DOE/OR/06-1213&D3

Record of Decision for Interim Action Source Control at the North-South Diversion Ditch, Paducah Gaseous Diffusion Plant, Paducah, Kentucky

March 1994

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

February 17, 1994

Mr. Joseph R. Franzmathes, Director
Waste Management Division
United States Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Ms. Caroline Patrick Haight, Director
Division of Waste Management
Kentucky Department for Environmental Protection
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

RECORD OF DECISION FOR INTERIM ACTION SOURCE CONTROL AT THE NORTH-SOUTH DIVERSION DITCH

Dear Mr. Franzmathes and Ms. Haight:

Enclosed for your review is the Record of Decision (ROD) for Interim Action Source Control at the North-South Diversion Ditch. Comments made by your offices to the Strawman Record of Decision have been incorporated with one exception: an apparent inconsistency between the Kentucky Department for Environmental Protection (KDEP) comment #8 and Environmental Protection Agency (EPA) guidance relative to inclusion of Resource Conservation and Recovery Act (RCRA) requirements as Applicable or Relevant and Appropriate Requirements (ARARs).

In order to maintain the current schedule, we are requesting that you provide any comments you may have by March 2, 1994. Once the signatures are incorporated, we plan to resubmit a final Record of Decision to EPA for signature on March 18, 1994. Upon EPA signature, the ROD will be forwarded to KDEP for concurrence.

If you have any questions or require additional information, please call David W. Dollins at (502) 441-6819.

Sincerely,

Robert K. Edwards

for Jimmie C. Hodges, Acting Site Manager
Paducah Site Office

EO-24:Edwards

Enclosure

cc w/enc: T. Able, EPA/Atlanta
E. Carreras, EPA/Atlanta
T. Taylor, KDEP/Frankfort

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Record of Decision for Interim Action Source Control at the North-South Diversion Ditch, Paducah Gaseous Diffusion Plant, Paducah, Kentucky

March 1994

Prepared by
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DE-AC05-91OR21950
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Prepared for
U.S. Department of Energy
Environmental Restoration and Waste Management

Science Applications International Corporation
contributed to the preparation of this document
and should not be considered
an independent contractor for its review.
DOE Contract No. DE-AC0591OR-21950

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The following list of acronyms, and abbreviations are provided to assist in the review of this document. Acronyms used in Tables only are defined in those respective tables.

ACRONYMS AND ABBREVIATIONS

ACO	Administrative Order by Consent
AEA	Atomic Energy Act of 1954, as amended
ANSI	American National Standards Institute
AR	administrative record
ARARs	applicable or relevent and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
C.F.R.	Code of Federal Regulations
DCG	derived concentration guides
DOE	U.S. Department of Energy
EQs	ecological quotients
EPA	U.S. Environmental Protection Agency
GM	Geiger Müller
HSP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments
K.A.R.	Kentucky Administrative Record
K.R.S.	Kentucky Regulatory Statutes
KDEP	Kentucky Department for Environmental Protection
KPDES	Kentucky Pollutant Discharge Elimination System
MCL	maximum contaminant level
MMUS	Martin Marietta Utility Services, Inc.
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
^{237}Np	neptunium 237
NRC	Nuclear Regulatory Commission
NSDD	North-South Diversion Ditch
PCBs	polychlorinated biphenyls
pCi/g	picocuries per gram
pCi/l	picocuries per liter
PGDP	Paducah Gaseous Diffusion Plant
^{239}Pu	plutonium 239
RCRA	Resource Conservation and Recovery Act, as amended
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SMP	Site Management Plan
TBC	to be considered
^{99}Tc	technetium 99
^{230}Th	thorium 230
TSCA	Toxic Substances Control Act
TSS	total suspended solids
^{235}U	uranium 235

DECLARATION FOR THE RECORD OF DECISION FOR INTERIM ACTION SOURCE CONTROL AT THE NORTH-SOUTH DIVERSION DITCH

SITE NAME AND LOCATION

North-South Diversion Ditch
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim action for the North-South Diversion Ditch (NSDD) at the Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky, chosen in accordance with the Resource Conservation and Recovery Act of 1976 (RCRA), Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Contingency Plan (NCP). This decision is based on the administrative record documentation file for this site.

The PGDP was proposed for inclusion on the National Priorities List (NPL) on May 10, 1993, and was issued a Kentucky Hazardous Waste Permit and Environmental Protection Agency Hazardous and Solid Waste Permit on July 16, 1991. On January 28, 1993, the U.S. Department of Energy (DOE) was directed by the Kentucky Department for Environmental Protection (KDEP) and the U.S. Environmental Protection Agency (EPA) to submit a work plan to implement an interim measure at the NSDD. This interim action will be initiated pursuant to the Interim Measure provisions of PGDP's Kentucky Hazardous Waste Permit issued by the Kentucky Division of Waste Management, the Hazardous and Solid Waste Permit issued by the Environmental Protection Agency and this Record of Decision. The Division of Waste Management concurs with the DOE and the EPA on the selected interim action, in accordance with the requirements of the Kentucky Hazardous Waste Permit. This action will serve as an incremental step toward comprehensively addressing site problems.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the North-South Diversion Ditch, if not addressed by implementing the response action selected in this Record of Decision (ROD) for Interim Action, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF SELECTED REMEDY

The primary objective of this interim remedial action is to initiate control of the source of continued contaminant releases into the NSDD and mitigate the spread of contamination from the NSDD. The surface water system at PGDP will be addressed comprehensively in a subsequent operable unit (hereinafter defined as the "Surface Water Integrator Operable Unit"). The NSDD is one part of the Surface Water Integrator Operable Unit. This interim action at the NSDD constitutes an incremental step towards comprehensively addressing site-wide problems. This action will mitigate the introduction of contaminants into the

NSDD, decrease the migration of contaminants already present in the NSDD, and decrease the potential for direct contact with the contaminated material. Final remedial decisions for the NSDD and the surface water integrator operable unit will be made through the remedial investigation and remedy selection process after the nature and extent of contamination in the surface water system and the contribution of contaminants into the surface water system from source operable units are more fully understood.

The principal threats associated with the NSDD are the potential for transport of contaminants to offsite areas, continued contaminant releases into the NSDD, and the potential for worker exposure to contaminants within the NSDD. The major components of the interim action remedy include:

- The effluent discharged from the C-400 Cleaning Building shall be treated to reduce radionuclide concentrations. PGDP shall install an ion exchange filtration unit in the C-400 Cleaning Building to reduce radionuclides concentrations in the effluent before it is discharged into the ditch. The proposed ion exchange unit will require a calibration period of six months or more after installation in order to optimize the removal of the radionuclides. The target treatment level for radionuclides will be the Safe Drinking Water Act and Kentucky Public and Semi-Public Drinking Water Regulations Maximum Contaminant Levels (MCL). The treatment level will be re-evaluated through the baseline risk assessment and remedy selection process to be conducted to determine the final remedial action for the NSDD and Surface Water Integrator Operable Unit.

- The effluent from the C-600 Steam Plant shall be treated to remove fly ash from the effluent prior to discharge to the NSDD. Fly ash which accumulates in the NSDD may potentially become cross contaminated due to other materials in the ditch and would subsequently increase the volume of contaminated material which may need to be addressed in a future final action. Settling lagoons will be used for source control treatment of the C-600 steam plant fly ash effluent. However, final design of the fly ash source control may be modified as the detailed design process proceeds.

- Lift station(s) shall be installed in the NSDD near the C-400 Building and C-600 Steam Plant. The lift station(s) shall discharge into a pipeline to transport permitted effluent discharges and storm water runoff from the southern end of the NSDD to the Ditch 001 Lift Station. The installed pipeline will discharge into the NSDD by the Outfall 001 Lift Station. This will bypass approximately 50% of the existing NSDD, thereby reducing the potential for mobilizing contaminated sediments in the vicinity of the NSDD. Elimination of a constant flow of effluent and storm water through the bypassed portion of the NSDD will also reduce the amount of contaminated surface water available for infiltration into the ground water. This reduced infiltration will also mitigate leaching from the existing contaminated sediments and soil into the ground water.

- A gabion type rock structure with nonwoven geotextile material secured to the upstream side shall be installed near the Ditch 001 Lift Station. This sediment trap will mitigate the potential for contaminant transport from the bypassed portion of the NSDD to offsite areas.

- Warning signs shall be installed at intervals not to exceed 100 feet, on both sides of the ditch, from Virginia Avenue to the C-616 Lift Station. These signs shall give notice that elevated levels of radionuclides, metals, and PCBs are present in the area.

The KDEP and EPA have participated in the development of the ROD, including review and comment on the content of the document. All KDEP and EPA comments issued to DOE have been incorporated into the ROD.

DECLARATION

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; complies with federal and state applicable or relevant and appropriate requirements for the scope of this limited action, and is cost effective. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Although partially addressed in this remedy, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element will be addressed by both this and the final response action. Subsequent actions are planned to address fully the principal threats posed by the conditions at this site. Because this remedy will result in hazardous substances remaining onsite above health based levels, a review will be conducted within five years after commencement of the remedial action and every five years thereafter until a final remedial alternative is selected and implemented for this unit. These reviews will be conducted to ensure that the selected remedy continues to provide adequate protection of human health and the environment. Because this is an Interim Action ROD, review of this unit and of this remedy will be ongoing, as DOE continues to develop final remedial alternatives for the North-South Diversion Ditch and the Surface Water Integrator Operable Unit.

_____ Date_____

William D. Adams
Assistant Manager, Environmental Restoration and Waste Management
U.S. Department of Energy

_____ Date_____

John H. Hankinson, Jr.
Regional Administrator
U.S. 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 cleanup activities at the Paducah Gaseous Diffusion Plant (PGDP) under its Environmental Restoration and Waste Management Program. These cleanup efforts are necessary to address contamination that has resulted from historic operation of the plant. Remedial activities are being conducted in consultation with the Commonwealth of Kentucky's Division of Waste Management and the United States Environmental Protection Agency (EPA).

The Paducah Gaseous Diffusion Plant (PGDP), located in Western Kentucky (Figure 1), is an active Uranium Enrichment facility which is owned by DOE. Effective July 1, 1993, DOE leased the plant production operation facilities to the United States Enrichment Corporation (USEC) which in turn contracted with Martin Marietta Utility Services, Inc. (MMUS) to provide operations and maintenance services. Martin Marietta Energy Systems, Inc. manages the environmental restoration and waste management activities for DOE at PGDP.

The PGDP is an active uranium enrichment facility which supplies fuel for commercial reactors. Construction of the plant began in 1951, and started operating in 1952. The PGDP uses gaseous diffusion to provide a physical separation process which allows for enrichment of the uranium. Commercially produced uranium hexafluoride (UF_6) is composed primarily of uranium-238 (^{238}U), and a small percentage of uranium-235 (^{235}U). The gaseous diffusion process is premised on the fact that UF_6 with fissionable ^{235}U is slightly lighter than UF_6 with ^{238}U. Therefore, as the UF_6 passes through the gaseous diffusion plant's cascade system, separation of ^{235}U from ^{238}U takes place. This separation results in enriched uranium (slightly higher percentage of ^{235}U). This enriched uranium is then transported to other DOE facilities for further enrichment.

The PGDP is situated on a 1,350 acre reservation (Figure 2) approximately four miles south of the Ohio River and about ten miles west of Paducah, Kentucky. Approximately 740 acres of the reservation are within a security area and buffer zone which has restricted access to the general public. Beyond the DOE-owned buffer zone is an extensive wildlife management area of approximately 6,000 acres.

The PGDP is located within the drainage basins of Big Bayou and Little Bayou Creeks, which meet about three miles north of the site and discharge into the Ohio River. Big Bayou Creek, which flows along the western boundary of the plant, is a perennial stream with drainage extending from approximately two and one-half miles south of the plant to the Ohio River. Little Bayou Creek, which originates in the West Kentucky Wildlife Management Area (WKWMA), flows north toward the Ohio River along a course that includes sections of the eastern boundary of the plant. During dry weather, much of the flow in both creeks is due to controlled effluent releases from PGDP. The North-South Diversion Ditch (NSDD) originates within

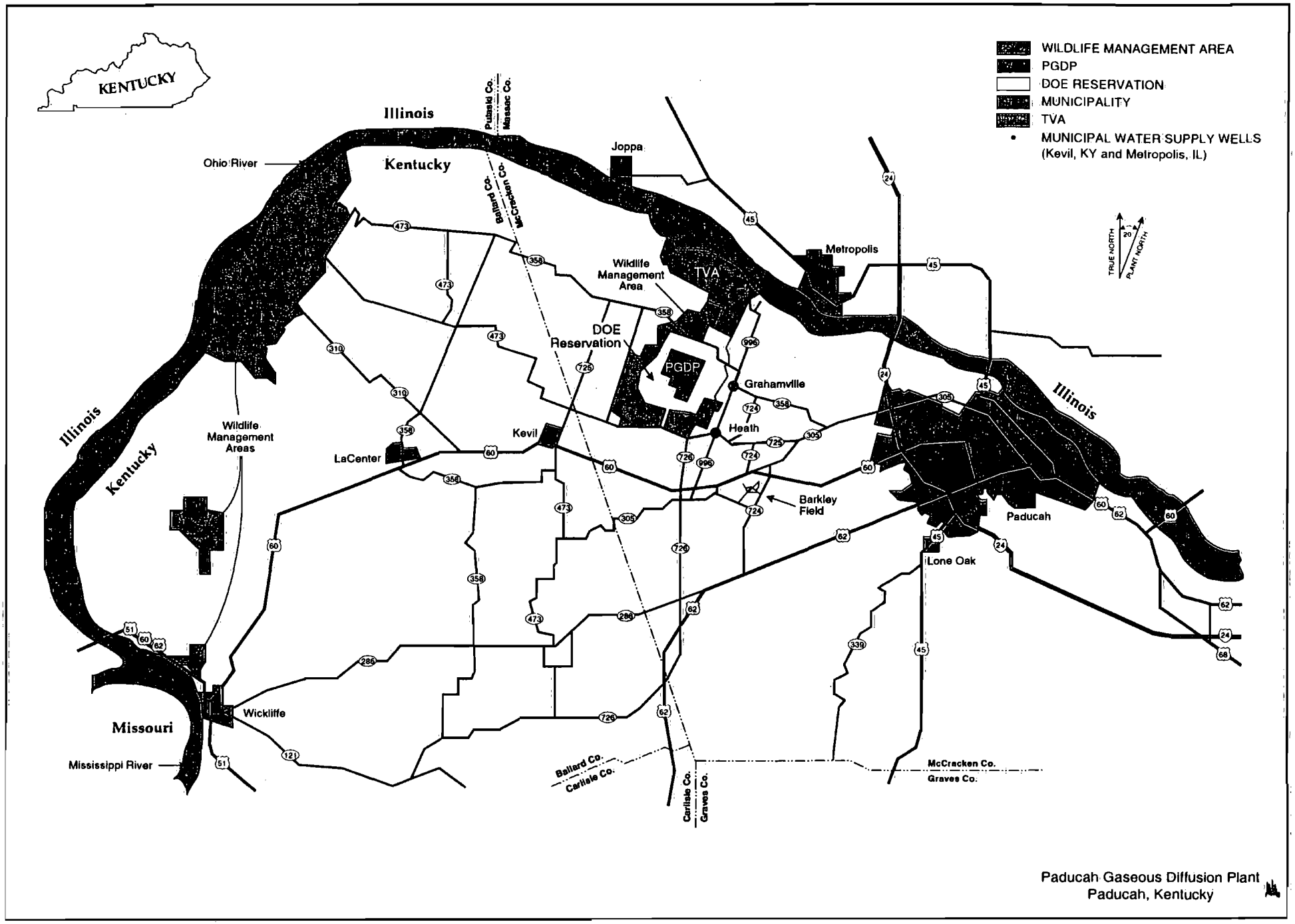

Figure 1. PGDP Vicinity Map

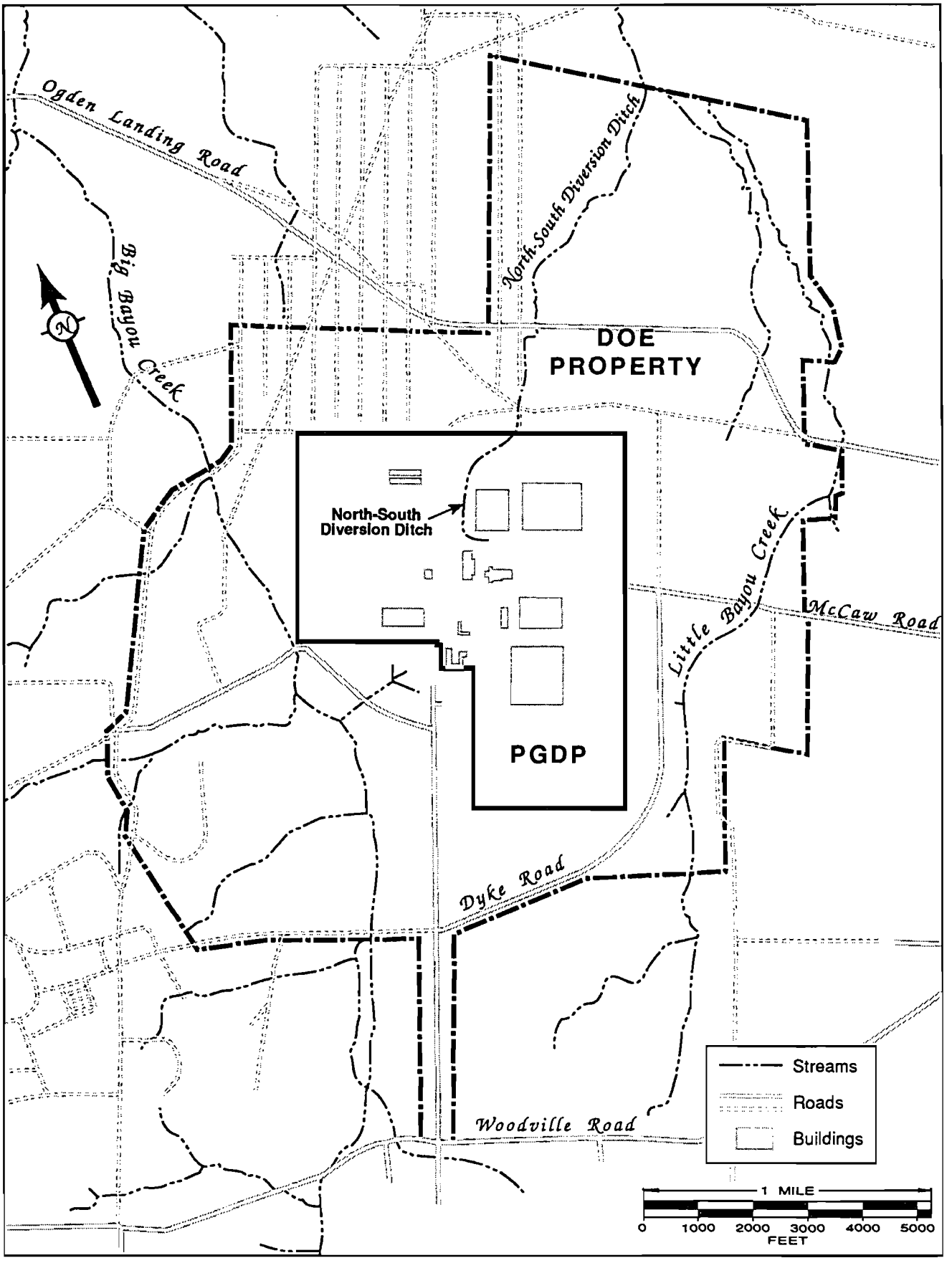

Figure 2. Area Map, Paducah Gaseous Diffusion Plant

the plant boundaries and joins with Little Bayou Creek to the north of the plant. Both creeks flow through the wildlife management area and may potentially be used for recreational purposes. However, neither creek is currently used as a drinking water source.

The PGDP is located within the Jackson Purchase region of Western Kentucky. The ground water in the area of the plant consists of the Regional Gravel Aquifer located within the Lower Continental Deposits and the McNairy Flow System.

2.2 Site History and Enforcement Activities

The NSDD is located in the north central portion of the security area (Figure 3). The portion of the ditch within the security area is approximately 2600 feet long and varies in width from 15 to 36 feet. The depth ranges from one-half to 5 feet. The portion of the NSDD located within the security fence, flows from Virginia Avenue to the C-616-C Lift Station. The ditch receives stormwater runoff from the steam plant (C-600), process buildings (C-335 and C-337), cooling tower (C-635), and the switchyards (C-535 and C-537). The NSDD also receives wastewater from the cleaning building (C-400) and residual fly ash with associated metals from the steam plant (C-600). Weekly flow measurements for the NSDD for the period of January 1991 through October 1993 are presented in Table 1 and Figure 4.

The NSDD receives wastewater containing radionuclides from the cleaning building (C-400). The soil and sediment in the ditch has been contaminated by radionuclides and polychlorinated biphenyls (PCBs). Potential sources of PCB contamination include dust palliative areas surrounding the nearby cascade buildings (C-335 and C-337), a pipeline and vault area southwest of the ditch (C-616-L) and the switchyards (C-535 and C-537).

The DOE in the role of "Lead Agency," as defined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), is conducting cleanup activities at PGDP under its Environmental Restoration and Waste Management Program. Pursuant to Executive Order No. 12580, 3 C.F.R. 193 (1987), 53 Fed. Reg. 2923 (January 29, 1987), the Lead Agency is required to assume responsibility for ensuring that sufficient action is taken to cleanup its sites in order to provide protection for human health and the environment. Remedial activities are being conducted in consultation with the Commonwealth of Kentucky and the EPA.

In the fall of 1988, EPA and DOE entered into an "Administrative Order by Consent" (ACO) under Sections 104 and 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, to address offsite contamination from PGDP. Pursuant to the ACO, PGDP conducted an investigation to determine the nature and extent of contamination. Results of this effort were published in a document entitled *Results of the Site Investigation, Phase I* (KY/ER-4, March 1991). A subsequent investigation sought to further characterize the extent of contamination. Results of this investigation were published in *Draft Results of the Site Investigation, Phase II* (KY/SUB/13B-97777CP-03/1991/1, October 1991). A revised version of this document was submitted to EPA and the Commonwealth of Kentucky in April 1992. Alternatives for remediation were identified, evaluated, and

Figure 3. Selected Interim Action for the North-South Diversion Ditch

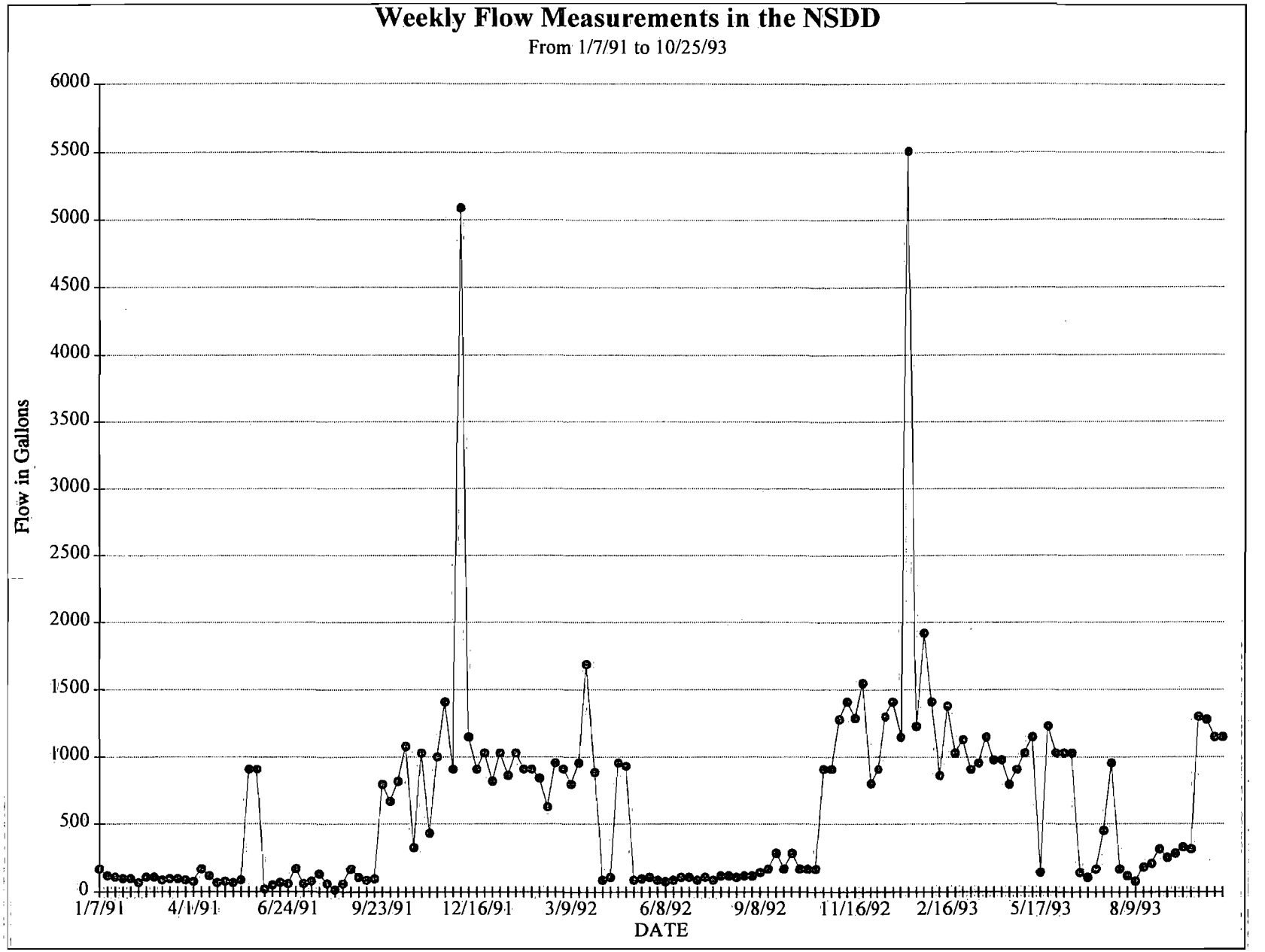

Figure 4. Weekly Flow Measurements in the North-South Diversion Ditch

1991-1993 Weeky Flow Measurements in the NSDD

Date	Flow mGD
1/7/91	169
1/14/91	120
1/21/91	109
1/28/91	98
2/4/91	98
2/11/91	68
2/19/91	109
2/25/91	109
3/4/91	88
3/11/91	98
3/18/91	98
3/25/91	88
4/1/91	77
4/8/91	169
4/15/91	120
4/22/91	68
4/29/91	77
5/6/91	68
5/13/91	88
5/20/91	908
5/28/91	908
6/3/91	20
6/10/91	50
6/17/91	68
6/24/91	59
7/1/91	169
7/8/91	59
7/15/91	77
7/22/91	132
7/29/91	59
8/5/91	15
8/12/91	59
8/19/91	169
9/3/91	109
9/9/91	88
9/16/91	98
9/23/91	795
9/30/91	666
10/7/91	817
10/14/91	1080
10/21/91	326
10/28/91	1030
11/4/91	432
11/11/91	1000
11/18/91	1410
11/25/91	908
12/2/91	5090
12/9/91	1150
12/16/91	908
12/23/91	1030
12/30/91	817
1/6/92	1030
1/13/92	862
1/20/93	1030
1/27/92	908
2/3/92	908
2/10/92	840
2/18/92	625
2/24/92	955
3/2/92	908
3/9/92	795
3/16/92	955
3/30/92	1690
4/6/92	885
4/13/92	88
4/20/92	109
4/27/92	955
5/4/92	931
5/11/92	88
5/18/92	98
5/26/92	109
6/1/92	88
6/8/92	77
6/15/92	88
6/22/92	109
6/29/92	109
7/6/92	88
7/13/92	109
7/20/92	88
7/27/92	120
8/3/92	120
8/10/92	109
8/24/92	120
8/31/92	120
9/8/92	144
9/14/92	169
9/21/92	283
9/14/92	169
9/21/92	283
9/28/92	169
10/5/92	169
10/12/92	169
10/19/92	908
10/26/92	908
11/2/92	1280
11/9/92	1410
11/16/92	1290
11/23/92	1550
11/30/92	800
12/7/92	908
12/14/92	1300
12/21/92	1410
12/28/92	1150
1/4/93	5510
1/11/93	1230
1/25/93	1920
2/1/93	1410
2/8/92	862
2/16/93	1380
2/22/93	1030
3/1/93	1130
3/8/93	908
3/15/93	955
3/22/93	1150
3/29/93	979
4/5/93	979
4/8/93	795
4/19/93	908
4/26/93	1030
5/3/93	1150
5/17/93	144
5/24/93	1230
6/1/93	1030
6/7/93	1030
6/14/93	1030
6/21/93	144
6/28/93	109
7/7/93	169
7/12/93	452
7/19/93	955
7/26/93	169
8/2/93	120
8/9/93	80
8/16/93	182
8/23/93	209
8/30/93	315
9/7/93	253
9/13/93	283
9/20/93	330
9/27/93	315
10/4/93	1300
10/11/93	1280
10/18/93	1150
10/25/93	1150

Table 1. 1991-1993 Weekly Flow Measurements in the North-South Diversion Ditch

published in the document *Draft Summary of Alternatives for Remediation of Offsite Contamination at the Paducah Gaseous Diffusion Plant* (DOE/OR-1013, December 1991). Additional specific information on the NSDD is available in the *Interim Corrective Measures Work Plan for the North-South Diversion Ditch Virginia Avenue to C-616-C Lift Station* (September 1993).

On July 16, 1991, EPA and the Commonwealth of Kentucky jointly issued permits under the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendment of 1984 (HSWA). The EPA permit contains only provisions of HSWA, while the Commonwealth of Kentucky permit contains provisions to address hazardous waste management as well as provisions similar to HSWA. The HSWA provisions require evaluation of hazardous constituent releases and implementation of interim and final corrective measures to address such releases.

On May 10, 1993, the PGDP was proposed for inclusion on the National Priorities List (NPL). The identification of a site on the NPL indicates that a site warrants further investigation to assess the nature and extent of the public health and environmental risks associated with the site and to determine what CERCLA remedial actions may be appropriate. Federal facilities, such as the PGDP, may be placed on the NPL even if they are also subject to the corrective action mandates of RCRA Subtitle C. Therefore, environmental restoration activities must satisfy both CERCLA and RCRA corrective action requirements.

2.3 Highlights of Community Participation

On November 7, 1993, a notice of availability was published in *The Paducah Sun*, a regional newspaper, regarding the Proposed Plan. This notice appeared in *The Paducah Sun* from November 7 until November 14, 1993. The *Proposed Remedial Action Plan for Source Control at the North-South Diversion Ditch* was released to the public on November 8, 1993. The plan was made available for public review at the Paducah Public Library and the offsite Administrative Record Center located in Kevil, Kentucky at the West Kentucky Technology Park. A public comment period was held November 8, 1993 through December 8, 1993.

Specific groups that received individual copies of the Proposed Plan included the local PGDP Neighborhood Council, Natural Resource Trustees, and the PGDP Environmental Advisory Committee. Informal meetings were held with the PGDP Neighborhood Council and PGDP Environmental Advisory Committee on December 9, 1993 and December 13, 1993, respectively. At these meetings, DOE personnel briefed the groups on the proposed action and solicited both written and verbal comments.

Phone calls and/or visits were made to various stakeholders, including neighbors and representatives of environmental groups, to advise them of the public comment period and briefly explain the Proposed Plan. Proposed Plans were mailed to those contacted. A response to the comments received during the public participation period is included in the Responsiveness Summary, which is part of this Record of Decision.

The Proposed Plan contained a notice of the availability of a public meeting to discuss the NSDD and proposed actions. However, no requests for a public meeting were received.

This decision document presents the selected interim remedial action for the NSDD at PGDP, chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Acts of 1986 (SARA), EPA and Commonwealth of Kentucky permits issued under RCRA, as amended by HSWA, and the NCP. The decision for this interim action at this site is based on administrative record (AR) documentation.

2.4 Scope and Role of Operable Unit or Response Action

This Response Action and the Site Management Strategy

The PGDP presents unusually complex problems in terms of hazardous waste management and environmental releases. Therefore, a Site Management Plan (SMP) has been drafted to specify the strategy for investigating and remediating hazardous substance releases at the site. The draft SMP is currently being revised following review by EPA and the Commonwealth of Kentucky. The proposed strategy in the draft SMP is to divide the site into operable units grouped by source areas and environmental media. Discrete response actions will be selected and implemented for each operable unit to address the source areas (i.e., source operable units) and the environmental media (i.e., integrator operable units) impacted by commingled releases from source operable units. Prioritization in the draft SMP for investigation and possible interim remedial actions have been assigned to each of the integrator operable units and source operable units depending on their potential for contributing to offsite contamination. Because integrator units serve as migration pathways that transport contamination from source operable units to offsite receptors, they receive the highest priority for undergoing initial evaluation and interim actions.

Consistent with the site management strategy described in the draft SMP, this action is intended as an incremental step toward addressing the surface water system integrator operable unit. The NSDD contributes to offsite surface water contamination that may continue to migrate and contaminate clean resources and potentially expose additional offsite receptors. The primary objective of this interim action is to stabilize the NSDD through decreasing the levels of contamination entering the NSDD and decreasing the migration of contaminants from the NSDD. By implementation of this interim action, increased stabilization of the site will be achieved, while a final remedy for the Surface Water Integrator Operable Unit is being developed.

The source control measures in this record of decision (ROD) constitute the first phase in remediation of the NSDD and also, a step toward comprehensive remediation of the surface water integrator operable unit. This action can be rapidly implemented while remedial investigations can be conducted for the remainder of the NSDD and Surface Water Integrator Operable Unit. This phased approach is consistent with the NCP, which advises initiation of early actions as soon as possible

after a problem is identified for which an early action is appropriate, and early actions should be coordinated with final remedies such that they are the first phase of the overall remedial action.

Future Response Actions Associated with this Response Action

The remedial action described by this ROD is not the final action for NSDD. Following issuance of the ROD for this source control measure, a remedial investigation will be initiated to evaluate additional remedial alternatives to implement a final remedy which will provide definitive protection of human health and the environment. This remedial investigation will be consistent with the requirements of both the draft SMP and the draft Federal Facility Agreement being developed by the DOE, EPA, and KDEP. This study may lead to a Proposed Plan for a second interim action and/or a final action for the NSDD or the entire Surface Water Integrator Operable Unit.

Although a site investigation, public health and ecological assessment, and an alternative evaluation was performed for the PGDP site as a whole, a final action cannot be recommended until further characterization activities have been completed. Before a final action can be recommended for the NSDD portion of the surface water integrator operable unit, a baseline risk assessment must be completed for the surface water integrator operable unit, including ecological risk. Additionally, a more complete characterization of the NSDD needs to be performed and the interaction of all source operable units with the surface water integrator operable unit must be better defined. Although additional data will be needed before the selection of a final action, sufficient information is available to support the interim remedial action presented in this document. This interim action should not be inconsistent with nor preclude implementation of any currently anticipated final remedy.

2.5 Operable Unit Characteristics

Contaminant Characteristics

Environmental samples obtained from the NSDD have identified contaminant levels that indicate a need for interim action. These sampling events include the collection of: six sediment/soil samples and two surface water samples that were collected as part of the Phase I and Phase II Site Investigations, and a radiological walkover survey to assess gross radionuclide contamination and to identify radiological hot spots. As part of the PGDP monitoring operations, weekly water samples are taken from the NSDD near the C-616-C Lift Station and samples from the uranium recovery unit filtrate solution in the C-400 Building are characterized prior to release into the NSDD.

Radioactive Contaminants

The data collected indicate that the NSDD may contribute to offsite ^{99}Tc and uranium (U) contamination of the surface water and sediment. The data also suggests that the NSDD is potentially contributing to offsite ground water

contamination. Technetium-99 has been detected in onsite and offsite ground water at concentrations above 1,000 µg/l. Technetium-99 in the NSDD has been recorded at levels as high as 45,315 picocuries per gram (pCi/g) in the soil and 139 picocuries per liter (pCi/l) in the surface water. Samples from the uranium recovery unit filtrate solution in the C-400 Building have recorded levels of ^{99}Tc from 81,000 pCi/l to 170,000 pCi/l. Although the levels of ^{99}Tc are below DOE Order 5400.5 *Radiation Protection to the Public and the Environment* derived concentration guidelines of 100,000 pCi/l at the permitted Kentucky Pollutant Discharge Elimination System (KPDES) outfalls, the levels may be contributing to the offsite ground water ^{99}Tc contamination. However, the derived concentration guideline for ^{99}Tc was developed to protect aquatic organisms, not human beings. The current federal and state maximum contaminant level (MCL) for beta emitters in drinking water, including ^{99}Tc, is 4 mrem/yr. The effluent from the uranium recovery unit typically exceeds these limits. The derived concentration guideline of 100,000 pCi/l is equivalent to a dose of 1 rad per day.

Monitoring of the surface water in the NSDD has also detected elevated levels of total uranium, beta radiation and alpha radiation. Concentration of alpha radiation, measured as total alpha emitters in pCi/l, have exceeded the MCL of 15 pCi/l. Measured total uranium levels have exceeded the proposed MCL of 20 micrograms per liter (µg/l). While the NSDD is not a source of drinking water, comparison with criteria such as drinking water MCLs provides an indicator of the potential site risks and potential impacts on the local shallow ground water system. Radionuclides concentrations in the surface water fluctuated only slightly along the length of the NSDD.

A radiological survey of the NSDD was conducted as part of the Phase I Site Investigation in March, 1990. The radiological survey consisted of the three following activities: a walkover survey of each bank of the NSDD using high efficiency gamma scintillation detectors; ground-contact, open-window, and closed-window measurements at 500-foot intervals along each bank of the NSDD using thin-end window Geiger-Müller (GM) detectors; and soil sampling at two background stations and five stations where the surveys indicated elevated radioactivity on the banks of the creeks and ditches. An additional sediment sample was collected during the Phase II Site Investigation. During the walkover survey, readings which were often more than 3 times background were found.

Sediment and soil samples were taken from the NSDD by PGDP personnel in November, 1988. The seven samples were analyzed for total U, ^{235}U, ^{99}Tc, ^{239}Pu, ^{237}Np, and ^{230}Th. Levels of the analyzed radionuclides were found to be as high as: U - 118 pCi/g, ^{239}Pu - 4.3 pCi/g, ^{235}U - 0.71 wt. percent, ^{237}Np - 42.2 pCi/g, ^{99}Tc - 45,315 pCi/g, ^{230}Th - 106 pCi/g.

The level of radionuclides, especially ^{99}Tc, decreased significantly from a high reading around the C-400 Building (45,315 pCi/g) to a low reading near the NSDD 001 Lift Station (no detect). Elevated beta and gamma levels were observed at most locations during the ground-contact open-window and closed window GM detectors.

The highest levels of radionuclides were detected at a isolated hot spot about 4 feet from the storm drain located between Virginia Avenue and the NSDD (across from the C-400 Building). The location adjacent to the C-400 Building discharge pipe suggests the discharge from the C-400 is the source of the hot spot. The boundary of this area is approximately 227 feet long and 3- to 15-feet wide. The gamma walkover readings at this hot spot measured 30,000 to 120,000 cpm (counts per minute) which is approximately 3 to 12 times the average background reading. The GM measurements were approximately 1,800 gross cpm (unshielded) which is up to 45 times greater than the average background reading.

Filtrate samples are taken from the Uranium Recovery Unit located inside the C-400 Building prior to the release of the fluid into the NSDD. As of March 12, 1993, the discharge of effluent from the C-400 Uranium Recovery has been halted by DOE until a treatment alternative can be implemented.

Non-radioactive Contaminants

Toluene was found at an estimated concentration of 210 ppb in the NSDD sediments near the C-400 Building. Toluene could be residual from the C-601 fuel spill of March 9, 1979. A total of 17,300 gallons of diesel was inadvertently released and then flowed to Big Bayou Creek via Ditches 008 and 015. Additionally, trichloroethylene was detected in one surface water sample in the NSDD.

Initial characterization of the NSDD indicated the presence of Aroclor 1260 (PCB) at levels as high as 11 ppm. These PCBs probably accumulated in the ditch largely due to adsorption of the PCBs on the residual coal particles from the C-600 Steam Plant. Only two of the six sediment/soil samples collected during the Phase I and II Site Investigations were analyzed for PCBs. Potential sources of PCB contamination include dust palliative areas surrounding the C-335 and C-337 Cascade Buildings, SWMU 165, C-616-L Pipeline and Vault contamination area, and the C-535 and C-537 Switchyards.

A PCB surface water characterization project was performed at PGDP by the United States Army Corps of Engineers during August 1991 to April 1992. This study evaluated surface water PCB concentrations in an effort to identify PCB sources. The project included 16 surface water sampling events in both the plant ditches and storm sewers during both dry and wet periods. The samples were analyzed both for PCBs, radioactivity, and Total Suspended Solids (TSS). Out of the 461 samples taken, only 19 had detectable (greater than 0.1 ppb) PCBs present. The surface water data did not detect any identifiable source of PCB contamination nor did the PCB detects correlate with the TSS in the sample. There were no PCB detects downstream of PGDP outfalls in both Big and/or Little Bayou Creeks. The samples which relate to the NSDD were taken in Ditch 001 before being lifted into the NSDD and in Ditch 001 after it leaves the C-616-F Full Flow Lagoon. There were no PCB detects downstream of the C-616-F Full Flow Lagoon. PCBs were detected in one sample (0.17 ppb) in Ditch 001 prior to being lifted into the NSDD. However, there were no corresponding detects in the other three downstream sampling points.

Sampling data on surface water and sediments in the NSDD show elevated levels of some metals. These metals are most likely associated with the fly ash that accumulates in the NSDD. The level of metals present in the surface water will be evaluated through the remedy selection process for the final ROD for the NSDD and the Surface Water Integrator Operable Unit.

2.6 Summary of Site Risks

The 1991 *Draft Results of the Public Health and Ecological Assessment, Phase II* (PHEA) , found that the critical exposure pathway is related to the offsite migration of onsite contaminant sources. The PHEA also recommended action to eliminate the offsite migration of these contaminants to the outside of the Paducah Gaseous Diffusion Plant's boundaries and recommended remedial action to eliminate this offsite movement. Based on the preliminary results of these studies, DOE, EPA, and Kentucky Department for Environmental Protection (KDEP) have decided that there is sufficient potential risk to the public and environment to warrant this action. The principal goals of this interim remedial action are to implement source control measures which will mitigate the introduction of contaminants into the ditch, decrease the migration of the contaminants which are present in the ditch, and decrease the potential for direct contact of contaminated material. Accomplishment of these goals will help stabilize and mitigate further environmental degradation within, and downgradient to, the NSDD.

Site investigations involving surface water and sediment indicated various contaminants at the NSDD which may pose a risk to human health and the environment at PGDP. The NSDD is located within the confines of the PGDP security fence and is accessible to any person with site access. The following contaminants were detected during site investigations: Trichloroethylene, PCBs, chromium, copper, nickel, vanadium, and zinc; and in the sediment: chromium, copper, zinc, cobalt, manganese, selenium, thallium, and vanadium.

The following radioactive elements have been released into the NSDD: Technetium-99, Plutonium 239, Thorium 230, Neptunium 237, Uranium 234, Uranium 235, and Uranium 238. Elevated levels of radionuclides have been measured in the surface water and sediment within the NSDD.

If no interim action were taken to address the NSDD, the potential exists for exposure of plant maintenance personnel to the contaminants within the ditch through their routine activities. To estimate risk assume that the maintenance worker is exposed for 4 hours per event, 12 times per year, over a 25-year exposure period. Complete exposure pathways assessed for the current maintenance worker include direct gamma irradiation from contaminated sediment and soil, dermal contact with soil, sediment and debris, inhalation of re-suspended particulate during mowing, and incidental ingestion of contaminated surface water, soil, and sediment.

The estimated carcinogenic risk for maintenance worker scenario evaluated in this assessment is 1×10^{-4}, which has been determined by the EPA to be an unacceptable risk level. The majority of this risk is associated with particulate inhalation of radiological contaminants during mowing. Hazard quotients calculated for the

exposure pathways were all less than 1, indicating that the exposure intakes are less than the reference doses (RfDs) and the potential for toxicological harm is low.

Species of terrestrial and aquatic organisms reported to reside at, or visit, the site, and which can be expected to reside at or visit the site in the future, include various soil and sediment dwelling invertebrates (e.g., earthworms, chironomids), aquatic and terrestrial insects and their larvae, frogs and salamanders, small mammals (e.g., hawks). Larger terrestrial mammals and fish are not currently present at the site and there are no known Federal or State threatened or endangered species located within the PGDP perimeter area.

When evaluating the exposure of aquatic and terrestrial biota to contaminants of potential concern from site sources; soil, surface water, and sediment will be considered the primary environmental exposure media. Complete exposure pathways for aquatic organisms include contact with and ingestion of water and sediment, or by direct ingestion of biota. Terrestrial organisms are exposed to contaminants in the soil through ingestion of soil where sediments and surface water have overflowed from the NSDD during floods or through ingestion of contaminated organisms. Uptake of contaminants by plants can lead to subsequent exposure to herbivores and omnivores from ingestion of contaminated vegetation.

The risk assessment for metals, PCBs, and volatile organic chemicals relies on aquatic and sediment toxicity data; there is no toxicity data for the contaminants of potential concern in soil. When the observed concentrations in the environment were compared to toxicity threshold concentrations, 11 of the 27 contaminants emerged as the contaminants of potential concern: Chloroform, Aroclor 1260, and 9 metals. The ecological quotients (EQs) for those contaminants of potential concern for which EQs could be calculated ranged from 1 to 922. Barium (922), Aroclor 1260 (220), aluminum (18), and cobalt (25) had the highest EQs in sediments at the NSDD. The highest EQ for a contaminant of potential concern in surface water was 4 for the metal copper. The risk from radionuclides and chloroform in surface water could not be calculated because there was no toxicity data to establish a toxicity threshold.

The contaminants of potential concern in sediment and surface water with large EQs strongly suggest that, in the absence of remediation, populations of aquatic organisms living in the NSDD will continue to be at risk from adverse effects likely to reduce population sizes. Predators of aquatic organisms may be at equivalent levels of risk due to bioaccumulation of PCBs. The risk to terrestrial organisms exposed to contaminants in the soils adjoining the NSDD is due to radionuclides, the ecological effects of which are uncertain due to the absence of terrestrial wildlife toxicity data.

2.7 Description of Alternatives

Four separate alternatives are considered for source control of the NSDD. Federal law requires the consideration of a no action alternative which is Alternative 1. Three additional alternatives consider combinations of treatment, engineering controls and institutional controls. The screening and evaluation process identified one alternative that will quickly and effectively reduce risk by controlling the spread

of contamination in and near the NSDD and reduce the potential for further contamination entering the ditch.

Alternative 1 - No Action

Pursuant to 40 C.F.R. 300.430(e)(6) of the NCP, DOE is required to consider a no action alternative. This alternative is useful as a baseline for comparison between potential alternatives. Under this alternative no further action would be taken.

Alternative 2 - Source controls, institutional controls and engineering controls

This alternative includes the following four separate actions: (1) institutional controls utilizing posted warning signs that will notify PGDP personnel that the NSDD contains elevated levels of radionuclides, PCBs and metals; (2) construction of a silt trap gabion just beyond the contaminated portion of the NSDD; (3) construction of an ion exchange unit inside the C-400 Building that will reduce the levels of technetium and other radionuclides in the effluent discharged to the NSDD by the Uranium Recovery Unit; and (4) construction of a source control treatment for fly ash removal from the C-600 Steam Plant effluent. Settling lagoons will be used for source control treatment of the C-600 Steam Plant fly ash effluent. However, the final design of the fly ash source control may be modified as the detailed design process proceeds. Further, the location for the effluent discharge will be determined through the remedial design process by DOE, EPA and the Kentucky Department for Environmental Protection.

Alternative 3 - Source controls, institutional controls and engineering controls including the installation of a pipeline and lift station

This alternative includes the four actions listed in Alternative 2 plus the installation of a lift station and above ground pipeline to transport runoff and effluent from the southern end of the NSDD to the area of the Outfall 001 Lift Station located just beyond the highly contaminated portion of the NSDD. This action will significantly reduce the buildup and infiltration of contaminated water in the NSDD, mitigate dispersal of contamination to areas outside of the site, and decrease the potential for plant personnel to come into contact with the contaminated surface water.

Alternative 4 - Source controls and institutional controls

This alternative includes excavation of the contaminated soil and sediment in the NSDD and initiates institutional controls by posting warning signs. Initial estimates indicate that approximately one foot of soil will be excavated over an area of approximately 74,169 ft^2 resulting in the generation of approximately 14,834 drums of waste. The drums will require storage until proper treatment and disposal can be conducted.

The implementation of Alternatives 2, 3, or 4 would have little or no significant physical effect on the environment. These alternatives would not adversely affect any wetlands, flood plains, or historic sites. All of the alternatives could be implemented within 17 months. This time period includes design by DOE with

approval by EPA and KDEP and the bid and award process as required by federal regulations.

2.8 Summary of the Comparative Analysis of the Interim Alternative

This section provides the basis for determining which alternative (i) meets the threshold criteria of overall protection of human health and the environment, state approval, and compliance with applicable or relevent and appropriate requirements (ARARs), and (ii) provides the best balance between effectiveness and reduction of toxicity, mobility, or volume through treatment, implementability, and cost, and (iii) satisfies community acceptance. A summary of the comparative analysis of alternatives is included in Table 2.

Nine criteria are required by 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. Because this action is intended to integrate both RCRA and CERCLA requirements, state approval has been substituted for state acceptance and listed as one of the threshold criteria. This change is necessary to reflect that this interim action will be implemented under the provisions of the Kentucky Hazardous Waste Permit and must also fulfill these RCRA requirements:

1. *Overall protection of human health and the environment.* Requires that the alternative adequately protect 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.* The alternatives must be assessed to determine if they attain compliance with applicable or relevant and appropriate requirements of both state and federal law.

3. *Long-term effectiveness and permanence.* 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.* The degree to which the alternative employs recycling or treatment to reduce the toxicity, mobility, or volume of the contamination.

5. *Short-term effectiveness.* 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.

Table 2. Comparison of Potential Alternatives

Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Movement, and Volume	Short-Term Effectiveness	Implementability	Cost*
1-NO FURTHER ACTION	No change	Does not achieve response objectives or satisfy state and local requirements.	Not applicable	No change	Not applicable	Not applicable	No additional costs
2- SIGNS, GABION STRUCTURE, ION EXCHANGE, AND SETTLING LAGOONS	Additional off-site releases in surface and ground water are greatly reduced by sediment and source control. Signs will reduce potential exposure of PGDP employees to contaminated sediment.	ARARs would be achievable	Intended for short-term use; might not be effective as long-term remedial action.	Decreases mobility and volume of contaminants discharged at the sources. Toxicity of water reduced. Contaminants in the ditch will continue to infiltrate into the ground water. Will generate approximately 7 drums of hazardous waste/year.	Immediate decrease in migration of contaminants to surface water.	Standard remediation technique with no technical barriers to implementation. Requires frequent inspections and maintenance. Reversible. Will not affect implementation of final remedy.	$820,862
3-SIGNS, GABION STRUCTURE, ION EXCHANGE, SETTLING LAGOONS, AND PIPELINE	In addition to protection provided by Alternative 2, the diversion of flow through a pipeline will bypass a portion of the ditch and will reduce exposure to the contaminated water piped to the lift station.	ARARs would be achievable	Similar to Alternative 2	Decreases mobility and volume of contaminants discharged at the sources. Will reduce the infiltration of contamination into the ground water. Will generate approximately 7 drums of hazardous waste/year. Installation of lift station will generate about 200 drums of hazardous waste.	In addition to effectiveness provided by Alternative 2, the diverting of flow through a pipeline will bypass the contaminated portion of the ditch and will further reduce contaminant releases to surface and ground water.	Similar to Alternative 2. Additional inspection and maintenance activities will be necessary for the pipeline.	$1,419,525
4-SIGNS AND EXCAVATION	Reduces potential exposure and further releases to off-site ground and surface water by removing contaminated sediments.	ARARs would be achievable	Reduces long-term risks of exposure. May need to be repeated.	Reduces mobility. No charge in volume or toxicity of contaminants in excavated materials. Will generate 14,834 drums of hazardous waste.	Handling, transporting, and disposing of excavated materials require additional safety measures to ensure the protection of workers, the public, and the environment.	Standard remediation technique with no technical barriers to implementation. Irreversible, will generate large volume of waste.	$19,535,860**

* Calculated using 5-year operating time, discount rate=7.00%, inflation rate=3.50%; ** Includes an estimated $14,834,000 cost for waste management

6. *Implementability.* Potential difficulties associated with implementing the alternative. This may include: technical feasibility, administrative feasibility, and the availability of services and materials.

7. *Cost.* The costs associated with the alternatives. These expenditures include the capital cost, annual operation and maintenance and the combined net present value of capital and operations and maintenance costs.

8. *State approval.* The incorporation of any formal comments by the Kentucky Division of Waste Management to the Interim Measure for the NSDD.

9. *Community acceptance.* The consideration of any formal comments by the community to the Proposed Plan for interim remedial action.

The criteria listed above are categorized into three groups. The first, second, and eighth categories are threshold criteria. The chosen final alternative must meet the threshold criteria to be eligible for selection. The five primary balancing criteria include criterion three through seven. The last criterion is termed the modifying criterion. The modifying criterion was evaluated following issuance of the Proposed Plan for public review and comment.

Overall Protection of Human Health and the Environment

Protection of human health and the environment is a threshold criteria. Alternatives must meet this criteria in order to be eligible for selection. Alternatives 2, 3, and 4 would provide protection of human health and the environment for the scope of this interim action.

As discussed in Section 2.6, Summary of Site Risks, there is sufficient potential risk to human health and the environment to warrant this interim action. Therefore, Alternative 1 does not meet this threshold criteria.

Alternative 2 would provide protection through source control of contaminant inputs into the NSDD, engineering controls for limiting the potential for contaminant migration, and institutional controls to limit potential direct exposure.

Alternative 3 would provide protection in the same manner as Alternative 2. However, additional protection would be provided by limiting the potential for contaminant transport and infiltration into the subsurface environment through engineering controls: a pipeline.

Alternative 4 would provide protection through the removal of contaminated materials from the NSDD. Institutional controls would also be implemented to limit potential exposure to residual contamination.

Compliance with ARARs

Compliance with ARARs is also a threshold criteria. Alternatives must meet this criteria in order to be eligible for selection. Alternatives 2, 3, and 4 would achieve ARARs. A detailed description of ARARs is included in this document only for the selected remedy. This is included in Section 2.9.

Long-term Effectiveness and Permanence

This criteria is generally not relevant to measures implemented as interim actions. However, the selected alternative is expected to be effective until a final remedial decision is implemented for the NSDD.

Alternatives 2 and 3 will not remove contaminants from the NSDD. However, they would provide some protection from potential exposure to the contaminants through institutional controls and source control. Alternative 4 would remove contaminants from the NSDD. However, other contaminated areas at PGDP and process wastewater from the active facilities may recontaminate the NSDD. Over the long term, this may result in having to excavate materials from the NSDD again in the future.

Long-term effectiveness and permanence will be addressed through a final remedial decision made for the NSDD and the Surface Water Integrator Operable Unit.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 2 and 3 would reduce the volume of contaminants through source control treatment measures. Alternative 3 would also reduce the mobility of contaminants within the NSDD by reducing the flow of water through the most highly contaminated portion of the NSDD. Alternative 3 would also mitigate any potential cross contamination from the surface water system to the shallow ground water system at the NSDD. Alternative 4 would reduce the toxicity, mobility, and volume of contaminants within the NSDD by excavating the materials. However, excavated materials would not be treated to remove or destroy contaminants. Excavated materials would require storage and/or disposal at permitted facilities.

Short-term Effectiveness

Remediation of the NSDD will be a long-term process due to the contamination from halogenated hydrocarbons and radionuclides. This interim action will provide effective short-term stabilization of the contaminated NSDD. Alternatives 2, 3, and 4 would provide protection immediately upon completion of construction and calibration activities.

None of the evaluated alternatives would pose a threat to nearby communities. Alternatives 2, 3, and 4 all require that workers perform activities in or near contaminated areas. Alternative 4 would require the handling of a large volume of contaminated materials during excavation and packaging. Workers associated with the implementation of the selected alternative will abide by the requirements of a

site-specific Health and Safety Plan (HSP). The HSP will be prepared as part of the bid package and submitted to the selected contractor prior to the award of the project. Prior to implementation of this interim action the EPA and KDEP will be afforded the opportunity to review the HSP. The draft HSP will be modified by the contractor to reflect pertinent comments submitted by the Regulatory Agencies.

Alternatives 2, 3, and 4 would require similar time periods for installation and each would expose workers to potentially contaminated materials and work time in contaminated areas. However, the time and type of work performed varies between the alternatives.

Implementability

Alternatives 2, 3, and 4 can be implemented using standard engineering practices with materials and equipment that is readily available. Site conditions are not expected to prevent implementation or maintenance of the alternatives.

Cost

The total projected costs presented in the Proposed Plan were Alternative 2 -- $820,862, Alternative 3 -- $1,370,862, and Alternative 4 -- $19,535,860. The majority of the costs associated with Alternative 4 are related to waste management requirements for radioactive and/or hazardous waste. The cost estimate for Alternative 3 has been further refined and has a capital cost of $1,342,511 and a present worth cost of $1,419,525 as reflected in Table 2.

State Approval

The Interim Corrective Measure Work Plan developed pursuant to PGDP's hazardous waste permits, Proposed Remedial Action Plan and Draft ROD were issued for review and comments to both the Commonwealth of Kentucky and the EPA. The Kentucky Division of Waste Management concurs with this action, consistent with the requirements of the facility's Hazardous Waste Permit issued by the Commonwealth of Kentucky.

Community Acceptance

As evidenced by the comments received during the public comment period, the selected interim remedy specified in the Record of Decision for Interim Action is supported by the local community.

No comments were received by DOE from any group or organization opposing this interim action. Community response to the alternatives is presented in the Responsiveness Summary which addresses comments received during the public meeting and the public comment period.

2.9 Selected Remedy

Based upon the evaluation of the alternatives in regard to the nine criteria, the remedy which best meets the threshold, balancing, and modifying criteria for the scope and objectives of this interim action is Alternative 3. The DOE will prepare a detailed design of the treatment unit in accordance with the requirements of the ROD for this interim action, and in accordance with the Interim Corrective Measure Work Plan for the North-South Diversion Ditch, Virginia Avenue to C-616-C Lift Station. The Interim Corrective Measure Work Plan pursuant to PGDP's Kentucky Hazardous Waste Permit and EPA Hazardous and Solid Waste Permit will be approved at the same time as this ROD is approved.

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

- The effluent discharged from the C-400 Building shall be treated to reduce the concentration of radionuclides. The target level for treatment shall be the MCLs established under the Safe Drinking Water Act. Sufficient engineering controls shall be utilized to achieve this goal. An ion exchange unit shall be installed to treat this effluent.

- The effluent discharged from the C-600 Steam Plant shall be treated to remove fly ash from the effluent prior to discharge to the NSDD. Settling lagoons will be used for source control treatment of the C-600 Steam Plant fly ash effluent. However, the final design of the fly ash source control may be modified as the detailed design process proceeds. Design of the discharge routing from the steam plant will be determined through the remedial design process by DOE, EPA and the Kentucky Department for Environmental Protection.

- Lift station(s) shall be installed in or near the NSDD, near the C-400 Building and the C-600 Steam Plant. A pipeline shall be installed to transport permitted effluent and storm water runoff from the installed lift station(s) at the southern end of the NSDD to the Ditch 001 Lift Station.

- A gabion type rock structure with nonwoven geotextile material secured to the upstream side shall be installed in the NSDD at or near the Ditch 001 Lift Station. A conceptual drawing of this structure is provided in Figure 5.

- Signs shall be installed at intervals not to exceed 100 feet, on both sides of the ditch, from Virginia Avenue to the C-616 Lift Station. These signs shall provide notice that elevated levels of radionuclides, metals, and PCBs are present in the area.

The actions proposed in the selected alternative will not cause an increased risk to workers or PGDP personnel during their construction or use. The silt trap gabion, lift station with pipeline and warning signs will be in and near the contaminated areas. Personal protective equipment and adequate worker safety procedures will be used to ensure that implementation of these proposed measures do not pose a risk to worker

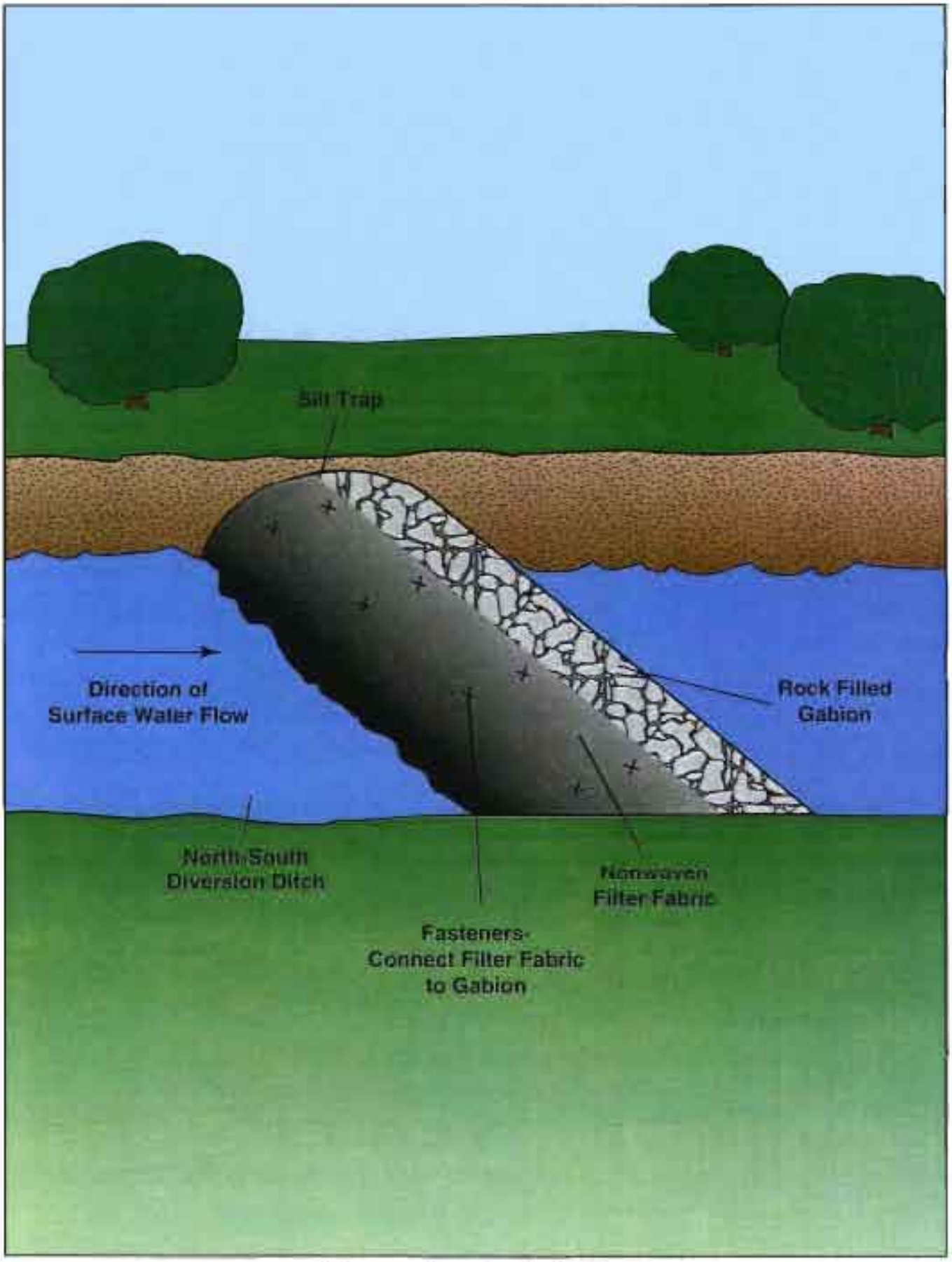

Figure 5. Example of a Gabion

health and safety. The selected alternative can be implemented using standard engineering practices with materials and equipment that are readily available. Site conditions are not expected to prevent the implementation or maintenance of these proposed actions.

The proposed ion exchange unit will require a calibration period of six months or more after installation, in order to optimize the removal of the radionuclides. The source control for fly ash, silt trap gabion and lift station with pipeline will immediately reduce the volume of contaminated effluent flowing through the ditch and into the Outfall 001 Lift Station. The estimated present worth cost of the selected actions is $1,419,525. Table 3 presents a more detailed breakdown of the estimated costs for this action. This cost is within 4% of the cost presented in the Proposed Plan and is not a significant change.

Table 3. Estimated Cost of Source Control Action

Source controls, institutional controls and engineering controls including the installation of a pipeline and lift

Capital Investment:		
1.	Ion Exchange unit:	$74,074
2.	Warning Signs:	$1,860
3.	Gabion:	$29,630
4.	Fly Ash Controls:	$481,481
5.	Lift Station and Pipeline:	$407,407
Subtotal		$994,452
Contingencies @ 35%:		$348,058
Total Capital Investment:		$1,342,511
Estimated Operation and Maintenance Expense (annually):		$17,000

TOTAL PRESENT WORTH COSTS*

* Net Present Value assuming an inflation rate of 3.5%, a discount rate of 7% and five years of operation: $1,419,525

2.10 Statutory Determinations

The DOE, EPA and Kentucky Division of Waste Management concur that the source controls will satisfy the statutory requirements of K.R.S. 224.46-530(g) and CERCLA 121(b) for providing protection of human health and the environment, attaining applicable or relevant and appropriate requirements directly associated with this

action, being cost-effective, utilizing permanent solutions and alternative treatment technologies to the maximum extent practicable, and exhibiting a preference for treatment as a principle element.

Protection of Human Health and the Environment

The selected interim action initiates protection of human health for the PGDP employees and the public through treatment of wastes entering the NSDD, institutional controls to limit the potential for direct exposure, and engineering controls to mitigate the infiltration and migration of contaminants from the NSDD to the subsurface environment and offsite until a final action is selected and implemented. The remedy provides effective management of all residual wastes generated during implementation of the action.

Compliance with ARARs

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 was passed by Congress and signed into law on December 11, 1980 (Public Law 96-510). This act was intended to provide for "liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive waste disposal sites." Adopted on October 17, 1986 (Public Law 99-499), SARA did not substantially alter the original structure of CERCLA but provided extensive amendments to it. This amendment also renumbered Section 107(g) on Federal Facility Compliance as Section 120(a) and added several provisions affecting response actions at federal facilities in the balance of Section 120. Among these provisions is Section 120(f) which requires federal facilities to provide states with the opportunity to participate in response actions as specified in Section 121. Section 121 requires that remedial actions for cleanup of hazardous substances must comply with requirements or standards under federal or more stringent state environmental laws which are applicable or relevant and appropriate to the hazardous substances or particular 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 environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site" (53 Fed. Reg. 51435, December 21, 1988).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site" (53 Fed. Reg. 51436).

"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). 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). 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). Selection of a particular remedial action at a site will invoke appropriate action-specific ARARs that may specify particular performance standards or technologies, as well as specific environmental levels for discharged or residual chemicals.

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 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 of protection of human health and the environment is met.

In order to expedite the cleanup process, Congress exempted certain CERCLA response actions from any federal, state, or local requirement to obtain permits. 42 U.S.C. section 9621(e)(1). This section applies only to response actions "conducted entirely onsite," defined in the NCP to mean "the areal extent of contamination and all suitable areas in very close proximity [which are] necessary for implementation of the response action." 40 C.F.R. section 300.5. Although laws that would otherwise apply with full force to non-CERCLA onsite activities do apply to CERCLA response actions, they do so only to the extent that they are ARARs. Consequently, only substantive requirements apply, not procedural ones. Regulatory requirements to obtain permits are procedural or administrative in nature, not substantive, and do not apply to CERCLA onsite response actions. 55 Fed. Reg. 8666, 8756 (March 8, 1990).

In an effort to further distinguish between substantive and administrative requirements, EPA offers the following examples. Substantive ARARs include acceptable concentrations for specific chemicals under the Safe Drinking Water Act (SDWA) or technology-based requirements under RCRA. Administrative requirements involve the approval of or consultation with administrative bodies, issuance of permits, documentation, reporting, and recordkeeping (53 Fed. Reg., 51443).

Since ARARs do not exist for every chemical or circumstance likely to be found at a Superfund site, other information not meeting the definition of an ARAR may be used to determine what is protective or may be useful in developing Superfund remedies. Therefore, 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). Criteria or guidance developed by 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 information is classified as to-be-considered (TBC) guidance and generally falls within three categories (health effects information, technical information on how to perform or evaluate investigations or response actions, and policy).

The EPA's treatment of state ARARs is fully consistent with the way EPA has treated federal requirements under the current NCP, in which federal guidance and nonpromulgated guidelines are put in a separate category ("other information to be considered") from potential ARARs. Like their federal counterparts, state guidance and other nonpromulgated guidelines may still be considered in determining an appropriate, protective remedy; but neither federal nor state guidance should be treated as potential ARARs (53 Fed. Reg., 51437).

The response action for the NSDD involves installation of a gabion filter system, ion exchange system, fly ash control, pipeline, and institutional controls. Selection of this alternative will allow for project execution to proceed without requiring an ARAR waiver while meeting all applicable or relevant and appropriate Commonwealth of Kentucky and federal regulations as well as DOE orders and American National Standards Institute (ANSI) standards. Proceeding with the selected remedy will meet chemical, location, and action-specific ARARs as described in the text below. An additional overview of the ARARs for the NSDD may be obtained by reviewing Table 4.

Chemical-specific

The Kentucky Water Quality Standards nondegradation policy is intended to safeguard the surface waters of the Commonwealth for designated uses, preventing the creation of any new pollution, and abating existing pollution [401 K.A.R. § 5:029(2)]. The KPDES permit, KY0004049, is the implementing vehicle for this applicable regulation.

Based upon sampling results, PCB levels as high as 11,000 µg/kg were detected in the sediment and soil of the NSDD; consequently, PCBs may be found in the surface water. Under 401 K.A.R. § 5:055, PGDP is required to obtain a permit for the dischargeof plant waste water. Waste water discharged from PGDP is regulated by KPDES Permit No. KY0004049 which also establishes effluent limitations for PCBs at KPDES outfalls. Concentrations of PCBs discharged from the treatment system into the water should not exceed 0.000079 µg/l.

Effluent from the ion exchange system will discharge into the NSDD, which in turn, ultimately flows through KPDES Outfall 001. The KPDES permit which was issued by

Table 4. ARARs for the North-South Diversion Ditch Project Area to be Covered from Virginia Avenue to C-616-C Lift Station Record of Decision

Actions	Requirements	Prerequisites	Federal Citation	Title 401, KAR Chapter
CHEMICAL-SPECIFIC				
Treatment of contaminated surface water	Prevent creation of any new pollution	Direct discharge to a surface water body - **applicable**		5:029(2)
	Treatment to KPDES permit limitations for Outfall 001 - 0.000079 µg/l for PCB	Direct discharge to a surface water body - **relevant and appropriate**		5:055
	Treatment to SDWA MCLs for Outfall 001 - 0.5 µg/l for PCB and 4 mrem/yr for ^{99}Tc	Direct discharge to a surface water body which feeds into a drinking water aquifer - **TBC guidance**	40 CFR 141.15; 141.16; & 141:61 40 C.F.R. 141-143	8:550
	Discharge must not exceed DCGs for radionuclides; discharge of 0.71% of ^{235}U should not exceed 0.87 mg/l and discharge for ^{99}Tc should not exceed 100,000 pCi/l for protection of aquatic organisms	Direct discharge to a surface water body -**TBC guidance**	DOE Order 5400.5	
Protection of warm water aquatic habitat	Prevent toxicity contribution to aquatic life	Discharge impacting productive warm water aquatic communities - **applicable**		5:031(4)
Protection of the general public from all sources of radiation	The general public must not receive an effective dose equivalent greater than 100 mrem/year	Dose received by the general public from all sources of radiation exposure at a DOE facility - **TBC guidance**	DOE Order 5400.5	
	All releases of radioactive material must be "as low as reasonably achievable" (ALARA)	Releases of radioactive material from DOE activities - **TBC guidance**	DOE Order 5400.5	
ACTION-SPECIFIC				
Site preparation	Precaution must be taken to prevent particulate matter from becoming airborne	Handling, processing, construction, road grading, and land clearing activities - **applicable**		63:010
	A responsible party must: • Use water or a chemical to control dust; • Place asphalt or concrete on roads and materials stockpile to control dust; • Ensure that no visible fugitive dust is emitted beyond the property line; or • Ensure that all open bodied trucks are covered if any materials in truck could become airborne.			63:010

Table 4. ARARs for the North-South Diversion Ditch Project Area to be Covered from Virginia Avenue to C-616-C Lift Station Record of Decision (Continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401, KAR Chapter
Container Storage (on-site)*	Containers of hazardous waste must be:	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 of, or handled). A generator who accumulates or stores hazardous waste on-site for 90 days or less in compliance with 40 CFR 262.34(a)(1-4) is not subject to RCRA interim or final status storage requirements - **applicable**	40 CFR 264 (Subpart I)	34:180
	• Maintained in good condition;		40 CFR 264.171	34:180.2
	• Compatible with hazardous waste to be stored; and		40 CFR 264.172	34:180.3
	• Closed during storage (except to add or remove waste)		40 CFR 264.173	34:180.4
	Inspect storage areas weekly for deterioration of containers and the containment system		40 CFR 264.174	34:180.5
	Container storage areas must have a crack and gap free base sufficiently impervious to contain leaks or spills; a base that is sloped or a containment system designed/operated to drain and remove liquids resulting from spills, leaks, or precipitation unless containers are elevated or protected from exposure to accumulated liquids		40 CFR 264.175	34:180.6
	Containment system with a capacity of 10% of container volume. Run-on into containment system must be prevented unless sufficient excess capacity exist. Remove spilled/leaked waste in a timely manner to prevent overflow to the containment system and manage such material appropriately under RCRA or CWA		40 CFR 264.178	34:180.9
	At closure, remove all hazardous waste and residues from the containment system and decontaminate or remove all containers, liners, bases, or soils containing hazardous waste or hazardous waste residues and manage such materials as appropriate under RCRA			

* 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 independent RCRA authority at the site.

Table 4. ARARs for the North-South Diversion Ditch Project Area to be Covered from Virginia Avenue to C-616-C Lift Station Record of Decision (Continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401, KAR Chapter
Container Storage (on-site) (continued)	An owner or operator of any facilities used for the storage of PCBs and PCB items must comply with the following requirements: • the facilities must meet the following criteria: • adequate roof and walls to prevent rain water from reaching PCBs storage containers • an adequate floor which has continuous curbing with a minimum six inch high curb • no drain valves, floor drains, expansion, joints, sewer lines, or other opening that would permit liquids to flow from the curbed area • floors and curbing constructed of continuous smooth and impervious materials to prevent or minimize penetration of PCBs, and • not located at a site that is below the 100-year flood water elevation • Containment volume at two times internal volume of largest PCB article or 25% of total internal volume of all PCB articles and containers	PCBs concentrations >50 ppm in liquid waste which is stored on-site - **applicable**	40 CFR 761.65(b) 40 CFR 761.65(b)	37:050.2(6) 37:050.2(b)
Waste Management	Must handle and dispose of radioactive waste in a manner that is protective of public health and the environment Land disposal restrictions must be addressed	If individuals generate or transport hazardous waste - **applicable**	DOE Order 5820.2A (TBC guidance) 40 CFR 268	
Transportation of hazardous waste	Waste must be manifested Transporters of hazardous waste must follow detailed standards	Waste exhibits a RCRA hazardous waste characteristic as defined by Subpart C of 40 CFR § 261 and off site transportation occurs If hazardous waste is transported - **applicable**	40 CFR 262 40 CFR 263 40 C.F.R. 260.10	

Table 4. ARARs for the North-South Diversion Ditch Project Area to be Covered from Virginia Avenue to C-616-C Lift Station Record of Decision (Continued)

Actions	Requirements	Prerequisites	Federal Citation	Title 401, KAR Chapter
Transportation of hazardous waste (continued)	Waste must be packaged and transported in accordance with DOT requirements	The waste is considered a RCRA hazardous waste by characteristic, or a hazardous substance that equals or exceeds a reportable quantity; and transportation in commerce occurs. **If DOE does not close off road to public use during transport; if the transport does not occur in a DOE operated government vehicle; or if access to the roads is not controlled by the use of gates and guards - applicable**	49 CFR §§ 172, 173, 178, and 179	
Worker Protection	Comply with the provisions for response action worker safety and health in 29 CFR 1910.120 and any other applicable worker safety standards (29 CFR 1910; 29 CFR 1926)	Response actions carried out under the National Contingency Plan - not generally considered an ARAR as it is a requirement of the NCP	40 CFR 300.150	
	Maintain worker exposures to ALARA	Internal and external sources of continuous exposure to occupational workers at a DOE facility - **TBC guidance**	DOE Order 5480.11	
	Maximum exposure to occupational workers; 5 rem/year (stochastic); 50 rem/year (nonstochastic) effective does equivalent	Internal and external sources of continuous exposure to occupational workers at a DOE facility - **TBC guidance**	DOE Order 5480.11	
	Comply with provisions for worker safety in confined spaces in ANSI Z117.1	Response actions at DOE facilities which require workers to enter confined spaces - **TBC guidance**	DOE Order 5480.4	
LOCATION-SPECIFIC	None			

the Kentucky Division of Water, to implement the requirements of 401 K.A.R. § 5:055, contains limits appropriate for the surface water use classification designated by the Commonwealth of Kentucky. KPDES Outfall 001 flows into Big Bayou Creek which has been designated as a warm water aquatic habitat. Warm water aquatic habitat criteria which are allowable in-stream concentrations for specific substances are designed to protect aquatic life from acute and chronic toxicity [401 K.A.R. 5:031(4)].

Effluent limitations are applicable at outfalls where monitoring takes place and are only enforceable at KPDES outfalls. The requirements of 401 K.A.R. § 5:055, as implemented through the KPDES permit No. KY0004049 would be a relevant and appropriate requirement for effluent discharged from the ion exchange because the PCB limit imposed by the permit must be met at the outfall. Therefore, if the KPDES permit limit is not exceeded in the water discharged from the ion exchange system, the system would not cause the permit limit to be exceeded at Outfall 001.

The SDWA and the Kentucky Public and Semi-Public Drinking Water Regulations are TBC guidance for this action. These regulations along with DOE's guidance to reduce exposures to radiation to levels "As Low As Reasonably Achievable" (ALARA) are being used as treatment goals to limit the introduction of radionuclides into the NSDD. The MCLs will be the target treatment levels for radionuclides being discharged from the C-400 Cleaning Building. These levels were selected for the target treatment level based upon the technical judgment of DOE, due to the limited characterization and risk information available, and the need for action to stabilize the unit and prevent further degradation. The most protective standards available, the MCLs, were selected for use in the action. The required treatment levels for radionuclides in the unit will be re-evaluated through the remedy selection process for the final ROD for the NSDD and the Surface Water Integrator Operable Unit.

Quantities of ^{99}Tc and uranium have been found in the soil and sediment of the NSDD. DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, limits radiation exposure to members of the public to an effective dose equivalent of less than 100 mrem/year, a dose of less than 5 mrem/year to any organ, and an effective dose of less than 4 mrem/year through drinking water. To achieve these standards, DOE Order 5400.5 also specifies derived concentration guidelines (DCGs) for radionuclides in water and air. According to DOE Order 5400.5, uranium concentrations in surface water at 0.71% 235U should not exceed 0.87 milligrams per liter (mg/l) and ^{99}Tc in surface water should not exceed 100,000 picocuries per liter (pCi/l). In addition, DOE Order 5400.5 mandates that DOE personnel and contractors strive to ensure that radiation doses to members of the public are as low as reasonably achievable (ALARA) below the appropriate limits.

DOE Orders are applicable internal requirements for DOE facilities; therefore, they are not legally enforceable requirements. DOE Order 5400.5 would be TBC guidance for the discharge of radionuclides to the NSDD.

Action-specific

Onsite construction activities may be necessary to prepare the site for implementation of the chosen alternative. These construction activities could produce airborne pollutants. Elevation of particulate concentrations resulting from earth-moving and site-grading activities may exceed the Kentucky Air Quality regulations found in 401 K.A.R. § 63:010 *et seq.* which contain General Standards of Performance governing fugitive dust emissions.

The regulations in 401 K.A.R. § 63:010(3) require the use of water or chemicals if possible and/or to place asphalt or concrete on roads and material stockpiles to control dust. The regulation also requires that visible fugitive dust in the ambient air must not extend beyond the property line of the dust originating facility. All open bodied trucks operating outside the property boundary which may emit airborne materials must be covered.

The treatment unit may generate spent ion exchange elements or other treatment residuals. The clean-up activity will generate decontamination water which is used to clean the construction equipment as well as personal protective equipment. Additionally, excavation of soil to place the gabion structure and filter will result in waste requiring management. All waste will have to be characterized to determine if the waste is hazardous [401 K.A.R. 34:020(4)], if it contains PCBs above 50 ppm (40 C.F.R. § 761.60), and/or is radioactive (DOE Order 5400.5).

DOE Order 5820.2A Radioactive Waste Management establishes policies, guidelines, and minimum requirements by which 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 assures protection of the health and safety of the public, DOE, contractor employees, and the environment. The management of low-level radioactive waste must be managed in such a manner that external exposure to the waste and concentrations of radioactive material which may be released to the surface water, ground water, soil, plants and animals results in an effective dose equivalent which does not exceed 25 mrem/year to any member of the public. Additionally, reasonable effort should be made to maintain releases of radioactivity in effluents to the general public as low as reasonably achievable. DOE Order 5820.2A should be evaluated as TBC guidance.

Kentucky regulations applicable to generators of hazardous waste are detailed in 401 K.A.R. § 32 *et seq.* Onsite accumulation of hazardous waste may occur for 90 days or less without a permit or without having interim status if requirements found in 401 K.A.R. § 32:030(5) are followed. This regulation details container marking requirements and KDEP notification requirements. If hazardous waste is stored for more than 90 days, requirements of 401 K.A.R. Chapter 34. Chapter 34 specifies the standards for owners and operators of hazardous waste storage, treatment and disposal facilities.

If these wastes are determined to be RCRA and Atomic Energy Act (AEA) mixed waste, then RCRA will apply to the hazardous waste component and the AEA will apply to the radioactive component of the waste [10 C.F.R. § 962(b)]. Movement of

treatment residuals containing RCRA-characteristic waste and radionuclides to another unit will trigger the 40 C.F.R. § 268.1 *et seq.* (Land Disposal Restrictions), an applicable ARAR for this alternative. DOE and EPA entered into Federal Facility Compliance Agreement Docket No. 92-03-FFR on June 30, 1992. This FFCA allows the storage of radioactive mixed waste containing an LDR prohibited hazardous waste component while treatment capacity is being developed. Whether the waste is characterized as RCRA characteristic, LLW, or mixed waste, it will be stored at an appropriate facility at PGDP which meets the substantive requirements of RCRA.

If the liquid waste contains only PCBs at concentrations greater than, or equal to, 50 ppm, then 401 K.A.R. § 37:050(2)(6) prohibits the storage of such waste unless the storage facility meets the Toxic Substances Control Act (TSCA) requirements found in 40 C.F.R. § 761.65. If the liquid waste contains only PCBs at concentrations less than 50 ppm, then the waste can be stored by following the requirements in 401 K.A.R. § 34:180 *et seq.* which entails the use and management of containers. Chapter 34 establishes minimum standards for new hazardous waste sites or facilities and minimum standards for the use and management of containers.

A storage facility which contains PCBs must meet the minimum TSCA requirements found in 40 C.F.R. § 761.65(b). These requirements are an adequate roof and walls to prevent rain water from reaching the stored PCBs and an adequate floor which has continuous curbing with a minimum six inch curb. These floor curbings must be made of continuous smooth and impervious materials to prevent or minimize penetration of PCBs. Moreover, the facility must not contain drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from the curbed area. Finally, the facility must not be located below the 100-year flood water elevation.

If wastes are shipped offsite for treatment and/or disposal, the following regulations will apply. 49 C.F.R. § 172 *et seq.* lists and classifies those materials which the Department of Transportation (DOT) has designated as hazardous materials (49 C.F.R. §§ 172.101 and 172.102) for purposes of transportation and prescribes the requirements for shipping papers (Subpart C of 49 C.F.R. § 172), package marking (Subpart D of 49 C.F.R. § 172), labeling (Subpart E of 49 C.F.R. § 172, and transport vehicle placarding applicable to the shipment and transportation of those hazardous materials (Subpart F of 49 C.F.R. § 172).

Additional requirements which are applicable to the transportation of hazardous material are located in 40 C.F.R. subparts 263 et al. These regulations detail standards for which persons transporting hazardous waste in the United States must adhere, including a manifest system, recordkeeping, and hazardous waste discharges. However, these regulations do not apply to on-site transportation of hazardous waste by generators or by owners or operators of permitted hazardous waste management facilities. 49 C.F.R. subpart 271 would be considered potentially applicable since it applies to each person who offers a hazardous material for transportation and each carrier who transports the material.

There is currently no criteria for qualifying radioactive waste as clean and acceptable for offsite shipment as non-radioactive waste. Radioactive or mixed waste can, however, be shipped to approved Nuclear Regulatory Commission (NRC) licensed facilities. Waste generated from this project will be stored onsite until characterization can be completed or disposal criteria can be met.

Requirements for providing and maintaining emergency response information during transportation and at facilities where hazardous materials are loaded for transportation, stored incidental to transportation or otherwise handled during any phase of transportation are delineated in Subpart G of 49 C.F.R. § 172. Training requirements for employees involved with the handling of hazardous waste (hazmat) are included in Subpart H of 49 C.F.R. § 172. Training ensures that a hazmat employee has familiarity with Subpart H requirements, is able to recognize and identify hazardous materials, and has knowledge of emergency response information, self-protection measures, and accident prevention methods and procedures. Subpart I of 49 C.F.R. § 173 sets forth requirements for transportation of radioactive materials by carriers and shippers. Package requirements, radiation level limitations, contamination control, and general transportation requirements are included in Subpart I. These regulations are applicable since provision and maintenance of said emergency response information is required for any contaminated material generation.

Specifications for packagings and containers used for the transportation of hazardous materials in commerce are included in 49 C.F.R. § 178 *et seq*. Subpart K of 49 C.F.R. § 178 consist of guidelines for packagings of Class 7 (radioactive) materials. 49 C.F.R. § 179 *et seq.* prescribes specifications for tanks that are to be mounted on, or form part of, a tank car and which are used in the transportation of hazardous materials in commerce.

The NCP (40 C.F.R. § 300.150) requires all response actions to comply with the provisions for response action worker safety and health found in 29 C.F.R. § 1910.120. In addition, DOE Orders which address occupational safety would be applicable internal TBC guidance for DOE projects. These Orders are 5480.11, *Radiation Protection for Occupational Workers* and 5480.4, *Environmental Protection, Safety, and Health (ES&H) Protection Standards*.

DOE Order 5480.11 establishes radiation protection standards and program requirements for DOE and DOE contractor operations with respect to the protection of the worker from ionizing radiation. The Order applies to all DOE operators and contractors performing work for DOE. Furthermore, in accordance with DOE's policy, radiation protection standards must be implemented which are consistent with the Presidential approved guidance to Federal Agencies promulgated by the EPA and based on recommendations by authoritative organizations.

DOE Order 5480.4 specifies and provides requirements for the application of the mandatory environmental protection, safety, and health standards which are applicable to all DOE and DOE contractor operations while providing a list of references and sources of ES&H standards. The Order should be followed during

design, construction, operation, modification, and decommissioning. Specifically, this Order is applicable where DOE has authority to establish and enforce environmental protection, safety and health protection program requirements.

In order for construction to be conducted on the lift station, a PGDP employee will have to work in a confined space. DOE Order 5480.4 states that safety for a worker in a confined space must meet the standards documented in the American National Standards Institute's criterion entitled "Safety Requirements for Working in Tanks and Other Confined Spaces" ANSI Z117.1 (1989). ANSI standards provide minimum safety requirements to be followed while entering, exiting and working in confined spaces at normal atmospheric pressure. This standard is intended to establish minimum requirements and procedures for the safety and health of employees who work in, and in connection with, confined spaces.

Location-specific

There are no location-specific ARARs for this alternative.

Cost Effectiveness

The interim action remedy employs a proven technology which affords overall effectiveness proportional to its costs such that the remedy represents reasonable value. This action will utilize a relatively inexpensive technology to initiate control of the source and mitigate the spread of contamination in the NSDD. This limited scale operation should reduce the cost of the overall remediation of the integrator operable unit by retarding the migration of the high concentration effluent portion of the NSDD.

Utilization of Permanent Solutions and Alternative Treatment Technologies

The objectives for this interim action are to stabilize the site by instituting source controls to decrease the introduction of contaminants into the ditch, and installing engineering controls which will decrease mobilization of the most contaminated portion of the ditch. This action should provide protection of human health and the environment. However, it does not fully address the principal threats to human health and the environment posed by the NSDD operable unit. This is not the final action planned for NSDD contamination. Subsequent actions will fully address the principal threats posed by the conditions at the PGDP. Utilization of a permanent solution will be addressed in the final decision document for the NSDD and the surface water integrator operable unit.

Preference for Treatment as a Principle Element

This interim action satisfies the statutory preference for treatment as a principal element of the action. This statutory preference will also be addressed in the final decision document for the NSDD and the Surface Water Integrator Operable Unit.

2.11 Documentation of Significant Changes

The *Proposed Remedial Action Plan for Source Control at the North-South Diversion Ditch*, was made available for public comment on November 8, 1993. The Proposed Remedial Action Plan identified Alternative 3, source controls, institutional controls and engineering controls including the installation of a pipeline and lift station, as the preferred alternative. DOE has reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Remedial Action Plan, were necessary.

During the development of the final remedial alternatives for the Surface Water Integrator Operable Unit, including the NSDD, the necessity of action implemented under this ROD for interim action will be reevaluated. The final ROD for the surface water system may retain or replace portions or all of the actions conducted through this ROD. However, nothing conducted pursuant to this ROD is deemed inconsistent with likely final remedial actions.

PART 3

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 the 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 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 initiate control of the contamination found in NSDD. As part of the remedial action process, a notice of availability was published in *The Paducah Sun*, a regional newspaper, regarding the Proposed Remedial Action Plan on November 7, 1993. This notice appeared in *The Paducah Sun* from November 7th until November 14th of 1993. The *Proposed Remedial Plan for Source Control at the North-South Diversion Ditch* was released to the public on November 8, 1993. This document was made available at both the onsite and offsite administrative records and at the Paducah Public Library. A public comment period was held from November 8, 1993 through December 8, 1993.

Specific groups which received individual copies of the Proposed Remedial Action Plan included the local PGDP Neighborhood Council, and the PGDP Environmental Advisory Committee. Informal meetings were held with each group on December 9, 1993 and December 13, 1993, respectively. At these meetings DOE personnel briefed the groups on the proposed action and solicited both written and verbal comments.

Phone calls and/or visits were made to various stakeholders, including neighbors and representatives of environmental groups, to alert them to the public comment period and briefly explain the Proposed Plan. Proposed Remedial Action Plans and/or Interim Corrective Measures were mailed to those contacted.

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: to provide DOE with information about the community preferences and concerns regarding the remedial alternatives and to show members of the community how their comments were incorporated into the decision making process. This document summarizes both the oral and written comments during the various informal meetings and telephone calls, and the written comments received during the public comment period running from November 8, 1993 through December 8, 1993.

As evidenced from the comments received during the public comment period, the selected interim remedy specified in the Record of Decision for interim action is supported by both the community and governmental agencies. No comments were received from any group or organization opposed to this interim remedial action.

Comments received during the public comment period for the interim remedial action are summarized below. Comments and responses have been divided into two parts and are categorized by topic within the Responsiveness Summary. Part I

represents local community concerns, and Part II specific legal and technical questions. The comments below have been paraphrased in order to effectively summarize them in this document. Copies of the written comments are available for review at the administrative records.

3.2 Summary and Response to Local Community Concerns

COMMENT: The United States Department of the Interior (USDOI) stated, "We support the efforts of DOE to reduce contaminant mobility and volume. To ensure this is occurring, we recommend regular monitoring of the discharge after treatment."

RESPONSE: The effluent which flows through the NSDD is discharged out the 001 KPDES Outfall. Consistent with the requirements of the KPDES permit this outfall is monitored for radionuclides on a monthly basis. Additionally, all discharges from C-400 will be sampled prior to release to ensure they comply with the target treatment goals specified in this Record of Decision.

COMMENT: "Any contamination which has left the reservation should be excavated and returned to the site. Signs and fences inside the complex will be satisfactory, unlike those placed on the offsite portion of the North-South Diversion Ditch. Fences offsite are not tall enough to restrict deer from entering portions of the ditch. This constitutes a pathway of contamination to humans who would hunt the deer or other small animals. Also, some of the fences are not fully enclosed."

RESPONSE: This interim action is intended to mitigate the movement of onsite contamination by providing source control to the contaminated portions of the NSDD which are located within the boundaries of the PGDP security fence. Remedial activities for dealing with areas outside the PGDP security fence will be evaluated through a feasibility study for the surface water integrator operable unit.

On July 15, 1993, construction was completed on the signs and fencing as specified in the *Interim Corrective Measure Work Plan for Institutional control of Offsite Contamination in Surface Water*. The objectives of this work plan was to implement a system of institutional controls that would identify the areas of contamination through the posting of warning signs and restrict casual public access to the creeks. This document was released for a thirty day public comment on October 30, 1992. No written comments were received.

To ensure protection of individuals which hunt in the areas adjacent to the PGDP, DOE and the WKWMA have instituted a biological sampling program. Through this program, a representative number of deer are sampled to ensure that they don't pose a health risk to personnel utilizing the WKWMA.

COMMENT: "Since there is funding of 3.1 million dollars in the FY 94 budget to correct the problems associated with the North-South Diversion Ditch and you show expenses of 2,194,724 dollars, does this reflect an attitude of the future that it's not worth the effort to remediate the site completely?"

RESPONSE: The cost estimate cited in the *Proposed Remedial Action Plan For Source Control At The North-South Diversion Ditch* estimated a cost of $1,370,860 for the selected interim remedial action. These estimates have been further refined to a capital cost of $1,342,511 and a present worth cost of $1,419,525. DOE believes that these interim actions are a key component towards providing protection for human health and the environment, while progressing to final remedies for each operable unit. The decision to not implement a final action at the NSDD at this point in time was not based on economic factors.

DOE is committed to proceed to final actions for each operable unit once sufficient information is known to ensure that the selected remedy will provide protection to human health and the environment and comply with all applicable or relevant and appropriate requirements. Final remedial decisions for the NSDD and the Surface Water Integrator Operable Unit will be made through the remedial investigation and remedy selection process after the nature and extent of contamination in the surface water system and the contribution of contaminants from source operable units are more fully understood.

3.3 Comprehensive Response to Specific Legal and Technical Comments

COMMENT: "The control of contaminates should start at the source. I am satisfied with the installation of the Ion Exchange unit to remove the radioactive contaminates before they reach the environment. What I am not comfortable with are the terms 'Derived Concentration Guideline Level, Best Management Practice, and As Low As Reasonably Achievable.' The contractor and the Department of Energy determine these figures. Past experience has been if the acceptable levels cannot be met, you will increase the allowable levels. Historically the levels of releases have been too high, as shown in the sediment samples of the ditch."

RESPONSE: This Record of Decision serves as a legally enforceable document. Both EPA and Kentucky's Division of Waste Management have the authority to make DOE comply with the requirements of this document. The target level for treatment for radionuclides was determined through consultation with both EPA and KDEP. DOE has selected these target treatment levels to provide protection to human health and the environment by safeguarding both the surface water and the underlying ground water.

COMMENT: DOE "failed to mention the sewer system that consists of a network of piping that collects surface drainage and building, roof, and floor drainage that is released to nine effluent ditches leading to Big and Little Bayou Creeks. The sediments within these pipes contain PCBs and radioactive contaminants which would also constitute a source of contamination. The use of silt trap, lift station, and piping will slow the contaminates in the North-South Ditch; but by not addressing the other nine ditches which constitute another major pathway for contamination, your efforts will be minimal."

RESPONSE: This interim action at the NSDD constitutes an incremental step towards comprehensively addressing the Surface Water Integrator Operable Unit. The sewer system and ditches cited in the comment are to be investigated and

remediated as part of Waste Area Group 18. DOE, EPA, and KDEP are currently negotiating the generic baseline schedules for the Waste Area Groups. These schedules will be part of the PGDP Site Management Plan. Once agreement has been reached on the generic baseline schedule, DOE will have a projected start date available to the public for initiation of the remedial activities for WAG 18.