-95

Date Signed

The Department of Energy has signed as "owner and operator" and Lockheed Martin Energy Systems, Inc., has signed as "co-operator" this application for the permitted facility. The Department has determined that dual signatures best reflect the actual apportionment of responsibility under which the Department's RCRA responsibilities are for policy, programmatic, funding, and scheduling decisions, as well as general oversight, and the contractor's RCRA responsibilities are for day-to-day operations (in accordance with general directions given by the Department of Energy as part of its general oversight responsibility), including but not limited to, the following responsibilities: waste analyses and handling, monitoring, record keeping, reporting, and contingency planning. For purposes of the certification required by 40 CFR Section 270.11(d), the Department of Energy's representatives certify, to the best of their knowledge and belief, the truth accuracy and completeness of the application for their respective areas of responsibility.

CERTIFICATION

Document Identification: Record of Decision for Interim Remedial Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Lockheed Martin Energy Systems, Inc.
Co-Operator

Lockheed Martin Energy Systems, Inc.

7/13/95
Date Signed

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DOE/OR/06-1351&D1

Record of Decision for Interim Remedial Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant Paducah, Kentucky

July 1995

Prepared by
Jacobs Engineering Group Inc.
175 Freedom Boulevard • Kevil, KY 42053
Under Contract DE-AC05-93OR22028

Prepared for
United States Department of Energy
Environmental Restoration Division

PREFACE

This *Record of Decision for Interim Remedial Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant* (DOE/OR/06-1351&D1) was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation and Liability Act, Resource Conservation and Recovery Act, and K.R.S. 224.46-530 for documenting the selection of a preferred interim remedial action, or corrective measure, for a solid waste management unit. This Record of Decision has been prepared in accordance with the "Record of Decision" outline prescribed in Appendix D of the draft Federal Facility Agreement for the Paducah Gaseous Diffusion Plant dated December 22, 1993. This work was performed under Work Breakdown Structure 1.4.12.7.1.02.11.02 (Activity Data Sheet 5302, "Offsite Groundwater Contamination"). Publication of this document meets a milestone pursuant to the United States Department of Energy's fiscal year 1995 commitments to federal and state regulatory agencies. This primary milestone document provides a record of information to be considered and the rationale which the United States Environmental Protection Agency and the United States Department of Energy will utilize in the selection of a preferred remedial action, or corrective measure, at Solid Waste Management Unit 2, the C-749 Uranium Burial Ground, and will formally record the decision to implement this interim action. This document also contains a schedule for conducting remedial design phase activities for this project. Information provided in this document forms the basis for the development of the Remedial Design Report for this project.

ACKNOWLEDGMENT

Jacobs Engineering Group Inc. under prime contract to the United States Department of Energy developed this document with the assistance of the Jacobs Environmental Restoration Team members:

Geraghty and Miller, Inc.
Lockwood Greene Technologies, Inc.
PAI Corporation
Solutions To Environmental Problems
United Science Industries
University of Tennessee

Additional support was given to the team by Lockheed Martin Energy Systems, Inc.

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TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

The following list of acronyms and abbreviations is provided to assist in the review of this document.

^{99}Tc	technetium-99
ARAR	applicable or relevant and appropriate requirement
bls	below land surface
BMP	best management practice
C.F.R.	Code of Federal Regulations
CAA	Clean Air Act of 1970
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended
cm	centimeter(s)
COC	chemical of concern
COPC	chemical of potential concern
DNAPL	dense nonaqueous phase liquid
DOE	United States Department of Energy
EMEF	Environmental Management and Enrichment Facilities
EPA	United States Environmental Protection Agency
Fed. Reg.	*Federal Register*
FFCA	Federal Facility Compliance Agreement
FS	feasibility study
ft	foot (feet)
gal	gallon(s)
HSWA	Hazardous and Solid Waste Amendments of 1984
in	inch(es)
J-value	qualifier indicating estimated value
K.A.R.	Kentucky Administrative Regulations
KDEP	Kentucky Department for Environmental Protection
KPDES	Kentucky Pollutant Discharge Elimination System
l	liter(s)
LDR	land disposal restriction
LLW	low-level (radioactive) waste
m	meter(s)
µg/l	microgram(s) per liter
mrem	millirem(s)
MW	monitoring well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operation and maintenance
PCB	polychlorinated biphenyl
pCi/g	picoCurie(s) per gram
pCi/l	picoCurie(s) per liter
PGDP	Paducah Gaseous Diffusion Plant
PPE	personal protective equipment
PW	Present Worth over 30-year period
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act, as amended
RGA	Regional Gravel Aquifer
RI	remedial investigation
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SWMU	solid waste management unit

TBC	to be considered
TCE	trichloroethene
U.S.C.A.	United States Code Annotated
UCRS	Upper Continental Recharge System
WAG	waste area group
WKWMA	West Kentucky Wildlife Management Area
yd^3	cubic yards
yr	year(s)

PART 1

DECLARATION

DECLARATION FOR THE RECORD OF DECISION FOR INTERIM REMEDIAL ACTION AT SOLID WASTE MANAGEMENT UNITS 2 AND 3 OF WASTE AREA GROUP 22

SITE NAME AND LOCATION

Solid Waste Management Units 2 and 3 of Waste Area Group 22
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for Solid Waste Management Units (SWMUs) 2 and 3 of Waste Area Group (WAG) 22 at the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the administrative record for this site.

The United States Department of Energy (DOE) entered into an Administrative Order by Consent pursuant to Sections 104 and 106 of CERCLA, effective November 23, 1988, with the United States Environmental Protection Agency (EPA). The PGDP was issued a Kentucky Hazardous Waste Management Permit and an EPA Hazardous and Solid Waste Amendments (HSWA) Permit July 16, 1991. The PGDP was placed on the National Priorities List effective June 30, 1994 (59 Federal Register 27989, May 31, 1994). Currently the DOE, the EPA, and the Kentucky Department for Environmental Protection (KDEP) are negotiating a Federal Facility Agreement for the PGDP site. On February 10, 1994, the EPA approved the DOE's January 20, 1994, proposal to issue a feasibility study report for SWMUs 2 and 3 of WAG 22. The concept of limiting the feasibility study to these two SWMUs was originally discussed among the EPA, the KDEP, and the DOE representatives during a June 11, 1992, meeting, and again during a January 5, 1994, meeting. Since SWMU 3 underwent Resource Conservation and Recovery Act (RCRA) closure in 1987, it does not require additional remedial or corrective actions at this time. Data gaps exist which prevent development and evaluation of final remedial actions at SWMU 2. In order to mitigate risks posed to ground water and the potential for direct contact, the DOE will implement an interim remedial action at SWMU 2. This interim remedial action will be initiated pursuant to the Interim Measure provisions of PGDP's Kentucky Hazardous Waste Management Permit issued by the KDEP and K.R.S. 224.46-530, the HSWA Permit issued by the EPA, and this Record of Decision (ROD). The Commonwealth of Kentucky concurs with the DOE and the EPA on the selected interim remedial action. This action will serve as an incremental step toward comprehensively addressing PGDP site problems.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from SWMU 2, if not addressed by implementing the response action selected in this ROD for interim remedial action, may present an imminent and substantial endangerment to public health, welfare, or the environment in the future.

DESCRIPTION OF SELECTED REMEDY

The primary objective of this interim remedial action, or corrective measure, is to reduce the infiltration of precipitation into buried wastes and mitigate any leaching of chemicals of concern from the wastes while the DOE collects additional data to support evaluation of a final remedial action. The Surface Water Integrator Operable Unit and the Ground Water Integrator Operable Unit at the PGDP will be addressed comprehensively in subsequent operable units. Solid Waste Management Units 2 and 3 are identified as source units at the PGDP. This interim remedial action for a source unit constitutes an incremental step toward comprehensively addressing site-wide problems at the PGDP. Decisions regarding final remedial actions will be made through the remedial investigation and remedy selection process after the source units are more fully understood.

The principal threat associated with SWMU 2 is the potential for transport of contaminants to the ground water operable unit and subsequent threats associated with the potential contamination of an aquifer and transport of contaminants beyond DOE property. The major components of the interim action remedy include:

- Once a determination has been made regarding possible ground water interaction with the buried wastes, a low permeability, multilayered cap may be placed on SWMU 2, the C-749 Uranium Burial Ground, to reduce infiltration of surface water from precipitation events into and through buried wastes. This will reduce potential leaching of contaminants to ground water. The cap will also decrease the gamma exposure rate to background levels and further decrease the likelihood of on-site workers and terrestrial animals coming into direct contact with the buried wastes.

- A ground water monitoring program will be implemented in the uppermost aquifer, the Regional Gravel Aquifer, to detect any release of contaminants from SWMU 2.

- Institutional controls will be implemented to prevent transferal of the SWMU 2 property and prevent future intrusive activities at the unit.

The EPA and the KDEP have participated in the development of this ROD, including review and comment on the content of the document.

STATUTORY DETERMINATIONS

This interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed for this unit. This interim action also complies with federal and state applicable or relevant and appropriate requirements for this limited-scope action, and is cost effective. This interim remedial action meets Condition IV. E. of the Kentucky Hazardous Waste Management Permit relating to interim corrective measures. This interim action is not intended to fully address the statutory mandate for permanent solutions and alternative treatment technologies to the maximum extent practicable for SWMU 2. Since this action does not constitute the final remedy for SWMU 2, the statutory preference for remedies which employ treatment that reduce toxicity, mobility, or volume as a principal element will be considered during evaluation of a final response action. Subsequent actions are planned to fully address the principal threats posed by the conditions at SWMU 2. Since this interim remedy will result in hazardous substances potentially remaining above health-based levels, a review will be conducted to ensure that the remedy continues to provide

adequate protection of human health and the environment within five years after commencement of the interim remedial action. Since this is an Interim Action ROD, review of this unit and of this remedy will be ongoing, as the DOE continues to develop final remedial alternatives for SWMU 2 of WAG 22 at the PGDP.

Date 8/16/95

Robert D. Dempsey
Assistant Manager for Environmental Management
United States Department of Energy

Date 8-22-95

John H. Hankinson, Jr.
Regional Administrator
United States Environmental Protection Agency, Region IV

PART 2

DECISION SUMMARY

DECISION SUMMARY

2.1 Site Name, Location, and Description

The United States Department of Energy (DOE) is conducting environmental cleanup activities at the Paducah Gaseous Diffusion Plant (PGDP) under the DOE Environmental Management and Enrichment Facilities (EMEF) Program. These cleanup efforts are required to address contamination that has resulted from past waste handling and disposal practices at the plant. The DOE is conducting the remedial activities in compliance with the requirements of the Kentucky Department for Environmental Protection (KDEP) and the United States Environmental Protection Agency (EPA).

The PGDP, located in western Kentucky, is an active uranium enrichment facility owned by the DOE. Effective July 1, 1993, the DOE leased the plant production operations facilities to the United States Enrichment Corporation, which in turn contracted with Lockheed Martin Utility Services, Inc. to provide operations and maintenance services. Lockheed Martin Energy Systems, Inc. manages EMEF Program activities for the DOE.

The PGDP is located in McCracken County in western Kentucky, approximately 3.5 miles south of the Ohio River (Figure 2-1). The PGDP facility covers about 540 hectares (1,335 acres), with approximately 300 hectares (740 acres) situated within a fenced security area; the remaining 240 hectares (595 acres) are maintained by the DOE as a buffer zone surrounding the plant. Approximately 850 hectares (2,100 acres) of land beyond the buffer zone are leased by the DOE to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area (WKWMA). The WKWMA is used extensively for recreation, primarily hunting and fishing.

The principal pathway of ground water flow at the PGDP is the Regional Gravel Aquifer (RGA), which consists of unconsolidated gravel and sand deposits occurring between 12 and 33 meters (m) [40 and 100 feet (ft)] below land surface (bls). From the PGDP, ground water within the RGA flows in a northward direction toward the Ohio River, which is the local base level for the system. Ground water contaminant plumes originating from the PGDP and extending north and northeast from the plant are located within this aquifer.

Waste Area Group (WAG) 22 consists of the following solid waste management units (SWMUs):

- SWMU 2, the C-749 Uranium Burial Ground;
- SWMU 3, the C-404 Low-Level Radioactive/Hazardous Waste Burial Ground;
- SWMU 7, the C-747-A Burial Ground; and
- SWMU 30, the C-747-A Burn Area.

These four units are situated within the security-fenced area in the northwest portion of the plant (Figure 2-2). Although SWMUs 7 and 30 are contained in WAG 22, it has been mutually determined by the DOE, the EPA, and the KDEP that remedy selection at these two units will not be conducted until further characterization activities have been completed. Consequently, SWMUs 7 and 30 will not be considered further in this document. As shown in Figure 2-2, SWMUs 2 and 3 are located near the west-central portion of the security-fenced area of the PGDP. Both burial grounds have been capped, SWMU 2 with a 15-centimeter (cm) [6-inch (in)] clay cap and 46-cm (18-in) vegetative

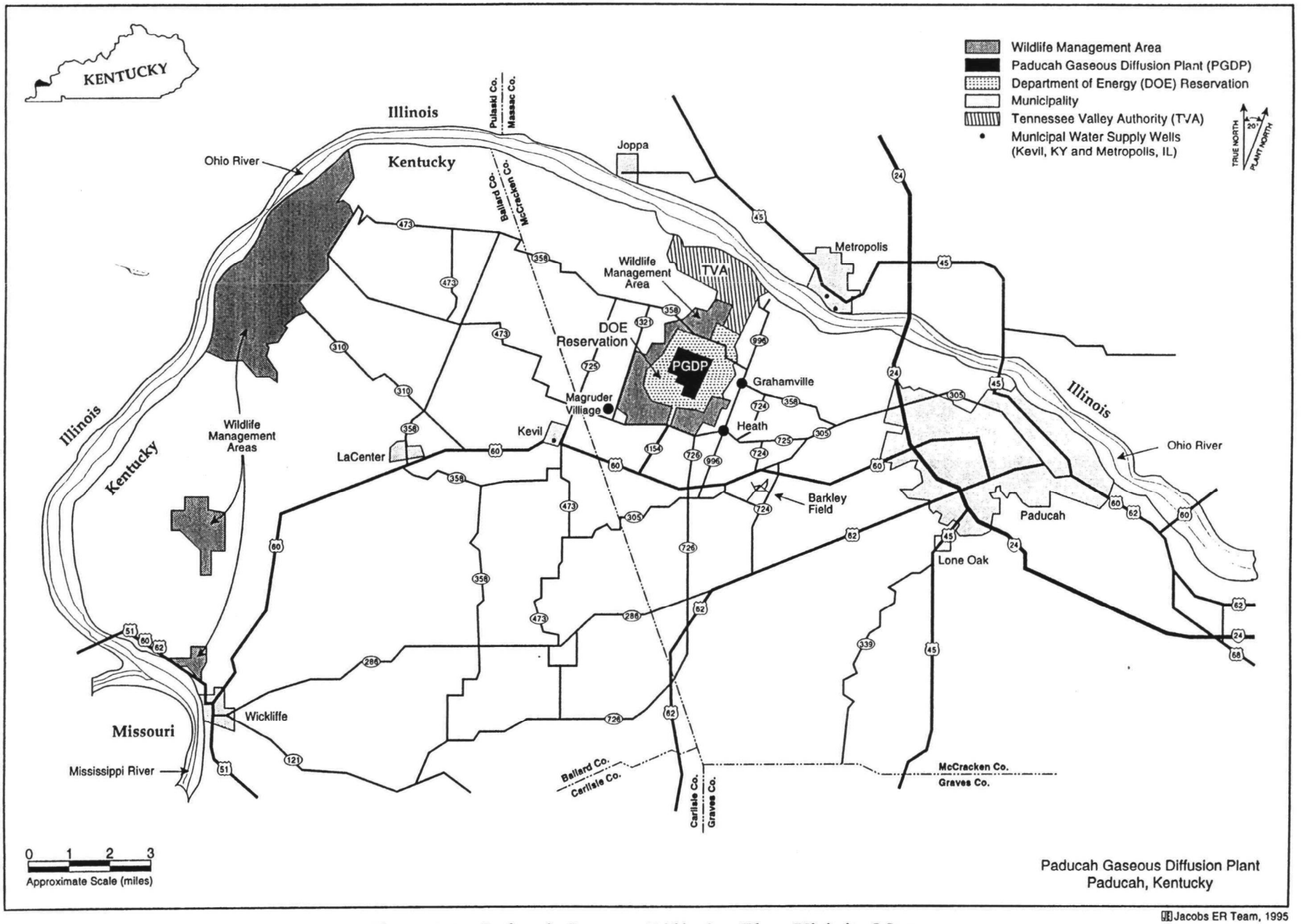


Figure 2-1 . Paducah Gaseous Diffusion Plant Vicinity Map

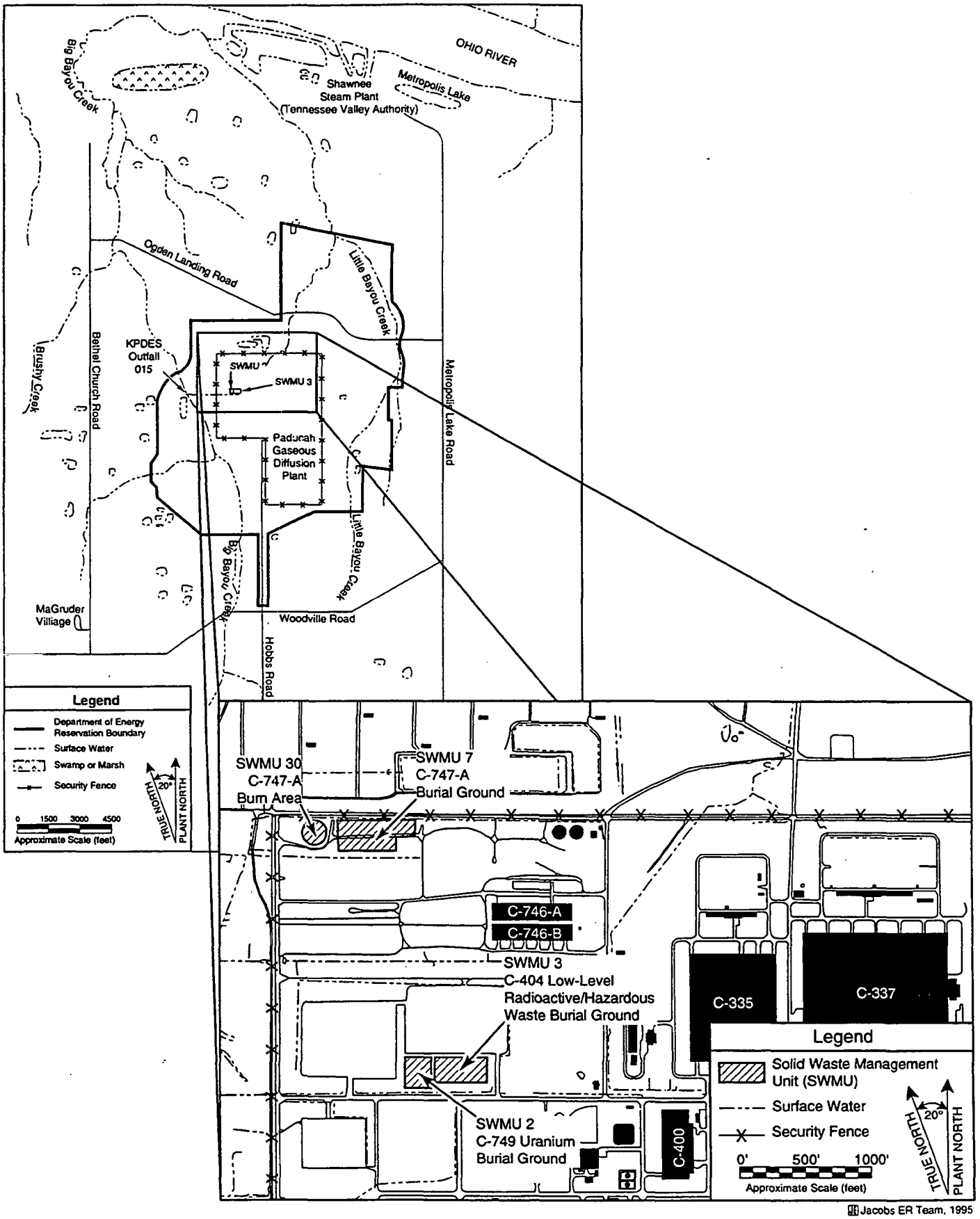


Figure 2-2. Location of Solid Waste Management Units in Waste Area Group 22

cover and SWMU 3 (a regulated unit) with a Resource Conservation and Recovery Act (RCRA) multilayered clay cap. The surfaces of both burial grounds are primarily grass covered. Surface elevations vary from about 113 to 119 m (370 to 390 ft) above mean sea level in the immediate vicinity of the two units. Surface runoff from the SWMUs flows into the ditches located north, south, and east of the units and discharges through Kentucky Pollutant Discharge Elimination System (KPDES) Outfall 015 to Big Bayou Creek.

2.2 Site History and Enforcement Activities

The C-749 Uranium Burial Ground (SWMU 2) is located in the west-central portion of the plant north of Virginia Avenue and on the western edge of the C-404 Low-Level Radioactive/Hazardous Waste Burial Ground (Figure 2-2). It encompasses an area of approximately 2,970 m^2 [32,000 sqare feet (ft^2)] with approximate dimensions of 48.8 by 61.0 m (160 by 200 ft) and is divided into 6.1 by 6.1 m (20 by 20 ft) sections. The C-749 Uranium Burial Ground was used from approximately 1951 to 1977 for the disposal of uranium and uranium containing wastes. The exact depth of the buried waste is not known. Wastes were reportedly placed in trenches excavated to a total depth of approximately 2.1 to 5.2 m (7 to 17 ft) and then covered with 0.61 to 1.2 m (2 to 4 ft) of soil. Occasionally, fires were reported as a result of oxidation of pyrophoric uranium metal, but no subsidence was observed resulting from potential volume reductions due to the fires. In 1982, the C-749 Uranium Burial Ground was covered with a 15-cm (6-in) clay layer and a 46-cm (18-in) vegetative cover. It has been estimated that 2.44×10^5 kilograms (270 tons) of uranium, 2.23×10^5 liters (l) [59,000 gallons (gal)] of oils, and 1.70×10^3 l (450 gal) of trichloroethene (TCE) were buried in SWMU 2. Most of the waste consisted of pyrophoric uranium metal in the form of machine shop turnings, shavings, and sawdust. Pyrophoric uranium metal was usually placed in 20-, 30-, or 55-gal drums and petroleum-based or synthetic oils were used to stabilize the waste. It is possible these oils may have included some polychlorinated biphenyl-(PCB) contaminated oils. Other forms of uranium, including oxides of uranium (solid and dissolved in aqueous solutions), uranyl fluoride solutions, uranium-zirconium alloy, slag, and uranium tetrafluoride were buried in smaller quantities.

There is no documentation of technetium-99 (^{99}Tc) disposal at SWMU 2, but its presence is suspected due to its association with operations at the PGDP. Technetium was produced at the PGDP as a by-product from reprocessing of reactor tailings. A portion of the uranium-containing wastes disposed in burial grounds at the PGDP likely contains ^{99}Tc from this source. In addition, detections of ^{99}Tc in ground water samples from nearby monitoring wells indicate that it may be present in SWMU 2.

In August 1984, Area 9 [which is approximately 6.1 by 4.3 m (20 by 14 ft)] and located on the southern border of SWMU 2) of the C-749 Burial Ground was excavated in response to concern about the integrity of the drums containing TCE reportedly disposed in this area. Little documentation is available concerning this activity. During excavation, four of the fifteen 30-gal drums believed to be in Area 9 were recovered, and three of them were in such poor condition that their content could not be determined. In addition to the four 30-gal drums, approximately 36 plastic-lined 55-gal drums were excavated. Five of the 55-gal drums were of poor integrity. There was no record of the 55-gal drums having been buried in Area 9.

The C-404 Low-Level Radioactive/Hazardous Waste Burial Ground (SWMU 3) is located immediately east of the C-749 Burial Ground in the west-central area of the plant (Figure 2-2). It is approximately 42.7 by 115.8 m (140 by 380 ft) and was originally constructed in the early 1950s as an aboveground holding pond, with an on-grade

tamped earth floor and 1.8-m (6-ft) high clay dike walls. The burial ground was used from 1951 to 1957 as a primary disposal area for ^{99}Tc and uranium-contaminated effluent. In 1957, all free liquids were removed, and disposal of uranium-contaminated bulk solid wastes began at the unit. In 1976, after the facility was filled with bulk solid waste, it was covered with compacted earth and the weir at the southwest corner was converted into a leachate collection sump. From 1977 until closure of the unit in 1986, the upper portion of SWMU 3 was used for the disposal of bulk and containerized uranium-contaminated solid waste. A portion of this waste, consisting of approximately 645 drums of precipitation filter cake (end products from the gold dissolver process) was found to be RCRA hazardous in 1986. Solid Waste Management Unit 3 was subsequently covered with a RCRA multilayered cap and certified closed in 1987. It is regulated under RCRA as a land disposal unit and is required to comply with a RCRA post-closure permit which was issued on September 1992.

Because SWMU 3 is closed with a RCRA cap and is being addressed by RCRA post-closure permit requirements, only SWMU 2 will be addressed by the interim remedial action described in this Record of Decision (ROD). Solid Waste Management Unit 3 will continue to be regulated under the existing RCRA permit which requires continued ground water monitoring.

2.3 Highlights of Community Participation

From May 31 to June 29, 1995, a notice of availability regarding the Proposed Remedial Action Plan was published in a regional newspaper, *The Paducah Sun*. The *Proposed Remedial Action Plan for Interim Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22* (DOE/OR/06-1315&D3) was released to the public May 31, 1995.

Specific groups which received individual copies of the Proposed Remedial Action Plan include the local PGDP Neighborhood Council, Natural Resource Trustees, and the PGDP Environmental Advisory Committee. A public meeting was tentatively scheduled for June 22, 1995, if requested by June 12, 1995. Since no requests were made for a public meeting, a notice of the meeting's cancellation was published in the Sunday, June 18, 1995, edition of *The Paducah Sun*.

2.4 Scope and Role of Operable Unit

Consistent with the DOE strategy, this interim action is intended as an incremental step toward addressing the source unit, SWMU 2. A potential contamination release into the RGA has been identified as the primary threat posed by SWMU 2. The objective of this interim action is to reduce infiltration of leachate through the unsaturated waste and delay the potential breakthrough of uranium and other chemicals of concern (COCs) to the RGA. By implementation of this interim action, leaching of contaminants into the ground water will be reduced while a final remedy for SWMU 2 is being evaluated.

Several data gaps exist which prevent the DOE from evaluating a final remedial action for SWMU 2. The missing data regarding SWMU 2 relates to the depth of the waste, the volume of the waste, and the form of the waste. One of the more important data gaps is whether any of the buried wastes are saturated or in direct contact with ground water. If the waste is in fact saturated, the effectiveness of the cap is limited and the contaminants are more likely to migrate within the RGA, thus posing a risk to off-site receptors. Additional information will be collected to fill data gaps as necessary to evaluate a final action in three separate manners. Field work associated with implementation of this action will fill some data gaps. Information collected during the course of other DOE projects near SWMU 2 will also fill data gaps. In addition, the DOE will prepare a

separate sampling plan currently scheduled to be submitted to the EPA and the KDEP in late 1995. The sampling plan will address those critical data gaps which will not be filled as a direct result of this interim action or other field projects. This interim action is an efficient, cost effective means of reducing risks posed by SWMU 2 at an early stage, while information necessary to evaluate a final action is being collected. Once the proper information has been collected, the DOE will evaluate and recommend a final remedial action for SWMU 2.

2.5 Site Characteristics

Hydrogeologic Characteristics

The subsurface at the PGDP consists of approximately 103.7 m (340 ft) of unconsolidated sediments overlying Mississippian limestone bedrock. Figure 2-3 presents a general subsurface profile of the PGDP area. The following discussion focuses on those lithologies present beneath SWMU 2.

Surficial deposits in the vicinity of SWMU 2 consist of approximately 4.0 to 6.1 m (13 to 20 ft) of silt loam and silty clay loam. These deposits consist of about 1.8 m (6 ft) of soil and an underlying 2.1 to 4.3-m (7 to 14-ft) thick layer of wind-deposited, fine-grained, silty material called loess.

Underlying the surficial deposits are unconsolidated sediments consisting of interbedded and interlensing gravel, sand, silt, and clay. These deposits, divided into the Upper and Lower Continental Deposits, were lain down in the region during the late Tertiary and Quaternary periods. The Upper Continental Deposits consist primarily of clayey silt, with thin layers of sand and occasional gravel found at a depth of about 4.0 to 6.1 m (13 to 20 ft) bls. They are approximately 12.2 to 15.2 m (40 to 50 ft) thick in the vicinity of SWMU 2. The loess and the Upper Continental Deposits have been informally grouped into a ground water flow system referred to as the Upper Continental Recharge System (UCRS). Water level measurements from a UCRS monitoring well, located at the northern edge of SWMU 2, Monitoring Well (MW) 154, indicate an area of high ground water elevations exists at SWMU 2. The ground water flow direction within the UCRS is ultimately downward through the low permeability clay, silt, or clayey silt layer separating the Upper and Lower Continental Deposits.

The top of the Lower Continental Deposits is typically found at depths of approximately 18.3 to 21.3 m (60 to 70 ft) bls. The Lower Continental Deposits consist predominantly of well-rounded chert gravel with sand and are approximately 6.1 to 9.1 m (20 to 30 ft) thick in the vicinity of SWMU 2. The principal gravel facies of the Lower Continental Deposits, the RGA, is the uppermost aquifer at the PGDP.

The Continental Deposits are underlain by the McNairy Formation at depths of approximately 25.9 to 30.5 m (85 to 100 ft) bls. The McNairy Formation in this area of the plant site has been described as brown to gray, silty, clayey, very fine to fine sand with dark gray silty clay. The total thickness of the McNairy Formation is approximately 68.6 m (225 ft). Directly underlying the McNairy Formation are the Mississippian rubble zone and the Cretaceous Tuscaloosa Formation, which consist of a 1.5 to 6.1 m (5 to 20 ft) thick layer of subangular chert and silicified limestone fragments. Deep borings at the PGDP have encountered Mississippian limestone bedrock approximately 102 to 107 m (335 to 350 ft) bls.

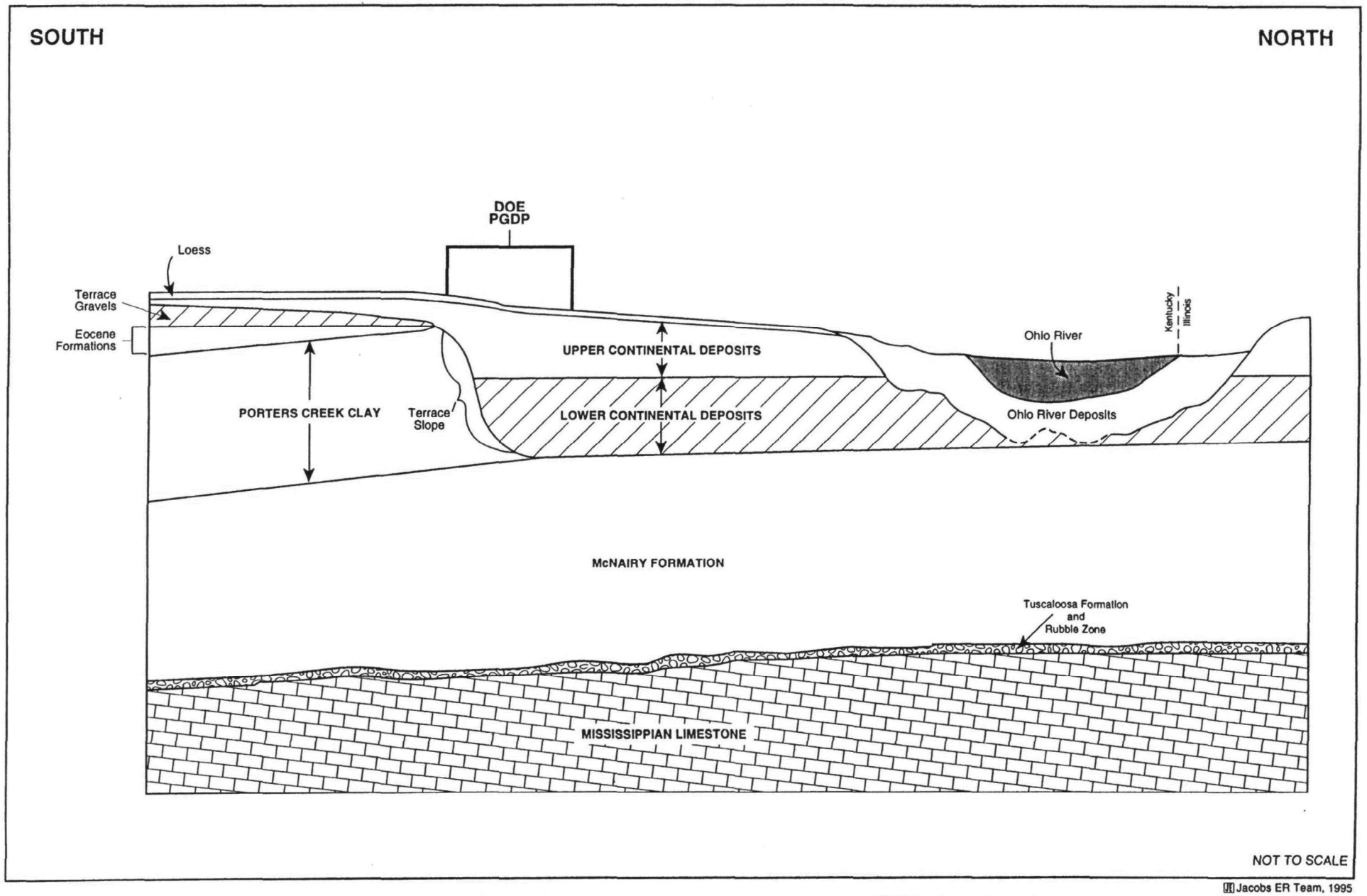


Figure 2-3. General Subsurface Profile of the Paducah Gaseous Diffusion Plant Area

Nature and Extent of Contamination at Solid Waste Management Unit 2

The results of the Phase I and Phase II Site Investigations indicate that organic, metal, and radionuclide contamination is present in surface soils, subsurface soils, and ground water in the SWMU 2 area. Sampling locations at SWMU 2 are shown in Figure 2-4. The possible source of this contamination is the low-level (radioactive) waste (LLW), primarily uranium and uranium-contaminated material, buried within the unit.

Over 30 chemicals of potential concern (COPCs) were identified in the *Remedial Investigation Addendum for Waste Area Grouping 22, Burial Grounds, Solid Waste Management Units 2 and 3, at the Paducah Gaseous Diffusion Plant* risk assessment. Nineteen of these COPCs were determined to pose a potential risk great enough to be considered COCs for the *Feasibility Study for Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant*. The criteria used to identify the COPCs and COCs, as well as the uncertainties associated with the identification process, are presented in the Remedial Investigation (RI) Addendum and in Appendix A of the Feasibility Study (FS).

The principal organic contaminant detected in the ground water at SWMU 2 is TCE, found primarily in the UCRS at concentrations varying from about 4 to 1,400 micrograms per liter (µg/l). Trichloroethene also has been detected in the upper RGA, at levels ranging from <5 to 98 µg/l. Trichloroethene is transported as a dissolved phase liquid in the direction of ground water flow. It also has the potential to migrate in the form of a dense nonaqueous phase liquid (DNAPL). As the buried waste containers degrade within SWMU 2, DNAPLs could potentially migrate to subsurface soils and ground water.

Metals have been detected above Phase II Site Investigation reference levels in soil and ground water samples at SWMU 2. Arsenic and silver were detected above reference levels in soil samples taken from borings located at the perimeter of SWMU 2. The principal inorganic contaminants in the ground water at SWMU 2 are manganese, vanadium, and beryllium. Beryllium was detected in total (unfiltered) metals analyses at levels above allowable drinking water maximum contaminant levels in the UCRS. Manganese and vanadium were detected at levels above reference values in UCRS wells located near SWMU 2.

Radiological contamination has been detected in shallow soil samples from borings located at the perimeter of SWMU 2, primarily at H 221 northwest of SWMU 2 and at H 262 southwest of SWMU 2. The radionuclides ^{99}Tc [up to 58 picoCuries per gram (pCi/g)] and total uranium (up to 89 pCi/g) have been detected in surface soils and in the ditch southwest of the unit to a depth of approximately 1.8 m (6 ft). The extent of surface radiological contamination likely extends from H 221 in the swale west of SWMU 2 and from H 262 in the ditch south of SWMU 2 to Outfall 015.

Ground water sampling indicates radiological contamination is present in the UCRS near SWMU 2. The principal radiological contaminants are ^{99}Tc and, at lower levels, uranium. In ground water samples from the UCRS wells near the unit, ^{99}Tc was detected at levels ranging from < 25 to 2,175 picoCuries per liter (pCi/l). Uranium has been detected at varying levels in UCRS wells; the maximum values (total fraction analysis) detected in UCRS wells at SWMU 2 were 10 pCi/l (J-value) uranium-234 in MW 49, 1.0 pCi/l uranium-235 in MW 91, and 27 pCi/l uranium-238 in MW 154. In general, the radiological contamination in the UCRS is higher than that found in the RGA. The principal radiological contaminant detected in the RGA is ^{99}Tc. Two downgradient wells in the area, MW 51 and MW 67, have reported ^{99}Tc values up to 53.2 pCi/l in the upper RGA. Uranium has not been detected above reference levels in the RGA in the vicinity of

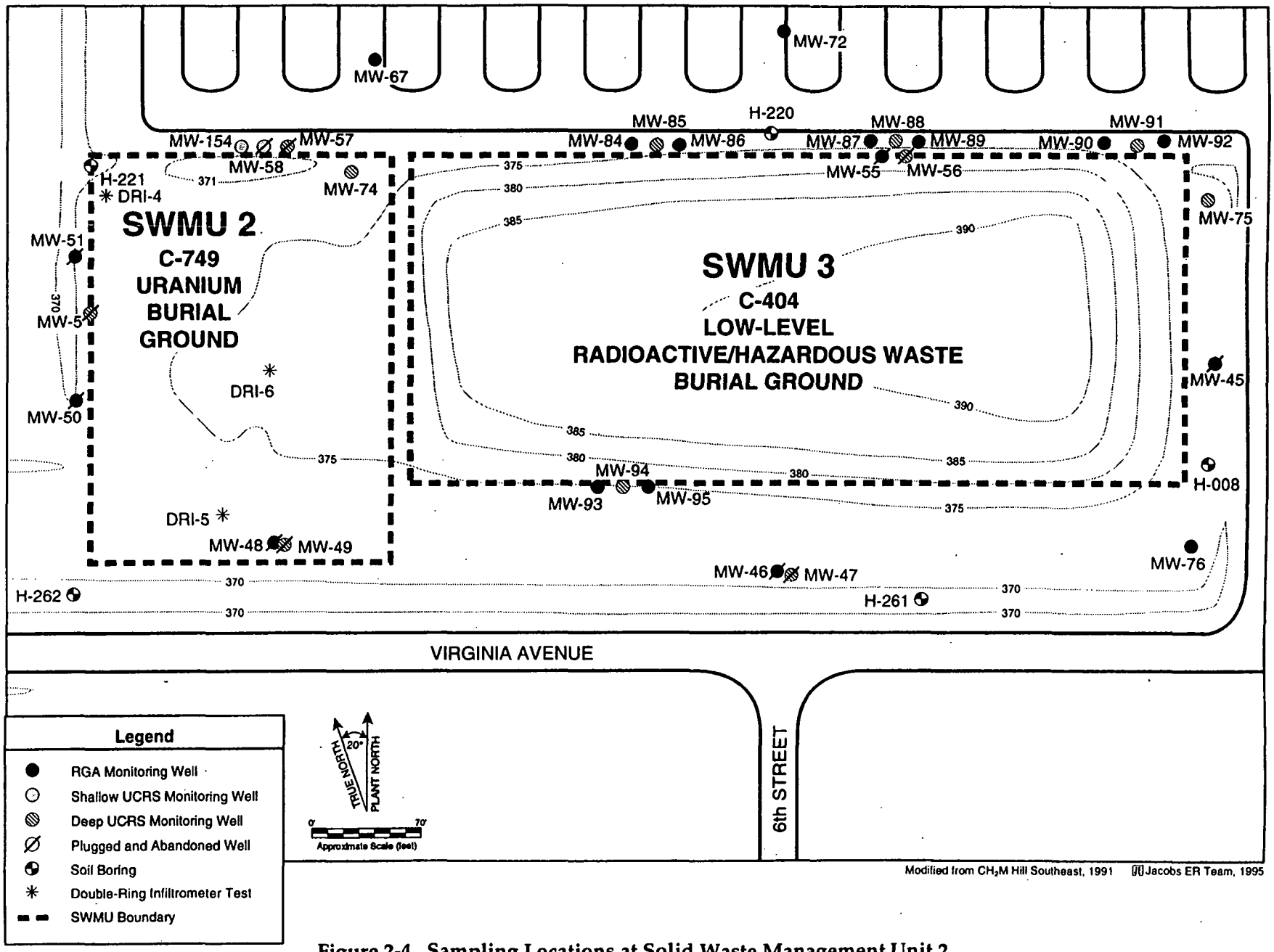


Figure 2-4. Sampling Locations at Solid Waste Management Unit 2

SWMU 2. The RESRAD (Residual Radioactivity) computer code was used for the FS to model potential leaching of uranium from SWMU 2. Results of this modeling indicate that uranium may migrate from SWMU 2, although very slowly, taking approximately 1,900 years to migrate to the RGA.

Two radiation walk-over surveys of SWMU 2 were conducted in August 1994. Detailed information concerning these surveys can be found in the FS. The survey results indicate that a generalized, low-level gamma field exists across SWMU 2. The field may be partially attributable to the large quantities of uranium metal buried in SWMU 2. Cylinder storage yards located adjacent to SWMU 2 are also likely contributing to the elevated gamma readings. In addition, during the Phase II Site Investigation, a radiation walk-over survey of the ditch located south of SWMU 2 was conducted. The results of this survey indicate that beta and gamma emitters are present at the surface of the ditch at levels exceeding three times background.

Conceptual Site Model for Transport and Exposure Pathways at Solid Waste Management Unit 2

The conceptual site model presented in Figure 2-5 identifies the probable and potential contaminant migration and exposure pathways at SWMU 2. From the source, defined as the low-level radioactive waste buried within SWMU 2, two probable pathways are identified: (1) a probable pathway to the adjacent soils; and (2) a probable pathway to ground water due to leaching and dissolution of contaminants. Consistent with the DOE strategy, DNAPL is considered a potential source beneath the buried waste since burial records indicate that TCE, a potential DNAPL compound, was buried at SWMU 2. However, the presence of DNAPL has not been identified at SWMU 2. Potential exposure to contamination at SWMU 2 via air is currently limited since SWMU 2 is covered with a 15-cm (6-in) clay cap and a 46-cm (18-in) vegetative cover. These are the primary pathways and will be the focus of Section 2.6. The interim action presented in this document is intended to address the potential transport of contaminants to ground water via infiltration of precipitation through the buried waste materials at this SWMU. The risks that are addressed by this interim action are discussed in the following section.

2.6 Summary of Site Risks

The results of the risk assessment suggest there is sufficient potential risk to the public and environment to warrant action. A summary of the long-term risk is presented in Table 2-1. The principal goal of the interim remedial action is to implement source control measures which will diminish infiltration of surface water from precipitation events the buried waste. This will reduce potential leaching of TCE and uranium into the ground water. The interim action will also eliminate the present and future potential for direct contact with the buried waste by both humans and terrestrial animals. A summary of the risk assessment is presented below.

Human Health Risks

The data from the Site Investigation were evaluated in the human health risk assessment. To identify contaminants of potential concern, all constituents detected in the surrounding soils and ground water were evaluated using established guidelines. From this data, contaminants of potential concern included metals, organic compounds, and radionuclides. Whether the chemicals detected in the ground water beneath the unit are associated with SWMU 2 is not known due to a lack of sampling data from the waste. Since uranium and TCE are two primary waste sources in SWMU 2, source term

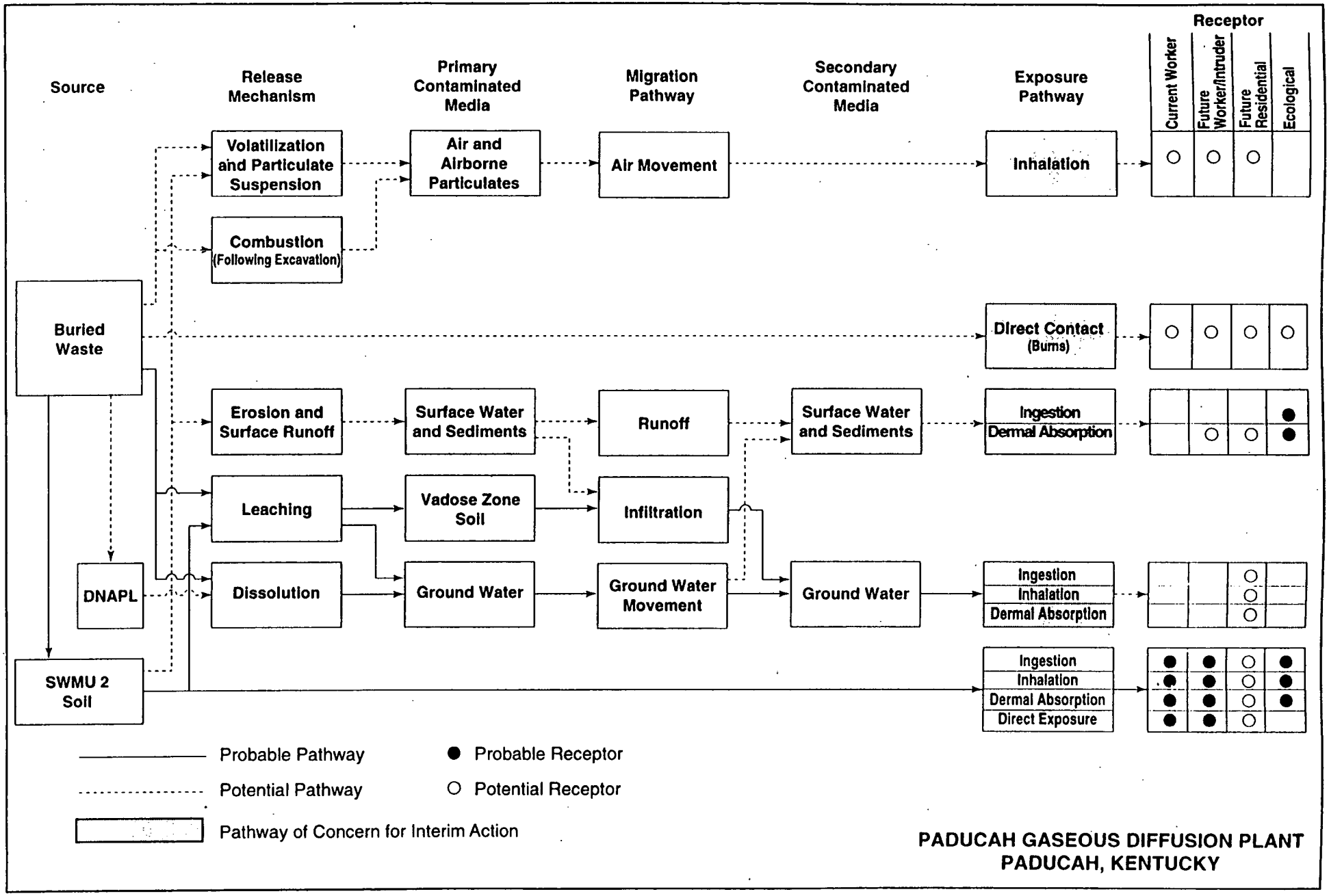


Figure 2-5. Conceptual Site Model of Solid Waste Management Unit 2

Table 2-1. Summary of Long-Term Risk at Solid Waste Management Unit 2 under No Action and Interim Action

	No Action	Interim Action
Future Unrestricted Workers		
Direct contact with waste	Direct contact with waste possible; risks from direct contact unacceptable.*	Potential for direct contact reduced by physical barrier created by the low permeability multilayered cap.
Future Potential Ground Water User		
Ingestion of ground water	Risk posed by ground water contamination is unacceptable. Contaminant concentrations in ground water expected to increase.	Migration of contaminants reduced through reduction of water movement through unit by the cap.

* Unacceptable risk: a potential risk higher than one additional cancer case in a population of one million people exposed to a certain level of a pollutant during a lifetime.

concentrations were estimated from disposal records as input parameters for the soil leaching models.

The exposure pathways evaluated in the human health risk assessment are shown in Figure 2-5. As indicated by this figure, the risk assessments considered SWMU 2 to be an industrial site both under current and future conditions. However, the future resident using ground water was also evaluated for the site. For these scenarios, the principal pathways considered are inhalation potentially associated with the combustion of pyrophoric uranium, direct contact with the pyrophoric waste, and ingestion of potentially contaminated ground water. Although the contaminants in the ground water do not pose a threat at present, the potential for migration of TCE and uranium to off-site ground water does exist. As the primary contaminant migration pathway, potential future releases from SWMU 2 to ground water were evaluated using predictive models to estimate leaching.

Toxicity information used in the risk assessment was taken from approved EPA documents and data bases. The potential adverse human health effects associated with the primary contaminants of concern include carcinogenic effects and noncarcinogenic or systemic effects. Uranium exposure is associated with radiocarcinogenic and chemical toxic effects. Exposure to TCE through inhalation and ingestion causes cancer and various adverse effects on human health.

Risk characterization for workers indicated that under current conditions, the risk at the unit was not unacceptable. However, the risk characterization for workers under future conditions indicated that the risk at the unit was unacceptable due to potential direct contact with the buried waste. Also, the risk characterization for use of contaminated ground water indicated that ground water use could pose significant unacceptable risk to human health under future conditions. The primary driver of risk was ingestion of contaminated ground water. The primary contaminants contributing risk were TCE and uranium for the interim action.

Table 2-1 presents a summary of the long term risk at SWMU 2 for workers and ground water users under both the baseline (no action) condition and after the interim action is in place. As shown in this table, the interim action is effective in reducing risk from direct contact with the waste and in reducing the risk posed by the pyrophoricity of the

buried uranium. Also, the interim action is effective in reducing risk from ground water use by reducing the rate of contaminant leaching from the buried waste to the underlying aquifer.

Several uncertainties, or factors that could significantly affect the results of the risk assessment, were identified in the risk assessment. Primary uncertainties included needs to estimate the quantity of buried waste at SWMU 2 and the physical and chemical makeup of the waste. The effect of having to estimate these factors is unknown; however, since the risk assessment used estimates of concentrations of uranium and TCE that were unlikely to underestimate waste volume or mass, the results of the risk assessment are not likely to be underestimates of risk.

Another uncertainty identified as being important was the fact that rates of exposure used in the assessment were likely to be overestimates for most parameters. Both methods for evaluating TCE and uranium in ground water assumed reasonable maximum leaching. Therefore, concentrations of TCE and uranium under no action may result in overestimates of risks.

A third uncertainty that affected the results of the risk assessment is the assumed pyrophoric nature of the buried uranium. To address this uncertainty, the risk assessment considered the various conditions that would need to occur for spontaneous combustion of the buried uranium. These conditions were presented to ensure that any remedial alternative selected for SWMU 2 would reduce the risk posed by the pyrophoricity of the buried uranium.

Environmental Risks

Potential ecological effects were qualitatively evaluated in the ecological risk assessment. According to the Site Investigation, neither critical habitat nor known federal or state threatened and endangered species were located inside the PGDP boundary. Only various soil and sediment dwelling invertebrates (e.g., earthworms, chironomids), aquatic and terrestrial insects and their larvae, frogs and salamanders, and small mammals were reported. The principal source of potential adverse impacts to ecological resources at SWMU 2 was the possible failure of the buried waste containers and the subsequent release of COPCs to a subsurface environment.

The major exposure pathways for terrestrial animals include ingestion of contaminated biota and, to a lesser extent, ingestion and direct contact with contaminated soils. Ingestion of water and sediment at SWMU 2 is probably a minor pathway of exposure for terrestrial animals. Exposure to COPCs would likely have adverse effects to terrestrial animals and biota.

The risk to terrestrial animal populations and biota populations is small under the current condition. Potential risks may be associated with ingestion and direct contact with buried wastes due to possible releases of COPCs to the environment. The interim action will limit potential risks by reducing the possibility of a release of COPCs to the environment.

Remedial Action Objectives

Results of the human health risk assessment (Table 2-1) indicate that ingestion of contaminated ground water and direct contact with the buried waste pose unacceptable risks in the future. The remedial action objectives for the interim action are to mitigate migration of uranium and TCE from SWMU 2 to ground water, and to prevent

disturbance or contact with the buried waste materials. The interim action will reduce infiltration of precipitation, which will reduce potential leaching of TCE and uranium. The interim action will also reduce human health risks estimated for TCE and uranium exposure through ground water. In addition, the interim action will provide current and future protection from direct contact with the buried waste.

2.7 Description of Alternatives

The following paragraphs present a description of the five alternatives evaluated in the approved *Feasibility Study for Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant* (DOE/OR/06-1246&D2).

Alternative 1—No Action

Pursuant to 40 C.F.R. § 300.430(e)(b) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the DOE is required to consider a no action alternative. This alternative served as a baseline to which the other alternatives were compared. Under this alternative, no further action would be taken at SWMU 2.

Since no wastes would be generated, this alternative did not include the use of any treatment technologies, containment, or storage components. No additional costs were associated with this alternative. In addition, the alternative would not provide compliance with applicable or relevant and appropriate requirements (ARARs), and it would not reduce risk. A summary of the detailed evaluation of this alternative is presented in Section 2.8 of this ROD.

Alternative 2—Limited Action

This alternative primarily consisted of institutional controls designed to prevent access to SWMU 2. The alternative contained three primary components. First, deed restrictions would be executed to prevent property transfer, inappropriate use of the property, and any intrusive activities which could expose buried waste materials. Second, a suitable fence and warning signs would be installed around the unit to prevent unauthorized entry. Third, the DOE would conduct reviews of the action no less than once every five years, since contaminants would remain in the unit. Although this alternative does not include construction of additional piezometers or ground water monitoring wells, information collected as a result of ground water monitoring activities at the PGDP would be utilized during the review proceedings.

A minimal volume of wastes would be expected to be generated from implementation of this alternative. Soils which would potentially be generated during installation of fencing would not be expected to contain COCs, so the soils would not require any special handling. However, if the soils were determined to contain a significant concentration of any COCs following characterization, they would be handled appropriately and may require treatment, storage, or disposal. Fencing would be erected to prevent access to an area encompassing approximately 2,973 m^2 (32,000 ft^2) or more. This alternative would not address potential long-term risks to ground water, and potentially would not comply with ARARs. Estimated costs and a summary of the detailed evaluation of this alternative are presented in Section 2.8 of this ROD.

Alternative 3—Excavation, Treatment, and Storage/Disposal

This alternative consisted of excavation of the buried wastes, treatment, and storage/disposal options. The alternative contained three primary components. First, the buried waste materials and associated contaminated soils would be excavated. Dewatering, stabilization of pyrophoric uranium, segregation of waste types, and a temporary storage facility would likely be required. Second, the wastes would require appropriate treatments to reduce toxicity. Sampling and analysis would be required to determine if the wastes would be classified as LLW and/or RCRA characteristically hazardous waste. Any contaminated water collected during dewatering activities would also require treatment. Third, the wastes would be stored/disposed in compliance with regulatory waste management practices. One option evaluated in this alternative would include a long-term storage facility at the PGDP. At this time, the PGDP does not have such a long-term storage facility or the capacity to accept the volume of LLW and/or RCRA hazardous wastes which would be generated by this alternative. The other disposal option considered in this alternative would consist of off-site disposal at an appropriate facility, likely at another DOE facility.

A significant volume of waste would be generated as a result of this alternative. Assuming an excavation depth of 5.2 m (17 ft) at SWMU 2 and potentially contaminated soils which immediately surround the unit, the volume of wastes generated was estimated to be in excess of 24,000 m^3 [31,000 cubic yards (yd^3)]. A significant volume of on-site storage capacity would be required for the wastes expected to be contaminated with volatile organic compounds and semi-volatile organic compounds, metals, radionuclides, and possibly PCBs. The wastes could either be treated or disposed at an appropriate DOE facility. In addition, dewatering would likely be required to conduct excavation activities. This alternative included construction of a treatment plant onsite to treat the extracted water. Potential treatment mechanisms included precipitation/coagulation, air stripping, ion exchange, and carbon adsorption. Treatability testing could be required to optimize treatment of wastes and/or extracted ground water. Appropriate controls would be utilized during the excavation phase to prevent adverse effects to workers and the surrounding environment. This alternative would address, or eliminate, long-term risks to the environment and could be conducted in accordance with ARARs. However, this alternative may not be safe to implement since it would include excavation of pyrophoric uranium. Estimated costs and a summary of the detailed evaluation of this alternative are presented in Section 2.8 of this ROD.

Alternative 4—Low Permeability, Multilayered Cap, Dewatering, Additional Monitoring and Institutional Controls

This alternative consisted of construction of a cap, long-term dewatering of the buried wastes, installation of additional monitoring wells and piezometers, and institutional controls. The alternative contained four primary components. First, a low permeability, multilayered cap would be constructed over SWMU 2 to significantly reduce surface water infiltration from precipitation events. Three conceptual capping options, which vary based on the type and number of layers employed, were evaluated in this alternative. The estimated cost and modeled effectiveness of each of the three capping options were compared to the estimated cost and modeled effectiveness of a RCRA cap. Second, a dewatering mechanism would be constructed to provide long-term, or continuous, dewatering of the buried waste materials. One dewatering option evaluated in this alternative would consist of approximately sixteen 9.1-m (30-ft) deep extraction wells/well points placed around the perimeter of SWMU 2. The second dewatering option evaluated in this alternative would consist of a highly permeable, approximately

9.1-m (30-ft) deep drainage trench placed around the perimeter of SWMU 2. Since the drainage trench would be placed under the edges of the cap, construction of the trench would precede construction of the cap. Treatment of liquids collected by a dewatering system would require construction of a treatment system. Third, four RGA ground water monitoring wells and two UCRS piezometers would be installed to monitor SWMU 2 and the effectiveness of this alternative at mitigating the potential for release of contaminants by reducing infiltration of precipitation. Fourth, two of the institutional controls identified in Alternative 2 (deed restrictions and periodic administrative reviews) would be enacted.

This alternative would generate solid and liquid wastes. A minimal volume of waste would be generated if well points were installed for long-term dewatering. The volume of wastes associated with installation of drainage trenches on the north, south, and west sides of SWMU 2 was estimated to be in excess of 1,350 m^3 (1,840 yd^3). The wastes produced during installation of either dewatering mechanism, piezometers, and ground water monitoring wells would likely be managed within the operable unit and placed on SWMU 2 as contour material for a low permeability, multilayered cap. In addition, dewatering would likely be required during trench construction activities. This alternative included construction of a treatment plant onsite to treat the extracted water. Estimates indicated dewatering activities would produce approximately 0.50 liters per second (7.9 gallons per minute) of potentially contaminated ground water. Potential treatment mechanisms included precipitation/coagulation, air stripping, ion exchange, and carbon adsorption. Treatability testing could be required to optimize treatment of wastes and/or extracted ground water. Appropriate controls would be utilized during the construction phases to prevent adverse effects to workers and the surrounding environment. This alternative would address long-term risks to ground water and could be conducted in accordance with ARARs. However, this alternative would require a significant amount of long-term care in the form of operation and maintenance, and ground water extraction and treatment. Estimated costs and a summary of the detailed evaluation of this alternative are presented in Section 2.8 of this ROD.

Alternative 5—Low Permeability, Multilayered Cap, Additional Monitoring, and Institutional Controls

This alternative consisted of construction of a cap, implementation of a ground water monitoring program, and institutional controls. The alternative contained three primary components. First, a low permeability, multilayered cap would be constructed over SWMU 2 to significantly reduce infiltration of surface water from precipitation events into the unit. Three conceptual capping options, which vary based on the type and number of layers employed, were evaluated in this alternative. The estimated cost and modeled effectiveness of each of the three options were compared to the estimated cost and modeled effectiveness of a RCRA cap. Second, a ground water monitoring program would be established in the RGA to detect potential contaminant releases from SWMU 2. The monitoring program would also evaluate the cap's effect(s) on the shallow ground water level in the UCRS and fill data gaps. Third, the institutional controls identified in Alternative 2 (deed restrictions and periodic administrative reviews) would be enacted.

This alternative would generate a relatively minor volume of solid wastes; for example, installation of one RGA monitoring well at the PGDP will produce approximately 2.5 m^3 (85 cubic feet) of wastes. These wastes would likely be managed within the operable unit and placed on SWMU 2 as contour material for a low permeability, multilayered cap. Appropriate controls would be utilized during the construction phases to prevent adverse effects to workers and the surrounding environment. This alternative would reduce risks to ground water and could be conducted in accordance with ARARs.

Estimated costs and a summary of the detailed evaluation of this alternative are presented in Section 2.8 of this ROD.

2.8 Summary of the Comparative Analysis of Alternatives

This section provides the basis for determining which alternative: (1) meets the threshold criteria of overall protection of human health and the environment, and compliance with ARARs; (2) provides the best balance between effectiveness and reduction of toxicity, mobility, or volume through treatment, implementability, and cost; (3) satisfies state and community acceptance; and (4) is consistent with the Kentucky Hazardous Waste Permit. Although the selected remedy is consistent with the permit, the selection of an interim corrective measure under the permit does not require the following comparative analysis of alternatives.

Nine criteria are required by Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) for evaluating the expected performance of remedial actions. The nine criteria are identified below and the interim action has been evaluated on the basis of these criteria:

1. *Overall protection of human health and the environment.* This threshold criterion requires that the remedial alternative adequately protects human health and the environment, in both the short and long term. Protection must be demonstrated by the elimination, reduction, or control of unacceptable risks.

2. *Compliance with ARARs.* This threshold criterion requires that the alternatives be assessed to determine if they attain compliance with ARARs of both state and federal law.

3. *Long-term effectiveness and permanence.* This primary balancing criterion focuses on the magnitude and nature of the risks associated with untreated waste and/or treatment residuals remaining at the conclusion of remedial activities. This criterion includes consideration of the adequacy and reliability of any associated containment systems and institutional controls, such as monitoring and maintenance requirements, necessary to manage treatment residuals and untreated waste.

4. *Reduction of contaminant toxicity, mobility, or volume through treatment.* This primary balancing criterion is used to evaluate the degree to which the alternative employs recycling or treatment to reduce the toxicity, mobility, or volume of the contamination.

5. *Short-term effectiveness.* This primary balancing criterion is used to evaluate the effect of implementing the alternative relative to the potential risks to the general public, potential threat to workers, potential environmental impacts, and the time required until protection is achieved.

6. *Implementability.* This primary balancing criterion is used to evaluate potential difficulties associated with implementing the alternative. This may include: technical feasibility, administrative feasibility, and the availability of services and materials.

7. *Cost*. This primary balancing criterion is used to evaluate the estimated costs of the alternatives. Expenditures include the capital cost, annual operation and maintenance (O&M), and the combined net present value of capital and O&M costs.

8. *State acceptance.*

9. *Community Acceptance.* This modifying criterion provides for consideration of any formal comments from the community on the Proposed Remedial Action Plan.

A summary of the comparative analysis of alternatives is provided in Table 2-2.

Overall Protection of Human Health and the Environment

An alternative must meet this threshold criterion to be eligible for selection. As discussed in Section 2.6, this interim action is necessary to address risks posed by SWMU 2. Alternative 1 does not meet this criterion since it does not address the risks at SWMU 2. Alternative 2 does not meet this criterion because short-term risks associated with direct contact to contaminants would be mitigated, long-term risks associated with contamination of ground water would not be addressed. Alternative 3 would meet this criterion; removal of the contaminants, treatment, and disposal at a secure, permitted facility would eliminate nearly all risks. Alternative 4 would also meet this criterion; direct contact would be mitigated, surface water infiltration from precipitation events would be significantly reduced, and dewatering would ensure the wastes are not in contact with water in the UCRS and provide protection of the RGA. Similarly, Alternative 5 would meet this criterion; the cap and institutional controls would physically and administratively mitigate direct contact, and infiltration of precipitation would be reduced, while additional data is collected to support evaluation of a final action.

Compliance with Applicable or Relevant and Appropriate Requirements

An alternative must meet this threshold criterion to be eligible for selection. Alternatives 1 and 2 would not provide compliance with ARARs since risks to ground water would not be reduced. Alternatives 3, 4, and 5 would provide compliance with ARARs. A detailed description of ARARs for the selected remedy is presented in Section 2.10 of this ROD.

Long-Term Effectiveness and Permanence

This criterion is generally not pertinent to measures implemented as interim actions. However, the selected interim remedial action is expected to prove effective until a final remedial action is implemented. Alternative 3 would meet this criterion; excavation, treatment of wastes, and disposal at a secure permitted facility would provide long-term effectiveness and permanence. Alternative 4 would meet this criterion also; a cap and continuous dewatering of the unit would provide long-term effectiveness. Alternative 5 also would meet this criterion until a final remedial action is implemented. Based on leaching model results from the FS, the estimated time it will take for TCE to migrate from the UCRS to the RGA without the proposed cap is from 35 to 156 years. Placement of a cap to reduce infiltration into the waste may significantly increase that amount of time. Uranium would require an even longer period to dissolve and leach to the RGA.

Table 2-2. Comparative Analysis of Alternatives

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Limited Action	Alternative 3 Excavation, Treatment, and Storage/Disposal	Alternative 4 Low Permeability Cap, Dewatering, Additional Monitoring, and Institutional Controls	Alternative 5 Low Permeability Cap, Additional Monitoring, and Institutional Controls
Threshold Criteria					
Overall Protection of Human Health and the Environment	No reduction in risk to human health or the environment	Short-term, direct contact risk mitigated Long-term, ground water pathway risk not addressed	All risks mitigated by removal of source Wastes treated and stored/disposed in a permitted, secure facility	Direct contact risk mitigated by cap and institutional controls Infiltration of precipitation into wastes significantly reduced by cap Risk to ground water significantly reduced Dewatering ensures waste is not in contact with UCRS water	Direct contact risk mitigated by cap and institutional controls Infiltration of into wastes significantly reduced by cap Risk to ground water significantly reduced
Compliance with ARARs	Would not comply with ARARs	May not comply with ARARs	Would comply with ARARs	Would comply with ARARs	Would comply with ARARs
Primary Balancing Criteria					
Long-term Effectiveness and Permanence	Source would not be removed or contained; existing risk will remain	Interim action, however, source would not be removed or contained; existing risk to ground water will remain until final action implemented	Source would be removed; maximum risk reduction level would be achieved Wastes would be treated and stored/disposed at permitted, secure facility(ies)	Interim action, however, source would not be removed; some risk would remain Source would be partially contained to reduce some risks until final action implemented Cap and continuous dewatering would provide long-term effectiveness Some future contaminant migration would be possible Ground water monitoring program implemented to detect any contaminant releases	Interim action, however, source would not be removed; some risk would remain Does not address risk posed by wastes which may be in contact with UCRS ground water Source would be partially contained to reduce some risks until final action implemented; limited to vadose zone Ground water monitoring program implemented to detect any contaminant releases

Table 2-2. Comparative Analysis of Alternatives (continued)

Evaluation Criteria	**Alternative 1** No Action	**Alternative 2** Limited Action	**Alternative 3** Excavation, Treatment, and Storage/Disposal	**Alternative 4** Low Permeability Cap, Dewatering, Additional Monitoring, and Institutional Controls	**Alternative 5** Low Permeability Cap, Additional Monitoring, and Institutional Controls
Primary Balancing Criteria (continued)					
Reduction of Toxicity, Mobility, or Volume through Treatment	No reduction	Interim action; no reduction	Toxicity reduced through treatment Mobility reduced by excavation and treatment Volume may or may not be reduced through treatment	Mobility reduced as a result of cap and dewatering Toxicity and volume of contaminants in extracted water reduced through treatment	Some future contaminant migration would be possible Interim action, however, mobility of wastes in unsaturated zone should be reduced to some extent as a result of cap
Short-term Effectiveness	Short-term risks to community, workers, and environment not increased	Short-term risks to community and environment not increased Risk to workers would be mitigated with standard health and safety precautions Objectives achieved in relatively minimal time	Short-term risks to community would be minimal Although health and safety precautions would be taken, increased risk to workers from pyrophoric uranium is significant and has been determined to be unacceptable Although risk would be minimized by use of engineering controls, risk to environment (including ground water and surface water) would be increased Objectives may be achieved within three years	Short-term risks to community would be minimal Risk to workers mitigated with standard health and safety precautions; installation of drainage trench poses greater risk than installation of well points Risk to environment minimized by use of engineering controls Objectives may be achieved within two to three years, but sooner than with Alternative 3	Short-term risks to community not increased Risk to workers mitigated with standard health and safety precautions (poses less risk than Alternative 3 or 4) Any risk to environment would be minimized by use of engineering controls Objectives would be achieved sooner than with Alternative 4

Table 2-2. Comparative Analysis of Alternatives (continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Limited Action	Alternative 3 Excavation, Treatment, and Storage/Disposal	Alternative 4 Low Permeability Cap, Dewatering, Additional Monitoring, and Institutional Controls	Alternative 5 Low-Permeability Cap, Additional Monitoring, and Institutional Controls
Primary Balancing Criteria (continued)					
Implementability	Not applicable	Technically and administratively feasible Services are readily available	Technically feasible; may require additional information/study Administratively feasible Excavation services are readily available; treatment services for some COCs are available; off-site disposal is considered available; on-site disposal is currently unavailable	Technically feasible and most services are readily available; construction of drainage trenches (to an estimated depth of 30 feet) may require innovative techniques Administratively feasible; regulatory approval required to deposit excavated soils and/or well cuttings on unit as contour material for cap	Technically feasible; services are readily available Administratively feasible; regulatory approval required to deposit any excavated soils and/or well cuttings on unit as contour material for cap

Table 2-2. Comparative Analysis of Alternatives (continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Limited Action	Alternative 3 Excavation, Treatment, and Storage/Disposal	Alternative 4 Low Permeability Cap, Dewatering, Additional Monitoring, and Institutional Controls	Alternative 5 Low Permeability Cap, Additional Monitoring, and Institutional Controls
Primary Balancing Criteria (continued)					
Cost (K = 1,000) (Total cost includes 30 years of O & M) (PW = Present Worth over 30-year period)	No additional costs	Capital cost: $215K 1st year O&M: $3,377K Total cost: $5,197K PW: $2,591K	With on-site disposal Capital cost: $69,579K 1st year O&M: $0 Total cost: $508,511K PW: $236,650K With off-site disposal Capital cost: $69,586K 1st year O&M: $0 Total cost: $564,311K PW: $288,862K	With RCRA cap and well points Capital cost: $6,319K 1st year O&M: $1,031K Total cost: $29,049K PW: $16,708K With RCRA cap and drainage trench Capital cost: $4,923K 1st year O&M: $1,031K Total cost: $23,224K PW: $13,403K With low permeability cap and drainage trench Capital cost: $3,970K 1st year O&M: $1,031K Total cost: $22,034K PW: $12,208K	With RCRA cap (for comparison only) Capital cost: $3,240K 1st year O&M: $165K Total cost: $8,337K PW: $5,846K With low permeability cap (Cap option 1) Capital cost: $2,825K 1st year O&M: $76K Total cost: $5,380K PW: $4,004K With low permeability cap (Cap option 2) Capital cost: $2,946K 1st year O&M: $76K Total cost: $5,531K PW: $4,114K With low permeability cap (Cap option 3) Capital cost: $2,615K 1st year O&M: $76K Total cost: $5,117K PW: $3,761K

Table 2-2. Comparative Analysis of Alternatives (continued)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Limited Action	Alternative 3 Excavation, Treatment, and Storage/Disposal	Alternative 4 Low Permeability Cap, Dewatering, Additional Monitoring, and Institutional Controls	Alternative 5 Low Permeability Cap, Additional Monitoring, and Institutional Controls
Modifying Criteria					
State Acceptance	The KDEP concurs with implementing Alternative 5 as an interim remedial action, consistent with the requirements of the Hazardous Waste Management Permit.				
Community Acceptance	As indicated in Part 3 of this ROD, the Responsiveness Summary, no groups or organizations opposed the proposed interim remedial action, Alternative 5.				

This modeling does not account for buried wastes which may potentially be in contact with water in the UCRS. Alternatives 4 and 5 would allow sufficient time to collect additional data and evaluate a final action. Long-term effectiveness and permanence will be fully addressed when a final remedial action for SWMU 2 is evaluated and selected.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

Alternative 3 would meet this criterion; mobility of contaminants would be reduced as a result of excavation; and toxicity would be reduced through treatment. Alternative 4 would not meet this criterion; although mobility would be significantly reduced as a result of dewatering. Alternative 5 would not meet this criterion either, although mobility of contaminants in the unsaturated/vadose zone would be reduced as the cap reduces infiltration. This criterion will also be addressed when a final action for SWMU 2 is evaluated and selected.

Short-Term Effectiveness

Alternative 3 would not meet this criterion; although appropriate safety measures would be utilized, excavation of wastes from SWMU 2 (including pyrophoric uranium) would produce significant risks to workers. Risks to ground water, surface water, and the environment would also be increased during implementation of Alternative 3. Alternative 4 would likely meet this criterion; utilization of appropriate safety measures during trench and cap installation should prevent significant risks to workers and the environment. Alternative 5 would meet this criterion; utilization of appropriate safety measures and best management practices (BMPs) would mitigate risks to workers and the environment during construction of the cap and installation of the monitoring wells and piezometers. None of the five alternatives would present significant risks to a nearby community.

Implementability

Alternative 3 would be implementable; although it is technically and administratively feasible, significant health and safety concerns exist. Alternative 4 would be feasible; innovation would be required to efficiently construct the drainage trenches to the proposed depth of 9.2 m (30 ft). Alternative 5 is readily implementable; it is technically and administratively feasible and the services required for implementation are readily available from a number of vendors/suppliers.

Cost

Estimated capital, 30-year O&M, and 30-year present worth costs for each alternative, including the options considered for the third, fourth, and fifth alternatives, are presented in Table 2-2.

State Acceptance

This interim remedial action will be initiated pursuant to the Interim Measure provisions of PGDP's Kentucky Hazardous Waste Management Permit issued by the KDEP. An RI Addendum, FS, and Proposed Remedial Action Plan, have been approved by the KDEP and the EPA. The KDEP concurs with this interim remedial action, consistent with the requirements of the Hazardous Waste Management Permit.

Community Acceptance

As indicated in Part 3 of this ROD, the Responsiveness Summary, no groups or organizations opposed this interim remedial action.

2.9 Selected Remedy

Based upon the evaluation of the alternatives utilizing the nine CERCLA criteria, the remedy which best meets the threshold, balancing, and modifying criteria for the scope and objectives of this interim action is Alternative 5. This alternative has been refined through a series of negotiations and meetings between the DOE, the EPA, and the KDEP from that presented in the approved FS. The modifications presented in the selected remedy will allow greater flexibility, expedited field investigation activities, and promote an incremental approach to implementation of the interim remedial action. The DOE will prepare a detailed design for this interim remedial action in accordance with the requirements specified in the Declaration of this ROD. The remedial design and remedial action phase activities for the interim action will be finalized following completion of additional investigative activities planned for SWMU 2. A schedule of remedial design activities is presented in the appendix of this ROD.

The selected remedy will consist of the following elements, at a minimum:

- *A low permeability, multilayered cap constructed over the areal limits of SWMU 2.* The cap will be designed to direct rainfall away from the unit and inhibit infiltration of precipitation into the unit. The cap will also serve as a physical barrier to inhibit direct contact with buried waste materials and soil contamination. The conceptual capping option may consist of compacted soil as contour material, a geosynthetic clay liner, a geomembrane liner, and a drainage layer with a vegetative soil cover.

- *A ground water monitoring program implemented in the uppermost aquifer, the RGA, to detect the potential release of contaminants from SWMU 2.* The monitoring program will also evaluate the cap's effect(s) on the shallow ground water level in the UCRS and fill data gaps. Any waste soil generated during sampling and remedial action activities will be managed within the limits of SWMU 2 and placed on the unit as contour material for the cap. All other wastes [such as personal protective equipment (PPE)] will be initially containerized and managed at the PGDP in accordance with approved protocols.

- *Institutional controls implemented to further prevent access to SWMU 2.* Deed restrictions may be utilized to ensure the DOE retains ownership of the property which SWMU 2 encompasses. Deed restrictions also may prevent future uses of the property which could result in the spread of contamination, such as installing wells or excavating. Since contaminants will remain in the unit following this interim remedial action, the DOE will conduct administrative reviews of the action and monitoring data no less than once every five years, at least until a final remedial action has been selected and/or implemented for SWMU 2.

This action will provide overall protection of human health and the environment. It also can be implemented in compliance with ARARs. This interim action will provide effectiveness until a final remedy is enacted at SWMU 2. Although treatment will not be employed, contaminant mobility will be reduced as a result of reduced infiltration. This alternative will provide short-term effectiveness and may be readily implemented. As

shown in Table 2-3, the total estimated cost for this alternative and cap option is $5,117,000 (present value of $3,761,000).

Table 2-3. Cost Estimates for Interim Action

Direct Costs	$1,184 K	
Indirect Costs	$1,431 K	
Total Capital Costs[a]		$2,615 K
O&M Costs[a] Year 1	$76 K	
O&M Costs Years 2-30	$1,350 K	
5-Year Review Costs	$54 K	
Total O&M Costs		$1,480 K
Total Contingency[b]		$1,022 K
Total Cost[c]		$5,117 K
Present Value[d]		$3,761 K
K=1,000		

a - Capital costs for cap only; monitoring well and piezometer capital costs incorporated into first year O&M.

b - Total contingency is conclusive of direct, indirect, and all O&M costs associated contingencies.

c - Cost estimates intended to be consistent with EPA guidance which recommends a +50% to -30% level of accuracy.

d - Present value estimates based on a 30-year time span with a 7% discount rate.

2.10 Statutory Determinations

This interim action is protective of human health and the environment; complies with CERCLA [as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA)], statutory requirements of K.R.S. 224.46-530 and federal and state ARARs directly associated with this action; and is cost effective. This action uses permanent solutions to the maximum extent practicable, given the limited scope of the action. Because this action does not constitute the final remedy for SWMU 2, the statutory preference for remedies employing treatment that reduces toxicity, mobility, or volume through treatment as principal elements will be addressed at the time of selection of the final response action. Subsequent actions are planned to fully address the principal threats posed by SWMU 2.

Overall Protection of Human Health and the Environment

The selected interim action contributes to protection of human health for the PGDP employees and the public through institutional controls to limit the potential for direct exposure and engineering controls to mitigate the infiltration and migration of

contaminants from SWMU 2 until a final action is selected and implemented. The remedy provides effective management of all residual wastes generated during implementation of the action.

Applicable or Relevant and Appropriate Requirements

Congress specified in Section 121 of CERCLA that remedial actions for cleanup of hazardous substances must comply with requirements, criteria, standards, or limitations under federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or circumstances at a site. Inherent in the interpretation of ARARs is the assumption that protection of human health and the environment is ensured.

The following is an explanation of the terms used throughout this section:

Applicable requirements are "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site" (40 C.F.R. § 300.5).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site" (40 C.F.R. § 300.5).

Chemical-specific requirements are usually "health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values" (53 Fed. Reg. 51437, 1988). These values establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment.

Location-specific requirements "generally are restrictions placed upon the concentration of hazardous substances or the conduct of activities solely because they are in special locations" (53 Fed. Reg. 51437, 1988). Some examples of special locations include floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-specific requirements are usually "technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes or requirements to conduct certain actions to address particular circumstances at a site" (53 Fed. Reg. 51437, 1988). Selection of a particular remedial action at a site will invoke the appropriate action-specific ARARs that may specify particular performance standards or technologies, as well as specific environmental levels for discharged or residual chemicals.

The CERCLA requires that the RCRA and other environmental laws be evaluated as ARARs [42 U.S.C.A. § 9621(d)(2)(A) and 40 C.F.R. § 300.430(f)(1)(i)(A)]. This in no way limits, takes away, or negates the KDEP's RCRA authority at the PGDP.

Requirements under federal or state law may be either applicable or relevant and appropriate to CERCLA cleanup actions, but not both. However, if a requirement is not

applicable it must be both relevant and appropriate for compliance to be necessary. In the cases where both a federal and a state ARAR are available, or where two potential ARARs address the same issue, the more stringent regulation must be selected. However, CERCLA § 121(d)(4) provides several ARAR waiver options that may be invoked, providing that the primary requirement for protection of human health and the environment is met.

Pursuant to CERCLA § 121(e), remedial actions under CERCLA conducted entirely onsite (as defined in 40 C.F.R. § 300.5) must comply with the substantive provisions of laws and regulations, but are exempt from the procedural or administrative requirements [42 U.S.C.A. § 962(e)(1)]. In order to ensure that CERCLA response actions proceed as rapidly as possible, the EPA has affirmed its position on permit and administrative exemptions in the final NCP (40 C.F.R. § 300). Substantive requirements pertain directly to the actions or conditions at a site, while administrative requirements facilitate their implementation (e.g., permit applications and procedural requirements).

Other information that does not meet the definition of an ARAR may be necessary to determine what is protective or may be useful in developing CERCLA remedies. In addition, ARARs do not exist for every chemical or circumstance likely to be found at a CERCLA site. Therefore, the EPA believes it may be necessary, when determining cleanup requirements or designing a remedy, to consult reliable information that would not otherwise be considered a potential ARAR (55 Fed. Reg. 8745, 1990). Criteria or guidance developed by the EPA, other federal agencies, or states may assist in determining, for example, health-based levels for a particular contaminant or the appropriate method for conducting an action for which there are no ARARs. This other information is to be considered (TBC) guidance and may be used when developing CERCLA remedies. The TBC guidance generally falls within three categories: (1) health effects information; (2) technical information on how to perform or evaluate investigations or response actions; and (3) policy.

Response actions under the NCP will comply with the provisions for response action worker safety and health in 29 C.F.R. § 1910.120 (40 C.F.R. § 300.150). These regulations are designed to protect the safety and health of workers; however, they are not considered ARARs. Requirements, standards, and regulations of the Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 *et seq.*) and of state laws, not directly referenced in Section 300.150 of the NCP must also be complied with where pertinent. Federal Occupational Safety and Health Administration requirements include, among other things, construction standards, general industry standards, and general duty requirements (40 C.F.R. § 300.150). In addition, Section 300.150 of the NCP specifies that all government agencies and private employers are directly responsible for the health and safety of their own employees.

The DOE, in DOE Order 5480.4, *Environmental Safety and Health Standards*, establishes requirements for mandatory environmental protection, safety, and health standards for all DOE and DOE contractor operations while providing a list of references and sources of Environmental Safety and Health standards. This is an internal standard for the protection of workers within the DOE and is not an ARAR. The DOE Order should be followed during design, construction, operation, modification and decommissioning.

In addition to establishing general occupational protection standards, the DOE establishes standards for occupational radiation protection of workers at its facilities in 10 C.F.R. § 835. Pursuant to this regulation, exposure of general employees resulting from the DOE activities, other than planned special exposure or emergency exposure situations, shall be controlled so the following annual dose limits are not exceeded: total

effective dose equivalent of 5 rems; the sum of the deep dose equivalent for external exposures and the committed dose to any organ or tissue other that the lens of the eye of 50 rems; a lens of the eye dose equivalent of 15 rems; and a shallow dose equivalent of 50 rems to the skin or to any extremity. Again, DOE Orders pertaining to worker protection are internal standards and are not ARARs.

Potential chemical-, location-, and action-specific requirements which exist for this interim action are described in the following paragraphs.

Chemical-specific applicable or relevant and appropriate requirements

Radiation Protection of the Public and the Environment, DOE Order 5400.5, limits radiation exposure to members of the public to an effective dose equivalent of less than 100 millirems/year (mrem/yr) from all exposure modes and a dose of less than 5 mrem/yr to any organ. The Order regulates exposure of the public as a consequence of all the DOE activities, including routine activities, remedial actions, and naturally occurring radionuclides released by the DOE processes and operations. In addition, this Order mandates that the DOE personnel and contractors shall strive to ensure that radiation doses to members of the public are as low as reasonably achievable below the appropriate limits. The DOE Order 5400.5 is TBC guidance for the radioactive waste that is left in place at SWMU 2. However, this Order is expected to be promulgated in the Code of Federal Regulations (C.F.R.) in August 1995 and will become an applicable requirement for the PGDP upon promulgation.

On-site activities involved with construction of the cap such as site grading and smoothing, earthmoving, and material stockpiles (i.e., clay, soil, etc.) will produce airborne pollutants. It is not expected that any radionuclide emissions will result from the site preparation of SWMU 2. However, if radionuclide emissions were to occur, emission standards for DOE facilities would apply. The regulations promulgated pursuant to the Clean Air Act of 1970 (CAA) set emission standards for radionuclides other than radon from the DOE facilities. The DOE is required to ensure that emissions from its facilities shall not exceed those amounts that would cause any member of the public to receive, in any year, an effective dose equivalent of 10 mrem/yr (40 C.F.R. § 61.92). The regulations in 40 C.F.R. § 61.92 are applicable requirements to DOE facilities. Also, *Radiation Protection of the Public and the Environment,* DOE Order 5400.5, and *Radioactive Waste Management,* DOE Order 5820.2A, which are TBC Guidance, refer to the CAA for emission level standards for radionuclides.

Location-specific applicable or relevant and appropriate requirements

No wetlands have been identified in the area of the proposed action. However, potential wetlands have been identified in adjacent drainage ditches. These ditches run east and west parallel to Virginia Avenue, and north and south parallel to the access road east of SWMU 3. Final wetland determination for these areas was not possible due to health and safety restrictions denying access to any ditches located on the PGDP. Consequently, for the purposes of this section, these areas are considered to be wetlands. Therefore, location-specific ARARs pertaining to wetlands are included in the event these areas are identified as wetlands in the future. Also, a functions and values analysis of these wetlands was completed to assess these areas in their present condition for possible ARAR purposes should they be identified as wetlands in the future.

Although all ARARs discussed in this section are applicable, they will be met by avoidance of the resources. However, if impacts become apparent, due to construction or other plan modifications, additional requirements (e.g., final wetland determination

and meeting ARARs) will need to be addressed and/or initiated to comply with the ARARs.

Construction of the cap must avoid or minimize adverse impacts on wetlands and act to preserve and enhance their natural and beneficial values [Executive Order 11990, 40 C.F.R. § 6.302(a), 40 C.F.R. Part 6; Appendix A, and 10 C.F.R. Part 1022].

Construction in wetlands should be avoided unless there are no practicable alternatives [40 C.F.R. § 6.302(a)]. Degradation or destruction of wetlands must be avoided to the extent possible [40 C.F.R. § 230.10 and 33 U.S.C.A. § 1344(b)(1)]. Considerations about protection of wetlands must be incorporated into planning, regulating, and decision-making [10 C.F.R. § 1022.3(b)]. Any action involving the discharge of dredged or fill material into wetlands must be avoided to the extent possible (33 U.S.C.A. § 1344, 40 C.F.R. Part 230, and 33 C.F.R. Parts 320 to 330).

Discharges of dredged or fill material for which there are practicable alternatives with fewer adverse impacts, or those which would cause or contribute to significant degradation, are prohibited [40 C.F.R. § 230.10(a)]. Discharges are also prohibited unless there are no practicable alternatives, and practicable, appropriate mitigation methods are available [40 C.F.R. § 230.10(d)]. Further, 40 C.F.R. § 230.10(b) prohibits discharges that cause or contribute to violations of state water quality standards, violate toxic effluent standards or discharge prohibitions (33 U.S.C.A. § 1317), or jeopardize threatened or endangered species or their critical habitat under the Endangered Species Act (16 U.S.C.A. § 1531, *et seq.*). If it becomes apparent that impacts to wetlands are unavoidable, due to construction plans or other modifications, the specific requirements of 33 C.F.R. § 330 (nationwide permits), or 33 C.F.R. § 325 (processing of general permits), and statutes governing discharges of dredged or fill material into waters of the United States would become applicable.

Action-specific applicable or relevant and appropriate requirements

On-site construction activities involved with the construction of the cap, such as site grading and smoothing, earthmoving, and material stockpiles (i.e., clay, soil, etc.) will produce airborne pollutants. Although SWMU 2 is well within the DOE property boundary, precautions must be taken to prevent particulate emission levels caused by construction activities from exceeding the Kentucky Air Quality regulations found in 401 K.A.R. 63:010 *et seq.* The Kentucky Air Quality regulations contain general standards of performance governing fugitive dust emissions (401 K.A.R. 63:010 *et seq.*). Most roads leading to SWMU 2 are asphalt or concrete and traffic would not create dust; however, in the event that roads made of dirt or gravel were used, the regulations in 401 K.A.R. 63:010 § 3(1) require the use of water or chemicals, if possible, and/or placement of asphalt or concrete on roads and material stockpiles to control dust. Visible fugitive dust must not be discharged beyond the property line of where the dust originated [401 K.A.R. 63:010 § 3(2)]. Additionally, all open bodied trucks which operate outside the property boundary and which may emit materials that could be airborne must be covered [401 K.A.R. 63:010 § 3(4)]. This regulation would be applicable.

Storm water discharges from construction activities onsite at the PGDP will be regulated by the KPDES Permit (KY00004049) established pursuant to 401 K.A.R. 5:055. Remedial activities will generate storm water runoff from SWMU 2 into Outfall 015 which is regulated by the KPDES Permit. The PGDP is exempted from the Kentucky General Permit for Storm Water Point Sources (KYR 100000) under 401 K.A.R. 5:055 because it has an individual KPDES Permit. Pursuant to 401 K.A.R. 5:055, the PGDP's KPDES

Permit specifies that BMPs and sediment and erosion controls be implemented at a site to control stormwater runoff.

The interim remedial action may involve the installation of monitoring wells which are regulated under 401 K.A.R. 6:310 § 13. Under this regulation, monitoring wells must be installed to maintain existing natural protection against the introduction of pollutants into aquifers and to prevent the entry of pollutants through the borehole [401 K.A.R. 6:310 § 13(2)]. In addition, the well shall be constructed to prevent the intermingling of ground water from different aquifers [401 K.A.R. 6:310 § 13(2)].

Pursuant to 401 K.A.R. 6:310 § 13, the appropriate materials for the purpose of the well shall be used during the construction of monitoring wells. In order to prevent pollution of the ground water samples, the annular space above the sampling depth shall be sealed with a suitable material, such as cement grout or bentonite [401 K.A.R. 6:310 § 13(3)]. Also, the well shall be completed at least four inches above the ground level or have a waterproof flush mount device capable of preventing surface water runoff, pollutants and contaminants from entering the well [401 K.A.R. 6:310 § 13(3)]. The well shall also have a locking cap within 30 days of its construction [401 K.A.R. 6:310 § 13(3)]. Lastly, monitoring wells must be properly abandoned within 30 days of the last sampling date or upon the determination that the well is found to be inadequate [401 K.A.R. 6:310 § 13(6)]. The Kentucky regulations for monitoring well construction are applicable to the well installation involved with this interim remedial action.

This interim remedial action will generate a minimal amount of waste. The waste generated from the installation of the two piezometers and ground water monitoring wells will likely be managed within the operable unit and placed on SWMU 2 as part of the low permeability, multilayered cap. However, there is a remote possibility that PPE worn by workers during site preparation and construction activities would be determined to be hazardous or radioactively contaminated waste. The remaining ARARs in this section will only apply in the event that PPE is determined to be RCRA hazardous or in the event that soil is not managed inside of SWMU 2 and is determined to be RCRA hazardous.

Although the waste will be left in place and capped, there may be excess soil and PPE from site grading and smoothing and from well installation that will need to be managed and ultimately disposed. Regardless of the amount, the excess waste will be stored in accordance with applicable ARARs. The PPE and any soil not placed in the cap will be characterized to determine if the waste is RCRA hazardous 401 K.A.R. 34:020 § 4 and/or radioactive. If the excess material is hazardous, then it will be containerized and stored onsite or shipped offsite for treatment or disposal.

Pursuant to 401 K.A.R. 32:030 § 5, on-site accumulation of hazardous waste may occur for 90 days or less without being placed in a RCRA permitted storage area, if the waste is placed in containers that comply with 401 K.A.R. 35:180. The regulation requires that containers holding the waste be in good condition (401 K.A.R. 35:180 § 2). Also, the waste must be stored in containers lined with materials that are compatible (401 K.A.R. 35:180 § 3). Furthermore, containers must be managed to ensure that: the containers are always closed during storage, except when necessary to add or remove waste; containers are not opened, handled, or stored in any manner which may rupture the container or cause it to leak; and the containers are labeled with the notation "Hazardous Waste" and the date upon which the accumulation began (401 K.A.R. 35:180 § 4). Also, inspections must be conducted at least weekly to determine if there are leaks or deterioration of the containers (401 K.A.R. 35:180 § 5). These selected requirements in 401 K.A.R. 35:180 are applicable to the management of hazardous waste

stored onsite for less than 90 days if any RCRA hazardous waste is derived from this action.

Only a remote possibility exists that excess soils and PPE would be contaminated with ignitable, reactive, or incompatible waste that would need to be managed. If such wastes are excavated during this remedial action, special precautions must be taken when managing ignitable, reactive, or incompatible wastes. Containers holding ignitable or reactive waste must be located at least 15 m (49 ft) from the facility's property line (401 K.A.R. 35:180 § 6). In addition, potentially incompatible wastes (as defined in 401 K.A.R. 35:030) must not be placed in the same container or be placed in an unwashed container that previously held an incompatible waste, unless there is compliance with 401 K.A.R. 35:020 § 8 (2) [401 K.A.R. 35:180 § 7(1)-(2)]. Lastly, a container holding hazardous waste that is incompatible with any waste or other materials stored nearby must be separated from the other materials by means of a dike, berm, wall, or other device [401 K.A.R. 35:180 § 7(3)]. These requirements apply when ignitable, reactive, or incompatible waste is stored onsite for less than 90 days.

If waste is accumulated onsite for more than 90 days, it will be stored in a permitted facility and the requirements in 401 K.A.R. Chapter 34 and the permit requirements in Chapter 38 would apply. However, on-site accumulation of as much as 55 gal of hazardous waste or one quart of acutely hazardous waste may occur for more than 90 days, provided §§ 2, 3, and 4(1) of 401 K.A.R. 35:180 are followed and the containers are marked with the notation "Hazardous Waste" [401 K.A.R. 32:030 § 5(3)(a)]. These requirements are applicable to on-site storage of hazardous waste for more than 90 days.

Radioactive Waste Management, DOE Order 5820.2A, establishes policies, guidelines, and requirements by which the DOE manages its radioactive and mixed waste and contaminated facilities. The Order ensures that radioactive and mixed wastes shall be managed in a manner which protects the health and safety of the public, DOE employees, contractor employees, and the environment. This Order requires a standard that assures that external exposure to the waste and concentrations of radioactive material which may be released into surface water, ground water, soil, plants, and animals results in an effective dose equivalent that does not exceed 25 mrem/yr to any member of the public. If excess soils and PPE derived from the installation of the low permeability cap and monitoring wells are determined to be radioactively contaminated or mixed waste, this Order would be TBC guidance for the management of those materials. The external exposure limits of this Order would be TBC guidance for the radioactive waste left in place.

The DOE Order 5820.2A applies to the management of LLW and the design, operational, and monitoring requirements for disposal of solid LLW containing no RCRA-regulated materials. The Order specifies that waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable. While there is only the slightest possibility that pyrophoric material will be excavated for well installation, the DOE Order 5820.2A would be TBC guidance were such material encountered.

Contaminated PPE from site preparation activities or any soil not placed atop SWMU 2 may be determined to be RCRA land disposal restricted. Pursuant to 401 K.A.R. 37:050 and 40 C.F.R. § 268.50, the storage of hazardous wastes restricted from land disposal under 401 K.A.R. 37:030 is prohibited, unless the generator stores such wastes in tanks, containers, or containment buildings onsite solely for the purpose of accumulating such quantities of hazardous waste as necessary to facilitate proper recovery, treatment, or disposal. Such storage must be in compliance with the requirements in 401 K.A.R. 32:030

§ 5 and 401 K.A.R. Chapter 34. Furthermore, each container must be clearly marked with the identification of its contents, the date each accumulation period began, and the quantity of each hazardous waste (401 K.A.R. 37:050). These regulations apply to the management of hazardous wastes prohibited from land disposal that are stored onsite. The PGDP has a Part B Permit which abides by these standards.

Movement of residuals containing RCRA characteristically hazardous waste and/or mixed waste that are land-disposal restricted outside of SWMU 2 may trigger the land disposal restrictions (LDRs) documented in 401 K.A.R. 37:030. The DOE and the EPA entered into a Federal Facility Compliance Agreement (FFCA) Docket No. 92-03-FFR on June 30, 1992, to allow for the continued storage of radioactive mixed waste containing an LDR-prohibited hazardous waste component while treatment capacity is being developed. The FFCA governs all wastes generated at the PGDP. The LDR requirements will only apply to restricted waste not managed within SWMU 2. In the unlikely event LDR waste is generated from this interim action and managed outside SWMU 2, the waste will be subject to and managed consistent with the FFCA.

A summary of ARARs for this remedial action is presented in Table 2-4.

Cost Effectiveness

This interim remedial action employs a remedy which provides overall effectiveness to prevent further spread of contamination while being proportional to its cost. The action represents the least expensive alternative to reduce surface water infiltration from precipitation and future migration of the contaminants while a final remedy is being devised. Compared to other cap options, such as the RCRA cap, this particular cap is the most cost effective.

Utilization of Permanent Solutions and Alternative Treatment Technologies

The objectives for this interim action are to stabilize the site by instituting the cap to reduce infiltration of leachate through unsaturated waste and to delay the potential breakthrough of uranium to the RGA. With the use of institutional controls, this remedial action should protect human health and the environment. However, since the waste is left in place, the interim remedial action does not fully address the principal threats to human health and the environment posed by this unit. Therefore, the principal threats posed by the current conditions will be fully addressed when a final action for SWMU 2 is evaluated and selected.

Reduction of Toxicity, Mobility, or Volume through Treatment

This remedial action is expected to reduce the mobility of unsaturated wastes at the unit. The volume of water infiltrating through the unit will be significantly reduced as a result of the multilayered cap. Since the waste is not treated or removed, neither the toxicity nor the volume of the waste left in place will be reduced under this interim remedial action. This criterion will be addressed fully when a final action for SWMU is evaluated and selected.

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
CHEMICAL-SPECIFIC				
Protection of the general public from all sources of radiation	General public must not receive an effective dose equivalent greater than 100 mrem/yr or 5 mrem/yr to any organ from all exposure modes.	Dose received by the general public from all sources of radiation exposure at a DOE facility - **TBC guidance for the waste left in place**	DOE Order 5400.5	
	All releases of radioactive material must be ALARA.	Release of radioactive material from all DOE activities - **TBC guidance for the waste left in place**	DOE Order 5400.5	
Emission Standards	Emissions from DOE facilities shall not cause members of the public to receive, in any year, an effective dose equivalent of 10 mrem/yr.	Emissions of radionuclides other than radon from DOE facilities - **applicable if construction activities at the site produce airborne pollutants - DOE Orders 5820.24A and DOE Order 5400.5 would also be TBC guidance for this requirement**	40 C.F.R. § 61.92	

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
LOCATION-SPECIFIC				
Protection of wetlands	Avoid or minimize adverse impacts on wetlands to preserve and enhance their natural and beneficial values.	Any federal action that will have an impact on wetlands - **applicable if avoidance is not accomplished**	10 C.F.R. § 1022; Executive Order 11990; 40 C.F.R. § 6:302 (a)	
	Avoid degradation or destruction of wetlands to the extent possible.	Any action involving discharge of dredged or fill material into wetlands - **applicable if avoidance is not accomplished**	40 C.F.R. § 230.10; 33 U.S.C.A. § 1344 (b)(1)	
	Incorporate considerations about protection of wetlands into planning, regulating, and decisionmaking.	Any federal action that will have an impact on wetlands - **applicable if avoidance is not accomplished**	10 C.F.R. § 1022.3(b)	

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
Discharge of dredged or fill material into waters of the United States	Discharges for which there are practicable alternatives with fewer adverse impacts or those which would cause or contribute to significant degradation are prohibited.	Any action involving discharge of dredged or fill material into wetlands - **applicable if avoidance is not accomplished**	40 C.F.R. § 230.10(a)	
	Significant degradation is also prohibited unless there are practicable alternatives and practicable, appropriate mitigation methods are available.	Any action involving discharge of dredged or fill material into wetlands - **applicable if avoidance is not accomplished**	40 C.F.R. § 230.10(d)	
	Discharges which cause or contribute to violations of state water quality standards, violate toxic effluent standards or discharge prohibitions, or jeopardize threatened and endangered species under the Endangered Secies Act.	Any action involving discharge of dredged or fill material into wetlands - **applicable if avoidance is not accomplished**	40 C.F.R. § 230.10(b); 33 U.S.C.A. § 1317; 16 U.S.C.A. § 1531	
	Unavoidable discharges can be permitted with a general or nationwide Section 404 Permit.	Any action involving discharge of dredged or fill material into wetlands - **applicable if avoidance is not accomplished**	33 U.S.C.A. 1344; 33 C.F.R. § 330; 33 C.F.R. § 325	

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
ACTION-SPECIFIC				
Site preparation	Although SWMU 2 is well within the plant boundary, precautions must be taken to prevent particulate matter from becoming airborne. A responsible party must:	Handling, processing, construction, road grading, stockpiles, and land clearing activities - **applicable if it is determined that airborne dust will reach the plant fence**		63:010 § 3
	• Use water or chemicals to control dust from construction activities and place asphalt, oil, water, or suitable chemicals on roads and material stockpiles to control dust;			63:010 § 3 (1)(a); 63:010 § 3 (1)(b)
	• Ensure that no visible fugitive dust is emitted beyond the property line; and			63:010 § 3(2)
	• Ensure that all open bodied trucks are covered if any materials in truck could become airborne.			63:010 § 4(1)
Surface water control	Implement good site planning and best management practices to control storm water discharge; comply with storm water runoff requirements of KPDES Permit KY0004049.	Construction activities at industrial sites where stormwater runoff would occur - **applicable**		5:055

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
Well installation	Wells must be installed to:	Construction or modification of a monitoring well - **applicable**		
	• Maintain the existing natural protection against pollutants into the aquifer;			6:310 § 13(2)
	• Prevent the entry of pollutants through the bore-hole; and			6:310 § 13(2)
	• Prevent the intermingling of ground water from different aquifers.			6:310 § 13(2)
	Certain construction requirements shall be followed, such as:	Construction or modification of a monitoring well - **applicable**		
	• The annular space shall be sealed with cement grout or bentonite;			6:310 § 13(3)
	• Completed at least 4 inches above the ground or have a waterproof mount device; and			6:310 § 13(3)
	• Have a locking well cap within 30 days of its construction.			6:310 § 13(3)
	Wells should be properly abandoned within 30 days of the last sampling date or the determination is made that the well is unsuitable for use as a monitoring well.			6:310 § 13(6)
Waste management *	Generators of waste shall determine if it is RCRA hazardous.	Generation of waste material - **applicable**	40 C.F.R. § 262.11	32:010 § 2

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
Container storage (onsite) - for less than 90 days *	Containers of hazardous waste must be: • Maintained in good condition; • Compatible with hazardous waste to be stored; and • Closed during storage (except to add or remove waste).	Storage of RCRA hazardous waste (listed or characteristic) not meeting small quantity generator criteria held for a temporary period before treatment, disposal, or storage elsewhere, in a container (i.e., any portable device in which a material is stored, transported, disposed, or handled). A generator who accumulates or stores hazardous waste onsite for 90 days or less in compliance with 40 C.F.R. § 262.34 (a)(1-4) is not subject to RCRA interim or final status storage requirements - **applicable to any excavated soil and PPE identified as RCRA hazardous waste**	40 C.F.R. § 265.171 40 C.F.R. § 265.172 40 C.F.R. § 265.173(a) 40 C.F.R. § 265.173(b) 40 C.F.R. § 265.174	35:180 § 2 35:180 § 3 35:180 § 4(1) 35:180 § 4(2) 35:180 § 5
	Containers must not be handled, opened, or stored in any manner which may rupture the container or cause it to leak. Inspections must be conducted at least weekly to determine leaks or deterioration. Containers must be labeled with the notation "Hazardous Waste."			35:180 § 4(3)

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
Container storage (onsite) of ignitable, reactive or incompatible waste for less than 90 days. *	Containers holding hazardous waste must be managed so that:	Management of ignitable, reactive or incompatible waste - **applicable if any excavated soil or PPE is determined to be ignitable, reactive, or incompatible waste**		
	• Containers are located at least 15 meters from the property boundary; and		40 C.F.R. § 265.176	35:180 § 6
	• Incompatible waste are not placed in the same container or placed in an unwashed container that previously held an incompatible waste.		40 C.F.R. § 265.177(a)	35:180 § 7(1)
			40 C.F.R. § 265.177(b)	35:180 § 7(2)

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
Waste management *	Must follow the RCRA permit for on-site storage more than 90 days.	Storage of hazardous waste in RCRA permitted storage area	HSWA Permit KY 8-890-008-982	Kentucky Permit KY 8-890-008-982 32:030 § 5(3)(a)
	Hazardous waste may be accumulated for more than 90 days for as much as 55 gallons of hazardous waste or one quart of acutely hazardous waste.	Accumulation of hazardous waste		
	Radioactive and mixed waste shall be managed in a manner which assures the health and safety of the public, the DOE, contractor employees, and the environment.	Management of LLW - **TBC Guidance if excavated soil and PPE is determined to be radioactively contaminated**	DOE Order 5820.2A	
	External exposure to the waste and concentrations of radioactive material which may be released into surface water, ground water, soil, plants, and animals shall not result in an effective dose equivalent that exceeds 25 mrem/yr to any member of the public.	Management of LLW - **TBC Guidance if excavated soil and PPE is determined to be radioactively contaminated**	DOE Order 5820.2A	
	Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be nonflammable.	Management of LLW - **TBC Guidance if excavated soil or PPE is determined to be pyrophoric**	DOE Order 5820.2A	
	Movement of residuals containing RCRA characteristic waste and radionuclides to another unit will trigger LDRs.	Movement of LDR waste from one land disposal unit to another - **applicable if LDR restricted waste is excavated from the unit**	40 C.F.R. § 268	37:030

Table 2-4. Applicable or Relevant and Appropriate Requirements and To Be Considered Guidance for the Interim Remedial Action (continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401 K.A.R., Citation
Waste management (continued) *	The storage of hazardous waste restricted from land disposal is prohibited, unless the generator stores such wastes in tanks, containers, or containment buildings onsite solely for the purpose of accumulating such quantities of hazardous waste as necessary to facilitate proper recovery, treatment, or disposal.	Storage of RCRA restricted hazardous waste onsite - **applicable to any excavated soil or PPE that is determined to be land disposal restricted hazardous waste**	40 C.F.R. § 268.50	37:050
	Containers of land disposal restricted waste must meet other RCRA storage requirements in addition to being clearly marked with the identification of its contents, the date the accumulation began, and the quantity of each waste.	Container storage of LDR waste - **applicable if any of the excavated soil or PPE is determined to an LDR waste**	40 C.F.R. § 268.50	37:050
	Continued storage of radioactive mixed waste containing an LDR prohibited hazardous waste component is allowed while treatment capacity is being developed.	Storage of radioactive mixed waste onsite - **applicable if excavated soil or PPE is determined to be mixed waste**	FFCA Docket No. 92-03-FFR	

* These ARARs will only apply if PPE is determined to be RCRA hazardous or excess soil is not managed within the unit.

RCRA listed as an ARAR is a requirement of CERCLA in ROD documentation. By doing this, it in no way limits, takes away, or negates the Commonwealth of Kentucky's RCRA authority at the site.

Permanent Remedy

This action is an interim remedial action. The DOE will collect additional data necessary to evaluate a final remedial action for SWMU 2. The final ROD for SWMU 2 may retain or replace portions or all of the actions conducted pursuant to this ROD. However, actions conducted pursuant to the ROD are not intended to be inconsistent with likely final remedial actions. The interim action defined in this ROD will reduce the threat to human health and the environment while additional characterization information is obtained to fill data gaps. Additional characterization will allow for the evaluation of a final remedy in the future.

2.11 Documentation of Significant Changes

The *Proposed Remedial Action Plan for Interim Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22* (DOE/OR/06-1315&D3) was made available for a 30-day public review and comment period May 31 through June 29, 1995. The Proposed Remedial Action Plan identified Alternative 5, a low permeability, multilayered cap, additional monitoring, and institutional controls, as the preferred alternative. No written or verbal comments were received during the 30-day public comment period; therefore, no significant changes to the remedy, as identified in the Proposed Remedial Action Plan, were necessary.

2.12 Five-Year Review

This interim action at SWMU 2 will be reviewed periodically until a final remedial action is selected in a ROD. The CERCLA requires remedial actions which result in hazardous substances, pollutants, or contaminants remaining at the site above levels that do not allow for unlimited use and unrestricted exposure, be reviewed no less often than once every five years after initiation of the selected remedial action. This interim remedial action will leave waste in place which will require restricted access; therefore, SWMU 2 will be reviewed no less than once every five years. In addition to the five-year review, the ground water data will be evaluated annually. The ground water monitoring program for SWMU 2 will be specified in the forthcoming sampling and analysis plan, which will be subject to review and approval by the EPA, the KDEP, and the DOE.

PART 3

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

3.1 Responsiveness Summary Introduction

The responsiveness summary has been prepared to meet the requirements of Sections 113(k)(2)(b)(iv) and 117 (b) of CERCLA, as amended by SARA, which requires the DOE as "lead agency" to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on the Proposed Remedial Action Plan.

The DOE has gathered information on the types and extent of contamination found, evaluated remedial measures, and has recommended an interim remedial action to mitigate leaching of COCs from the buried wastes while the DOE collects additional data to support evaluation of a final remedial action. As part of the remedial action process, a notice of availability regarding the Proposed Remedial Action Plan was published in *The Paducah Sun*, a major regional newspaper of general circulation. The *Proposed Remedial Action Plan for Interim Action at Solid Waste Management Units 2 and 3 of Waste Area Group 22* (DOE/OR/06-1315&D3) was released to the general public May 31, 1995. This document was made available to the public at the Environmental Information Center in the West Kentucky Technology Park in Kevil, Kentucky, and at the Paducah Public Library. A 30-day public comment period began May 31, 1995, and continued through June 29, 1995. The Proposed Remedial Action Plan also contained information which provided the opportunity for a public meeting to be held, if requested. No public meeting was requested.

Specific groups which received individual copies of the Proposed Remedial Action Plan included the local PGDP Neighborhood Council, Natural Resource Trustees, and the PGDP Environmental Advisory Committee. In addition, information regarding the proposed interim remedial action and copies of the Proposed Remedial Action Plan were made available during a public workshop which the DOE held July 13, 1995.

Public participation in the CERCLA process is required by SARA. Comments received from the public are considered in the selection of the remedial action for the site. The responsiveness summary serves two purposes: (1) to provide the DOE with information about the community preferences and concerns regarding the remedial alternatives, and (2) to show members of the community how their comments were incorporated into the decision-making process.

3.2 Community Preferences/Integration of Comments

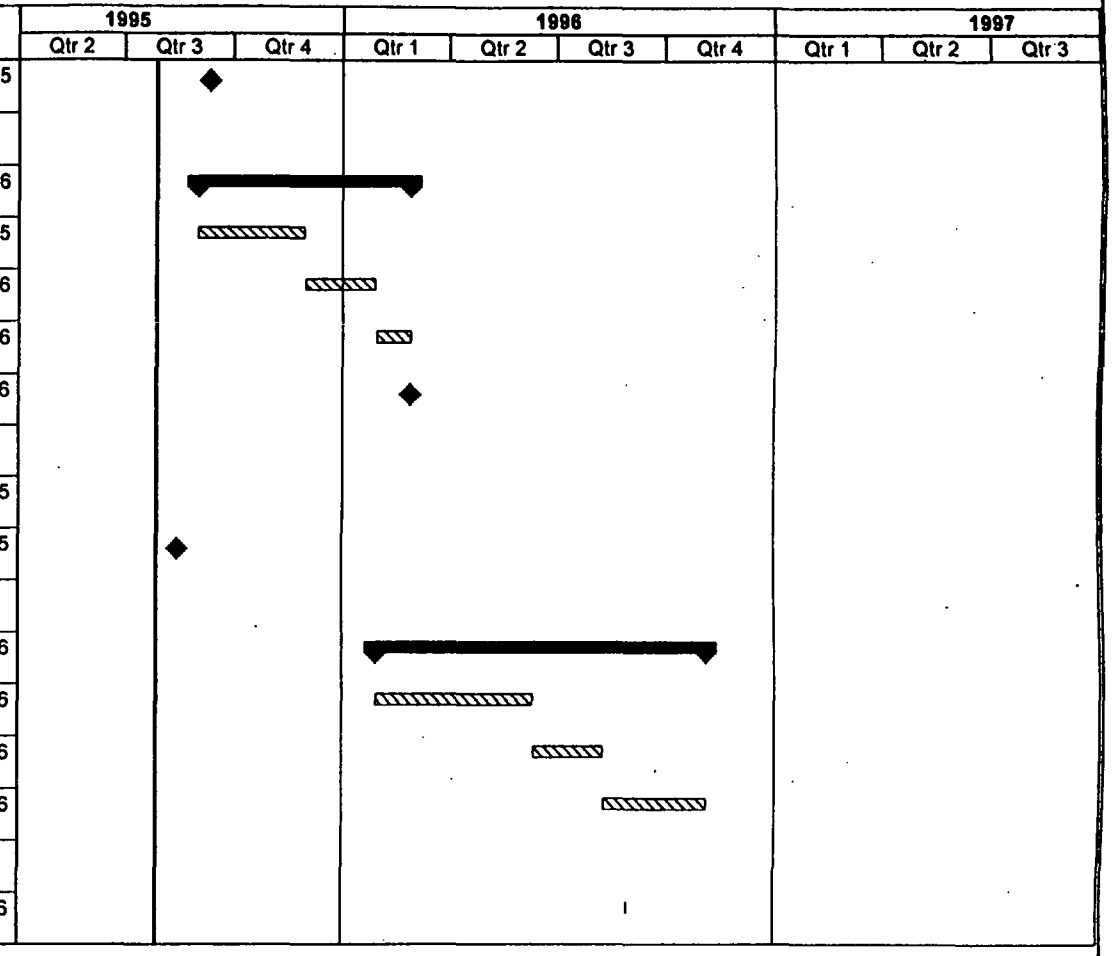
The Proposed Remedial Action Plan clearly indicated comments could be issued to a local DOE representative, the Kentucky Division of Waste Management, or the EPA. Neither the DOE, the KDEP, nor the EPA received either verbal or written comments during the 30-day public comment period. In addition, no substantive comments were generated during the DOE's July 13, 1995, public workshop. Since no comments were received, modifications to this ROD have not been required to integrate public concerns.

Appendix

Remedial Design Schedule

Remedial Design Schedule for Interim Action at SWMU 2 of WAG 22

ID	Activity	Duration	Start	Finish
1	EPA ROD signature & KDEP letter of concurrence	0d	9/11/95	9/11/95
2				
3	Sampling and Analysis Plan (SAP) Development	180d	9/1/95	2/27/96
4	EPA & KDEP review D1 SAP	91d	9/1/95	11/30/95
5	DOE incorporate EPA & KDEP comments	59d	12/1/95	1/28/96
6	EPA & KDEP review D2 SAP [See footnote A]	30d	1/29/96	2/27/96
7	EPA & KDEP approve SAP	0d	2/27/96	2/27/96
8				
9	Remedial design (RD) phase: Wells	0d	8/15/95	8/15/95
10	Design completed by DOE	0d	8/15/95	8/15/95
11				
12	Sampling activities and Remedial action phase: Wells	281d	1/29/96	11/4/96
13	*Procurement* [See footnote B]	134d	1/29/96	6/10/96
14	Mobilization	60d	6/11/96	8/9/96
15	Install wells/soil sampling/geophysics	87d	8/10/96	11/4/96
16				
17	Waste/ground water interaction meeting	1d	8/30/96	8/30/96



Revised: July 27, 1995

A: D2 SAP submittal date contingent upon receipt of comments on D1 SAP by 12/1/95.

B: Procurement contingent upon approval of task order contract and approval of SAP by 2/27/96.

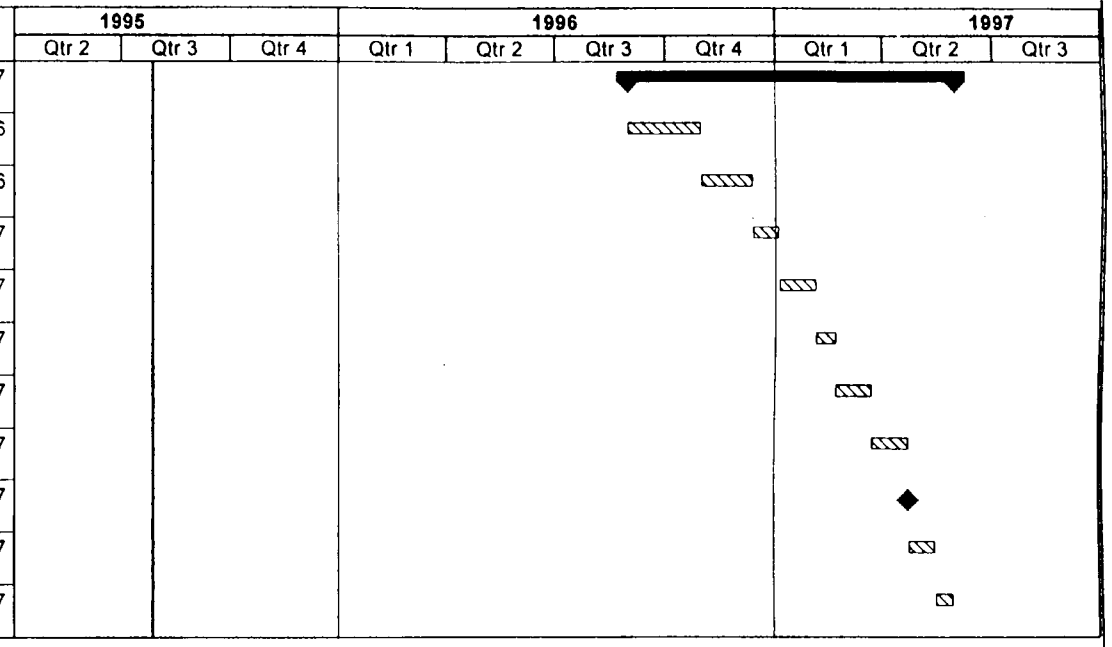
Summary ▬▬ Milestone ◆

Activity ▨▨▨

Durations presented in calendar days.

Remedial Design Schedule for Interim Action at SWMU 2 of WAG 22

ID	Activity	Duration	Start	Finish
18	Remedial design (RD) phase: Low permeability, multilayered cap	273d	8/31/96	5/30/97
19	Design procurement	61d	8/31/96	10/30/96
20	DOE develop 30% design [See footnote C]	43d	10/31/96	12/12/96
21	EPA & KDEP review 30% design	22d	12/13/96	1/3/97
22	DOE develop 60% design	31d	1/4/97	2/3/97
23	EPA & KDEP review 60% design	17d	2/4/97	2/20/97
24	DOE develop 90% design and construction schedule	31d	2/21/97	3/23/97
25	EPA & KDEP review 90% design and construction sched.	31d	3/24/97	4/23/97
26	EPA & KDEP approve 90% design and construction sched.	0d	4/23/97	4/23/97
27	Complete design	22d	4/24/97	5/15/97
28	Design certified for construction (CFC)	15d	5/16/97	5/30/97



Revised: July 27, 1995

C: Design activities contingent upon DOE, EPA, and KDEP concurrence to proceed with a definite strategy by 8/30/96.

Summary ▬▬▬ Milestone ◆

Activity ▨▨▨

Durations presented in calendar days.

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Program Manager
U.S. Department of Energy
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KY Department of Fish and Wildlife Resources
#1 Game Farm Road
Frankfort, KY 40601

LOCKHEED MARTIN ENERGY SYSTEMS, INC.
Patricia A. Gourieux
(Letter Only)
Lockheed Martin Energy Systems
761 Veterans Ave
Kevil, KY 42053

Jimmy C. Massey (Letter Only)
Lockheed Martin Energy Systems
761 Veterans Ave
Kevil, KY 42053

NATURAL RESOURCE TRUSTEES
Alex Barber
Commissioner Office
KY Dept. for Environmental Protection
14 Reilly Road
Frankfort Office Park
Frankfort, KY 40601

James H. Lee
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Tennessee Valley Authority
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Andrea B. Perkins
U.S. Department of Energy
Information Resource Center
105 Broadway
Oak Ridge, TN 37830

Allen Robison
U.S. Department of Interior
Fish and Wildlife Service
446 Neal Street
Cookville, TN 38501

STATE OF KENTUCKY
Caroline P. Haight
Division of Waste Management
KY Dept. for Environmental Protection
14 Reilly Road
Frankfort Office Park
Frankfort, KY 40601

Tuss Taylor (4 copies)
UK/KDEP
18 Reilly Road
Frankfort Office Park
Frankfort, KY 40601

Lisa Fleming/Todd Mullins
KY Division of Waste Management
4500 Clarks River Road
Paducah, KY 42003

TVA
Ted Whitaker
Plant Manager
Shawnee Fossil Plant
7900 Metropolis Lake Road
West Paducah, KY 42086

Janet Watts
Manager of Environmental Affairs
5D Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

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Paducah, KY 42001

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U.S. Geological Survey
2301 Bradley Avenue
Louisville, KY 40217

WEST KY WILDLIFE MANAGEMENT AREA
Charles W. Logsdon
West Kentucky Wildlife Mgnt Area
KY Dept. of Fish and Wildlife Resources
10535 Ogden Landing Road
Kevil, KY 42053