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Bechtel Jacobs Company LLC

DOE Contract No. DE-AC05-98OR22700
Job. No. 23900
October 16, 2002

Mr. W. Don Seaborg
Paducah Site Manager
U.S. Department of Energy
P.O. Box 1410
Paducah, KY 42002-1410

Subject: *Record of Decision for Interim Remedial Action at the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/OR/07-1948&D2)*

Dear Mr. Seaborg:

Enclosed are three additional copies, including the errata sheet, of the signed version of the subject document for your use. This document was prepared as a collaborative effort between Department of Energy (DOE) and the regulatory parties. The signed version reflects the working document as it appeared upon receipt of signature; as such, the document did not receive a final editorial review. DOE requested that Bechtel Jacobs Company LLC (BJC) distribute the document as signed, without inclusion of final formatting changes. Since final formatting was not completed for the signed document, an errata sheet has been attached to the document to aid the reader.

On October 10, 2002, 15 copies of the subject document were forwarded to the following at the Commonwealth of Kentucky regulatory agencies: Ms. Gaye Brewer, Mr. Robert Daniell (7), Mr. Steve Hampson, Ms. Janet Miller, and Mr. Eric Scott. Four copies of the enclosed document were transmitted to the following at the U.S. Environmental Protection Agency: Mr. Jeff Crane and Mr. Carl Froede (3). This document was distributed to the regulators in accordance with the *Standard Distribution List for Bechtel Jacobs Company LLC Primary and Secondary Documents (09/26/02)*, with the exception of the distribution to BJC, which will be made with issuance of this letter.

If you have any questions or require further information, please contact Rudy Bonilla of my staff at 5198.

Sincerely,

Gordon L. Dover
Paducah Manager of Projects

GLD:dj
LTR-PAD/EP-DJ-02-0127

Enclosure: Subject document

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DOE/OR/07-1948&D2
Primary Document

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

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

DOE/OR/07-1948&D2
Primary Document

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

Date Issued—August 2002

Prepared for the
U.S. Department of Energy
Office of Environmental Management

Environmental Management Activities at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky 42001
managed by
Bechtel Jacobs Company LLC
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-98OR22700

Errata Sheet for

Record of Decision for Interim Remedial Action at the North South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/OR/07-1948&D2

The *Record of Decision for Interim Remedial Action at the North South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-1948&D2, was prepared as a collaborative effort between the U.S. Department of Energy and the regulatory parties. This signed version reflects the worlung document as it appeared upon receipt of signature; as such, this document did not receive a final editorial review.

Since final formatting was not completed for the signed document, this errata sheet has been developed to aid the reader. Instances of underlining and missing text from bullets appear in the document because a final edit was not performed, and these instances should not be considered significant with regard to content or style. For example, page 32 shows "DOE, EPA, and KNREPC have" as underlined text and page 42 shows text in bold as a heading. Examples such as these should not be regarded as intentional. –

1) Page 30 is blank.

2) The note found on page 38 is associated with the table on the preceding page.

3) Page 41 is blank.

4) The bolded text on page 42, paragraph 2, refers to Table 2.76. This text should reference Table 2.6.

5) Table 2.7 does not exist in this document.

6) Page 44 contains an empty bullet "(1)." There is no text associated with this bullet.

7) The footnote on page 46 contains the text related to the Proposed Remedial Action Plan (PRAP). The following paragraph is not part of the footnote.

8) Page 65 contains an empty bullet in Section 2.12.2. There is not text associated with the second bullet.

9) Page 69, paragraph 2 refers to Tables 2.12 and 2.13. These tables are found on pages 72-75.

10) Pages 73 and 74 are blank.

11) Page 78, paragraph 3 refers to Table 2.15. This text should reference Table 2.16.

PREFACE

This *Record of Decision for Remedial Action at the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-1948&D2, was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation and Recovery Act, and KRS 224.46-530 for documenting the selection of a preferred remedial action or corrective measure for a solid waste management unit. Publication of this document will meet a primary document deliverable for the U.S. Department of Energy, pursuant to the Paducah Gaseous Diffusion Plant's *Federal Facility Agreement.*

This Record of Decision follows the issuance of a Proposed Remedial Action Plan and selects the remedial action for Sections 1 and 2 (i.e., Alternative 2) of the NSDD. Decisions for remaining portions of the North-South Diversion Ditch (e.g., the portion located outside the security fence) are not included in this Record of Decision.

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CONTENTS (continued)

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FIGURES

TABLES

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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
AWQC	Ambient Water Quality Criteria
BGOU	Burial Grounds Operable Unit
bgs	below ground surface
BJC	Bechtel Jacobs Company LLC
CAA	Clean Air Act
CAB	Citizens Advisory Board
CFR	*Code of Federal Regulations*
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COC	contaminant of concern
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDE	effective dose equivalent
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
EPC	exposure point concentration
FFS	focused feasibility study
FR	*Federal Register*
FS	feasibility study
GWOU	Ground Water Operable Unit
HEAST	EPA's Health Effects Assessment Summary Tables
HI	hazard index
HSWA	Hazardous and Solid Waste Amendments
IRA	interim remedial action
IRIS	EPA's Integrated Risk Information System
KAR	Kentucky Administrative Regulations
KDEP	Kentucky Department for Environmental Protection
KDFWR	Kentucky Department of Fish and Wildlife
KNREPC	Kentucky Natural Resources and Environmental Protection Cabinet
KPDES	Kentucky Pollutant Discharge Elimination System
KRS	Kentucky Revised Statutes
LLW	low-level waste
LUC	land use control
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
MOA	Memorandum of Agreement
NCEA	EPA's National Center for Exposure Assessment
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NSDD	North-South Diversion Ditch

ACRONYMS AND ABBREVIATIONS (continued)

NTS	Nevada Test Site
NWP	Nationwide Permit
O&M	operation and maintenance
OREIS	**Oak** Ridge Environmental Information System
OSHA	Occupational Safety and Health Administration
OU	operable unit
PAHs	polynuclear aromatic hydrocarbons
PEC	Probable Effect Concentration
PEL	Probable Effect Levels
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
PRAP	proposed remedial action plan
PTSM	principal threat source material
RAOs	remedial action objectives
RCRA	Resource Conservation and Recovery Act
ROD	record of decision
RI/FS	remedial investigation/feasibility study
SARA	Superfund Amendments and Reauthorization Act
SMP	Site Management Plan
SSAB	Site-Specific Advisory Board
SOU	Soils Operable Unit
SWMU	solid waste management unit
SWOU	Surface Water Operable Unit
T&E	threatened and endangered
TBC	to be considered
TCA	trichloroethane
TCE	trichloroethene
TRU	transuranic waste
TSCA	Toxic Substances Control Act
USCA	United States Code Annotated
USEC	United States Enrichment Corporation
USVS	upper screening values
UTS	universal treatment standards
WAC	waste acceptance criteria
WAG	waste area group
WKWMA	West Kentucky Wildlife Management Area

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PART 1

DECLARATION

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

SITE NAME AND LOCATION

North-South Diversion Ditch
Surface Water Operable Unit
Paducah Gaseous Diffusion Plant
U.S. Department of Energy
Paducah, Kentucky
CERCLIS # KY8-890-008-982

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the North-South Diversion Ditch (NSDD) at the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky, that was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for this site.

In addition, this decision document has been prepared in accordance with paragraph II E.2 of the *Secretarial Policy Statement on the National Environmental Policy Act* (DOE 1994a) which states, "To facilitate meeting the environmental objectives of CERCLA and to respond to concerns of regulators, consistent with the procedures of most other Federal agencies, the Department of Energy (DOE) hereafter will rely on the CERCLA process for review of actions to be taken under CERCLA and will address National Environmental Policy Act (NEPA) values and public involvement procedures as provided below...Department of Energy CERCLA documents will incorporate NEPA values, such as analysis of cumulative, off-site, ecological, and socioeconomic impacts, to the extent practicable."

A Focused Feasibility Study (FFS) for the NSDD, submitted to the U.S. Environmental Protection Agency (EPA) and Commonwealth of Kentucky on January 8, 2001, provided an evaluation of alternatives for remediation of the NSDD. In addition, a Proposed Remedial Action Plan (PRAP) was submitted for public comment on October 1, 2001. This PRAP presented preferred remedial actions for the surficial soil and sediment in all five sections which comprise the NSDD OU. However, this ROD selects remedial actions only for human exposure to surficial soils and sediment in Sections 1 and 2 of the NSDD (i.e., the portion inside the existing security fence), and defers ecological considerations, groundwater considerations, and remediation decisions on the remainder of the OU. For this reason, this is an interim action with respect to the entire NSDD OU. The Commonwealth of Kentucky and the EPA concur with the remedial action selected in this document by the DOE. This action will serve as an incremental step toward comprehensively addressing problems within the Surface Water Operable Unit (SWOU).

The public notice of the PRAP for the NSDD served as a Statement of Basis for the tentative decision to grant a modification to the Kentucky Hazardous Waste Permit (Permit Number: KY8-890-008-982) for the incorporation of this proposed action for the NSDD. The Commonwealth of Kentucky's concurrence with this selected remedy constitutes its approval of the permit modification to the Kentucky Hazardous Waste Permit. This permit modification will become effective upon the final signature.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the NSDD, if not addressed by implementing the response action selected in this Record of Decision (ROD), will continue to present an endangerment to public health, welfare, or the environment.

DESCRIPTION OF SELECTED REMEDY

Source units and areas of contamination at the PGDP have been combined into four operable units (OUs) for evaluation of remedial actions. These OUs include the SWOU, the Burial Grounds Operable Unit (BGOU), the Soils Operable Unit (SOU), and the Groundwater Operable Unit (GWOU). Each OU is designed to remediate an area and contaminated media associated with the PGDP. The SWOU consists of source units that primarily contain surface water contamination or potentially contribute to surface water contarnination. These units include the NSDD, outfall ditches, impoundment ponds, and Little Bayou and Bayou Creeks. DOE, EPA and the Commonwealth of Kentucky have agreed that preventing off-site migration of contaminants is the highest site-wide priority for non-emergency clean-up activities at PGDP, and that containment of potential surface water discharges of contaminants on PGDP property is the highest priority for the SWOU.

The portion of the NSDD addressed by the remedial action is comprised of 2 sections (i.e., Sections 1 and 2) and 1 solid waste management unit (SWMU) (i.e., SWMU 59). This portion of the NSDD is located inside the main security fence surrounding the industrialized portion of the PGDP. Prior to evaluating a response action under CERCLA for the NSDD, DOE, state, and federal regulatory agencies established a technical working group known as the Core Team, which consists of representatives from DOE, EPA, and the Commonwealth of Kentucky (specifically the Kentucky Cabinet for Natural Resources and Environmental Protection and the Kentucky Cabinet for Health Services). The Core Team was established with the intent of providing a mechanism to build consensus among the parties of the PGDP Federal Facility Agreement (FFA) in an effort to expedite the scoping, planning, and development process for site characterization and removal/remediation activities (including the development, review, and approval of CERCLA decision documents).

The PGDP Core Team developed an OU Scoping Strategy, or a methodology to be used for identifying candidate SWMUs and areas of concern (AOCs) at PGDP for early action. The intent of the scoping strategy is to identify SWMUs for which sufficient characterization information is available (e.g., analytical data and process knowledge) to determine the need for a response action. Under the strategy, if a SWMU is identified as posing a significant risk based on the existing information, then it may be a candidate for early action. Documentation of the Core Team process is provided in the Administrative Record. The Core Team determined that the NSDD was a candidate for early action due to risks associated with contaminated soil in the banks of the ditch, contaminated sediments in the ditch, and the potential for contaminated surface water runoff from the PGDP into portions of the ditch located outside the security-fenced area.

The remedial action objectives (RAOs) developed by the Core Team for sections of the NSDD located inside the security-fenced area at PGDP (i.e., Sections 1 and 2) are as follows:

- prevent future discharge of process water to the NSDD;

- reduce the risk to industrial workers and ecological receptors from exposure to contaminated surface soil, sediment, and surface water; and

- prevent future on-site runoff from being transported offsite (i.e., outside the existing security fence) via the NSDD.

The land use control (LUC) objective identified to assure the protectiveness of the preferred alternative for Sections 1 and 2 of the NSDD are as follows:

- Sections 1 and 2 (Industrial areas) – Restrict unauthorized access, restrict unauthorized excavations or penetrations below prescribed contamination cleanup depth, and restrict uses of the area that are inconsistent with the assumed industrial use (i.e., to prevent recreational and/or residential use).

Implementation of Land Use Controls designed to meet these objectives will be documented in a Land Use Control Implementation Plan. DOE is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the Land Use Controls selected under this ROD.

The major components of the selected remedy include a two-phased approach. Phase I of the selected remedy includes the following components.

- Installation of piping to route process discharges, which currently go to the NSDD, directly to the C-616 Water Treatment Facility;

- Installation of storm-water runoff controls in the NSDD downstream of Section 2 prior to excavation of a surge basin during Phase I (existing culverts at the downgradient end of Section 2 will be plugged and filled with controlled low strength material as an initial step in surge basin construction and existing sediment controls inside the security fence will remain in place to control runoff);

- Excavation of a surge basin to contain storm-water runoff until it can be treated through the C-616 facility; and

- Installation of a plug in the NSDD at the PGDP security fence and in three other ditches within the watershed to prevent discharge of storm-water runoff to sections of the NSDD outside the PGDP security fence.

Phase II of the selected remedy includes the following components.

- Complete excavation of contaminated soils/sediments along Sections 1 and 2 of the NSDD to achieve specified cleanup levels. Sections of the NSDD located inside the PGDP security-fenced area (Sections 1 and 2) will be excavated to remove contaminated soils/sediments and a clay cover will be installed at the base of the excavation. The clay cover will provide an extra layer of protection in the elimination of the surface exposure pathway.

- Appropriate staging and disposal of contaminated materials excavated during Phases I and II. Non-hazardous waste generated as a result of the NSDD remedial action will be disposed of in the C-746-U Landfill.

- Restoration of Sections 1 and 2 of the NSDD to grade with 2 ft of clay cover, approximately 2 ft of clean soil and vegetation following completion of excavation activities. The clay cover will provide an extra layer of protection in the elimination of the surface exposure pathway. If excavation achieves or exceeds the specified cleanup levels for Section 1, long-term maintenance of the clay

cover would not be required. However, since the extent of contamination is not characterized fully and the remediation focuses on the ditch only, it is possible that some residual contamination would remain at depth. Any residual contamination would be addressed by the GWOU.

Sections 1 and 2 of the NSDD, located within the security-fenced area of PGDP, are identified as an industrial zone for both current and anticipated future land use. As part of the selected remedy for the NSDD remedial action, LUCs, consisting of property record notices and restrictions, administrative controls (e.g., excavation/penetration permits), and access controls (e.g., fences, gates, security measures), will be imposed for portions of the NSDD within the security-fenced area of PGDP. LUCs and five- year reviews will be required. LUCs will be implemented as an integral part of the selected remedy and will be maintained to ensure long-term protectiveness until the FFA parties deem them unnecessary. DOE is responsible for implementing, monitoring, maintaining, reporting on, and enforcing the LUCs selected in this ROD in accordance with the requirements in the LUCIP approved for the NSDD.

Final disposition of all contaminated materials associated with the NSDD Remedial Action will be to an approved on-site or off-site facility, preferably the on-site C-746-U Landfill or, if necessary, another on-site facility or to an off-site facility [e.g., Envirocare or the Nevada Test Site (NTS)]. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. A risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Non-hazardous waste generated as a result of the NSDD remedial action will be disposed of in the C-746-U Landfill. DOE estimates that approximately 90 % of the remediation waste resulting from the Phase I and Phase II activities will be disposed of in the C-746-U Landfill.

If significantly more than 10% of the Phase I and/or Phase II remediation waste is subsequently determined after excavation and characterization to exceed the WAC and to be inappropriate for disposal at the C-746-U Landfill and so must be shipped and disposed offsite at more expense, DOE's estimate of the cost of implementing Phase I and/or Phase 11 may increase substantially. Consistent with EPA Guidance (EPA 1988) cost estimates have been made based on an expected accuracy of –30% to +50%, and cost changes outside this range may be considered "substantial." Should any of the FFA parties conclude in good faith that such a substantial cost increase appears likely, any of the FFA parties may require DOE, EPA, and the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) to reconsider the selected alternative in light of the anticipated cost increase. If, as the result of their reconsideration, the three FFA parties agree that, or the dispute resolution process under the FFA determines that, significant changes or fundamental alterations should be made to the previously-selected action, then the proposed changes will be documented in accordance with the NCP using procedures that provide the public with an opportunity to review and comment on the proposed changes prior to any final decision on adopting them.

Phase I work will proceed upon signature of the ROD. Phase II excavation work will begin after Phase I activities are complete, and disposal options have become available. During implementation of Phase I and II activities, results from characterization of remediation wastes will be used to determine to what extent remediation wastes can be placed in the C-746-U Landfill. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. A risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Mixed waste generated during remedial actions will be managed in accordance with the PGDP Site Treatment Plan. Should any party, as contemplated above. require the reconsideration of the selected alternative during implementation of Phase I or II activities, all

excavation activities that would generate remediation waste will halt (unless FFA parties agree otherwise) pending the completion of the reconsideration process described herein.

STATUTORY DETERMINATIONS

This remedial action satisfies the mandates of CERCLA § 121 and the requirements of the NCP protective of human health and the environment, compliant with federal and state applicable or relevant and appropriate requirements (ARARs) for the scope of this limited action, and cost effective. In addition, this remedial action is consistent with Resource Conservation and Recovery Act corrective action requirements and the Hazardous and Solid Waste Amendments (HSWA) Permit for these SWMUs. Although this remedial action is a permanent solution, it does not satisfy the statutory preference for treatment or resource recovery to the maximum extent practicable as a principal element of the remedy, since the excavated waste will be disposed of without any planned treatment. Treatment was not retained in any of the alternatives for the detailed analysis because the assessment of the OU did not indicate the presence of any highly toxic or liquid source materials that constitute a principle threat, and treatment of the large volume of residual soil contamination would not be a cost effective means of meeting the RAOs. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining in Sections 1 and 2 of the NSDD above levels that allow for unlimited use and unrestricted exposure, **a** statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern and their respective concentrations
- Baseline risk represented by the chemicals of concern
- Cleanup levels established for chemicals of concern and the basis for these levels
- How source materials constituting principal threats are addressed
- Current and reasonably anticipated future land use assumptions
- Estimated cost of the remedial action
- Key factors that led to selection of the remedy

M. Holland

Date 9/25/02

Michael D. Holland, Acting Manager
U.S. Department of Energy

Richard D. Green

Date 21 AUG 02

Richard D. Green
Director, Waste Management Division
U.S. Environmental Protection Agency, Region 4

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PART *2*

DECISION SUMMARY

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DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

The PGDP, located in western Kentucky, is an active uranium enrichment facility owned by the DOE. The PGDP has been operating since the early 1950s and currently supplies enriched uranium for both government and commercial nuclear fuel needs. The PGDP was owned and managed first by the Atomic Energy Commission, DOE's predecessor, then by DOE, until 1993. On July 1, 1993, the United States Enrichment Corporation (USEC) assumed management and operation of the PGDP enrichment facilities under a lease agreement with DOE. However, DOE still owns the enrichment complex and is responsible for environmental restoration activities associated with operation of the PGDP (CERCLIS # KY8-890-008-982). In accordance with the NCP, DOE is the lead agency for this remedial action, and EPA and the Kentucky Department for Environmental Protection (KDEP)provide regulatory oversight pursuant to the **FFA.**

The PRAP addressed potential response actions for the entire NSDD (i.e., Sections 1, 2, 3, 4, and 5). At this time DOE, EPA, and the Commonwealth of Kentucky have decided to proceed with remediation of Sections 1 and 2 only; therefore, this ROD documents remedial decisions pertaining to Sections 1 and 2. Response actions for Sections 3, 4, and 5 will be addressed in a later decision document.

Alternatives 2 and 3, as described in the PRAP, are the same in regard to the remedial action proposed for Sections 1 and 2 of the NSDD. The preferred alternative identified in the PRAP for Sections 1 and 2 was Alternative 2; therefore, for simplicity, the remedial action proposed for Sections 1 and 2 in this ROD also will be referred to as Alternative 2.

The PGDP is situated on a 1,457-hectare (3,600 acre) reservation approximately 6.4 kilometers (km) **(4** miles) south of the Ohio River and about 16 km (10 miles) west of Paducah, Kentucky (Figure 2.1). About 304 hectares (750 acres) of the reservation are within a security area and buffer zone that have restricted access to the general public. Beyond the DOE-owned buffer zone is the Western Kentucky Wildlife Management Area, which covers approximately 2,428 hectares (6,000 acres).

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The entire NSDD is located on property owned by the DOE. For the purposes of this remedial action, the NSDD has been divided into sections that are numbered south to north (i.e., upgradient to downgradient). Sections 1 and 2 are within the plant security-fenced area: Sections 3, 4, and 5 are outside the security fenced area (Figure 2.2). The NSDD originates within the north central portion of the PGDP and discharges into Little Bayou Creek to the north of the plant. Little Bayou Creek originates within the West Kentucky Wildlife Management Area south of PGDP and flows northward to the Ohio River. Little Bayou Creek is intermittent in its upper reaches, becoming perennial downgradient of its confluence with Outfall 010, a continuous flow outfall from PGDP.

The portion of the NSDD within the security-fenced area SWMU 59 is approximately 793 m (2,600 ft) long (Figure 2.3). This portion of the ditch varies in width from approximately 2.5 to 3.1 m (S to 10 ft), and the depth ranges from approximately 0.2 to 1.5 m (0.5 to 5 ft). Inside the plant security fence, the ditch flows from Virginia Avenue north, beyond the C-616-C Lift Station, to the plant security fence. Inside the security-fenced area, the NSDD is vegetated with grasses and is posted for radiological contamination (pursuant to 10 *CFR* S35 requirements).

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The portion of the NSDD outside of the security-fenced area (SWMU 58) is approximately 2,562 m (8,400 ft) long (Figure 2.2). This portion of the ditch varies in width from approximately 4.6 to 11 m (15 to 36 ft), and the depth ranges from approximately 1.5 to 4.6 m (5 to 15 ft). The banks of the NSDD outside of the security-fenced area are generally vegetated with grasses and brush, and trees line some sections of the bank. Approximately 900 m (3,000 ft) of the NSDD (i.e., that portion nearest to Little Bayou Creek) fall within the 500-year floodplain of Little Bayou Creek, and some portions of this segment fall within the 100-year floodplain (COE 1994). Section 5 of the NSDD downstream of the C-746-U Landfill access road is a natural, relatively unmodified stream channel. Stream flow in this channel is intermittent in the southernmost reaches, but becomes perennial as it approaches Little Bayou Creek. Upstream of the C-746-U Landfill access road, the NSDD is channelized and bordered by mowed grasses, except for a short wooded segment immediately downstream of the security fence. The NSDD outside of the security-fenced area also is posted for radiological contamination (pursuant to 10 *CFR* 835 requirements).

2.2.1 Previous Investigations and Cleanup Decisions

Historically, the NSDD received wastewater from the C-400 Cleaning Building, coal pile runoff, and storm water. The primary functions of the C-400 Cleaning Building included cleaning, metal plating, metals

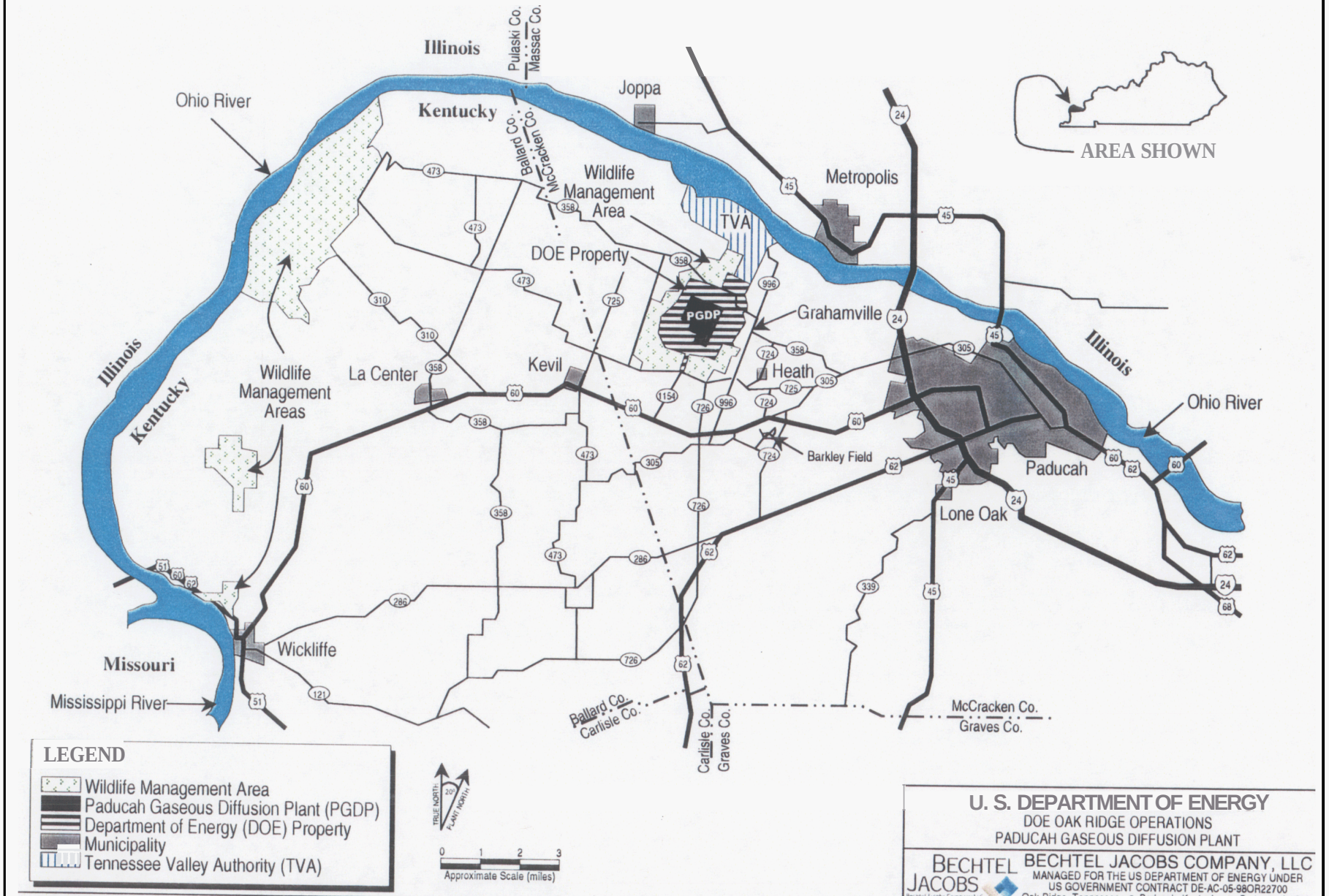

Fig. 2.1. Paducah Gaseous Diffusion Plant vicinity map.

U. S. DEPARTMENT OF ENERGY
DOE OAK RIDGE OPERATIONS
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL JACOBS COMPANY, LLC
MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

Science Applications International Corporation
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FIGURE No. c5ac90001sk127R1.ppt
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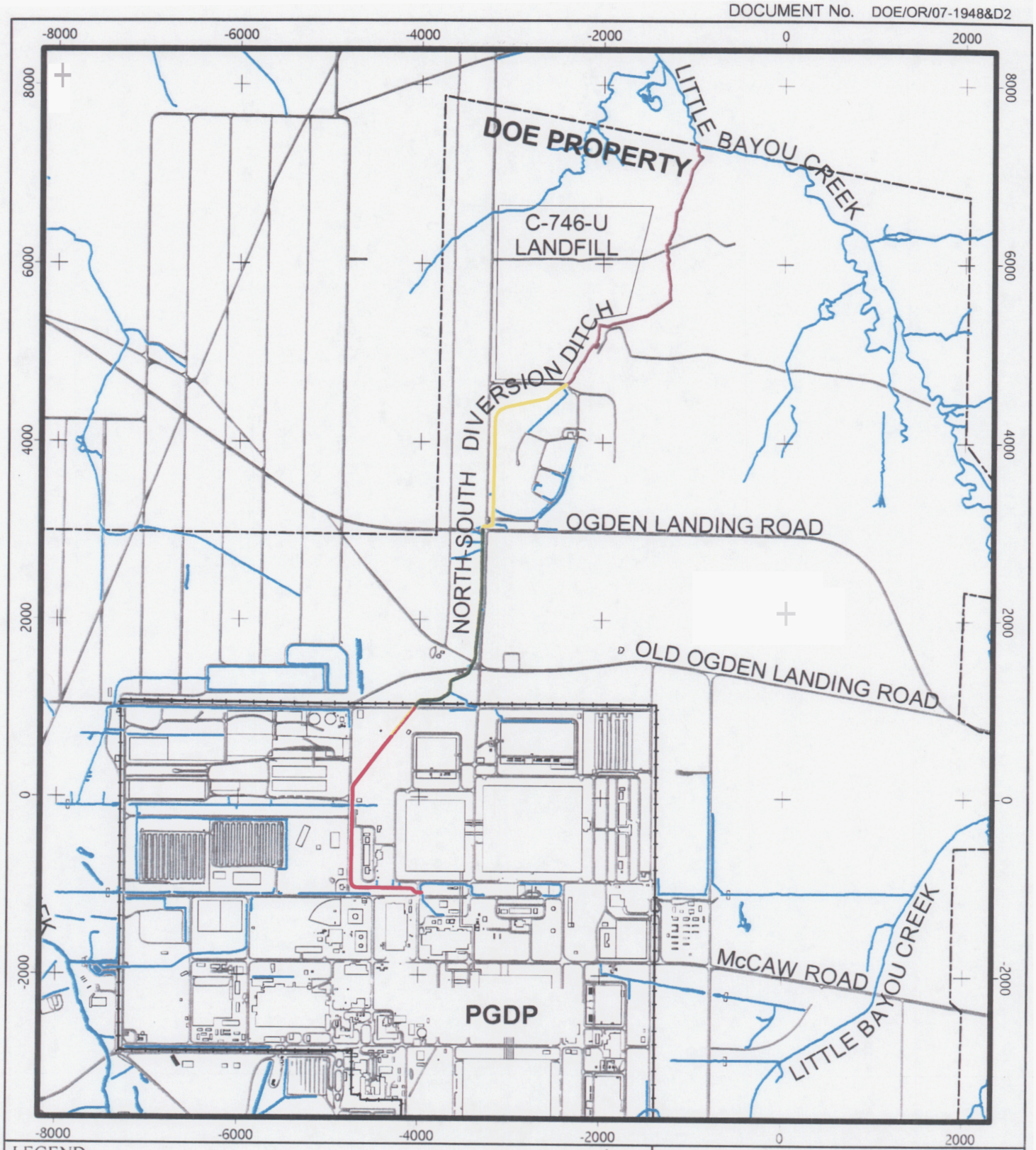

LEGEND:

- DOE BOUNDARY
- FENCE
- ROAD
- SURFACE WATER
- FACILITY
- NSDD SECTION 1
- NSDD SECTION 2
- NSDD SECTION 3
- NSDD SECTION 4
- NSDD SECTION 5

TRUE NORTH 20° PLANT NORTH

1500 0 1500
FEET

U.S. DEPARTMENT OF ENERGY
DOE OAK RIDGE OPERATIONS
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL JACOBS COMPANY LLC
MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER
US GOVERNMENT CONTRACT DE-AC-05-98OR22700
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Fig. 2.2. North-South Diversion Ditch location.

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FIGURE No. c5ac90001sk128R2.apr
DATE 02-21-02

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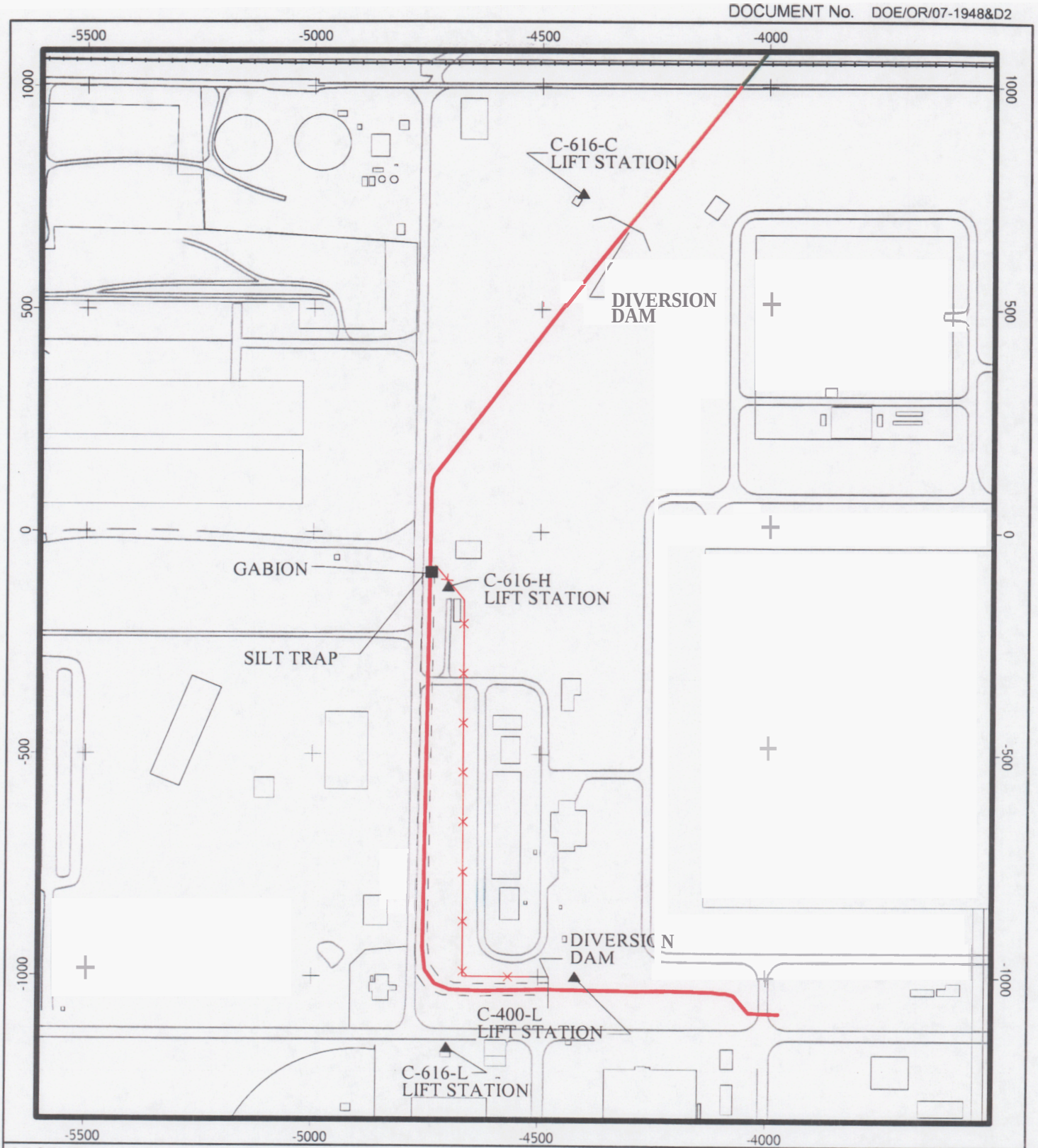

LEGEND:
- FENCE
- ROAD
- FACILITY
- LIFT STATION
- NSDD SECTION 1
- NSDD SECTION 2
- BY-PASSED NORTHSOUTH DITCH
- PIPELINES ABOVE GROUND

300 0 300 Feet

TRUE NORTH 20° PLANT NORTH

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Source: SAIC, 2001-L96NSDD.dwg

Fig. 2.3. Sections of the North-South Diversion Ditch inside the security-fenced area and vicinity.

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FIGURE No. c5ac90001sk129R2.apr
DATE 02-18-02

recovery, radioactive materials stabilization and recovery, uranium trioxide production. diffusion process equipment testing, and uranium tetrafluoride (green salt) pulverization. Sources of storm water runoff to the ditch include a steam plant (C-600), process buildings (C-335 and C-337), a cooling tower (C-635), electrical switchyards (C-535 and C-537), a neutralizing pit (C-403), and a feed plant (C-410). As a consequence, the soil and sediment in the ditch have been contaminated. Over the years, fly ash and coal dust from the C-600 Steam Plant and sediment from the ditch watershed nearly have filled the southern portion of Section 1 of the NSDD. This caused runoff from heavy rainfall events to overflow the ditch, primarily near 10th Street. In order to restore adequate flow, sediments periodically were dredged from the NSDD, and the spoils were placed near the banks of the ditch.

In 1977, the C-616-C Lift Station was constructed approximately 145 m (475 ft) upstream of the plant security fence. This lift station diverts all normal flow from upstream locations in the NSDD to the C-616-F Full Flow Lagoon for settlement of suspended solids prior to discharge through the Kentucky Pollutant Discharge Elimination System (KPDES) Outfall 001 ditch system to Bayou Creek.

In 1982, a portion of the NSDD located north of Ogden Landing Road was relocated to its present configuration to facilitate construction of the C-746-S and C-746-T Landfills. The former segment of the NSDD was filled and abandoned and now is located under the C-746-S and C-746-T Landfills. The abandoned segment of the ditch is not within the scope of this action. Remediation of the abandoned segment, now a portion of SWMU 145, will be addressed as part of any remedial actions for SWMU 145.

DOE entered into an Administrative Order by Consent pursuant to Sections 104 and 106 of CERCLA, effective November 23, 1988, with the EPA. The PGDP was issued a Kentucky Hazardous Waste Management Permit and an EPA HSWA Permit July 16, 1991. The PGDP was placed on the National Priorities List, effective June 30, 1994 (59 Federal Register 27989, May 31,1994). On February 13, 1998, DOE, EPA, and KDEP signed the *FFA* for the PGDP site.

The C-616-H Lift Station (Ditch 001 Lift Station) began operation in 1991. This lift station pumps effluent of the C-335 and C-337 Process Buildings and the C-535 and C-537 Switchyards into *the* NSDD for downstream capture by the C-616-C Lift Station and treatment through the C-616-F Full Flow Lagoon.

In 1992, an Interim Corrective Measure (ICM) included the installation of fencing and signs to restrict access to Little Bayou Creek and portions of the NSDD located outside the PGDP security fence (DOE 1992). Warning signs were installed along the NSDD north of the PGDP security fence to Ogden Landing Road. These signs warn that the ditch is contaminated and should not be used for drinking, recreational, or fishing purposes. In March 1994, DOE and EPA, with the concurrence of the KDEP, signed a ROD for an interim action at the NSDD as an incremental step toward addressing site-wide problems (DOE 1994b). The primary objectives of the interim action were to mitigate the discharge of contaminants into the NSDD, decrease the off-site migration of contaminants already present in the NSDD, and decrease the potential for worker exposure (i.e., direct human contact) to the contaminants within the ditch (DOE 1994b). The interim remedial action (IRA) consisted *of* the following activities:

- Installation of an ion exchange system in the C-400 Building to reduce radionuclide levels in the effluent to be discharged to the NSDD;
- Removal of fly ash from the C-600 Steam Plant effluent discharged to the NSDD;
- Flow from the sediment-filled southern end of the NSDD was piped northward to the C-616-H Lift Station to reduce the potential for mobilization of contaminants. This was accomplished by constructing a lift station (C-400-L) near the southern end of the NSDD.

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- **A** gabion-type rock structure was constructed in the NSDD upstream of the C-616-H Lift Station to trap sediment and mitigate the potential for sediment transport to off-site areas from the portion of the NSDD that was bypassed with the piping (i.e., the section from the C-400-L Lift Station to the C-6 16-H Lift Station).

- Warning signs were installed on both sides of the portions of the NSDD inside the security fence from Virginia Avenue to the C-616-C Lift Station. These signs provide notice that elevated levels of radionuclides, metals, and PCBs are present in the area.

Construction of the IRA was completed during August 1995 (DOE 1935). Once construction was completed, two components of the actions, the C-400 Ion Exchange and C-600 Fly Ash Lagoons, were incorporated into the daily operations of the PGDP by USEC and the discharge from the C-400 Ion Exchange system was routed into the Outfall 009 storm water drain to eliminate discharges from the C-400 Building to the NSDD. Lagoons constructed at the C-600 facility eliminated fly ash deposition in the NSDD.

In 1999 institutional controls were erected along Sections 3 and 4 of the NSDD to comply with 10 CFR 835. These controls consisted of radiological barriers (i.e., yellow and magenta chains), "Fixed Contamination Area" signs, and "10 CFR 835" explanation signs.

2.2.2 Land Use Controls

Areas at PGDP cannot support unrestricted use due to hazardous substances remaining in place after implementation of the selected remedy. Land use restrictions are required as part of this CERCLA action and will be achieved through imposition of LUCs that limit the use and/or exposure to those areas of the property that are contaminated. DOE will implement, monitor, maintain, and enforce the LUCs selected as part of this remedy to ensure that the remedy remains protective of human health and the environment.

DOE has agreed in a Memorandum of Agreement (MOA) with EPA and KDEP to comply with the PGDP Land Use Control Assurance Plan (LUCAP) whenever LUCs, including institutional controls, are selected as **part** of a remedial action (as in this ROD). The LUCAP, which is attached to the MOA, establishes procedures designed to ensure that each selected LUC will be implemented and properly maintained for as long as the LUC is needed to protect public health and the environment. Included in the LUCAP are requirements for planning implementation of each selected LUC, regular periodic monitoring of each LUC following its implementation, and annual certification by the manager of DOE–PGDP that each LUC continues to be effectively implemented.

Pursuant to the PGDP LUCAP, when **a** remedial action that includes LUCs has been selected, a LUCIP must be developed and included within Appendix B of the LUCAP,. DOE currently is developing a LUCIP for the NSDD that addresses the units covered under the ROD having LUCs selected as part of this action. . The LUCP will specify LUC objectives for the NSDD, identify the controls and mechanisms required to achieve each objective, and describe the actions necessary to implement and maintain the LUCs. DOE will submit this LUCP for regulatory approval with the RD/RA Workplan, a FFA Primary Document. Upon final approval, the NSDD LUCIP will be appended to and become part of the RD/RA Work Plan and LUCAP. The LUCIP will establish the implementation and maintenance requirements enforceable under CERCLA and the FFA, including enforceable requirements for regular periodic monitoring of each LUC after its implementation.

The three LUCs that will be used at the NSDD are summarized in Table 2.1 and include property record actions. administrative controls, and access controls. For each of these controls, the table specifies the purposes of the controls, duration, implementation, and affected areas. The primary controls that will be used to limit unauthorized activities in the remediation areas include signs and administration of an excavation/penetration permit program. Use restrictions and information about the residual contamination/waste management areas also will be recorded by DOE along with the original acquisition records (e.g., deeds) for the PGDP.

DOE is responsible for implementing, monitoring, maintaining, reporting on, and enforcing the LUCs selected in this ROD and the requirements in the LUCIP approved for NSDD. The LUCIP will remain in effect until the follow-on or final ROD for the NSDD has been signed and the follow-on or final LUCIP has been approved. The LUCIP may be modified or expanded, as needed, over the intervening period to address LUCs stipulated in other forthcoming decision documents for the NSDD.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The FFS and the PRAP for the NSDD at the PGDP in Paducah, Kentucky, have been made available to the public: the FFS in March 2001 and the PRAP in October 2001. They can be found in the Administrative Record file and information repository maintained at the Region 4 EPA Docket Room in the Paducah Public Library. The notices of availability for these two documents were published in a regional newspaper, *The Paducah Sun*. The notice for the FFS was published March 24, 2001, with a public comment period held from April 16, to May 31,2001. A PRAP was prepared in March 2001, but significant changes subsequently occurred to the preferred alternative, and a revised PRAP was developed and issued for public review and comment. The notice of availability for the revised PRAP was published September 23,2001, with a public comment period held from October 1 to November 15, 2001. Copies of the submitted comments on the revised PRAP are included in Appendix A. A formal Comment Response Summary addressing these comments is presented in Appendix B.

Specific groups that received individual copies of the revised PRAP include the Natural Resource Trustees and the PGDP Citizens Advisory Board (CAB), formerly known as the Site-Specific Advisory Board (SSAB).. The DOE, EPA, and Commonwealth of Kentucky jointly held a public meeting November 1, 2001, to present information on the revised PRAP to the community. A summary of this public meeting is provided in Appendix C of this document. Further information on public participation in the NSDD remedial action is presented in the Responsiveness Summary of this ROD.

DOE provided opportunity for public participation in accordance with applicable requirements of CERCLA, the Resource Conservation and Recovery Act (RCRA), and KRS 224 as outlined in the Paducah **FFA** and the DOE Community Relations Plan. In addition to providing the opportunity to review draft documents, DOE hosted two public information meetings - one on November 20, 2000, and another on November 1,2001.

Briefings were provided to the CAB in 2000 (September and October) and in 2001 (March, April, June, July, August, September, October, November, and December). The CAB Surface Water Task Force was briefed in 2001 (May, June, July, August, September and November).

The CAB and the Surface Water Task Force will continue to be updated as activities begin. Remedial Action Work Plans are made available to all members by placing a copy of the document in the CAB office and notifying members of the arrival. Tentatively, **a** tour of the area is being planned for the Surface Water Task Force and other interested CAB members. Work progress will be reported in the DOE bi-monthly newsletter, "Paducah Project Update," which is mailed to more than 2,000 stakeholders in the region.

2.4 SCOPE AND ROLE OF THE OPERABLE UNIT

The SWOU is one of four OUs at the PGDP being used for evaluation and implementation of remedial actions. The general scope and role of the SWOU is focused on contaminated media that primarily contain or cause surface water and associated sediment contamination. The SWOU consists of 52 source units (i.e., SWMUs) and areas of contamination that are being evaluated as **part** of the ongoing OU Remedial Investigation/Feasibility Study (RI/FS) activities. **As** a part of the SWOU evaluations, DOE, EPA, and KDEP identified the NSDD as an early action (i.e., one given priority relative to the other SWMUs). Although this response action is being selected as an interim action with respect to the NSDD inside the security fence, a subsequent ROD for the SWOU will document the final remedial action for the entire NSDD and/or SWOU as a whole.

The specific purpose of the NSDD response action is to prevent off-site migration of contaminants and to mitigate on-site direct exposure of humans and ecological receptors to soil, sediment, and surface water contaminated above identified cleanup goals. If DOE encounters principal threat source material (PTSM) [i.e., 1×10^{-3}, HI = 10, and Dose =25 mrem/year] that extends beneath the depths being proposed in this action (i.e., 4 feet) the DOE will engage the Kentucky Division of Waste Management and EPA to determine the extent of additional removal of soils to below PTSM criteria.

Table 2.1. Summary of LUCs for Sections 1 and 2 of the NSDD at the PGDP

Type of control	Purposes of control	Duration	Implementation	Affected areas
Property Record Actions Notices[a]	Provide notice to anyone searching records about the existence and location of contaminated areas and land use assumptions.	The LUC will remain in place until Kentucky/EPA approve DOE's request to modify/delete LUC.	Notice recorded by DOE in accordance with state law at County Court Clerk's office: as soon as practicable after signing of the ROD, as specified in the LUCIP	• SWMU 59 (i.e., Sections 1 and 2 of the NSDD)
Property Record Actions Restrictions[b]	Restrict use of property by imposing limitations and maintaining the clay cover	The LUC will remain in place until Kentucky/EPA approve DOE's request to modify/delete LUC.	DOE will draft the restrictive covenant language and provide it to Kentucky/EPA and DOE contractors as soon as practicable after signing the ROD, as specified in the LUCIP. Recorded by DOE in accordance with state law at County Court Clerk's office	• SWMU 59 (i.e., Sections 1 and 2 of the NSDD)
Excavation/Penetration Permits Program[c]	Require review and approval of any proposed intrusive activities to protect workers and remedy; process may prohibit or limit intrusive activities.	The LUC will remain in place until Kentucky/EPA approve DOE's request to modify/delete LUC.	• Implemented by DOE and its contractors. o Provide permits program with contamination information as soon as practicable after signing the ROD, and update information regularly while remediation proceeds. • Initiated by permit request.	• SWMU 59 (i.e., Sections 1 and 2 of the NSDD)
Access Controls[d] (e.g., signage; fences, gates, security measures, etc.)	Restrict access to workers and restrict public/uncontrolled access.	The LUC will remain in place until Kentucky/EPA approve DOE's request to modify/delete LUC.	• Identification of specific access controls and implementation schedule to be identified in LUCIP for NSDD. • Controls maintained by DOE.	• SWMU 59 (i.e., Sections 1 and 2 of the NSDD)

[a] Property Record Notices – Refers to any nonenforceable, purely informational document recorded along with the original property acquisition records of DOE and its predecessor agencies that alerts nnyonc searching property records to important information about contamination/waste on the property.

[b] Property Record Restrictions– Refers to conditions and/or covenants that restrict or prohibit certain uses of real property and to limitations on its use necessitated by residual contamination. DOE will ensure that legally enforceable use restrictions arc in place that prohibit or otherwise restrict transferees from conducting activities that arc not compatible with the specified land use.

- Excavation/Penetration Permit Program – Refers to the internal DOE/DOE contractor administrative program(s) that require the permit requestor to obtain authorization, usually in the form of a permit, before beginning any excavation/penetration activity (e.g., well drilling) for the purpose of ensuring that the proposed activity will not affect underground utilities/structures, or in the case of contaminated soil or groundwater, will not disturb the affected area without the appropriate precautions and safeguards.
- Access Controls – Physical barriers or restrictions to entry.

The GWOU will address sources of contamination to groundwater. Current information on contaminant nature and extent at the NSDD indicates that surface soils [i.e., soils from 0 to 1 ft below ground surface (bgs)] and shallow subsurface soils (i.e., soils up to 4 ft bgs) at the NSDD probably are not a current source of contamination to groundwater. However, current information on contaminant nature and extent in deeper subsurface soils is sparse, and deeper subsurface soils at the NSDD could be a source of contamination to groundwater, as recognized during discussions concerning the GWOU. If this is determined to be the case, any sources of contamination found in deeper subsurface soils that contribute to unacceptable groundwater contamination will be addressed as part of the GWOU.

It is expected that the selected remedial alternative will leave no residual contamination that will pose a risk to humans under current and likely future exposure scenarios, and will not pose a risk to ecological receptors in any part of the NSDD (inside the security fence). However, it is expected that some residual contamination may remain in the subsurface following excavation.

Any residual soil contamination remaining at depth will be subject to long-term land-use restrictions to restrict exposure under current, and likely potential future, land-use activities. Post-excavation samples will be collected during implementation of the remedial alternative and analyzed for contaminants of concern to ensure the accomplishment of these objectives. Data collected as part of this response action will be used to support subsequent RI/FS evaluations for the entire SWOU.

All waste generated by the NSDD response action will be disposed of at an approved on-site or off-site facility, preferably the on-site C-746-U Landfill or, if necessary, another on-site facility, or to an off-site facility (e.g., Envirocare or the NTS. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. A risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Non-hazardous waste generated as a result of the NSDD remedial action will be disposed of in the C-746-U Landfill. DOE anticipates that approximately 90 % of the remediation waste resulting from the Phase I and Phase II activities will be disposed of in the C-746-U Landfill.

If significantly more than 10% of the Phase I and/or Phase 11 remediation waste is subsequently determined after excavation and characterization to exceed the WAC and to be inappropriate for disposal at the C-746-U Landfill and so must be shipped and disposed offsite at more expense, DOE's estimate of the cost of implementing Phase I and/or Phase II may increase substantially. Consistent with EPA Guidance (EPA 1988) cost estimates have been made based on an expected accuracy of –30% to +50%, and cost changes outside this range may be considered "substantial." Should any of the FFA parties conclude in good faith that such a substantial cost increase appears likely, any of the **FFA** parties may require DOE, EPA, and KNREPC to reconsider the selected alternative in light of the anticipated cost increase. If, as the result of their reconsideration, the three **FFA** parties agree that, or the dispute resolution process under the FFA determines that, significant changes or fundamental alterations should be made to the previously-selected action, the proposed changes will be documented in accordance with the NCP, using procedures that provide the public with an opportunity to review and comment on the proposed changes prior to any final decision on adopting them.

Phase I work will proceed upon signature of the ROD. Phase II excavation work will begin after Phase I activities are complete, and disposal options have become available. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. **A** risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Additionally, should any party, as contemplated above,

require the reconsideration of the selected alternative during implementation of Phase I or II activities, all excavation activities that would generate remediation waste will halt (unless FFA parties agree otherwise) pending the completion of the reconsideration process described herein.

2.5 SUMMARY OF SECTION 1 AND 2 NSDD SITE CHARACTERISTICS

Information used to describe the nature and extent of contamination within the NSDD comes from three sources:

(1) historical data from previous investigations, including the CERCLA Phase I Site Investigation (CH2M HILL 1991), the Waste Area Grouping (WAG) 6 RI (DOE 1999C), the Remedial Evaluation for Groundwater Contamination Source Areas (DOE 2000a), and a 2000 Department of Justice inquiry in which data was collected from surface soil sampling and trench excavations;

(2) process history concerning the operations at PGDP that discharged wastes into the NSDD such as compliance monitoring associated with the KPDES Outfalls 003 and 018; and

(3) radiological and polychlorinated biphenyl (PCB) sampling of the NSDD (SAIC 2000).

A conceptual site model for the NSDD at the PGDP is included as Figure 2.4. Figures 2.5, 2.6, and 2.7 summarize the location of analytical data used to develop the NSDD site conceptual model and perform the **risk** evaluation and alternatives analysis. Figure 2.8 provides an "operations model" diagramming how contaminants were introduced into and migrated through the NSDD.

The principal contaminants associated with the sediments and soils of the NSDD are radionuclides, metals, and PCBs. A screen of analyses of soils and sediments from the NSDD against PGDP surface and subsurface background levels reveals a total of 24 metals and 10 radionuclides (Table 2.2) that are present at levels greater than their background concentration. Furthermore, 11 metals and **9** radionuclides exceed ten times their background value.

Volatile organic compounds, such as trichloroethene (TCE), were infrequently detected at low concentrations. 1,1,1-trichloroethane (1,1,1-TCA), another common volatile organic compound, was not detected in any sample. However, analytical results from recent sampling events (December 2001 to March 2002) conducted in Sections 1 and 2 of the ditch do not indicate the presence of detectable levels of TCE or 1,1,1-TCA.

Based on the information listed above, the following is known.

- Most of the contaminated soil and sediment at the NSDD is expected at depths that range from the surface to four ft bgs, with the deepest contamination generally occurring onsite.

- The areal extent of radionuclides and metals contamination is expected to encompass the portion of the NSDD inside the security fence (i.e., Sections 1 and 2)

In the secured sections of the NSDD (Sections 1 and 2), exposure of industrial workers to contaminants in NSDD surface soils and sediment is likely. Exposure of ecological receptors is of less concern in these sections because habitat is limited due to industrial use of the surrounding area; therefore, only occasional visits by foraging ecological receptors can reasonably be expected. (Please see Section 2.2 for additional descriptions of the NSDD and areas surrounding it.)

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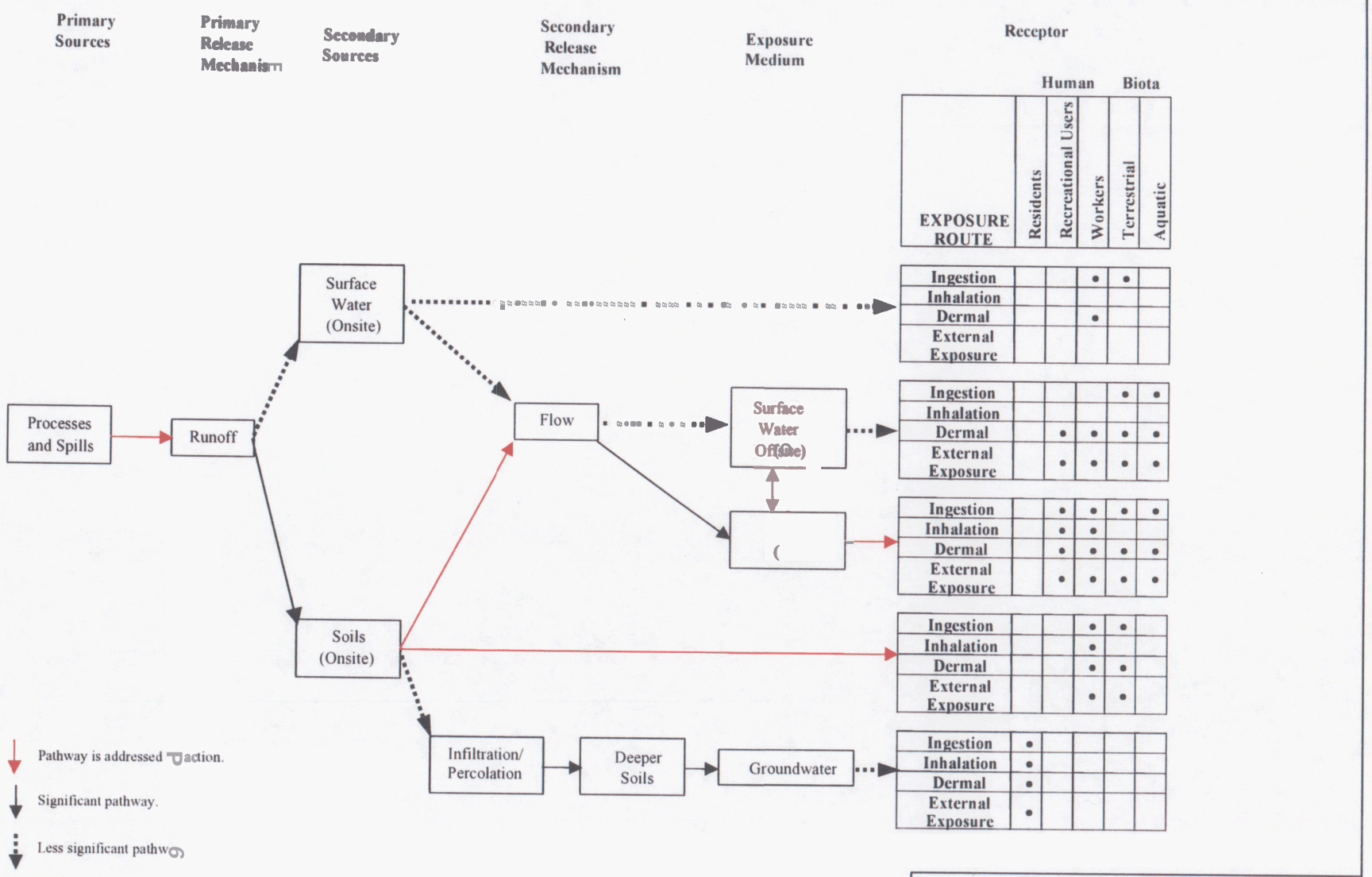

Fig. 2.4 Conceptual site model for the North-South Diversion Ditch.

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FIGURE No. c5ac90001sk156R1.ppt
DATE 02-08-02

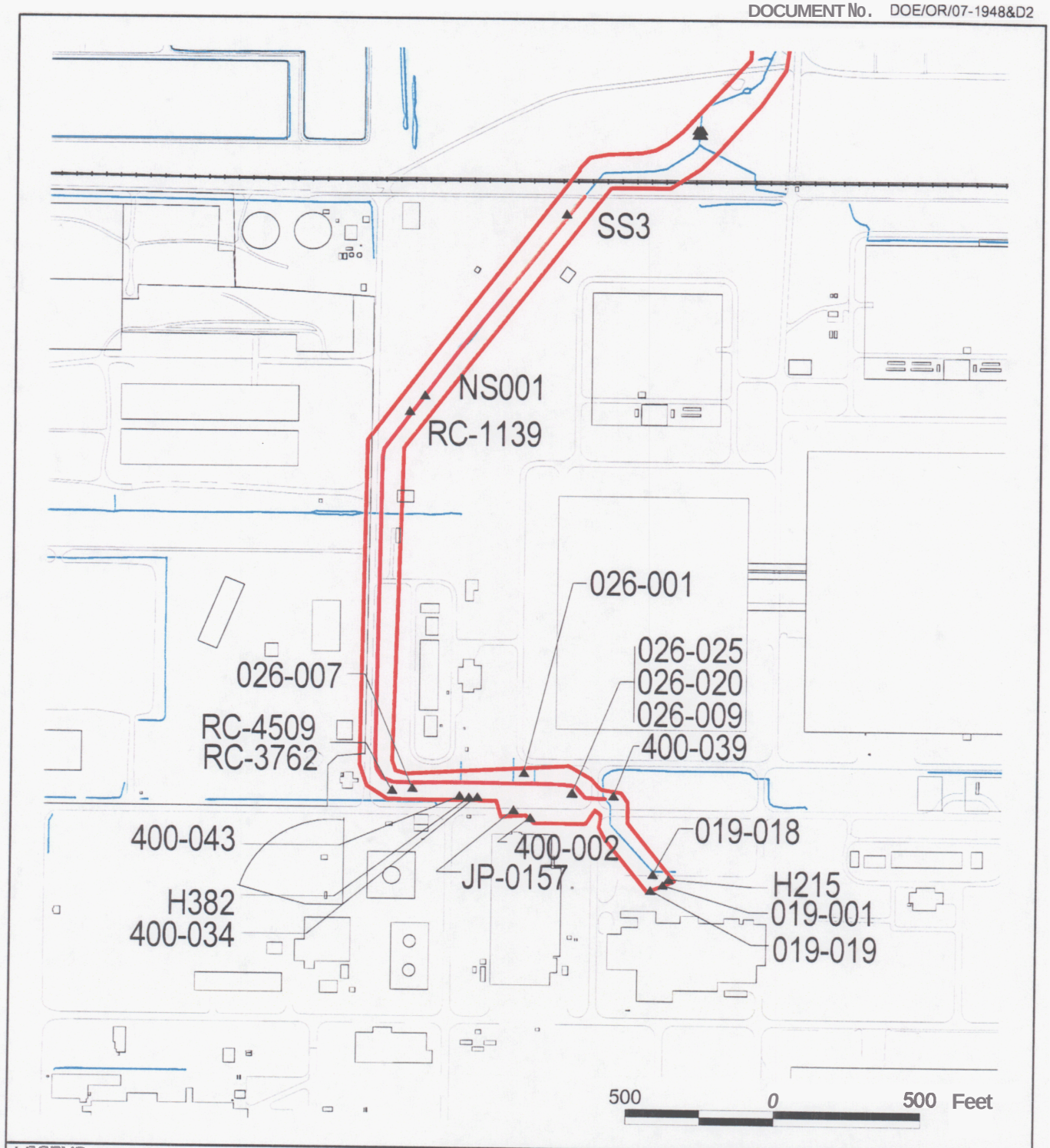

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Fig. 2.5 Soil and sediment samples analyzed for metals.

FIGURE No. c5ac90001sk130r3.apr
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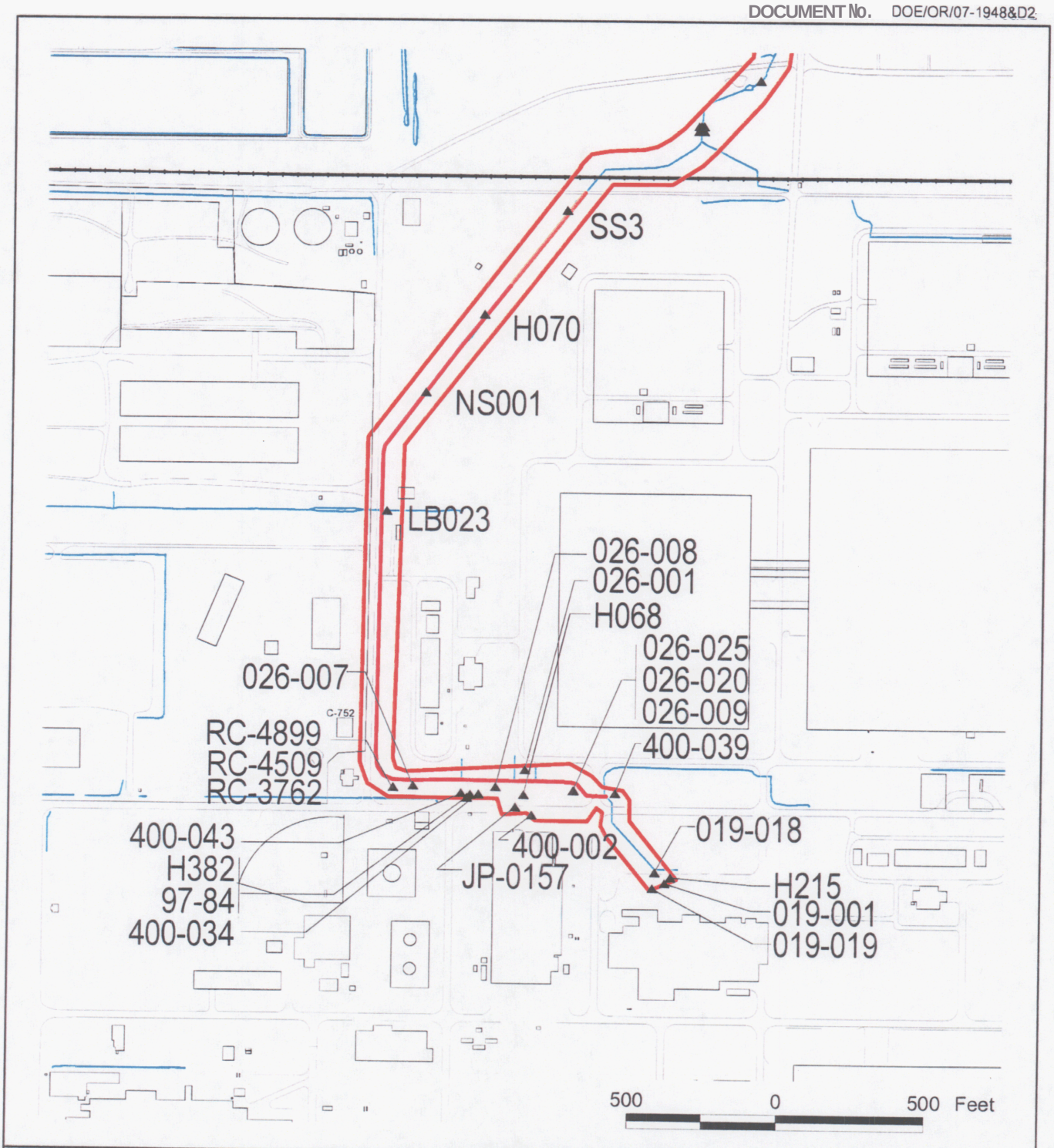

LEGEND:
- PGDP BOUNDARY
- DOE BOUNDARY
- 50' STUDY AREA BOUNDARY
- METALS SOIL/SEDIMENT SAMPLE LOCATIONS WITHIN STUDY AREA BOUNDARY
- SECTION 1
- SECTION 2

TRUE NORTH 20° PLANT NORTH

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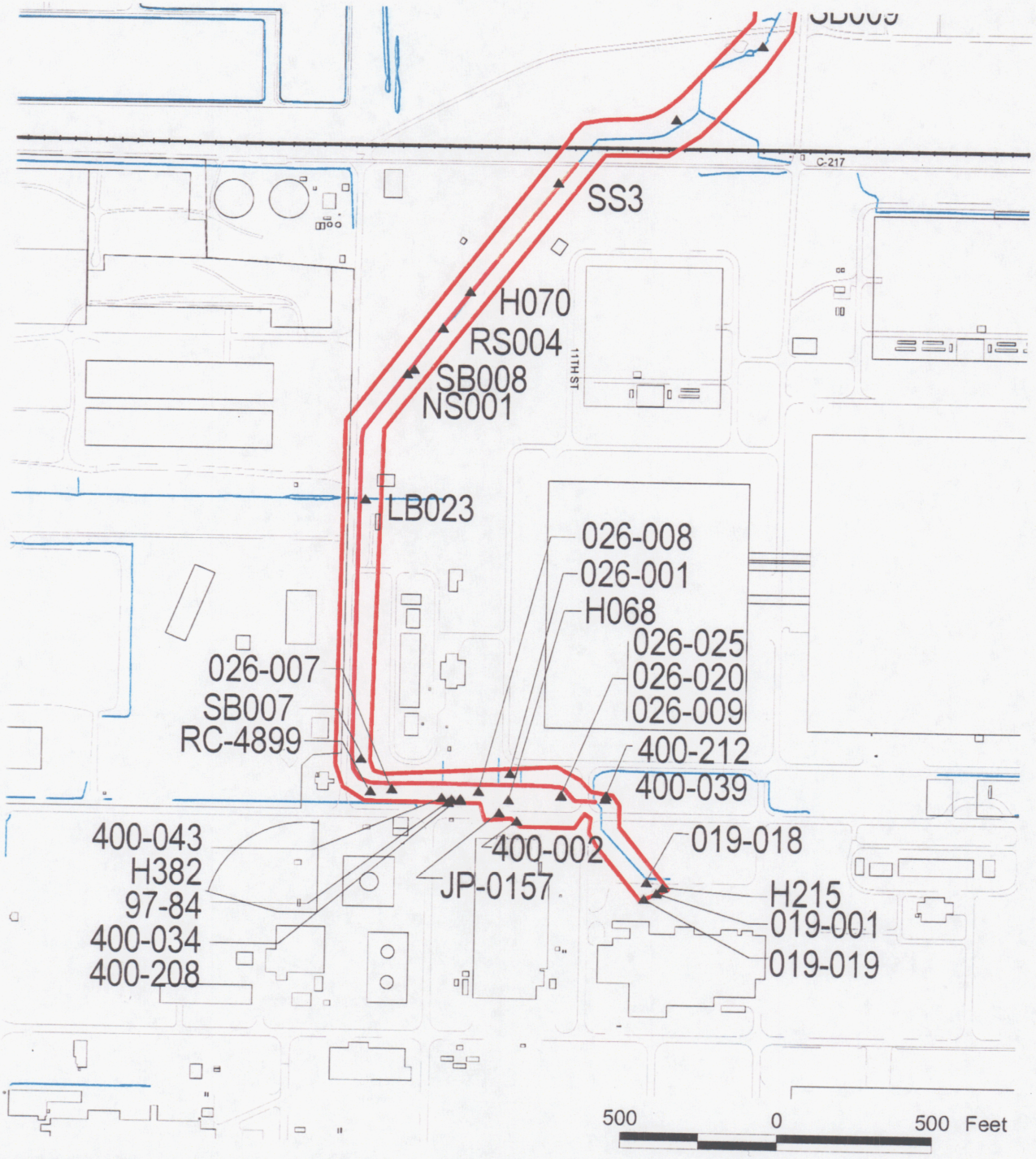
Fig. 2.6 Soil and sediment samples analyzed for organics.

FIGURE No. c5ac90001sk135r3.apr
DATE 07-26-02



LEGEND:
- PGDP BOUNDARY
- DOE BOUNDARY
- 50' STUDY AREA BOUNDARY
- METALS SOIL/SEDIMENT SAMPLE LOCATIONS WITHIN STUDY AREA BOUNDARY
- SECTION 1
- SECTION 2

TRUE NORTH 20° PLANT NORTH

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Fig. 2.7 Soil and sediment samples analyzed for radionuclides.

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FIGURE No. c5ac90001sk136r3.apr
DATE 07-26-02

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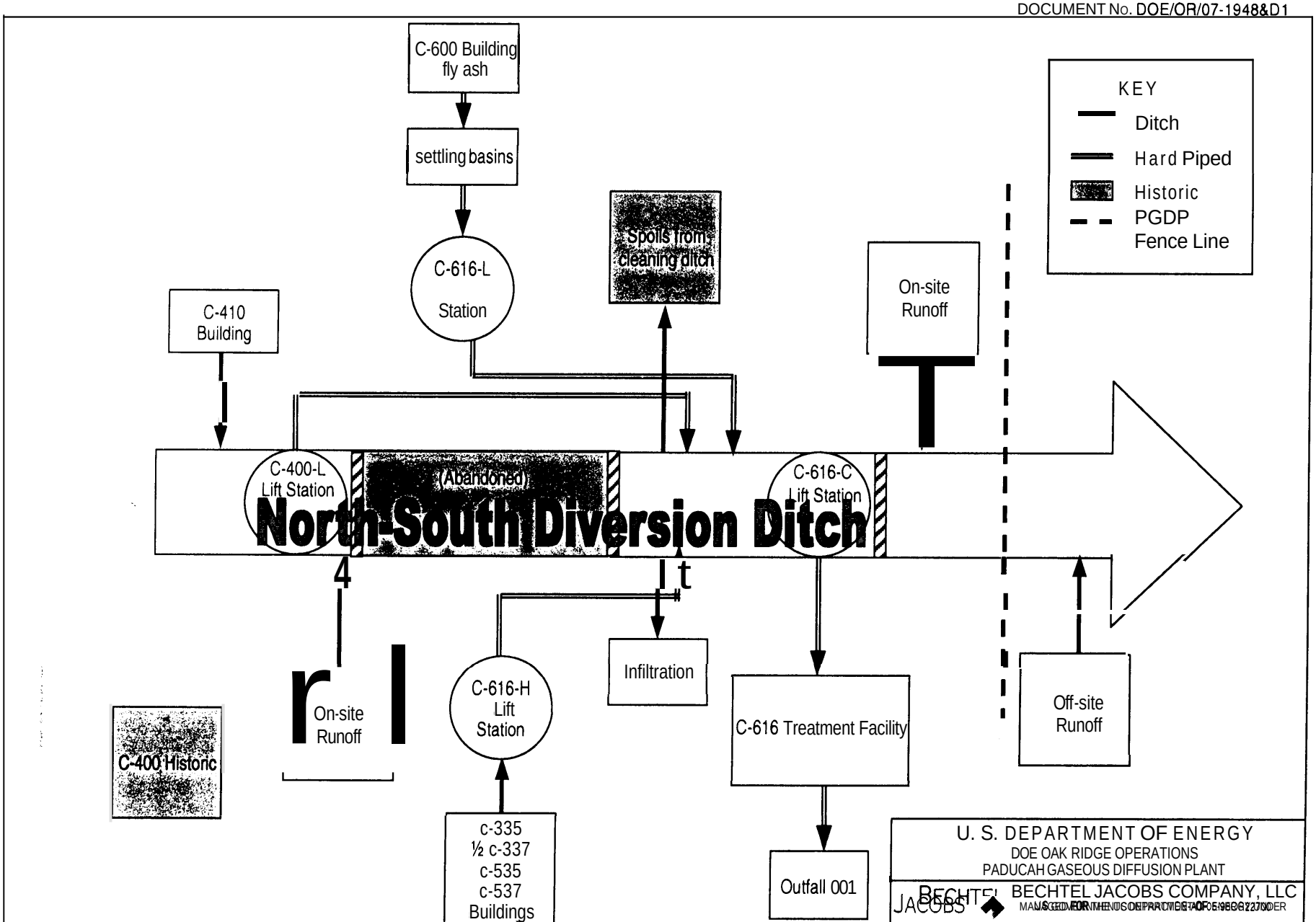

Fig. 2.8 North-South Diversion Ditch: Operations model inside the PGDP fence line.

FIGURE No. c5ac90001sk131r1.ppt
DATE 12-05-01

Table 2.3. Metals and radionuclides that exceed background levels in soil and sediment samples from Sections 1 and 2 of the North-South Diversion Ditch

Metals			Radionuclides
Aluminum (9/20)	Cobalt (6/21)	Potassium (4/21)	***Cesium-137*** (6/12)
Antimony (10/21)	***Copper*** (8/21)	***Selenium*** (4/20)	***Neptunium-237*** (10/20)
Arsenic (7/20)	Iron (1121)	***Silver*** (5/23)	Potassium-40 (2/4)
Barium (5/23)	Lead (6/23)	Sodium (10/21)	***Plutonium-239*** (11/17)
Beryllium (8/22)	**Magnesium** (7/21)	Thallium (3/22)	***Technetium-99*** (15/22)
Cadmium (5123)	Manganese (2/21)	***Uranium*** (6/6)	***Thorium-230*** (14/18)
Calcium (8/21)	***Mercury*** (5124)	Vanadium (1/20)	***Uranium-234*** (11/18)
Chromium (11/24)	***Nickel*** (10/23)	Zinc (7/21)	***Uranium-235*** (9/15)
			Uranium-238 (15/18)

Bold Italics indicate the contaminant was detected in one or more samples at a concentration greater than 10 times background. Values denoted in parentheses are the number of samples in which the analyte detection exceeded 1 times its background concentration over the number of samples tested for the analyte.

Analytes never detected or detected at a maximum concentration less than the analyte's background level are not included in this table.

In **1994** the PGDP area was evaluated for the presence of potential habitat for federally listed threatened and endangered (T&E) species (COE **1994;** CDM Federal **1994).** T&E species or potential T&E species habitat was not observed within those portions of PGDP located inside the security fence.

However, ten federally-listed, proposed, or candidate species have been identified as potentially occurring at or near the PGDP (Table 2.3). No critical habitat for any of these species has been designated anywhere in the study area (BJC 2000) and, except for sighting in **1999** of five Indiana bats near the lower downstream reaches of Bayou Creek (KDFWR 2000), none of the species has been reported as sighted on the DOE property.

Table 2.3. Federally listed, proposed, and candidate species potentially occurring within PGDP area

Common name	Scientific name	Endangered Species Act status
Indiana bat	*Myotis sodalis*	Listed Endangered
Interior least tern	*Sterna antillarum athalassos*	Listed Endangered
Pink mucket	*Lampsilis abrupta*	Listed Endangered
Ring pink	*Obovaria retusa*	Listed Endangered
Orange-footed pearly mussel	*Plethobasus cooperianus*	Listed Endangered
Fat pocketbook	*Potamilus capax*	Listed Endangered
Tubercled-blossom pearly mussel	*Epioblasma torulosa torulosa*	Listed Endangered
Bald eagle	*Haliaeetus leucocephalus*	Listed Endangered
Sturgeon chub	*Macrhybopsis gelida*	Candidate

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Historically, contaminants that would be expected to have the potential to leach were released to the NSDD from process operations primarily in the C-400 Building. However, these releases were confined to Section 1 of the NSDD with the construction in 1977 of the C-616-H Lift Station and were eliminated totally in 1994 with the addition of treatment for the remaining discharges from the C-400 Building. **As** a result, contaminants that had the potential to leach that may have been present in the NSDD are expected already to have migrated. However, if residual contamination that may impact groundwater is found, then either the Soils Operable Unit or the Groundwater Operable Unit will deal with this contamination.

2.6 CURRENT AND POTENTIAL FUTURE LAND USE

Consistent with information contained in Section **3.3** of the 2001 *Annual Revision of the Site Management Plan for the PGDP,* DOE/OR/07-1849&D1, issued in November 2000, both the current and anticipated future land-use of the part of the NSDD located inside the PGDP security-fenced area (SWMU 59 – Sections 1 and 2) is industrial.

The current and anticipated future use of selected property at PGDP has a significant impact on the cleanup standards, types of remedial actions, and total costs for site remediation. To identify stakeholder-preferred alternatives for future land use at PGDP, DOE conducted **a** limited land use study that considered (1) existing lease commitments (USEC), (2) the nature of site contamination currently present at the facility (primarily radionuclides, organic solvents, and PCBs), and (3) stakeholder input.

With regard to external stakeholders, DOE began preliminary discussions with stakeholders on future land use during a public workshop at Paducah on June 30, 1994. Subsequently, future land use was presented and discussed at public workshops in Paducah on December 1, 1994; January 26, 1995; and September 26, 1995. In addition, the subject has been discussed at various meetings with the PGDP Neighborhood Council, the PGDP Environmental Advisory Committee, city and county officials, economic development interests, and the CAB. In general, the majority of the stakeholders supported a continued industrial/commercial presence at the site that would preserve existing jobs and continue to contribute to the regional economy. No stakeholders recommended converting DOE property to residential use.

Based on all the above factors, DOE, EPA. and KNREPC have adopted the recommendation of the current land use of industrial as the most likely future use scenario for the purpose of a long-term planning assumption to support future remedial decisions inside the security-fenced area. The land use assumptions will be subject to public review and comment in individual decision documents utilizing the assumptions.

The LUC objectives identified for implementation as part of this remedial action will ensure protectiveness of the preferred alternative, given the current and anticipated future land use of the portion of the NSDD inside the security fence. The LUCs will restrict unauthorized access, restrict unauthorized excavations or penetrations below prescribed contamination cleanup depth, and restrict uses of the area that are inconsistent with the assumed land use (i.e., to restrict recreational and/or residential use).

2.7 SUMMARY OF SITE RISKS

This section of the ROD provides summaries of the screening human health risk assessments performed for Sections 1 and 2 of the NSDD. Generally, this summary focuses on the information that is driving the need for the response action described in this ROD and is not a comprehensive summary of all **risk** assessment activities performed in the investigation of the NSDD. Specifically, this section concentrates on the scenarios, exposure pathways, and contaminants of concern (COCs) driving the need for action at the NSDD.

Because action for the NSDD was based upon process knowledge and existing data sets, the form of the risk assessments described in Section 2.7.1 varies from that which would be used to complete full baseline human health risk assessments as described in the PGDP human health risk methods document (DOE 2000d). Therefore, the presentation of the risk assessment results in this ROD varies from that recommended in EPA's guidance document (EPA 1999), which is based upon the summarization of complete baseline risk assessments. However, as concluded in Section 2.7.3, the risk assessments completed for Sections 1 and 2 of the NSDD provide information sufficient to determine that action to address contamination at Sections 1 and 2 of the NSDD is appropriate and to allow for the development of interim cleanup standards for the action selected.

Additionally, because the **risk** assessment results were derived using screening assessments, the methods used for the assessments are conservative, and results are biased toward the identification of elevated levels of risk even if **risk** levels may actually be lower.

2.7.1 Summary of Human Health Risk Assessment

The human health risk assessment for Sections 1 and 2 of the NSDD estimated the risks posed to receptors exposed to contaminated sediment and soil at the site under a no action scenario. The risk assessment, therefore, provides the basis for determining whether remedial action should be taken and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This **risk** assessment consisted of comparisons between environmental concentrations of contaminants and risk-based screening levels. This section describes the methods used to complete this comparison, including the sources of the environmental concentrations and the risk-based screening values. This section concludes with the identification of the COCs for the current most likely future land use within Sections 1 and 2 of the NSDD. Cleanup levels for contaminants are in Section 2.12.

2.7.1.1 Data evaluation and risk-based screening values

Data used in the risk assessment were taken from the PGDP Oak Ridge Environmental Information System (OREIS) database in fall 2001. These data consisted of soil and sediment samples collected during all previous investigation activities from 1989 to fall 2001. Data were segregated by depths, and data from all samples collected at a depth greater than 10 ft bgs were not included in the risk assessmsnt. Table ***2.3*** presents a summary of these data for the COCs. In this table, a COC is a chemical with an exposure point concentration (EPC) that exceeds a residential use risk-based screening level or is without a residential use

Table 2.4. Summary of COCs[a] and exposure point concentrations for soils and sediments for Sections 1 and 2 of the NSDD

Exposure Point[b]	COCs	Concentration Detected min	Concentration Detected max	Units	Frequency of Detection[c]	Esposure Point Concentration	EPC Units	Statistical Measure[d]
Areas			*Inorganic Chemicals*					
inside the	Aluminum	4150	25600	mg/kg	20/20	25600	mg/kg	rnax
PGDP	Antimony	0.600	2.90	mg/kg	10/21	2.90	mg/kg	max
security	Arsenic	2.00	130	mg/kg	20/20	130	mg/kg	rnax
fence	Barium	40.1	922	mg/kg	23/23	922	mg/kg	rnax
	Beryllium	0.290	13.7	mg/kg	22/22	13.7	mg/kg	rnax
	Cadmium	0.030	3.40	mg/kg	11/23	3.40	mg/kg	max
	Chromium	5.70	141	mg/kg	23/24	141	mg/kg	rnax
	Copper	4.10	9520	mg/kg	21/21	9520	mg/kg	rnax
	Iron	3840	51700	mg/kg	21/21	51700	mg/kg	max
	Lead	5.00	119	mg/kg	22/23	119	mg/kg	rnax
	Manganese	85.8	4150	mg/kg	21/21	4150	mg/kg	max
	Mercury	0.0182	12.3	mg/kg	13/24	12.3	mg/kg	max
	Nickel	8.00	17600	mg/kg	22/23	17600	mg/kg	max
	Selenium	0.240	12.5	mg/kg	7/20	12.5	mg/kg	rnax
	Silver	0.100	17.2	mg/kg	12/23	17.2	mg/kg	max
	Tantalum	1.94	26.4	mg/kg	2/3	26.4	mg/kg	max
	Thallium	0.42	1.30	mg/kg	3/22	1.30	mg/kg	max
	Thorium	6.20	14.0	mg/kg	3/3	14.0	mg/kg	max
	Titanium	522	864	mg/kg	3/3	864	mg/kg	max
	Tungsten	2.90	2.90	mg/kg	1/3	2.90	mg/kg	max
	Uranium	24.0	224	mg/kg	6/6	224	mg/kg	max
	Vanadium	6.20	80.7	mg/kg	18/20	80.7	mg/kg	max
	Zirconium	20.6	25.6	mg/kg	3/3	25.6	mg/kg	rnax
			Organic Compounds					
	Benz(a)anthracene	0.040	3.70	mg/kg	6/30	3.70	mg/kg	max
	Benzo(a)pyrene	0.040	4.00	mg/kg	6/30	4.00	mg/kg	max
	Benzo(b)fluoranthene	0.040	5.80	mg/kg	7/30	5.80	mg/kg	max
	Benzo(g,h,i)perylene	0.055	2.10	mg/kg	4/29	2.10	mg/kg	max
	Benzo(k)fluoranthene	0.050	2.20	mg/kg	5/30	2.20	mg/kg	max
	Bis(2-ethylhexyl)phthalate	0.050	5.70	mg/kg	10/24	5.70	mg/kg	max
	Indeno(1,2,3-cd)pyrene	0.050	2.50	mg/kg	4/30	2.50	mg/kg	max
	PCB-1260	0.00560	0.400	mg/kg	4/16	0.400	mg/kg	max
	Phenanthrene	0.040	8.10	mg/kg	5/30	8.10	mg/kg	max
	Polychlorinated biphenyl	0.00560	0.800	mg/kg	8/30	0.800	mg/kg	max
			Radionuclides					
	Americium-241	0.100	1.50	pCi/g	7/9	1.50	pCi/g	
	Cesium-137	0.100	11.1	pCi/g	11/12	11.1	pCi/g	max
	Neptunium-237	0.100	63.0	pCi/g	16/20	63.0	pCi/g	rnax
	Plutonium-239	0.100	53.0	pCi/g	15/17	53.0	pCi/g	rnax
	Technetium-99	0.900	4840	pCi/g	19/22	4840	pCi/g	rnax
	Thorium-230	0.00440	1300	pCi/g	18/18	1300	pCi/g	max
	Uranium-234	0.250	150	pCi/g	15/18	150	pCi/g	max
	Uranium-235	0.00540	5.00	pCi/g	14/15	5.00	pCi/g	max
	Uranium-238	0.340	210	pCi/g	17/18	310	pCi/g	max
	Uranium (Total)	0.600	317	pCi/g	10/10	317	pCi/g	max

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Notes:

min = Minimum; max = Maximum: EPC = Exposure Point Concentration

[a] COCs were selected through a comparison between the exposure point concentration and the residential use risk-based screening level. (See Table 2.5.). Macroelements such as calcium and potassium are not listed. Only radionuclides commonly found at the PGDP are listed.

[b] Areas inside the PGDP security fence include Sections 1 and 2 of the North-South Diversion Ditch.

[c] Number of samples in which COC was detected over total number of samples. Chemicals with total number of samples equal to 1 are not listed.

[d] For the human health risk assessment. the maximum detected concentration was selected as the exposure point concentration.

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risk-based screening level. See Table 2.5 for information about this screening level. Consistent with earlier discussions in this ROD, this summary is limited to results for the sections of the NSDD located inside the PGDP security fence (SWMU 59-Sections 1 and 2).

As shown in Table 2.4, there are 43 COCs for Sections 1 and 2 of the NSDD. Of the 43 COCs listed for Sections 1 and 2, 23 are inorganic chemicals, 10 are organic compounds, and 10 are radionuclides. None of the COCs are volatile organic compounds such as TCE and 1,1,1-TCA.

In selecting the COCs, the comparisons were made between the maximum detected contaminant concentration and human health screening values. The screening values used are the no action screening levels derived for the December 2000 revision of *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2000d). The no action values for the resident, recreational user, and industrial worker are shown in Table 2.5. In all cases, the hazard screening levels in Table 2.5 are based upon a hazard index of 0.1, and the risk screening levels are based upon a cancer risk level of 1×10^{-6} (i.e., one in one million). The no action value is the lesser of the hazard- and cancer-based values for each receptor type. [Because COCs were derived from comparisons between maximum detected concentrations and the no action screening levels, the screening assessment was biased toward the identification of unacceptable levels of risk even if risk levels were actually acceptable (i.e., the assessment was conservative).]

The receptor types (i.e., the industrial worker, recreational user, and resident) are shown in Table 2.5. These receptors represent the most conservative screening criteria (i.e., the resident) and the most likely future use scenario for the areas of the NSDD located inside the PGDP security fence (industrial) The routes of exposure considered in the development of the screening criteria are incidental ingestion of soil (or sediment), inhalation of resuspended soil particles (i.e., dust), inhalation of vapors emitted from soil, dermal contact with soil, and external exposure to ionizing radiation emitted from soil.

Except for lead, toxicity values used in the derivation of the screening values were taken from three sources in the fall of 2000. These were EPA's Integrated Risk Information System (IRIS), EPA's National Center for Exposure Assessment (NCEA), and EPA's Health Effects Assessment Summary Tables (HEAST). For lead, the screening values were those provided by the Commonwealth of Kentucky Risk Assessment Branch.

2.7.1.2 Risk characterization

The human health risk assessment for Sections 1 and 2 of the NSDD characterized risk by deriving cancer risk and hazard values utilizing the formulae discussed below.

For cancer risk posed by an individual chemical, compound, or radionuclide:

$$\text{Cancer Risk} = \frac{\text{Exposure Point Concentration}}{\text{Cancer - based Screening Level}} \times \text{Risk Target}$$

where: Cancer Risk is the risk posed by a specific chemical, compound, or radionuclide
Exposure Point Concentration (EPC) is the contaminant concentration to which a receptor may be exposed. For this assessment, the EPC is the maximum detected value for each chemical for the NSDD risk assessment.
Cancer-based Screening Level is the appropriate value selected from Table 2.5.
Risk Target is the cancer risk value used in the derivation of the screening levels. This is 1×10^{-6} for the values in Table 2.5.

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Table 2.5. Risk-based screening levels[a] for *COCs* in soil and sediment

Chemical[c]	Industrial Worker[b]			Recreational User[b]			Resident[b]		
	Hazard	Cancer	No Action	Hazard	Cancer	No Action	Hazard	Cancer	No Action
Inorganic Chemicals (mg/kg)									
Aluminum	4.64E+03		4.64E+03	1.98E+03		1.98E+03	7.32E+02		7.32E+02
Antimony (metallic)	3.79E-01		3.79E-01	1.61E-01		1.61E-01	6.35E-02		6.35E-02
Arsenic, Inorganic	8.41E+00	5.23E-01	5.23E-01	3.60E+00	3.46E-01	3.46E-01	9.59E-01	1.32E-01	1.32E-01
Barium	2.29E+02		2.29E+02	9.78E+01		9.78E+01	3.70E+01		3.70E+01
Beryllium and compounds	9.48E-01	5.47E+04	9.48E-01	4.04E-01	6.02E+04	4.04E-01	1.60E-01	1.55E+04	1.60E-01
Cadmium (Diet)	2.13E+01	7.53E+04	2.13E+01	9.12E+00	8.30E+04	9.12E+00	2.64E+00	2.14E+04	2.64E+00
Chromium (III) (Insoluble Salts)	3.56E+02		3.56E+02	1.52E+02		1.52E+02	6.05E+01		6.05E+01
Chromium VI (particulates)	2.84E+00	1.12E+04	2.84E+00	1.21E+00	1.23E+04	1.21E+00	4.76E-01	3.18E+03	4.76E-01
Copper	4.93E+02		4.93E+02	2.11E+02		2.11E+02	6.81E+01		6.81E+01
Iron	2.07E+03		2.07E+03	8.83E+02		8.83E+02	3.14E+02		3.14E+02
Lead And Compounds			500E+01			500E+01			500E+01
Manganese (Water)	8.66E+01		8.66E+01	3.70E+01		3.70E+01	1.43E+01		1.43E+01
Mercury, Inorganic Salts	9.82E-01		9.82E-01	4.19E-01		4.19E-01	1.58E-01		1.58E-01
Nickel Soluble Salts	2.42E+02		2.42E+02	1.03E+02		1.03E+02	3.40E+01		3.40E+01
Selenium	9.49E+01		9.49E+01	4.06E+01		4.06E+01	1.21E+01		1.21E+01
Silver	4.11E+01		4.11E+01	1.75E+01		1.75E+01	6.12E+00		6.12E+00
Thallium Chloride	7.27E-01		7.27E-01	3.10E-01		3.10E-01	1.07E-01		1.07E-01
Uranium (Soluble Salts)	1.01E+02		1.01E+02	4.34E+01		4.34E+01	1.08E+01		1.08E+01
Vanadium, Metallic	3.32E+00		3.32E+00	1.42E+00		1.42E+00	5.62E-01		5.62E-01
Organic Compounds (mg/kg)									
Benz[a]anthracene		2.12E-01	2.12E-01		1.33E-01	1.33E-01		6.70E-02	6.70E-02
Benzo[a]pyrene		2.12E-02	2.12E-02		1.33E-02	1.33E-02		6.70E-03	6.70E-03
Benzo[b]fluoranthene		2.12E-01	2.12E-01		1.33E-01	1.33E-01		6.70E-02	6.70E-02
Benzo[k]fluoranthene		2.12E+00	2.12E+00		1.33E+00	1.33E+00		6.70E-01	6.70E-01
Bis(2-ethylhexyl)phthalate	8.84E+01	8.84E+00	8.84E+00	3.77E+01	5.53E+00	5.53E+00	1.40E+01	2.84E+00	2.84E+00
Indeno[1,2,3-cd]pyrene		2.12E-01	2.12E-01		1.33E-01	1.33E-01		6.70E-02	6.70E-02
PCB-1242		1.99E-01	1.99E-01		1.27E-01	1.27E-01		5.74E-02	5.74E-02
PCB-1248		1.99E-01	1.99E-01		1.27E-01	1.27E-01		5.74E-02	5.74E-02
PCB-1254	2.84E-01	1.99E-01	1.99E-01	1.22E-01	1.27E-01	1.22E-01	3.88E-02	5.74E-02	3.88E-02
PCB-1260		1.99E-01	1.99E-01		1.27E-01	1.27E-01		5.74E-02	5.74E-02
PCBs (Total)		1.99E-01	1.99E-01		1.27E-01	1.27E-01		5.74E-02	5.74E-02
Radionuclides (pCi/g)									
Americium-241		8.09E+00	8.09E+00		2.05E+01	2.05E+01		1.49E+00	1.49E+00
Cessium-137+D		1.05E-01	1.05E-01		2.18E-01	2.18E-01		1.56E-02	1.56E-02
Neptunium-237+D		4.54E-01	4.54E-01		9.53E-01	9.53E-01		6.82E-02	6.82E-02
Plutonium-239		1.01E+01	1.01E+01		2.68E+01	2.68E+01		1.96E+00	1.96E+00
Technetium-99		2.27E+03	2.27E+03		6.02E+03	6.02E+03		4.40E+02	4.40E+02
Thorium-230		8.34E+01	8.34E+01		2.20E+02	2.20E+02		1.62E+01	1.62E+01
Uranium-234		7.13E+01	7.13E+01		1.89E+02	1.89E+02		1.38E+01	1.38E+01
Uranium-235+D		8.16E-01	8.16E-01		1.70E+00	1.70E+00		1.22E-01	1.22E-01
Uranium-238+D		3.13E+00	3.13E+00		6.60E+00	6.60E+00		4.73E-01	4.73E-01
Uranium (Total)		3.13E+00	3.13E+00		6.60E+00	6.60E+00		4.73E-01	4.73E-01

Notes:

Blank cells indicate that a value is not available for the chemical. Chemicals listed in Table 2.4, but without any screening levels. are not listed here.

[a] Hazard values based on a target hazard index of 0.1. Cancer values based on a target cancer risk of 1×10^{-6}. The No Action value is the lesser of the hazard- and cancer-based values.

[b] The industrial worker values are based upon exposure through incidental ingestion, inhalation of dust, inhalation of vapors. dermal contact, and external exposure to ionizing radiation. The frequency and duration of exposure are 250 days/year and 25 years, respectively. The recreational user values are based upon exposure through incidental ingestion. inhalation of dust, inhalation of vapors, dermal contact, and external exposure to ionizing radiation. All hazard values are based upon a child's exposure of 140 days/year for 6 years. All cancer values are based upon a lifetime exposure duration of 40 years during which the child and teen are exposed for 140 days/year, and the adult is exposed for 104 days/year.

The resident values are based upon exposure through incidental ingestion. inhalation of dust, inhalation of vapors, dermal contact, and external exposure to ionizing radiation. All hazard values are based upon a child's exposure of 350 days/year for 6 years. All cancer values are based upon a lifetime exposure duration of 40 years during which both the child and the adult are exposed for 350 days/year.

[c] Only COCs with risk-based screening levels are shown.

Risk and hazard from exposure to chromium differs with valence state. Values for chromium VI are used in risk and hazard calculations. Values for thallium chloride are used for thallium metal, which docs not have a screening value.

The value for lead is based upon regulation. provided by Commonwealth of Kentucky Risk Asscssmcnt Branch.

Risk-based screening values for cesium-137, neptunium-737. uranium-235 and uranium-335 wcrc derived considering contributions from short-lived decay products.

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Value for U-238+D **used** for Uranium (Total).

For cancer risk posed over all COCs:

$$\text{Cumulative Cancer Risk} = \sum \text{Chemical-specific Cancer Risks}$$

where: Cumulative Cancer Risk is the risk posed to a receptor through all routes of exposure.
Chemical-specific Cancer Risks are as described earlier.

For hazard posed by an individual chemical or compound:

$$\text{Hazard} = \frac{\text{Exposure Point Concentration}}{\text{Hazard-based Screening Level}} \times \text{Hazard Target}$$

where: Hazard is the risk posed by a specific chemical, compound, or radionuclide
EPC is the contaminant concentration to which a receptor may be exposed. For this assessment, the EPC is the maximum detected value for each chemical for the NSDD risk assessment.
Hazard-based Screening Level is the appropriate value selected from Table 2.5.
Hazard Target is the hazard value used in the derivation of the screening levels. This is 0.1 for the values in Table 2.5.

For hazard posed over all COCs:

$$\text{Cumulative Hazard} = \sum \text{Chemical-specific Hazards}$$

where: Cumulative Hazard is the hazard posed to a receptor through all routes of exposure.
Chemical-specific Hazards are as described earlier.

Cancer risks derived using this method usually are expressed in scientific notation (e.g., 1×10^{-6} or 1E-06) and are the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Therefore, a cancer risk of 1×10^{-6} indicates that a receptor has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. Generally, this risk can be considered to be an excess lifetime cancer risk (ELCR). This means that the cancer risk estimated here would be in addition to that from other routes of exposure such as smoking tobacco and exposure to too much sun. Cancer risk from those routes can be as high as 1 in 3. At the PGDP, the *de minimis* ELCR value selected for this response action by regulatory agencies in consultation with DOE is 1×10^{-6}. This value is at the lower end of EPA's generally acceptable risk range for site-related exposure. This risk range is 10^{-4} to 10^{-6}. (A *de minimis* value is defined as one that is so small as to be of little or no concern.)

Hazard values derived using this method usually are expressed using one significant digit (e.g., *5)*. These hazard values are expressions of the potential for a receptor to develop a deleterious condition as the result of exposure. These effects can range from states such as sickness to undesirable changes in the skin. In any case, a cumulative hazard value less than 1 indicates that it is unlikely that exposure will result in the development of a deleterious effect. However, a cumulative hazard value greater than 1 does not indicate that a deleterious effect will occur. Generally, if several chemicals do not affect the same organ or tissue (i.e., effects are not additive), then it is unlikely that a deleterious effect will result from exposure to the chemicals. However, at the PGDP, effects are routinely and conservatively assumed to be additive in the absence of other evidence. Effects are assumed to be additive here.

Table 2.6 shows the chemical-specific cancer risks and hazards for portions of the NSDD located inside the PGDP security fence. In addition, the cumulative risks and hazards for the industrial worker receptor are shown by analyte class and over all contaminants.

Table **2.6. Risk** characterization" **for Sections** 1 **and** 2 **of** the NSDD

Chemical[b]	Sections 1 and 2 EPC	Industrial Worker		Recreational User		Resident	
		Hazard	Cancer	Hazard	Cancer	Hazard	Cancer
Inorganic Chemicals (EPCs in mg/kg)							
Aluminum	25600	0.6	NV	1.3	NV	3.5	NV
Antimony (metallic)	2.90	0.8	NV	1.8	NV	4.6	NV
Arsenic, Inorganic	130	1.5	2.E-04	3.6	4.E-04	13.6	1.E-03
Barium	922	0.4	NV	0.9	NV	2.5	NV
Beryllium and compounds	13.7	1.4	3.E-10	3.4	2.E-10	8.6	9.E-10
Cadmium (Diet)	3.4	<0.1	5.E-11	<0.1	4.E-11	0.1	2.E-10
Chromium VI (particulates)	141	5.0	1.E-08	11.7	1.E-08	29.6	4.E-08
Copper	9520	1.9	NV	4.5	NV	14.0	NV
Iron	51700	2.5	NV	5.9	NV	16.5	NV
Manganese (Water)	4150	4.8	NV	11.2	NV	29.0	NV
Mercury, Inorganic Salts	12.3	1.3	NV	2.9	NV	7.8	NV
Nickel Soluble Salts	17600	7.3	NV	17.1	NV	51.8	NV
Selenium	12.5	<0.1	NV	<0.1	NV	0.1	NV
Silver	17.2	<0.1	NV	0.1	NV	0.3	NV
Thallium Chloride	1.3	0.2	NV	0.4	NV	1.2	NV
Uranium (Soluble Salts)	224	0.2	NV	0.5	NV	2.1	NV
Vanadium, Metallic	80.7	2.4	NV	5.7	NV	14.4	NV
Subtotal Inorganic Chemicals		30.3	2.E-04	71.1	4.E-04	199.5	1.E-03
Organic Compounds (EPCs in mg/kg)							
Benz[a]anthracene	3.70	NV	2.E-05	NV	3.E-05	NV	6.E-05
Benzo[a]pyrene	4.00	NV	2.E-04	NV	3.E-04	NV	6.E-04
Benzo[b]fluoranthene	5.80	NV	3.E-05	NV	4.E-05	NV	9.E-05
Benzo[k]fluoranthene	2.20	NV	1.E-06	NV	2.E-06	NV	3.E-06
Bis(2-ethylhexyl)phthalate	5.70	<0.1	6.E-07	<0.1	1.E-06	<0.1	2.E-06
Indeno[1,2,3-cd]pyrene	2.50	NV	1.E-05	NV	2.E-05	NV	4.E-05
PCBs (Total)	0.800	NV	4.E-06	NV	6.E-06	NV	1.E-05
Subtotal Organic Compounds		<0.1	3.E-04	<0.1	4.E-04	<0.1	8.E-04
Radionuclides (EPCs in pCi/g)							
Americium-241	1.50	NV	2.E-07	NV	7.E-08	NV	1.E-06
Cesium-137+D	11.1	NV	1.E-04	NV	5.E-05	NV	7.E-04
Neptunium-237+D	63.0	NV	1.E-04	NV	7.E-05	NV	9.E-04
Plutonium-239	53.0	NV	5.E-06	NV	2.E-06	NV	3.E-05
Technetium-99	4840	NV	2.E-06	NV	8.E-07	NV	1.E-05
Thorium-230	1300	NV	2.E-05	NV	6.E-06	NV	8.E-05
Uraniurn-234	150	NV	2.E-06	NV	8.E-07	NV	1.E-05
Uranium-235+D	5.00	NV	6.E-06	NV	3.E-06	NV	4.E-05
Uraniurn-238+D	210	NV	7.E-05	NV	3.E-05	NV	4.E-03
Subtotal Radionuclides		0.0	3.E-04	0.0	2.E-04	0.0	2.E-03
Total		30.3	8.E-04	71.1	9.E-04	199.5	4.E-03

Notes:

Lead also is a COC in areas of the NSDD inside the security fence. Contribution from lead is not included above because risk characterization for lead is determined using alternative methods (DOE 2000d). Generally, lead concentrations are deemed unacceptable and likely to cause a deleterious effect in a child if they exceed the screening value shown on Table 2.5 (i.e., 50 mg/kg).

[a] Risks and hazard derived as discussed in text.

[b] Only chemicals with screening values arc shown.

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For Sections 1 and 2 of the NSDD, the total hazard and cancer risk for the most likely future receptor (i.e., industrial worker) are 30.3 and 8×10^{-4}, respectively. Chemicals contributing a hazard greater than 0.1 to the total (and considered to be COCs for hazard for this receptor) are aluminum, antimony, arsenic, barium, beryllium, chromium, copper, iron, manganese, mercury, nickel, thallium, uranium, and vanadium. Chemicals contributing a cancer risk greater than 1×10^{-6} to the total (and considered to be COCs for risk for this receptor) are arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, PCBs, cesium-137, neptunium-237, plutonium-239, technetium-99, thorium-230, uranium-234, uranium-235, and uranium-238. (Note that lead also is a COC in areas of the NSDD located inside the security fence as discussed in the footnote to Table 2.6.)

2.7.1.3 For Sections 1 and 2 of the NSDD, the driving contaminants for hazard are inorganic chemicals, which make up 100% of the total hazard. Of these inorganic chemicals, the driving contaminants (i.e. *COCs* that make up over 5% of total hazard) and their percentage of total hazard are nickel (24%), chromium (16%), manganese (16%), iron (8%), vanadium (8%), copper (6%), arsenic (5%), and beryllium (5%). For risk, the percentage of total risk is similar between the analyte groups. The driving contaminants (i.e., COCs that make up over 5% of total risk) and their percentage of total risk are arsenic (30%), benzo(a)pyrene (22%), neptunium-237 (16%), cesium-137 (13%), and uranium-238 (8%). (Note that lead is also a COC in the on-site areas of the NSDD located inside the security fence, as discussed in the footnote to Table 2.76.) Uncertainty in human health risk assessment

This section briefly summarizes the significant uncertainties in the human health risk assessment and their effect upon the risk characterization. These uncertainties were considered when developing the cleanup levels presented in Section 2.12.

1) Retention of infrequently detected analytes (i.e., detected in less than 10% of the samples analyzed) in the list of COCs. Effect: Although some infrequently detected analytes were retained in the list of COCs, this was deemed appropriate given the lack of data for some areas of the NSDD; therefore, this uncertainty is assumed to have little effect on the risk characterization and selection of COCs.

2) Lack of consideration in temporal patterns when selecting COCs. Effect: Historical data (i.e., data from samples collected more than 5 years ago) were used to develop the list of COCs. The use of historical data may result in the selection of a chemical as a COC when the chemical no longer is present at a high concentration because of physical (e.g., migration and attenuation) or chemical (e.g., degradation) processes or the lack of selection of a chemical as a COC when the chemical was introduced to the site since the original sampling date. The true effect of this uncertainty cannot be known without additional sampling; however, the data set from which the COCs were selected was deemed to be consistent with the process releases from the PGDP. Therefore, this uncertainty is assumed to have little effect on the list of COCs.

3) Removal of analytes from the list of COCs on the basis of a comparison to background concentrations. Effect: A screen of chemical concentrations against concentrations thought to be naturally occurring was not used in this risk assessment. Because a background screen was not performed, it is possible that some inorganic chemicals and radionuclides identified as COCs are not site-related contaminants. This uncertainty is addressed during the development of the cleanup levels presented later in this document.

4) Characterization of EPCs for environmental media under current conditions. Effect: The use of maximum detected concentrations as EPCs may have led to the identification of some chemicals as COCs when they really are not. However, it is unlikely that chemicals that really are COCs were excluded.

Therefore, the effect of this uncertainty is the development of a more extensive COC list. However, because the COC list is consistent with past process releases, it is not believed that this uncertainty is significant.

5) Use of default values when estimating dermal absorbed dose. Effect: Previous risk assessments have shown that the difference in default absorption rates between KDEP and EPA guidance has a significant impact on risk estimates. Generally, the effect can be estimated by noting that hazard and **risk** values for most metals would be approximately one-fiftieth of those shown if EPA defaults had been used. However, because insufficient information exists to determine which of the defaults is "more correct," the more conservative KDEP default is used when deriving the screening values used in this assessment.

6) Use of provisional or withdrawn toxicity values. Effect: Some chemicals are identified as COCs using screening levels that are based upon **a** provisional or withdrawn toxicity value. Because the screening values for these chemicals are likely to change as additional toxicological information is collected by EPA, the identification of these chemicals as COCs in this assessment is uncertain. Chemicals with cleanup goals based on withdrawn or provisional values in this assessment are aluminum and iron.

7) Lack of toxicity information, toxicity values, or both for some chemicals. Effect: Some chemicals do not have screening levels because toxicity values for them are not available. While this does not increase the uncertainty in any single **risk** or hazard value, it does lower the cumulative risk or hazard and prevents subsequent development of cleanup levels. Fortunately, for this assessment, the COCs lacking cleanup goals are detected in what appears to be trace amounts.

2.7.2 Summary of Ecological Risk Evaluation

An ecological risk assessment for all sections of the NSDD was evaluated and discussed in the FFS and PRAP. A summary of the ecological risk assessment is not presented here because this ROD proposes remedial actions for Sections 1 and 2 of the NSDD only. These sections are industrialized and discussion of ecological risk evaluations would not be pertinent to the interim remedial actions proposed in this document.

(1)

2.7.3 Basis for Action Statement

A CERCLA response action generally is warranted if one or more of the following conditions exist at a site: (1) the cumulative ELCR to an individual exceeds 1×10^{-4} (using reasonable maximum exposure assumptions for either the current or reasonably anticipated future land use or current or potential beneficial use of groundwater and/or surface water); (2) the cumulative hazard index is greater than one (using reasonable maximum exposure assumptions for either the current or reasonably anticipated future land use or current or potential beneficial use of groundwater and/or surface water); (3) site contaminants cause adverse environmental impacts; or (4) chemical-specific standards or other measures that define acceptable risk levels are exceeded and exposure to contaminants above these levels is predicted under current or reasonably anticipated future land use.

Because each of the conditions listed in the preceding paragraph exists at the NSDD (based upon the results of the conservative screening risk assessment described in Sections 2.7.1 and 2.7.2), a response action is appropriate. The following specific condition is of note.

(1) Cancer risk and hazard levels for exposure by an industrial worker to contaminants found in soil and sediment in Sections 1 and 2 of the ditch exceed 1×10^{-4} and 1, respectively.

The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants from the ditch, which may present an imminent and substantial endangerment to public health and welfare.

2.8 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific or OU-specific goals for protecting human health and the environment (EPA 1988). The RAOs are developed by taking into account the results of the screening-level risk assessment and ARARs. These RAOs serve as general design goals for the remedial alternatives that are presented in the following sections.

Inside the PGDP security fence, LUCs will be implemented to ensure that the current and future land use is industrial. In this area, workers are assumed to be directly exposed to contaminated soil, sediment, and surface water. Sections 1 and 2 are industrialized and it is not anticipated that ecological receptors (e.g., animals feeding within the vegetated areas within the security fence) would be directly exposed to contaminated soil, sediment, and surface water. The following RAOs have been established for Sections 1 and 2 of the NSDD (DOE 2001a):

- prevent future discharge of process water to the NSDD;
- reduce the risk to industrial workers and ecological receptors from exposurs to contaminated surface soil, sediment, and surface water to acceptable levels by eliminating direct exposure to contaminated media at the NSDD; and
- prevent future on-site runoff from being transported offsite via the NSDD.

The LUC objectives identified for this remedial action to assure the protectiveness of the preferred alternative is are as follows:

- Sections 1 and 2 (Industrial areas) – Restrict unauthorized access, restrict unauthorized excavations or penetrations below prescribed contamination cleanup depth, and restrict uses of the area that are inconsistent with the assumed land use (i.e., to restrict recreational and/or residential use).

Cleanup levels and specific LUCs selected to achieve these RAOs and LUC objectives are presented and discussed along with the selected alternative in Section 2.12.

2.9 DESCRIPTION OF ALTERNATIVES

As described previously, portions of the NSDD are located both inside and outside the PGDP security fence. However, the entire NSDD is on DOE property. The areas inside and outside the security fence have different operational practices, current land uses, and assumed future land uses. For the purposes of remedial evaluation in this ROD, only the portion of the NSDD located inside the security fence (i.e., Sections 1 and 2) is discussed (Table 2.8 and Figure 2.9).1

Table 2.8. Summary of Sections 1 and 2 of the North-South Diversion Ditch

Section	Location	Length	Beginning Point	Ending Point
1	Inside PGDP security fence	648 m (2125 ft)	NSDD source	C-616-C Lift Station
2	Inside PGDP security fence	145 m (475 ft)	C-616-C Lift Station	PGDP security fence

The *Focused Feasibility Study for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant* DOE/OR/07-1922&D2 evaluated three remedial action alternatives: no action (Alternative 1); excavation of the entire length of the NSDD (Alternative 2); and excavation of "hot spots" of contaminated soil and sediment along the NSDD (Alternative 3). The *Proposed Remedial Action Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-1923&D2 Rev. 1 modified implementation of the second and third alternatives into a two-phased approach. For both the second and third alternatives, Phase I would include the following:

- installation of piping to route process discharges, which currently go to the NSDD, directly to the C-616 Water Treatment Facility;
- installation of storm-water runoff controls in the NSDD downstream of Section 2 prior to excavation of a surge basin during Phase I (existing culverts at the downgradient end of Section 2 will be plugged and filled with controlled low-strength material as an initial step in surge basin construction and existing sediment basins inside the security fenced area will remain in place to receive runoff);
- excavation of a surge basin to contain storm-water runoff until it can be treated through the C-616 facility; and

- the installation of a plus in the NSDD at the PGDP security fence and in three other ditches within the watershed to prevent discharge of storm-water runoff to sections of the NSDD outside the PGDP security fence.

For Alternative 2/Alternative 3[1], Phase II activities would consist of complete excavation of contaminated soils and sediments along Sections 1 and 2 of the NSDD **up** to a total depth of 4 ft, with appropriate staging and disposal of contaminated materials excavated during Phases I and 11. Following excavation of Sections 1 and 2, to a depth of 4 ft bgs soil samples would be collected from the bottom of the excavation. **If** the sampling indicates the presence of excess levels of residual contamination, DOE will review the data and determine if additional, limited excavation is required. Wastes would be characterized and disposed of at an appropriate on- or off-site facility after excavation and characterization. Following excavation, the ditch channel would be restored to grade with 2 ft of clay cover, approximately 2 ft of clean soil and both sections of the ditch then would be revegetated using a mixture of fescue, red top, clover, ryegrass, and bluegrass. The clay cover will provide an extra layer of protection in the elimination of the surface exposure pathway. If excavation achieves or exceeds the specified cleanup levels for Section 1, long-term maintenance of the clay cover would not be required.

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[1]Since the issuance of the PRAP, The PRAP addressed potential response actions for the entire NSDD (i.e., Sections 1, 2, 3, 4, and 5). At this time DOE, EPA, and the Commonwealth of Kentucky have decided to proceed with remediation of Sections 1 and 2 only; therefore, this ROD documents remedial decisions pertaining to Sections 1 and 2. Response actions for Sections 3, 4, and 5 will be addressed in a later decision document.

Alternatives 2 and 3, as described in the PRAP, are the same in regard to the remedial action proposed for Sections 1 and 2 of the NSDD, The preferred alternative identified in the PRAP for Sections 1 and 2 was Alternative 2; therefore, for simplicity, the remedial action proposed for Sections 1 and 2 in this ROD also will be referred to as Alternative 2.

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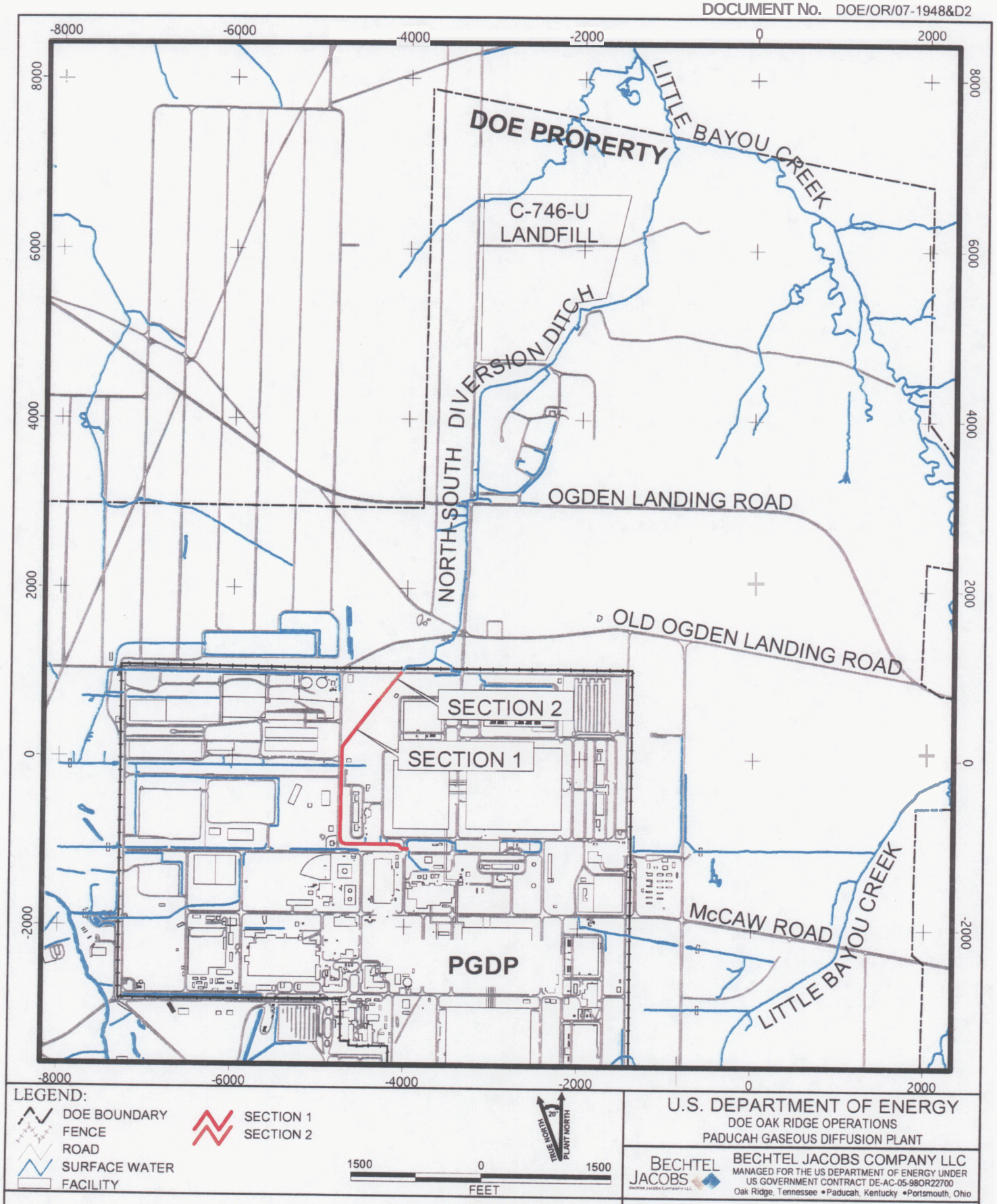

U.S. DEPARTMENT OF ENERGY
DOE OAK RIDGE OPERATIONS
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL JACOBS COMPANY LLC
MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

Science Applications International Corporation
Oak Ridge, Tennessee 37831

Fig. 2.9. Sections 1 and 2 of the North-South Diversion Ditch.

FIGURE No. c5ac90001sk133R3.apr
DATE 07-26-02

DOE estimates that approximately 90% of the remediation waste resulting from the Phase I and Phase II activities will be disposed of in the C-746-U Landfill.. If significantly more than 10% of the Phase I and/or Phase II remediation waste is subsequently determined after excavation and characterization to exceed the WAC and to be inappropriate for disposal at the C-746-U Landfill, and so must be shipped and disposed offsite at more expense, DOE's estimate of the cost of implementing Phase I and/or Phase II Sections 1 and 2 excavation may increase substantially. Consistent with EPA Guidance (EPA 1988) cost estimates have been made based on an expected accuracy of –30% to +50%, and cost changes outside this range may be considered "substantial." Should any of the **FFA** parties conclude in good faith that such a substantial cost increase appears likely, any of the FFA parties may require DOE, EPA, and the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) to reconsider the selected alternative in light of the anticipated cost increase. If, as the result of their reconsideration, the three **FFA** parties agree that, or the dispute resolution process under the **FFA** determines that, significant changes or fundamental alterations should be made to the previously-selected action, the proposed changes will be documented in accordance with the National Contingency Plan, using procedures that provide the public with an opportunity to review and comment on the proposed changes prior to any final decision on adopting them.

Phase I work will proceed upon signature of the ROD. Phase II excavation work will begin after (Phase I activities are complete, and disposal options have become available. CERCLA remediation waste remaining onsite must be disposed in **a** manner that is demonstrated to have sufficient long-term protection of human health and the environment. A risk/performance evaluation currently is being conducted by DOE for the C **746-U** Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Additionally, should any party, as contemplated above, require the reconsideration of the selected alternative during implementation of Phase I or II activities, all excavation activities that would generate remediation waste will halt (unless **FFA** parties agree otherwise) pending the completion of the reconsideration process described herein.

2.9.1 NSDD **Sections 1 and 2**

In order to meet the RAOs for Sections 1 and 2 of the NSDD, three remedial alternatives were developed for each section (DOE 2001a). Descriptions of these alternatives are provided below.

Sections 1 and 2 – Alternative 1 (No Action)

- This alternative would consist of no remedial action, no additional monitoring, and no site restrictions. Five-year reviews, as mandated by CEKCLA, would be required since untreated wastes would remain in place. Alternative 1 would not satisfy the RAOs established for Sections 1 and 2 of the NSDD, and there would be no reduction in risk.

Section 1 – Alternative 2 (Complete Excavation and NSDD Restoration with Rerouting of Process Water and LUCs)

- Effluents that currently are discharged into the ditch include process water and surface water runoff from the northeastern comer of the plant. This effluent would be piped directly to the existing on-site C-6 16 Treatment Facility, satisfying the RAO for preventing discharge of process water into the NSDD.

- Excavation of the entire length of Section 1 to a depth of 4 ft bgs would be performed and soil samples would be collected from the bottom of the excavation. If the sampling indicates the presence of excess levels of residual contamination, DOE will review the data and determine if additional, limited excavation is required. Wastes would be characterized and disposed of at an appropriate on- or off-site facility after excavation and characterization. Following excavation, the ditch channel would be restored to grade with 2 ft of clay cover, approximately 2 ft of clean soil and vegetated, satisfying the RAO for elimination of a surface exposure pathway. The clay cover will provide an extra layer of protection in the elimination of the surface exposure pathway. If excavation achieves or exceeds the specified cleanup levels for Section 1, long-term maintenance of the clay cover would not be required. However, since the extent. of contamination is not characterized fully and the remediation focuses on the ditch only, it is possible that some residual contamination would remain at depth. Any residual contamination would be addressed by the GWOU.

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- The remaining RAO to prevent storm water runoff from being transported offsite would be satisfied by the installation of storm water runoff controls downgradient of Section 2, the excavation of a surge basin to contain storm water runoff until it could be treated through the C-616 facility, and the installation of plugs in the NSDD at the PGDP security fence and in three other ditches within the watershed.

- Subsurface contamination may remain above levels that allow unlimited use and unrestricted exposure; therefore, LUCs consisting of property record actions, administrative controls, and access controls would be required. In addition, five-year reviews would be conducted no less often than once every five years in accordance with 40 *CFR* § 300.400(f)(4)(ii). Further information on the LUCs to be implemented in conjunction with the NSDD Remedial Action will be included in the *Land Use Control Implementation Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2001b). LUCs will be implemented as an integral part of the selected remedy and will be maintained to ensure long-term protectiveness until the FFA parties deem them unnecessary. DOE is responsible for implementing, monitoring, maintaining, reporting on, and enforcing the LUCs selected in this ROD in accordance with the requirements in the LUCIP approved for the NSDD.

Section 1 – Altenintive 3 ("Hot Spot" Excavation. Complete Backfill and Replacement with Rerouting of Process Water, arid LUCs)

- Effluents that currently are discharged into the ditch include process water and surface water runoff from the northeastern comer of the plant. This effluent would be piped directly to the existing on-site C-616 Treatment Facility, satisfying the RAO for preventing discharge of process water into the NSDD.

- Excavation of "hot spots" (i.e., a contaminant concentration resulting in a target ELCR > 1×10^{-4} or a target hazard index (HI) > 3) to an appropriate level (based on industrial use) would be performed. The wastes would be characterized and disposed of at an appropriate on- or off-site facility after excavation and characterization. The existing ditch channel would be completely backfilled with clean soil to restore grade, vegetated, and replaced with a newly constructed ditch located adjacent to the existing NSDD. The new ditch channel would be lined with vegetation. While some contamination would be expected to remain at depth, the clean soil backfill would reduce the risk to an acceptable level by eliminating the potential risk pathway. This action would satisfy the second RAO to reduce risk to industrial workers and ecological receptors by removing surficial contaminants.

- The remaining RAO, to prevent storm water runoff from being transported offsite. would be satisfied by the excavation of a surge basin to contain storm water runoff until it could be treated through the C-616 facility, and the installation of plugs in the NSDD at the PGDP security fence and in three other ditches within the watershed.

- Subsurface contamination may remain above levels that allow unlimited use and unrestricted exposure; therefore, LUCs consisting of property record actions, administrative controls, and access controls would be required. In addition, five-year reviews would be conducted no less often than once every five years in accordance with 40 *CFR* § 300.400(f)(4)(ii). Further information on the LUCs that will be implemented in conjunction with the NSDD Remedial Action will be included in the *Land Use Control Implementation Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2001b). LUCs will be implemented as an integral part of the selected remedy and will be maintained to ensure long-term protectiveness until the **FFA** parties deem them unnecessary. DOE is responsible for implementing, monitoring, maintaining, reporting on, and enforcing the LUCs selected in this ROD in accordance with the requirements in the LUCIP approved for the NSDD.

Section 2 – Alternative 2 (Complete Excavation and NSDD Restoration with Rerouting of *Process Water and LUCs)*

- Section 2 does not receive process water; therefore, the first RAO is not applicable to this section.

- Excavation of the entire length of Section 2 to a depth of 4 ft bgs would be performed and soil samples would be collected from the bottom of the excavation. If the sampling indicates the presence of excess levels of residual contamination, DOE will review the data and determine if additional, limited excavation is required. Wastes would be characterized and disposed of at an appropriate on- or off-site facility after excavation and characterization. Following excavation, the ditch channel would be restored to grade with 2 ft of clay cover, approximately 2 ft of clean soil and vegetated, satisfying the RAO for elimination of a surface exposure pathway. The clay cover will provide an extra layer of protection in the elimination of the surface exposure pathway. If excavation achieves or exceeds the specified cleanup levels for Section 1, long-term maintenance of the clay cover would not be 'required. However, since the extent of contamination is not characterized fully and the remediation focuses on the ditch only, it is possible that some residual contamination would remain at depth. Any residual contamination would be addressed by the GWOU. The C-616-C Lift Station would be removed and replaced/upgraded.

- The remaining RAO to prevent storm water runoff from being transported offsite would be satisfied by the excavation of a surge basin to contain storm water runoff until it could be treated through the C-616 facility, and the installation of plugs in the NSDD at the PGDP security fence and in three other ditches within the watershed.

- Subsurface contamination may remain above levels that allow unlimited use and unrestricted exposure; therefore, LUCs consisting of property record actions, administrative controls, and access controls would be required. In addition, five-year reviews would be conducted no less often than once every 5 years in accordance with 40 *CFR* § 300.400(f)(4)(ii). Further information on the LUCs that will be implemented in conjunction with the NSDD Remedial Action will be included in the *Land Use Control Implementation Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2001b). LUCs will be implemented as an integral part of the selected remedy and will be maintained to ensure long-term protectiveness until the **FFA** parties deem them unnecessary. DOE is responsible for implementing, monitoring, maintaining,

reporting on, and enforcing the LUCs selected in this ROD in accordance with the requirements in the LUCIP approved for the NSDD.

Section 2 – Alternative 3 ("Hot Spot" Excavation, Complete Backfill and Replacement with Rerouting of Process Water, and LUCs)

- Section 2 does not receive process water; therefore, the first RAO is not applicable to this section.

- Excavation of "hot spots" (i.e., a contaminant concentration resulting in a target ELCR > 1×10^{-4} or a target HI > 3) to an appropriate level (based on industrial use) would be performed. The wastes would be characterized and disposed of at an appropriate on- or off-site facility after excavation and characterization. The existing ditch channel would be completely backfilled with clean soil to restore grade, vegetated, and replaced with a newly constructed ditch located adjacent to the existing NSDD. The new ditch channel would be lined with vegetation. While some contamination would be expected to remain at depth, the clean soil backfill would reduce the **risk** to an acceptable level by eliminating the potential **risk** pathway. This action would satisfy the second RAO to reduce risk to industrial workers and ecological receptors by removing surficial contaminants. The C-616-C Lift Station would be removed and replaced/upgraded.

- The remaining RAO, to prevent storm water runoff from being transported offsite, would be satisfied by the excavation of a surge basin to contain storm water runoff until it could be treated through the C-616 facility, and the installation of plugs in the NSDD at the PGDP security fence and in three other ditches within the watershed.

- Subsurface contamination may remain above levels that allow unlimited use and unrestricted exposure; therefore, LUCs consisting of property record actions, administrative controls, and access controls would be required. In addition, five-year reviews would be conducted no less often than once every five years in accordance with 40 CFR § 300.400(f)(4)(ii). Further information on the LUCs that will be implemented in conjunction with the NSDD Remedial Action will be included in the *Land Use Control Implementation Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2001b). LUCs will be implemented as an integral part of the selected remedy and will be maintained to ensure long-term protectiveness until the **FFA** parties deem them unnecessary. DOE is responsible for implementing, monitoring, maintaining, reporting on, and enforcing the LUCs selected in this ROD in accordance with the requirements in the LUCIP approved for the NSDD.

The disposal options considered for these alternatives include on-site disposal and off-site disposal. For the purposes of developing cost estimates, on-site disposal of approximately 90% of the remediation waste resulting from Phase I and II excavation was assumed to be at the C-746-U Landfill. Off-site disposal of the remaining 10% was assumed to be at the NTS or Envirocare. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. A risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. For the purposes of this evaluation, it is assumed that (a) each facility meets the disposal requirements of CERCLA, and (b) the wastes generated from the NSDD meet each facility's waste acceptance criteria (WAC). However, the on-site landfill has halted the acceptance of waste containing residual radioactivity since November 1999, pending an authorized limit request for such waste. Under these circumstances, use of the landfill may be constrained or not available at all.

Nonhazardous waste generated as a result of the NSDD remedial action will be disposed of in the C-746-U Landfill. If significantly more than 10% of the Phase I and/or Phase II remediation waste is subsequently determined after excavation and characterization to exceed the WAC and to be inappropriate for disposal at the C-746-U Landfill, and so must be shipped and disposed offsite at more expense, DOE's estimate of the cost of implementing Phase I and/or Phase II Sections 1 and 2 excavation may increase substantially. Consistent with EPA Guidance (EPA 1988) cost estimates have been made based on an expected accuracy of –30% to +50%, and cost changes outside this range may be considered "substantial." Should any of the FFA parties conclude in good faith that such a substantial cost increase appears likely, any of the **FFA** parties may require DOE, EPA, and KNREPC to reconsider the selected alternative in light of the anticipated cost increase. If, as the result of their reconsideration, the three FFA parties agree that, or the dispute resolution process under the **FFA** determines that, significant changes or fundamental alterations should be made to the previously-selected action., the proposed changes will be documented in accordance with the NCP, using procedures that provide the public with an opportunity to review and comment on the proposed changes prior to any final decision on adopting them.

Phase I work will proceed upon signature of the ROD. Phase II excavation work will begin after (1) Phase I activities are complete, (2) the C-746-U Landfill is available to receive waste, and (3) NTS (or another appropriated off-site disposal facility) has approved NSDD remediation waste for disposal at its facility. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. **A** risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Additionally, should any party, as contemplated above, require the reconsideration of the selected alternative during implementation of Phase I or II activities, all excavation activities that would generate remediation waste will halt (unless **FFA** parties agree otherwise) pending the completion of the reconsideration process described herein.

In addition, a LUCIP (DOE 2001b) will be developed separately, as required by the *Land Use Control Assurance Plan for the Padricah Gaseous Diffusion Plant* (DOE 2000f). This LUCIP will establish LUC implementation and maintenance requirements enforceable under CERCLA and the FFA. DOE will be responsible for implementing, monitoring, maintaining, reporting on, and enforcing the selected LUCs and the requirements of the NSDD LUCIP.

LUCs for Sections 1 and 2 include Property Record Actions, Administrative Controls, and Access Controls. Property Record Actions consist of two types of actions: Property Record Notices and Property Record Restrictions. Property Record Notices refer to any nonenforceable, purely informational document filed with the McCracken County Court Clerk that alerts anyone searching the records to important information about the contamination present in the NSDD and are the appropriate Property Record Action to take as long as DOE owns the land on which the NSDD is located. Property Record Restrictions refer to conditions and/or covenants that restrict or prohibit certain uses of real property and are recorded along with original property acquisition records of DOE and its predecessor agencies. Filing of Property Record Restrictions will be required as soon as practicable after ROD signature, and as specified in the LUCIP. Administrative Controls include DOE and DOE contractor administrative controls such as the excavation/penetration permits program. Access Controls include barriers or restrictions to entry (e.g., fences, gates, security measures, etc.).

2.9.2 Summary of Alternatives

The three alternatives that are being considered for the NSDD Remedial Action are (1) No Action; (2) Complete Excavation and NSDD Restoration with Rerouting of Process Water and LUCs; and (3) "Hot

Spot" Excavation, Complete Backfill and Replacement with Rerouting of Process Water, and LUCs. A brief summary of each alternative and the expected outcome of implementation is provided below.

The no action alternative, while cost efficient and technically and administratively feasible to implement, would not meet ARARs and to be considered guidance (TBC) and would not be protective of human health or the environment under the current or expected future use scenario for Sections 1 and 2 of the NSDD.

The remaining two alternatives propose excavation as the remedial technology to remove contaminated material from Sections 1 and 2 of the NSDD. Both alternatives would meet ARARs and TBCs, would be technically and administratively feasible, would be protective of human health and the environment under current and expected future use scenario for Sections 1 and 2 of the NSDD, and would have the same cost.

For Alternative 2, Complete Excavation, Sections 1 and 2 of the NSDD would be excavated without further field assessment to define contamination, a clay cover would be installed at the base of the excavation in Sections 1 and 2, and the entire NSDD would be restored to grade with 2 ft of clay cover, approximately 2 ft of clean soil and vegetated. The amount of soil that would be excavated as a result of implementing Alternative 2 is approximately 34,000 yds^3. Assuming 90% on-site disposal and 10% off-site disposal for the excavated material, total costs for Alternative 2, including waste disposal costs, would be expected to be approximately $12,965,000. No additional costs for further field assessment would be required.

For Alternative 3, "Hot Spot Excavation," only those areas identified during additional field assessment to be above a specified contaminant concentration would be excavated. For cost estimation purposes it has been assumed that 100% of Sections 1 and 2 would be excavated, so that estimates for excavated material, disposal scenarios and costs are the same as for Alternative 2. With the implementation of either Alternative 2 or Alternative 3, subsurface contamination would remain above levels allowing unlimited use and unrestricted exposure within Sections 1 and 2 of the NSDD. Therefore, LUCs, consisting of property record actions, administrative controls, and access controls, and five-year reviews as mandated by CERCLA would be required for both alternatives.

2.10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides the basis for determining which alternative does the following: (1) meets the threshold criteria of overall protection of human health and the environment, and compliance with ARARs; (2) provides the best balance between effectiveness and reduction of toxicity, mobility, or volume through trsatment, implementability, and cost; and (3) satisfies state and community acceptance. Additionally, the alternatives are analyzed to determine whether they are consistent with the Kentucky Hazardous Waste Permit.

Nine criteria are required by CERCLA for evaluating the expected performance of rsmedial actions. The nine criteria are identified below.

(1) *Overall protection of human health and the environment.* This threshold criterion requires that the rsmedial 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.* This threshold criterion requires that the alternatives be assessed to determine if they attain compliance with ARARs of both state and federal law or provide grounds for invoking a waiver.

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

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

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

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

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

(8) *State acceptance.* This modifying criterion provides for consideration of any formal comments from the state on the PRAP.

(9) *Community Acceptance.* This modifying criterion provides for consideration of any formal comments from the community on the PRAP.

2.10.1 Overall Protection of Human Health and the Environment

Under this threshold criterion, alternatives are evaluated to determine the ability to reduce risk to human health and the environment. For the portions of the NSDD located inside the security-fenced area, it has been determined that unacceptable levels of contamination exist relative to risk-based screening thresholds for industrial workers Additionally, the maximum concentrations of many contaminants are greater than ecological **"no risk"** screening values.

Alternative 1 is a No Action alternative and would not provide a reduction in risk for any of the sections of the NSDD; therefore, Alternative 1 does not provide overall protection to human health or the environment and does not meet RAOs.

Alternative 2 (complete excavation and restoration of the NSDD with rerouting of process water and LUCs) provides adequate overall protection to human health and the environment by meeting RAOs. Alternative 2 is protective of the environment (i.e., vegetation, wildlife, T&E species, and wetlands) and of human health whether or not there is risk, since this alternative includes removal of surficial contamination when present above levels associated with no adverse effect on ecological or human

receptors, placement of clean backfill to eliminate a surface exposure pathway, and the implementation of LUCs.

2.10.2 Compliance with **ARARs**

Under this threshold criterion, alternatives are evaluated to determine whether they would comply with the requirements, criteria, standards, or limitations under federal or more stringent state environmental laws that are legally applicable or relevant and appropriate to the hazardous substances or circumstances at a site. Remedial actions conducted under CERCLA are required to attain ARARs or qualify for **a** specific waiver. Under § 121(e) [42 USCA § 9621(e)], federal, state, or local permits are not required to conduct on-site response actions; however, the substantive requirements of the permitting programs must be followed. In addition, CERGLA § 121(d)(4) [42 USCA § 9621(d)(4)] provides several ARAR waiver options that may be invoked, provided that human health and the environment are protected. Finally, per 40 CFR 300.405(g)(3), other advisories, criteria, or guidance may be considered in determining remedies that meet the TBC category.

ARARs typically are divided into three categories: (1) location-specific, (2) chemical-specific, and (3) action-specific. Location-specific requirements establish restrictions on permissible concentrations of hazardous substances or establish requirements for how activities will be conducted because they are in special locations (e.g., floodplains or historic districts). Chemical-specific ARARs provide health- or risk-based concentration limits or discharge limitations in various environmental media (i.e., surface water, groundwater, soil, or air) for specific hazardous substances, pollutants, or contaminants. Action-specific ARARs include operation, performance, and design requirements or limitations based on waste types, media, and removal/remedial activities.

TBC information also may be used in developing and evaluating remedial action alternatives. In the absence of ARARs, TBC information consisting of advisories, criteria, or guidance, such as DOE Orders, may be useful in determining cleanup levels that are protective of human health and the environment. A list of potential ARARs and TBCs has been identified to address the alternatives proposed in this ROD and is included as Appendix D.

Alternative 1, No Action, would not comply with *ARARs* and TBCs. Alternative 2 will comply with all *ARARs* and TBCs.

2.10.3 Long-Term Effectiveness and Permanence

Under this balancing criterion, long-term effectiveness and permanence are evaluated based upon the magnitude of residual risk and the adequacy and reliability of controls used to manage remaining waste (untreated waste and treatment residuals) over the long term (i.e., after remedial objectives are met).

Alternative 1, No Action, does not meet this balancing criterion since significant residual risks would remain, and contaminants that might migrate into the environment would continue to be discharged. Alternative 2 meet the criterion for long-term effectiveness and permanence. This alternative reduces the magnitude of residual risk by excavation of contaminated soils. Some long-term O&M may be required to maintain the vegetative cover over the ditch. LUCs and five-year reviews, as mandated by CERCLA, would be required for portions of the NSDD located inside the security-fenced area to demonstrate the integrity and effectiveness of the controls and confirm that additional exposure pathways have not developsd.

Potential long-term impacts to resources and mitigative measures to offset any potential impacts are described in the text below. The depth of impact analysis and mitigative measures is correlated to the degree to which a resource may be impacted.

Land use. Since no contamination is remediated under Alternative 1 (No Action), the NSDD would remain posted for radiological contamination, which could limit some potential use of the surficial areas near the ditch. Alternative 2 will reduce or eliminate surface contamination. However, due to the possibility of remaining contamination at depth, the implementation of LUCs still will be required to ensure protectiveness; therefore, long-term land use will be limited under Alternative 2.

Socioeconomics. There would be no direct long-term effects on socioeconomics due to implementation of Alternative 1 or Alternative 2.

Air quality and noise. Long-term impacts to air quality and noise would not increase through the implementation of Alternative 1 or Alternative 2.

Vegetation. Unacceptable ecological risk (probability of adverse impacts on ecological receptors such as vegetation, wildlife, T&E species, and wetlands) from chemical and radiological wastes in the NSDD is a potential concern, as indicated by comparisons between environmental and benchmark concentrations. Implementation of Alternative 1 would have no adverse impact on vegetation if no risk were present. Alternative 1 could adversely impact vegetation from contaminants in the NSDD soil and sediment. Stabilization of the excavated area (Alternative 2) includes revegetation to prevent erosion. Although revegetation and wetland reconstruction efforts (where required) might impact the site for the short term, it is expected that the site would return to a viable ecosystem as the vegetative cover **is** reestablished, thus having a negligible long-term impact.

Wildlife. Unacceptable ecological risk (probability of adverse impacts on ecological receptors such as vegetation, wildlife, T&E species, and wetlands) from chemical and radiological wastes in the NSDD is a potential concern, as indicated by comparisons between environmental and benchmark concentrations. Implementation of Alternative 1 would have no adverse impact on wildlife if no risk were present. Alternative 1 might adversely impact wildlife from contaminants in the NSDD soil and sediment. Alternative 2 calls for the revegetation of the excavated areas to allow for the reestablishment of wildlife populations. It is expected that natural populations would move into the area upon completion of the remedial activities as the vegetative cover became established, thereby minimizing any long-term impact.

T&E Species. Unacceptable ecological risk (probability of adverse impacts on ecological receptors such as vegetation, wildlife, T&E species, and wetlands) from chemical and radiological wastes in the NSDD is a potential concern, as indicated by comparisons between environmental and benchmark concentrations. Although no federal or state listed T&E species have been identified as occurring in the NSDD, the lower sections of the NSDD potentially provide habitat for the federally listed Indiana bat and other state listed species (e.g., crayfish).

Implementation of Alternative 1 would have no adverse impact on T&E if no risk were present. Alternative 1 could potentially have adverse impacts on T&E species that may occur within the NSDD or in the immediate vicinity if risk is present. For example, foraging Indiana bats could ingest insects that had accumulated contaminants from esposure to NSDD soil/sediment.

implementation of Alternative 2 potentially could have long-term adverse impacts to T&E species if they were present, because habitats could be destroyed during the removal of contamination. However, because no T&E species arc believed to inhabit the area inside the PGDP, no overall long-term effects

would be espected through implementation of Alternative 2. Furthermore, removal of contamination would have an overall positive impact by lowering exposure levels.

Cultural resources. No long-term effects to cultural resources are anticipated for Alternative 1 or Alternative 2..

Groundwater. Long-term groundwater impacts may exist under Alternative 1, since no Contamination would be removed. Under Alternative 2, potential groundwater impacts will be assessed under the Groundwater Operable Unit.

Surface water. Since no contamination would be removed by implementation of Alternative 1, long-term impacts to surface water may exist. No long-term impacts to surface water for Alternative 2 are anticipated since contamination would be removed.

Floodplains. There would be no changes to the flood plains and, therefore, no long-term effects to the floodplains for Alternatives 1 or Alternative 2.

Wetlands. Unacceptable ecological risk (probability of adverse impacts on ecological receptors such as vegetation, wildlife, T&E species, and wetlands) from chemical and radiological wastes in the NSDD is a potential concern, as indicated by comparisons between environmental and benchmark concentrations. Implementation of Alternative 1 would have no adverse impact on wetlands, if no **risk** were present. Alternative 1 might adversely impact wetlands from contaminants in the NSDD soil and sediment. No long-term impacts to wetlands exist for Alternative 2, since this alternative would include removal of contamination when present above levels associated with no adverse effect on ecological receptors. The reconstruction of impacted wetlands, as necessary, or the replacement on a two-for-one basis would be expected to provide adequate habitat for any impacted populations and allow for their reestablishment within the area. In addition, wetlands found in Sections 1 and 2 of the NSDD would be avoided to the extent practicable during remedial action implementation and mitigative steps taken such that no potential long-term impacts would be expected.

Soils and prime farmland. No impacts to soils or prime farmlands would be expected to occur through the implementation of Alternative 1 or Alternative 2/Alternative 3.

Transportation. No long-term direct or indirect effects are anticipated for any of the alternatives.

Cumulative impacts. Cumulative impacts are defined as the incremental impact of an action when added to other past, present, reasonable, or foreseeable future actions, regardless of what agency or person undertakes other such actions. No cumulative impacts resulting from Alternative 2 have been identified.

2.10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Under this balancing criterion, the ability of an alternative to meet the statutory preference to employ treatment to reduce the toxicity, mobility, or volume of hazardous substances is assessed. Since Alternative 1 does not include any treatment, it does not satisfy this criterion. Although Alternative 2 includes excavation of contaminated soils, it does not include any treatment. Treatment was not retained in any of the alternatives for the detailed analysis because the assessment of the OU did not indicate the presence of any highly toxic or liquid source materials that constitute a principle threat, and treatment of the large volume of residual soil contamination would not be a cost effective means of meeting the RAOs. Therefore, none of these alternatives satisfy the statutory preference for treatment. However, it should be noted that treatment, though not anticipated, may be completed, if necessary, to meet any WAC.

2.10.5 **Short-Term** Effectiveness

Under this balancing criterion, the short-term effectiveness of an alternative is evaluated relative to its effect on human health and the environment during the implementation of the remedial action. Alternative 1 would not pose any additional risks to workers or the community if it were implemented.

Implementation of Alternative 2 would pose minimal, but manageable, impacts in terms of risks to the community. Since this alternative includes excavation of contaminated soils, there might be slight increases in risk exposure for a short period of time to on-site workers; likewise, these risks to the on-site workers would be manageable through the use of health and safety requirements and PGDP procedures.

Land rise. Since no contamination is remediated under Alternative 1 (No Action), the NSDD will continue to be contaminated, which may limit some potential use of areas near the ditch. Alternative 2, which reduce or eliminate surface contamination, would not impact short-term land use.

Socioeconomics. There would be no direct effects on socioeconomics due to implementation of Alternatives 1 or Alternative 2.

Air quality and noise. Impacts to air quality and noise would not increase through the implementation of Alternative 1. Implementation of Alternative 2 would potentially cause temporary effects to air quality and noise to be noticed; however, it is expected these effects will be minimal.

Vegetation. No additional impacts to vegetation are anticipated for Alternative 1, since no vegetation would be destroyed. Short-term negative impacts to the vegetation likely would occur with sediment excavation proposed in Alternative 2. Excavation potentially redistributes wastes into new uncontaminated areas, potentially destroys animals and plants residing at the excavated locations, and potentially destroys existing features of the environment that provide habitat or food to plants and animals. The degree. of short-term damage to the environment increases with the surface area removed. Full or partial recovery to the natural conditions in sections with suitable substrates would be likely because these habitats are open to colonization and actions will.be taken to reestablish vegetation along Sections 1 and 2 of the NSDD following implementation of the remedial action.

Wildlife. No additional impacts to wildlife are anticipated for Alternative 1, since no wildlife will be destroyed and no modifications will be made to habitats. Short-term negative impacts to wildlife would be likely to occur with sediment excavation as in Alternative 2. Excavation potentially redistributes wastes into new uncontaminated areas, potentially destroys animals and plants residing at the excavated locations, and potentially destroys existing features of the environment that provide habitat or food to plants and animals. The degree of short-term damage to the environment increases with the surface area removed. It is anticipated that few local indigenous species occur in the habitat that will be affected. The area impacted would be minimized to the extent possible and revegetation activities would allow for species to repopulate the affected area as vegetation was reestablished. Full or partial recovery to the natural conditions in sections with suitable substrates would be likely because these habitats are open to colonization.

T&E species. No additional impacts to T&E species are anticipated for Alternative 1, since no vegetation will be destroyed and no modifications will be made to habitats. The Indiana bat (*Myotis sodalis*) is the only T&E species potentially occurring in the vicinity of the NSDD. However, it does not occur within Sections 1 and 2 of the NSDD. Implementation of Alternative 2 would not have an impact since the Indiana bat does not occur within Sections 1 and 2 and the excavation will not remove roosting trees.

Cultural resources. No short-term effects to cultural resources are anticipated for Alternative 1 or Alternative 2.

Groundwater. Short-term groundwater impacts may exist for Alternative 1. since no contamination is removed. Under Alternative 2, potential groundwater impacts will be assessed under the Groundwater Operable Unit.

Surface water. No short-term effects to surface water are anticipated for Alternative 1. Short-term impacts to surface water are likely to occur with sediment and soil excavation proposed in Alternatives 2/ Alternative 3 due to the increased availability of sediment for transport. The Phase I (pre-excavation) portion of Alternative 2 includes provisions for rerouting process water, excavation of a surge basin to contain storm water runoff from Sections 1 and 2 of the NSDD, and the installation of plugs in the NSDD at the downgradient end of Section 2 and in three other ditches within the watershed to prevent discharge of storm water runoff to sections of the NSDD located outside the PGDP security fence. These measures would minimize the potential short-term impacts to surface water from excavations conducted at Sections 1 and 2 of the NSDD.

Floodplains. There would be no changes to the flood plains and, therefore, no short-term effects to the floodplains for Alternative 1 or Alternative 2.

Wetlands. No additional impacts to wetlands are anticipated for Alternative 1, since no vegetation will be destroyed. Implementation of Alternative 2 potentially could result in adverse impacts to wetlands. Wetlands primarily associated with the NSDD are linear and located within the riparian zone of the ditch. Rare or unique wetland types such as floodplain-tupelo, vernal pool, and wet meadow/grassland are not associated with the NSDD. Remedial actions could include temporary adverse impacts such as increased siltation/sedimentation from uncontrolled soil erosion or permanent loss of wetlands due to filling or excavation. To the extent that wetlands impact could not be avoided, all practical measures (e.g., erosion controls) would be incorporated to minimize adverse impacts. If adverse impacts could not be minimized, wetland restoration or replacement might be required. Any remedial activities would be required to comply with the substantive requirements of DOE's regulations (10 CFR 1022), U.S. Army Corps of Engineers regulations (33 CFR 320), and EPA regulations (40 CFR 230) for compliance with floodplain/wetlands environmental review requirements. Stream and wetland restoration and/or mitigation would have to be negotiated among DOE, the Commonwealth of Kentucky, and the U.S. Army Corps of Engineers.

Soils and pi-inze farmland. No impacts to soils or prime farmlands would be expected to occur through the implementation of Alternatives 1 or Alternative 2.

Transportation. There would be no impacts under Alternative 1. An increased amount of traffic would be expected with the offsite transport of waste, as required for Alternative 2, commensurate with the volume of waste being transported. Other than the increased potential for transportation accidents, no short-term direct or indirect effects are anticipated for any of the alternatives.

Cumulative impacts. Cumulative impacts are defined as the incremental impact of an action when added to other past, present, reasonable, or foreseeable future actions, regardless of what agency or person undertakes other such actions. Due to excavation of sediment and soil as in Alternative 2, short-term impacts might be anticipated, but are expected to be negligible to vegetation, wildlife, T&E species. wetlands, and surface water. There would be no changes in cumulative impacts through implementation of Alternative 1.

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2.10.6 Implcmcntability

Under this balancing criterion, the technical and administrative feasibility of implementing an alternative and the availability of necessary materials and services required during its implementation are assessed. Alternative 1 and Alternative 2is technically and administratively feasible to implement. Alternative 2 assumes that on-site and/or off-site disposal capacity is readily available.

2.10.7 Cost

Under this balancing criterion, the cost of each alternative is evaluated. The estimates are intended to aid in making project evaluations and comparisons between alternatives. Consistent with EPA guidance (EPA 1988), the estimates have an expected accuracy of -30% to +50% for the scope of action described for each alternative. The initial cost estimates that were developed for each alternative are presented in Tables 2.9 and 2.10.

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Table 2.9. Estimates of Soil Disposal Volumes and Costs for Alternative 2

Alternative Description	Volume of Soil for Disposal (yds^3)	Waste Disposal Options[b]	
		10% off-site[b] / 90% on-site	100% off-site
Alternative 2: Complete Excavation and NSDD Restoration with Rerouting of Process Water and LUCs	34,000	$12,965,000	$27,839,000

[a] Cost estimates presented here are lower than those presented in the PRAP due to the fact that the **ROD** only addresses the proposed remedial action for Sections 1 and 2 of the NSDD.

[b] For cost estimation purposes, off-site disposal at Envirocare and on-site disposal at **C-746-U** Landfill are assumed,

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Table 2.10. Dctailcd analysis of remedial alternatives for the NSDD

Assessment Criteria	Alt. 1: No Action	Section 1	Section 2
		Alt. 2	Alt. 2
Overall protection of human health and the environment	Would not be protcctivc of human health and the environrncnt.	Would be protective of human health and the environment.	Would be protective of human health and the environment.
Compliance with **ARARs**	Would not comply with ARARs.	Would comply with **ARARs.**	Would comply with **ARARs.**
Long-term effectiveness and permanence	Contaminants would continue to bc discharged into the environment and migrate.	Some residual risks within **PGDP** security fence would remain.	Some residual risks within **PGDP** security fence would remain.
Reduction of toxicity, mobility, or volume through treatment	No treatment.	No treatment.	No treatment.
Short-term effectiveness	No increased risks to workers or community.	Little or no impact *to* comrnunity; manageable risk to workers.	Little or no impact to community; manageable risk to workers.

Table 2.10, (continued)

Assessriient Criteria	Alt. 1: No Action	Section 1 Alt. 2[b]	Section 2 Alt. 23
Implement-ability	No Action to implement.	Technically and administratively fcnsible to implement; assumes on- and off-site disposal capacity is readily available.	Technically and admin-istratively feasible to implement; assumes on- and off-site disposal capacity is readily available.
(Total) Cost (BJC 2000b)	No cost	Alt. 2 costs for complete length of NSDDa: 10% off-site & 90% on-site disposal: $12,964,339 100% off-site disposal: $27,838,762	See Section 1, Alt. 2.
State acceptance	Comments from the Commonwealth of Kentucky have been incorporated into this document, as appropriate, following their review of the draft document.		
Community acceptance	Following a formal public comment period on the PRAP, significant comments from the community have been addressed in a responsiveness summary, which is presented in Part 3 of this ROD.		

Footnotes:
a – For cost estimation purposes, off-site disposal at Envirocare and on-site disposal at C-746-U Landfill are assumed.

These costs include project management, design, supplies and equipment. construction. construction support, waste characterization, and waste shipping and disposal. The costs do not include an allowance for contingency or a cost-benefit analysis to support an ALARA cleanup goal determination.'

The extent of contamination in the NSDD has not been assessed fully and the cost estimates for Alternatives 2 and 3 will be sensitive to waste volume and disposal location (i.e., on-site vs. off-site disposal). On-site disposal of contaminated soils has lower transportation costs and disposal fees than shipment to an off-site facility.

2.10.8 State Acceptance

The Focused Feasibility Study, PRAP, and draft ROD were issued for review and comment to both the KDEP and EPA. The KDEP concurs with the selected remedial alternative for the NSDD, consistent with the requirements of the Commonwealth of Kentucky's Hazardous Waste Permit.

2.10.9 Community Acceptance

Part 3 of this document, Responsiveness Summary, addresses comments received during the public briefing and public comment period.

2.11 PRINCIPAL THREAT WASTES

Principal threat wastes are source materials that are highly toxic or highly mobile and cannot be reliably contained or that would present **a** significant risk to human health or the environment should exposure occur. Based upon the nature and extent of contamination in the NSDD, it is unlikely that principal threat wastes are present within the areas of the NSDD to be addressed by the proposed action. However, in the unlikely event that principal threat wastes are identified during the remedial action, then these wastes will be excavated and disposed of appropriately.

2.12 SELECTED REMEDY

Based upon the evaluation of the alternatives with regard to the nine criteria, the selected remedy is Alternative 2, complete excavation and restoration of Sections 1 and 2 of the NSDD with rerouting of process water, installation of a clay cover in Sections 1 and 2, disposal of non-hazardous waste generated as a result of the remediation action in the C-746-U Landfill, and LUCs. DOE will prepare a detailed design for this remedial action in accordance with the requirements specified in the "Declaration" of this ROD.

2.12.1 Summary of the Rationale for the Selected Remedy

The comparison of alternatives discussed in Section 2.10 indicates that Alternative 1, No Action, would not provide overall protection to human health or the environment and would not meet the RAOs

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[1] While there was no cost-benefit analysis performed for the ALARA determination, the cleanup levels proposed were selected by the SWOU Project Core Team, which includes representatives from DOE, EPA, and the Commonwealth of Kentucky. Additionally, assuming the availability of on-site disposal for approximately 90% of the NSDD cleanup materials, DOE, EPA, and the Commonwealth of Kentucky have determined that the selected remedial action is cost effective.

established for this project. Alternative 2 was determined to be protective of human health and the environment and both would meet project RAOs.

Alternative 2 satisfies the mandates of CERCLA § 121 and the requirements of the NCP to be protective of human health and the environment, is compliant with federal and state ARARs for the scope of this limited action, and is cost effective. In addition, this remedial action is consistent with RCRA corrective action requirements and the HSWA Permit for these SWMUs. Alternative 2 does not satisfy the statutory preference for treatment or resource recovery to the maximum extent practicable as a principal element of the remedy, since the excavated waste will be disposed of without any planned treatment. Treatment was not retained in any of the alternatives for the detailed analysis because the assessment of the OU did not indicate the presence of any highly toxic or liquid source materials that constitute a principle threat, and treatment of the large volume of residual soil contamination would not be a cost effective means of meeting the RAOs. Because this remedy may result in hazardous substances, pollutants, or contaminants remaining in both Sections 1 and 2 of the NSDD above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

2.12.2 Description of the Selected Remedy

The selected remedy will be implemented in a two-phase approach. Phase I will include the following:

- installation of piping to route process discharges, which currently go to the NSDD, directly to the C-616 Water Treatment Facility;
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- installation of storm-water runoff controls in the NSDD downstream of Section 2 prior to excavation of a surge basin during Phase I (existing culverts at the downgradient end of Section 2 will be plugged and filled with controlled low-strength material as an initial step in surge basin construction and existing sediment basins inside the security fenced area will remain in place to receive runoff);
- the installation of a plug in the NSDD at the PGDP security fence and in three other ditches within the watershed to prevent discharge of storm-water runoff to sections of the NSDD outside of the security-fenced area.

Phase II will consist of excavation of contaminated soils and sediments along the entire length of Sections 1 and 2 of the NSDD to a depth of 4 ft bgs, together with appropriate staging and disposal of contaminated materials excavated during Phases I and II. Following excavation soil samples would be collected from the bottom of the excavation. If the sampling indicates the presence of excess levels of rssidual contamination (i.e. PTSM), DOE will review the data and determine if additional, limited excavation is required. Wastes would be characterized and disposed of at an appropriate on- or off-site facility after excavation and characterization. Following excavation, the ditch channel would be restored to grade with 2 ft of clay cover, approximately 2 ft of clean soil, and vegetated. In Sections 1 and 2 of the NSDD, some contamination is expected to remain at depth; therefors, the five-year reviews mandated by CERCLA will be required.

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As identified in Figure 3 of the Site Management Plan (SMP) for PGDP (DOE 2000b), Sections 1 and 2 of the NSDD, located within the security-fenced area of PGDP. are identified as an industrial zone for both current and anticipated future land use. **As** part of the selected remedy for the NSDD remedial action, LUCs consisting of property record notices and restrictions, administrative controls (e.g., excavation/penetration permits), and access controls (e.g., fences, gates, security measures) will be imposed for portions of the NSDD within the security-fenced area of PGDP.

The selected remedial alternative for the NSDD includes LUCs to protect future industrial workers. **A** LUC Implementation Plan (LUCIP for the NSDD) will be developed and submitted to the EPA and KNREPC for approval. The unit-specific LUCIP will be submitted with the D1 RD/RA Phase I Work Plan in accordance with the schedule presented in Appendix E of this ROD. The LUCP will specify how DOE will implement, maintain, and monitor the LUC elements of the remedy identified in the ROD to ensure that the remedy remains protective of human health and the environment. Upon regulatory approval, the NSDD LUCP will be added to Appendix B of the PGDP LUCAP (DOE 2000a).

The LUC objectives identified to assure the protectiveness of the preferred alternative are as follows:

- Sections 1 and 2 (Industrial areas) – Restrict unauthorized access, restrict unauthorized excavations or penetrations below prescribed contamination cleanup depth, and restrict uses of the area that are inconsistent with the assumed land use (i.e., to restrict recreational and/or residential use); and

The LUCs selected to restrict unauthorized exposure to the contaminated media at the NSDD include the following:

- controlled access to Sections 1 and 2 of the NSDD through existing PGDP security gates and perimeter fences, and the site use/site clearance program,
- requirement for excavatiodpenetration permits for any proposed intrusive activities,
- filing of Property Record Notices to provide information on the existence and location of contaminated areas and land use assumptions (Sections 1 and 2 of the NSDD), and
- filing of Property Record Restrictions to impose limitations on use should property ever be transferred.

In addition, a description of the boundary to which LUCs apply will be prepared and included with the NSDD LUCIP.

2.12.3 Waste Disposition

Non-hazardous waste generated as a result of the NSDD remedial action will be disposed of in the C-746-U Landfill. The waste derived from the NSDD Remedial Action will be temporarily staged pending characterization and final disposition to an approved on-site or off-site facility, preferably the on-site C-746-U Landfill or, if necessary, another on-site facility or to an off-site facility (e.g., Envirocare or the NTS. DOE estimates that approximately 90% of the remediation waste resulting from the Phase I and Phase II excavation activities may be appropriately disposed in the C-746-U Landfill. CERCLA remediation waste remaining onsite must be disposed in a manner that is demonstrated to have sufficient long-term protection of human health and the environment. **A** risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment.

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If significantly more than 10% of the Phase I and/or Phase II remediation waste is subsequently determined after excavation and characterization to exceed the WAC and to be inappropriate for disposal at the C-746-U Landfill and so must be shipped and disposed offsite at more expense, DOE's estimate of the cost of implementing Phase I and/or Phase II may increase substantially. Consistent with **EPA** Guidance (EPA 1988) cost estimates have been made based on an expected accuracy of –30% to +50%, and cost changes outside this range may be considered "substantial." Should any of the **FFA** parties conclude in good faith that such a substantial cost increase appears likely, any of the **FFA** parties may require DOE, EPA, and KNREPC to reconsider the selected alternative in light of the anticipated cost increase. If, as the result of their reconsideration, the three **FFA** parties agree that, or the dispute resolution process under the **FFA** determines that, significant changes or fundamental alterations should be made to the previously selected action. The proposed changes will be documented in accordance with the NCP, using procedures that provide the public with an opportunity to review and comment on the proposed changes prior to any final decision on adopting them.

Phase I work will proceed upon signature of the ROD. Phase II excavation work will begin after Phase I activities are complete, and disposal options have become available. CERCLA remediation waste remaining onsite must be disposed in **a** manner that is demonstrated to have sufficient long-term protection of human health and the environment. **A** risk/performance evaluation currently is being conducted by DOE for the C 746-U Landfill to ensure that disposition of CERCLA remediation waste in the C 746-U Landfill is protective of human health and the environment. Additionally, should any party, as contemplated above, require the reconsideration of the selected alternative during implementation of Phase I or 11 activities, all excavation activities that would generate remediation waste will halt (unless **FFA** parties agree otherwise) pending the completion of the reconsideration process described herein.

2.12.4 Summary of the Estimated Remedy *Costs*

A cost estimate summary for implementation of Alternative 2 is presented in **Table** 2.11. The information in this cost estimate summary is based on the best available information regarding **the** anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost.

2.12.5 Cleanup Levels for the NSDD

This section of the ROD presents the cleanup levels (i.e., contaminant-specific remediation goals) selected for all COCs identified in soil and sediment in Sections 1 and 2 of the NSDD under the selected alternative. (Note that the cleanup levels provided in this section are for remedial action at the NSDD only. Cleanup levels for other areas of the PGDP are likely to vary due to the location of the area being addressed and the changes in the methods used to derive cleanup levels.) This section also provides the basis of selection for each of the levels. These cleanup levels), if achieved, will result in contaminant-specific exposure levels. In the event excavating to 4 ft bgs does not attain the cleanup levels, the excavation in conjunction with LUCs will result in a remedy that is protective of human health for the future uses defined in the selected

Background Values

The background values used in the derivation of cleanup levels for the NSDD were taken from Table A-12 in *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2000d). These values, which are for soil and are provisional, were taken from background studies performed for the PGDP. Values for subsurface soil background are used when deriving cleanup levels for the NSDD because the alternative includes removal of overlying sediment.

alternative and protective of the environment. As discussed in Sect. 2.6. this use is industrial use for Sections 1 and 2. Attainment of these levels also will address the presence of principal threat source material in Sections 1 and 2 of the NSDD, in the unlikely event any is discovered during remediation.

Because the purpose of the response action is to eliminate or control risks to human health and the environment posed by direct contact with soil and sediment, the list of contaminants for which cleanup levels are presented in this section matches that in Table 2.6.

Table 2.11. Cost Estimate Summary for Alternative 2

	Assumes 100% Off-Site Disposal[a]			Assuines 10% Off-Site Disposal[a]		
Task	**Material**	**Labor**	**Total**	**Material**	**Labor**	**Total**
Project Support[b]	$335,000	$3,190,000	$3,525,000	$335,000	$3,190,000	$3,525,000
Decision Documents	$172.000	$7.000	$179,000	$172,000	$7.000	$179.000
Design	$0	$207,000	$207,000	SO	$207,000	$207,000
Post Remediation Post-Excavation Sampling[c]	$682,000	$ 10,000	$692,000	$682,000	$10,000	$692,000
Waste Characterization	$1,606,000	$0	$1,606,000	$1,606,000	$0	$6,606,000
Shipping/Disposal[d]	$14,231,000	$0	$14,23 1,000	$1,398,000	$0	$1,398,000
'On-Site Disposal'	$0	$0	$0	$893,000	$99,000	$992,000
Section 1 Excavation/Restoration	$1.790.000	$773,000	$2.563.000	$682,000	$538.000	$1.220.000
Section 1 Hardpiping	$598,000	$0	$598,000	$598,000	$0	$598,000
Section 2[f] Excavation/Restoration	$2,606,000	$1,222,000	$3,828,000	$1,2 12,000	$926,000	$2,138,000
Site Prep/Infrastructure[g]	$302,000	$117,000	$419,000	$302,000	$117,000	$419,000
Total	$22.322.000	$5.526.000	$27.848.000	$7.880.000	$5.094.000	$12,974,000

[a] Assumes approximate soil disposal volume of 34,000yds^3.
[b] Project Support includes Bechtel Jacobs Company LLC (BJC) and subcontractor support time for oversight activities, cost analysis, scheduling, sampling, **and** data management.
[c] Post-excavation includes the cost for sampling and analysis after excavation activities.
[d] Shipping/Disposal includes the transportation cost to the disposal facility and disposal cost by the disposal facility.
[e] On-site Disposal includes the cost for temporary staging of the excavated material prior to shipping to the on-site landfill.
[f] Section **2** includes costs for the installation of the surge basin.
[g] Site Prep/Infrastructure includes cost for road repairs, construction of staging areas and work areas, fence installation, and utilities design.

For the Sections 1 and 2, the cleanup levels were selected by considering (1) the protection provided by implementing engineering controls to prevent exposure (e.g., backfill with clean material), (2) values for human health (under industrial use) back-calculated from acceptable cancer **risk** and hazard targets, (3) background concentrations for subsurface soil, (4) values for human health (under industrial use) back-calculated from acceptable dose targets (radionuclides only), and *(5)* the possible presence of principal threat source material. This analysis determined that backfill with clean material would prevent any contact by humans and ecological receptors with contaminants in subsurface soil and that numeric standards for reduction of risk and dose from direct contact are not necessary (i.e., engineered controls and LUCs would restrict any unrestricted exposure.) Therefore, numeric standards were derived to address the possible presence of principal threat source material only. The cancer risk and hazard targets used to calculate these standards were 1×10^{-4} and 3.0, respectively. The dose target was 25 mrem/year. These targets were selected to remain consistent with the definition of principal threat source material presented in DOE 2000a. (That is, material containing contaminants at a concentration exceeding action levels

calculated using a target cancer risk of 1×10^{-3}, a hazard index of 10, or a dose of 25 mrem/year.) Note that more conservative targets are used here to address the presence of multiple contaminants.

Each cleanup level was selected from a series of potential values based upon expected future land use, risk (human health only because potential cleanup values based upon ecological risk were determined to not be relevant to the action for Sections 1 and **2),** dose, and background. For all contarninants, the background value was selected as the cleanup level if it was the greatest value. If the background level was smaller than the risk-based value for inorganic or organic contarninants, then the risk-based value was selected. If the background level was smaller than the human health risk-based and dose-based values for radionuclide contaminants, the smaller of the human health risk-based and dose-based value was selected as the cleanup level.

Cleanup values, including the list of potential values from which each cleanup value was selected, are presented in Table **2.12.** Footnotes to this table provide additional information regarding the source of all values. **A** list of selected cleanup levels without the additional detail is presented in Table 2.13.

In total 53 samples have been collected from Sections 1 and 2 of the NSDD or from within 50 ft of its centerline. Of these samples, 30 were collected during historical (i.e., pre-December **2001)** investigations, and **23** were collected during recent (i.e., December **2001** to March **2002)** field efforts. As shown in Table **2.14,** when the maximum detected concentrations of COCs in these data are compared to the clean-up levels, only five inorganic chemicals, one organic compound, and one radionuclide are seen to have a maximum detected concentration exceeding its cleanup level. (Note that maximum concentrations match values in Table 2.4 and cleanup levels match values in Table **2.13.)** Additionally, while analyses of soil and sediment samples collected from Sections 1 and 2 of the NSDD had detectable levels of PCBs, these organic compounds were not detected at a maximum concentration greater than its cleanup level in either historical or more recent samples. Finally, while historical investigations (pre-December 2001) occasionally detected volatile organic compounds such as TCE at low concentrations in soil and sediment samples collected from the NSDD, neither TCE nor **1,1,1-** 1,1,1-TCA, another volatile organic compound that historically has been detected in storm water runoff source areas adjacent to the NSDD, were detected in any sample collected during the recent field effort (i.e., December 2001 to March 2002) conducted in Sections **1** and 2. Therefore, as noted in Section 2.5, recent sampling results indicate that neither TCE nor 1,1,1-TCA are present in Sections 1 and 2 of the NSDD at detectable levels.

Table 2.14. Comparison between maximum detected concentrations of and selected cleanup levels for COCs found in soil and sediment in the NSDD[a] – Results for Sections 1 and 2

COC	Maximum Detect	Cleanup Level	Exceed?[b]
	Inorganic Chemicals (mg/kg)		
Aluminum	25,600	139,200	
Antimony	2.90	11.37	
Arsenic	130	52.3	X
Barium	922	6,870	
Beryllium	13.7	28.44	
Cadmium	3.4	639	
Chromium	141	85.2	X
Copper	9,520	14,790	
Iron	51,700	62,100	
Lead	119	*50*	X
Manganese	4,150	2,598	X
Mercury	12.3	29.46	

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Nickel	17,600	7,260	X
Selenium	12.5	2,837	
Silver	17.2	1,233	
Thallium	1.30	2.20	
Uranium	224	3,030	
Vanadium	80.7	99.6	
	Organic Compounds (mg/kg)		
Polychlorinated biphenyls (Total)	0.800	19.9	
Polycyclic aromatic hydrocarbons (Total)	4.00	2.12	X
	Radionuclides (pCi/g)		
Americium-241	1S 0	467	
Cesium-137	11.1	13.3	
Neptunium-237	63.0	45.4	X
Plutonium-239	53.0	563	
Technetium-99	4,840	227,000	
Thorium-230	1,300	3,510	
Uranium-234	150	6,880	
Uranium-235	5.00	81.6	
Uranium-238	210	313	

[a] Maximum detected values taken from Table **2.4.** Cleanup levels taken from Table 2.13.
[b] COCs **with a** maximum detected value greater **than** the selected cleanup level are marked **with an** "X".

2.12.6 Expected Outcomes of the Selected Remedy

Implementation of Alternative 2 would meet all RAOs for the remediation of the NSDD. Upon completion of excavation and implementation of required LUCs, Alternative 2 would provide immediate protection of human health and the environment to the **risk** levels specified for the current and expected future use scenarios for Sections **1** and 2 of the NSDD. For Sections 1 and 2, the portions of the NSDD located inside the PGDP security fence, the current and expected future use scenario is industrial. **Any** residual contamination remaining in the deeper subsurface soils (i.e., soils below **4** ft bgs) along the NSDD will be addressed by the GWOU. **A** summary of the RAOs for the selected remedy and their associated general response actions is provided in Table 2.15.

Table 2.15 NSDD RAOs and General Response Actions

Ditch Section	RAOs	General Response Actions
Sections 1 and 2 (Inside Security Fence)	Prevent future discharge of process water to the NSDD.	▪Hardpipe to C-616 Treatment Facility
	Prevent future on-site runoff from being transported offsite via the NSDD.	▪Surge Basin/Plug Pipe at Security Fence
	Reduce the risk to industrial workers and ecological receptors from exposure to contaminated surface soil, sediment, and surface water *to* acceptable levels by eliminating direct exposure to contaminated media at the NSDD.	▪Excavate Contaminated Surface Soils ▪Engineered Cover ▪Land Use Controls
		▪

2.13 STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment; complies with CERCLA (as amended by **SARA),** statutory requirements of KRS 224.46-530 and federal and state

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Table 3.12. COCs, **potential** cleanup **values, and** selected cleanup levels **for** soil **and sediment in Sections 1 and 2 of the NSDD**

Media: Soil [with engineering and LUCs (e.g., clean cover)]
Site **Area:** Sections 1 and 2 of the North-South Diversion Ditch **Available Use:** Industrial
Controls to **Ensure Restricted Use:** Plant security

COC[a]	Risk-based[b]	Dose-based[c]	Background for Subsurface Soil[d]	Selected Cleanup Level[e]
		Inorganic Chemicals (mg/kg)		
Aluminum	139,200	NV	12,000	139,200
Antimony	11.37	NV	0.21	11.37
Arsenic	52.3	NV	7.9	52.3
Barium	6,870	NV	170	6,870
Beryllium	28.44	NV	0.69	28.44
Cadmium	639	NV	0.21	639
Chromium	85.2	NV	43	85.2
Copper	14,790	NV	25	14,790
Iron	62,100	NV	28,000	62,100
Lead	50[f]	NV	23	50
Manganese	2,598	NV	820	2,598
Mercury	29.46[g]	NV	0.13	29.46
Nickel	7,260	NV	22	7,260
Selenium	2,847	NV	0.7	2,847
Silver	1,233	NV	2.7	1,233
Thallium	2.2[h]	NV	0.34	2.2
Uranium	3,030[i]	NV	4.6	3,030
Vanadium	99.6	NV	37	99.6
		Organic Compounds (mg/kg)		
Polychlorinated biphenyls (Total)	19.9	NV	0	19.9
Poiycyclic aromatic hydrocarbons *(Total)*	2.12	NV	0	2.12
		Radionuclides[j] (pCi/g)		
Americium-241	809	467	0	467
Cesium-137	13.3	40.1	0.28	13.3
Neptunium-237	45.4	97.5	0	**45.4**
Plutonium-239	1,010	563	0	563
Technetium-99	227,000	606,000	2.8	227,000
Thorium-230	8,340	3,5 10	**1.4**	3,5 10
Uranium-234	7,130	6,880	2.4	6,880
Uranium-235	81.6	177	0.14	81.6
Uranium-238	313	880	1.2	313

Notes:

NV = no value is available.

[a] List includes all COCs identified in Section **2.7.** Note that ecological risk-based values are not included because these values were determined to be inappropriate when setting cleanup levels for portions of the NSDD located inside the security fence.

[b] Risk-based human health cleanup levels are for restricted use of area by an industrial worker (see Section **2.12)** and are the lesser of the risk-based and hazard-based values set at targets of ELCR = 1×10^{-4} and HI = 3.

[c] Dose-based human health cleanup levels are for restricted use of area by an industrial worker (see Section 2.12 for discussion of restrictions) and are calculated using a target dose of **25** mrem/year.

[d] Background values for subsurface soil are provisional values taken from Table **A-12** of the 2000 revision of *Methods for Conducting Human Health* ***Risk Assessments and Risk Evaluations*** *at the Paducah* ***Gaseous Diffusion Plant,*** *Paducah, Kentucky* (DOE 2000a).

[e] The selected cleanup level is the lesser of the human health-based values if a background value for a contaminant is not available. The selected cleanup level is the background value if it exceeds all human health-based values or if it is greater than the smallest human health-based value.

[f] Value for lead is regulatory based.

[g] Value is for mercury soluble salts.

[h] Value is for thallium chloride because a value for thallium metal does not exist.

[i] Value **is** for uranium's effects as a heavy metal. The values for individual uranium isotopes arc more protective and should be used as the final clean-up goals.

[j] [illegible] for radionuclides include consideration of both the decay of the radionuclide and the ingrowth short-lived daughters.

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Table 3.13. Selected cleanup levels **for** COCs found in soil and sediment in Sections **1** and **2 of the** NSDD"

COC	Cleanup Levels for Sections 1 and 2
	Inorganic Chemicals (mg/kg)
Aluminum	139,200
Antimony	11.37
Arsenic	52.3
Barium	6,870
Beryllium	28.44
Cadmium	639
Chromium	85.2
Copper	14,790
Iron	62,100
Lead	50
Manganese	2,598
Mercury	29.46
Nickel	7,260
Selenium	2,847
Silver	1,233
Thallium	2.2
Uranium	3,030
Vanadium	99.6
	Organic Compounds (mg/kg)
Polychlorinated biphenyls (Total)	19.9
Polycyclic aromatic hydrocarbons (Total)	2.12
	Radionuclides (pCi/g)
Americium-241	467
Cesium-137	13.3
Neptunium-237	45.4
Plutonium-239	563
Technetium-99	227,000
Thorium-230	3,510
Uranium-234	6,880
Uranium-235	81.6
Uranium-238	313

[a] **All** values taken from last column in Table 2.12. Please see that table for additional explanation of the sources of cleanup levels.

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ARARs; and is cost effective. This action uses permanent solutions to the maximum extent practicable, given the limited scope of the action.

2.13.1 Overall Protection of Human Health and the Environment

The selected remedial action, which includes excavation of contaminated soils/sediments along Sections 1 and 2 of the NSDD and the implementation and maintenance of engineering controls and LUCs, provides adequate overall protection to human health and the environment. For Sections 1 and 2 of the NSDD, the remedial action will prevent future discharge of process water to the NSDD; reduce the risk to industrial workers from exposure to contaminated surface soil, sediment, and surface water to acceptable levels by eliminating direct exposure to contaminated media; and prevent future runoff from those sections inside the PGDP security fence from being transported offsite via the NSDD. The protectiveness of this remedial action will be assured by the implementation, maintenance, monitoring, and enforcement of LUCs in Sections 1 and 2 of the NSDD. For Sections 1 and 2, LUCs will be implemented to restrict unauthorized access, restrict unauthorized excavations or penetrations below prescribed contamination cleanup depth, and restrict uses of the area that are inconsistent with the assumed land use (i.e., to restrict recreational and/or residential use). Maintenance of these LUCs will be continued as long as it is necessary to ensure protection of human health and the environment.

The selected action will not pose either unacceptable short-term **risks** to receptors or result in any cross-media impacts. Cross-media impacts are not expected because mobilization of contaminants during excavation will be controlled though best engineering practices consistent with ARARs.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy meets those ARARs (listed and described in Appendix D of this ROD) related directly to implementing the remedial activities selected in this ROD and does not invoke any waiver(s) under CERCLA 121(d)(4). The selected remedy makes significant progress in reducing contamination in Little Bayou Creek at the PGDP and achieving compliance with the KDEP's water quality criteria.

Additionally, per 40 CFR 300.405(g)(3), other advisories, criteria, or guidance may be considered in determining remedies (TBC category). TBC information also may be used in developing and evaluating remedial action alternatives. In the absence of ARARs, TBC information consisting of advisories, criteria, or guidance, such as DOE Orders, may be useful in determining cleanup levels that are protective of human health and the environment in the absence of ARARs. The selected remedy is compliant with those TBCs (listed and described in Appendix D) related directly to implementation of the selected remedy, and the proposed remedial actions could be implemented in compliance with TBCs.

2.13.3 "Contained-In" Determination

In accordance with EPA's "Contained-In Policy,"

> ...EPA generally considers contaminated environmental media to contain hazardous waste: 1) when they exhibit a characteristic of hazardous waste; or, 2) when they are contaminated with concentrations of hazardous constituents from listed hazardous waste that are above health-based levels.

Trace amounts of TCE, a hazardous contaminant, historically have been detected in subsurface soil satnples collected from within the NSDD. TCE and 1,1,1-TCA, also a hazardous contaminant. historically have been detected in environmental media adjacent to the NSDD at the C-403 Neutralization Pit and the C-400 Northwest Sump. Both of these areas are sources of storm-water runoff to the NSDD. Based on personal interviews and on review of other existing information sources, as reported in the whits

paper entitled, *Determination for Contaminated Environmental Media Associated with the Excavation of the NSDD* (DOE 2001c), DOE has determined that it is possible that the source of the TCE and 1,1,1-TCA detected in these adjacent areas could be traced to activities formerly conducted in the C-400 Facility (degreasing process) that would have resulted in the generations of F-Listed and/or U-listed waste. Under the "Contained-In Policy," the presence of such hazardous contaminants in the NSDD, or in source areas discharging to the ditch, could require an environmental medium excavated from the NSDD to be classified as F- and U-Listed waste under RCRA and the Kentucky Hazardous Waste regulations, if the hazardous contaminants are present above health-based standards.

EPA's "Contained-In Policy" also includes provisions that allow **a** waste generator to develop health-based standards below which the waste media does not require management as a listed hazardous waste. To determine if the environmental medium requires management as a hazardous waste, EPA guidance recommends the following approach:

> ...contained-in determinations [should] be made based on direct contact exposure using a reasonable maximum exposure scenario and...conservative, health-based standards [should] be used to develop the site-specific, health-based levels **of** hazardous constituents below which contaminated environmental media would be considered to no longer contain hazardous wastes.

If concentrations of the listed hazardous constituents in the environmental medium are below the site-specific, health-based levels developed by this method, then it may be determined that the medium no longer contains a hazardous waste and, therefore, the medium would not be subject to RCRA Subtitle C requirements. This approach also is consistent with EPA Region **4** Guidance, Management of Contaminated Media, September 7, 1999.

40 CFR Section 300.430(e)(2) defines acceptable health-based exposure levels for known or suspected carcinogens as a concentration that, upon exposure, could result in an excess upper bound lifetime cancer **risk** between 10^{-6} to 10^{-4}. For systemic toxicants, acceptable health-based exposure levels are defined as concentrations to which the human population, including sensitive subgroups, may be exposed without adverse effects during a lifetime or part of a lifetime, incorporating an adequate margin of safety. EPA guidance defines this latter exposure level as that resulting in a Hazard Index (HI) of 1. The Commonwealth routinely uses 10^{-6} and a HI of 1 as *de minimis* levels. Therefore, 1×10^{-6} for carcinocens and a HI of 1 for toxicants are appropriate health-based standards for the purpose of determining when an environmental medium no longer contains a listed waste.

Based on the 1×10^{-6} and HI of 1 standards, the conservative site-specific, health-based levels for TCE and 1,1,1-TCA were calculated for the NSDD and were submitted for EPA and KDEP review in the *Determination for Contaminated Environmental Media Associated with the Excavation of the NSDD* (DOE 2001c). These levels are summarized below in Table 2.16.

Table 2.16. Proposed site-specific, "contained-in" health-based levels for TCE and 1,1,1-TCA

Contaminant	Value used for Contained-In Determination
TCE	39.2 mg/kg
1,1,I-TCA	2,080 mg/kg

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EPA has delegated its RCRA enforcement authority to the Commonwealth of Kentucky. Thus. KDEP has the authority to determine acceptable health-based levels used in the contained-in determination. KDEP has indicated that the site-specific, health-based values listed in Table 2.16 will be used as the values below which the waste soils or associated investigation-derived waste from this action will not require management as RCRA hazardous waste provided the waste is disposed of in the C-746-U Landfill and complies with applicable ARARS, WAC and LDRs as outlined below.. All NSDD soil containing concentrations of TCE or 1,1,1-TCA below the site-specific, health-based values presented in Table 2.16 will be managed as non-hazardous waste, upon receipt of a contained-in determination from the Commonwealth of Kentucky, and will be disposed of in the C-746-U Landfill. ARARs. the C-746-U Landfill Waste Acceptance Criteria (WAC), ,Land Disposal Restrictions (LDRs) of 40 CFR Part 268 and 401 KAR Chapter 37, will be met. Mixed waste generated during remedial actions will be managed in accordance with the PGDP Site Treatment Plan.

LDRs are rules that require hazardous wastes to be treated before disposal on land to destroy or immobilize hazardous constituents that might migrate into soil and groundwater. According to EPA Region IV guidance, LDRs will be applicable to an environmental medium from the NSDD. Applicable LDRs are listed in 40 CFR 268.40, CFR 268.48, 40 CFR 268.49(c), and 401 KAR Chapter 37.

Historically 1,1,1-TCA has not been detected in soil from the NSDD. and all TCE detections have been at concentrations significantly below the site-specific, health-based levels noted in Table 2.16. Based on this data, all soils excavated from the NSDD initially will be managed within the AOC pending the collection of additional waste characterization data prior to appropriate disposal. According to EPA's interpretation of RCRA, certain discrete areas of generally dispersed contamination (i.e., AOCs) may be considered RCRA units, and consolidation of material within an AOC and treatment of material, *insitu,* within an AOC does not create a point of hazardous waste generation for the purposes of RCRA. If the levels of TCE and 1,1,1-TCA in excavated soil exceed the values contained in Table 2.15 the excavated soils would be managed as a listed hazardous waste and requirements pertaining to the date of hazardous waste generation would not apply until the waste was removed from the AOC.

Waste characterization samples of excavated materials will be collected, as appropriate, to satisfy WAC specific to the designated disposal facility. Details of the planned waste characterization sampling will be presented in a separate Sampling and Analysis Plan. If TCE or 1,1,1-TCA concentrations in excess of the designated site-specific, health-based levels are detected in a waste characterization sample, the soil characterized by that sample will be managed as a listed hazardous waste. All applicable LDRs will be followed during the management of both hazardous waste and nonhazardous waste.

2.13.4 Cost Effectiveness

Alternative 2 is cost effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost effective if its costs are proportional to its overall effectiveness." [NCP §300.430(f)(1)(ii)(D)]. This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and, hence, Alternative 2 represents a reasonable value for the money to be spent.

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The estimated cost of Alternative 2 (assuming 10% of off-site waste disposal) is $13 million. Since Alternative 3 assumes 100% excavation for Sections 1 and 2 of the NSDD, the cost is the same.

DOE estimates that approximately 90% of the remediation waste resulting from the Phase I and/or Phase II excavation activities may be appropriately disposed of in the C-746-U Landfill. If significantly more than 10% of the Phase I and/or Phase II remediation waste is subsequently determined after excavation and characterization to exceed the WAC and to be inappropriate for disposal at the C-746-U Landfill and so must be shipped and disposed offsite at more expense, DOE's estimate of the cost of implementing Phase I and/or Phase II may increase substantially. . Consistent with EPA Guidance (EPA 1988) cost estimates have been made based on an expected accuracy of –30% to +50%, and cost changes outside this range may be considered "substantial." Should any of the **FFA** parties conclude in good faith that suc'ha substantial cost increase appears likely, any of the FFA parties may require DOE, EPA, and the KNREPC to reconsider the selected alternative in light of the anticipated cost increase. If, as the result of their reconsideration, the three FFA parties agree that, or the dispute resolution process under the FFA determines that, significant changes or fundamental alterations should be made to the previously-selected action, the proposed changes will be documented in accordance with the NCP, using procedures that provide the public with an opportunity to review and comment on the proposed changes prior to any final decision on adopting them.

2.13.5 Utilization of Permanent Solutions and Alternative Treatment Technologies

Alternative 2 represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, Alternative 2 provides the best balance of trade-offs in terms of the five balancing criteria.

Alternative 2 will provide a permanent remedial action since contaminated soils will be excavated and removed from Sections 1 and 2 of the NSDD. The NSDD will be restored with clean soil and a vegetative cover. In addition, appropriate LUCs will be implemented.

2.13.6 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 2 does not include any treatment and, therefore, does not satisfy the statutory preference for treatment. Treatment was not retained in any of the alternatives evaluated for this remedial action because the assessment of the OU did not indicate the presence of any highly toxic or liquid source materials that constitute a principle threat, and treatment of the large volume of residual soil contamination would not be a cost-effective means of meeting the RAOs. However, though not anticipated, treatment of soils may be completed to meet the disposal facility's WAC.

2.13.7 Five-Year Review

The remedial action proposed for the NSDD will be reviewed periodically. CERCLA requires that remedial actions resulting in hazardous substances, pollutants, or contaminants remaining at the site. above levels that do not allow for unlimited use and unrestricted exposure, be reviewed no less often than once every five years after initiation of the selected remedial action. The remedial action chosen for the Sections 1 and 2 of the NSDD will provide remediation to industrial-use, risk-based levels. However, in portions of the NSDD located inside the security-fenced area, some contamination would be expected to remain at depth, and five-year reviews would be required.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

The *Proposed Remedial Action Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-1923&D2 Rev. 1, was made available for a 45-day public review and comment period October 1, through November 15, 2001. The PRAP, which proposed remedial actions for Sections 1 through 5 of the NSDD, identifies Alternative 2, complete excavation and restoration of the ditch with rerouting of process water and LUCs, as the preferred alternative for Sections 1 and 2. The Responsiveness Summary (Part 3) of this document describes integration of public comments.

The selected remedy in this ROD differs from the preferred alternative identified in the PRAP in that it only addresses the remedial decision for Sections 1 and 2 of the NSDD and cost adjustments have been made to reflect expenditures only for Sections 1 and 2. The selected action for Sections 1 and 2 is the same as was identified in the PRAP. Decisions for remaining portions of the NSDD (i.e., Sections 3, 4, and 5, located outside the security fence) will be addressed in a later decision document.

PART 3

RESPONSIVENESS SUMMARY

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RESPONSIVENESS SUMMARY

3.1 RESPONSIVENESS SUMMARY INTRODUCTION

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

DOE has gathered information on the types and extent of contamination found, evaluated remedial measures, and has recommended a remedial action at the NSDD. As part of the remedial action process, a notice of availability regarding the PRAP was published in *The Paducah Sun*, a major regional newspaper of general circulation. The *Proposed Remedial Action Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-1923&D2 Rev. 1, was released to the general public October 1,2001. This document was made available to the public at the Environmental Information Center in the Barkley Center, Paducah, Kentucky, and at the Paducah Public Library. A 45-day public comment period began October 1, 2001, and continued through November 15, 2001. DOE's response to comments received on the PRAP are included in Appendix B of this document.

Specific groups that received individual copies of the PRAP included the Natural Resource Trustees, the PGDP CAB, and people on the standard document mailing list. The DOE, EPA, and Commonwealth of Kentucky jointly held a public meeting November 1, 2001, to present information on the PRAP to the community.

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

3.2 COMMUNITY PREFERENCES/INTEGRATION OF COMMENTS

The 45-day public review period for the NSDD PRAP ended on November 15,2001. Several parties issued written comments on the document. Copies of the submitted comments are included as Appendix A of this ROD. A formal Comment Response Summary was prepared to address these comments from the public and is presented as Appendix B of this ROD.

On November 1, 2001, a public meeting held by DOE, EPA, and the Commonwealth of Kentucky allowed discussion of public questions and comments regarding the NSDD PRAP. A summary of the meeting is attached to the ROD as Appendix C.

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APPENDIX A

PUBLIC COMMENTS
ON THE
NORTH-SOUTH DIVERSION DITCH
PROPOSED REMEDIAL ACTION PLAN

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Dollins, David **W**
From: Mark Donham [markkris@earthlink.net]
Sent: Wednesday, November 14,2001 10:02 PM
To: Dollins, David W
CC: Kristi Hanson
Subject: North/South Diversion Ditch comments of RACE and CNJ

Dave Dollins

U.S. Dept. of Energy, North South Diversion Ditch cleanup

Paducah, Ky, Nov. 14,2001

Dear Dave, (please acknowledge receipt)

These are the comments of the Regional Association of Concerned Environmentalists (RACE) and its nuclear project, the Coalition for Nuclear Justice (CNJ) regarding the proposed plan for the North South Diversion Ditch (NSDD) cleanup at the Paducah site.

As an initial matter, this project demonstrates that the lack of a coordinated, site-wide plan is affecting the efficient cleanup of the site. There has been no good response to the questions raised about the possibilities decontamination from contaminated areas unremediated that remain in the watershed. We have seen no reliable map of the watershed for the NSDD, and it appears that what is being proposed is another case of shifting pollution around. **As** I'm sure you know, we have been advocating for a side-wide plan for many years at the site.

We now know that the agency spent a considerable amount of public money to write a meaningless regulation - the site-wide EIS requirement. We still believe that an adequate cumulative impact analysis would virtually be this site-wide analysis that we have long advocated. If such a plan were done and rationally justified, then such things as decontamination of the excavated ditch, and the shifting of overflow effluents from Little to Big Bayou Creeks could be avoided.

But that isn't even the most troublesome part of the plan. That comes in the proposal to take some of the contamination dug up from the ditch and pile it up in the "U" landfill. (C-746U landfill) The bad part of that idea is not only that this landfill was poorly engineered in an absolutely horrible location for a regular landfill, let alone one that will accept any level of transuranics, but it was poorly built and is closer to residential neighborhoods and the Ohio River than the contamination is now.

What are the long term stewardship costs for this proposal? What is your work plan for long term stewardship and what is your time limit for monitoring and doing corrective actions at the site? You have no idea. And yet, how can you not look at that? Especially in the face of the information on the record that indicates that the landfill was built on a wetland with inadequate engineering considerations to compensate. Especially in the face of information that a bunch of metal monitoring wells in the vicinity got ate away by something recently. How can you possibly just assume that this is going to be a good place to dump a lot *of* radioactive (with a variety of radionuclides, including plutonium, neptunium, et al) soil? This is sacrificing the future.

There are other alternatives that could be done other than putting it in a landfill, assuming arguendo that digging up the ditch is the right thing to do. For example, as we have suggested over and over, earthquake proof above ground containment facilities could be built. We have seen no serious look at this alternative, although we have had BJC personnel state that it was feasible but costly. We have, however, not seen any cost comparisons in writing. We would like to see that.

As a matter of fact, there really has not been enough information released about this decision on the administrative record to justify it. Although the agency claims that there is a huge discrepancy between the costs of on site vs. off site disposal, with on site being significantly cheaper, there

has not been made public a detailed cost analysis of how this conclusion is drawn. We think that has to be on the administrative record and therefore, subject to public disclosure.

We are concerned that the holding pond too keep the drainage on site is going to end up becoming both a source of additional groundwater contamination and a future remediation site which will cost considerable to clean up. This relates back to the long term stewardship discussion. What do you project as a cost for cleanup if the clay liner develops cracks and additional contamination of the groundwater occurs?

How can a transportation alternative be given serious and fair consideration if the agency hasn't yet completed its analysis of transportation issues? This again goes to the issue of not having a comprehensive plan for dealing with all of the cleanup issues.

We are very concerned about the observations from plant neighbors that all this does is shift the pollution burden from the Little Bayou Creek watershed to the Big Bayou Creek watershed.. Assurances both the treatment plant and the holding pond are sufficient to deal with all contingencies are not very assuring. What will happen if either a rain event or events occur that is outside of your projections occurs? It is obvious. The contamination will then be diverted out of Big Bayou Creek, though private property. If the agency is going to risk contaminating an area to a greater extent why not contaminate their own area, and the government has taken the land adjacent and on both sides of Little Bayou Creek and it's already fenced. Why push the contamination onto another area when this one seems more prepared, if there is such a thing, to receiving it? This is not adequately explained in the documents up to this point.

We want to know the process that is going to be gone through to designate so called acceptable levels of radioactivity that is allowed in a landfill, especially a subtitle D landfill. This landfill cannot receive any waste that is radioactive or hazardous under this designation. Yet, somehow a regulatory scheme is being devised to allow some level of radioactivity to be deemed as equivalent to no radioactivity. We don't think this is the proper forum for this determination. Not only is there an **EA** ongoing on the authorized limits for 746U, or those levels of radioactivity that will be considered equal to zero in regard to the ability of material to be dumped in the landfill, but the radioactivity in the materials, regardless of the levels, will contain transuranics such as plutonium and neptunium. How can those materials be dumped into a subtitle D landfill, one that is almost certainly leaking?

But better yet, how can the agency predict a total waste load before any kind of limits are set and they know how deep and wide they have to excavate to reach the cleanup levels? If excavations a foot or *two* more or less end up being done, the waste volumes will vary significantly. That will affect the cost benefit analysis for the alternatives. We think that cleanup levels have to be set up front, as part of the NEPA analysis, and, based upon comprehensive sampling, determine how much dirt will have to be removed to meet the cleanup objective. It seems this is being done out of sequence.

It is hard to have faith in any of the data coming out of the plant now, especially in light of the fact that some 17,000 rad samples out of 28,000 that were previously done in and around the plant to fulfill legal obligations, and were paid for with public money, are now considered "unreliable" and basically taken off pollution maps at the site. If that data is suspect, then why should we believe any of the data?

What are you going to do about the neighborhood resident's lands that have been polluted? Why are you only trying to clean up the government land? Don't the contaminated landowners around the facility count? Isn't it time that this issue be addressed?

We finally reference the May 2001 GAO report regarding the cost analysis between on site and off site disposal of DO€ waste. That report indicates that DOE sites routinely misestimate the amounts of waste that will have to be disposed at a site, and that misestimation is usually too low. That and other omissions in the analysis caused cost benefit analysis between on and off site disposal to be significantly different, enough so to justify a decision based mostly on cost. However, the study brought to light that a new, up to date analysis using the best current information, could easily determine that the old analysis was wrong and that off site shipments

again became a viable alternative, short of having earthquake proof above ground storage. This is especially true, if, as is, the long term stewardship costs are not adequately identified and analyzed.

Thank you for considering these comments.

Mark Donham, RACE
Kristi Hanson CNJ
RR # 1, **Box** 308
Brookport, IL

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Coalition for Health Concern

1091 US 641 North
Benton, Kentucky 42125
270-527-1217

November 14,2001

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COMMENTS **Corinne Whitehead**

US Department of Energy
North/South Ditch Waste to C-746U Landfill

The Coalition for Health Concern vehemently opposes the disposition of waste from the Department of Energy (DOE) Paducah Gaseous Diffusion Plant's (PGDP) North/South Ditch to the C-746U landfill. Some of our reasons are:

1) The DOE PGDP is not licensed by the Nuclear Regulatory Commission, (NRC). It is only certified. There are potential legal loopholes that do not guarantee to Kentucky citizens accountability for the ultimate responsibility for the waste. The last thing the state of Kentucky needs is to be held responsible for the billions of pounds of DOE waste at the Paducah site. A replay of the Maxey Flats nuclear dump which has cost Kentucky taxpayers many millions of dollars must not be repeated at Paducah.

2) The mystery owners[?] of the C-746U Landfill and the unusual action by DOE and others in obtaining special legislation from the Kentucky General Assembly for the C-746U Landfill raises questions. There were no public hearings or public notice. Who are the insiders? Was there special legislation because C-746U is operated by a foreign corporation? Or is C-746U a similar insider operation to the PGDP Cylinders stored offsite for years in a North Grahamville residential neighborhood?

3) The failed logic of removing DOE waste from the North/South Ditch inside the plant fence to the C-746U Landfill outside the Plant reservation fence so what is accomplished? Poisoning the aquifer at yet another site? All landfills fail.The US EPA and every Agency that deals with landfills and waste have documented for many years the contamination of the groundwater and the migration of the waste in the aquifer. The technology for cleaning up large amounts of water with long-lived radionuclides and toxic chemical compounds to safe drinking water standards does not exist.

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4) Finally, the refusal by DOE to incorporate policy safeguards for waste management at the Paducah Gaseous Diffusion Plant when a large volume of scientific research documents historic facts of liquefaction, sand blows, and major ground movement in Western Kentucky during the seismic events during 1811/1812. This indicates a callous disregard for the workers, the residents of the adjacent communities and the region.

Corinne Whitehead

Corinne Whitehead
President
On Behalf of Coalition Membership

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November 14, 2001

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Mr. David Dollins
DOE Site Office
P.O. Box 1410
Paducah, KY 42001

Public Comment in the matter of:
North-South Diversion Ditch cleanup

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Comment Period ends:
November 15, 2001

Please include the following comments as part of the permanent file.

Charles Jurka
RT 3 Box 265A
Golconda, IL 62938

Vicki Jurka
RT 3 Box 265A
Golconda, IL 62938

Charles Jurka

Vicki Jurka

Comments:

The North-South Diversion Ditch (NSDD) drains waste from the Paducah Gaseous Diffusion Plant (PGDP), a National Priorities Listed Superfund site regulated in part under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This ditch has been an open chemical sewer for over four decades. Process water and storm water runoff flow its entire course from the PGDP C-400 building to where it empties into Little Bayou Creek en-route to the Ohio River. Chemicals, metals and radionuclides contaminate the entire two mile stretch; overflowing to surface water and leaching into the shallow groundwater system. The onsite steam plant released mercury and cadmium laden flyash into this ditch. Water flowing to the ditch from the cooling towers contained hexavalent chromium. The process building contributed effluent containing technecium^{99}, plutonium ^{239}, uranium and other radionuclides. Switchyard runoff, to the ditch, contained hydrocarbons and polychlorinated biphenyls (PCBs). The cleaning building releases contained additional PCB as well as trichloroethylene and other solvents. Arsenic, nickel, beryllium, chromium, lead, aluminum, cobalt, zirconium, neptunium and more were released to the NSDD. Now, the concentrations of those highly regulated substances is alarming; substances regulated in part due to carcinogenic or neuro-toxic behavior. By in large these were not accidental releases to the environment but deliberate time saving and cost cutting measures responsible in part for the creation of this Superfund Site.

While we are in agreement with you that the NSDD needs to be cleaned to a point where it becomes safe for unrestricted human use we do not agree with the time saving and cost cutting proposal offered during the public meeting of November 1, 2001. We adamantly disagree with the proposal to send the untreated excavated material from the ditch to the C-746-U landfill which is

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regulated under the Resource Conservation and Recovery Act (RCRA) as a sanitary landfill. Quite simply we are saying that moving 25,000 dump truck loads of this toxic and hazardous material, that has already poisoned the people downstrean, 1 to 1½ miles closer to their homes should be considered a criminal act. C-746-U IS NOT REGULATED or suitable for containment of the radioactively toxic material embedded in the soil from the NSDD. Now, unfortunately, those responsible for the contamination and cleanup continue to misrepresent, it not outright lie, about the extent of the contamination in an effort to meet the criteria protective of human health and the environment and to gain compliance with regulatory .requirements. The C-746-U landfill might contain some of the toxins for the short term but would not contain, what certainly should be characterized as CERCLA waste, for the long term. Radionuclides can pass through the clay and HDPE liners as well as through geotextile and clay caps. Various solvents can either weaken the liner through a "melting" action or cause the liner to dry out and become brittle, while others simply pass through. Certainly within five years the liner will be breached and the same material in new chemical combinations will be rereleased to the same environment. In fact downgradient monitoring wells have already captured chromium, Tc^{99}, and gross beta leaking from this landfill.

We also offer the following question and comments:

Between November 30, 2000 and November 1, 2001 the estimated minimum cost for preferred cleanup actions rose from $18 million to $23 million. What factors caused the projected $5 million increase in cost during a recessionary period?

Excavation of the NSDD should not begin until the U.S. Justice Department has fully characterized the extent of the contamination in the old filled portion of the ditch and a full remedial action is completed. Sections 4 and 5 of the NSDD are below this "spur" and could become recontaminated from this section.

The surge basin should be built before excavation of section one begins because according to the time table the most hazardous sections of the ditch are scheduled for excavation during the wet season.

5.7" of rain in a 24 hour period is not an adequate measurement for determining the capacity of the surge basin. During the past three years we've experienced.two rainfalls of 7" in a 24 hour period with weeklong rains compounding the problem.

We support Alternative #2-Complete Excavation.

We oppose onsite storage of excavated waste.

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Ultimate disposal concerns should be resolved before excavation begins.

Excavation of the ditch should not eliminate the need for radiological postings. The contamination has spread beyond the NSDD and will continue to be a problem for a very, very long time.

There was no mention as to how fugative dust emissions would be controlled during excavation of the NSDD.

Thank you...

39592

Lowell Collins
DOE site office

9 50 20

These are my comments on the north-south diversion ditch

This ditch has been a open sure for contaminants for over fourty years, anyone who worked at the plant knows the ditch cannot be cleaned up.

The people who work at this plant who are proposing this plan to spend 23 million on this plan are working for the contractors If they are working for the contractors then the contractors should pay their salaries and not the tax-payers

D.O.E. should live up to its responsibility to the workers & workers and makes sure have been made sick from the plant and not to waste 23 million dollars on a ditch

C. B. Puckett
6365 Bethel Ch. Rd.
Kevil Ky 42053

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APPENDIX B

COMMENT RESPONSE SUMMARY
FOR THE
PUBLIC COMMENTS
ON THE
NORTH-SOUTH DIVERSION DITCH
PROPOSED REMEDIAL ACTION PLAN

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COMMENT RESPONSE SUMMARY
for the Public Comments on the
Proposed Remedial Action Plan at the North-South Diversion Ditch
at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky
(DOE/OR/07-1949&D2/R1)

Comment Number	Topic	Reviewer and Comment	Response
1.	Environmental Impact Statement (EIS)	Regional Association of Concerned Environmentalists (RACE)/M. Donham and Coalition for Nuclear Justice (CNJ)/C. Hanson: "We still believe that an adequate cumulative impact analysis would virtually be this site-wide analysis that we have long advocated."	"DOE is taking this action consistent with CERCLA and the FFA, in coordination with the State and EPA. DOE has satisfied all NEPA requirements. No Site Wide EIS is required for the site."
2.	Long-term stewardship	RACE/M. Donham and CNJ/C. Hanson: "What are the long-term stewardship costs for this proposal?" "What is your work plan for long-term stewardship and what is your time limit for monitoring and doing corrective actions at the site?"	Long-term activities that will be associated with this remedial action includes assuring that the land use controls specified in the NSDD Record of Decision (ROD) and Land Use Control Implementation Plan (LUCIP) are enforced. The associated costs will be minimal. DOE will meet all of its legal commitments for this site.
3.	3-746-U Landfill	RACE/M. Donham and CNJ/C. Hanson: "How can you possibly just assume that this is going to be a good place to dump a lot of radioactive (with a variety of radionuclides, including plutonium, neptunium, et al) soil?"	DOE does not anticipate that "a lot of radioactive ... soil" will be generated by the remedial actions proposed. Only waste within DOE authorized limits will be placed in the C-746-U Landfill.

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Comment Number	Topic	Reviewer and Comment	Response
4.	C-746-U Landfill	RACE/M. Donham and CNJ/C. Hanson: "There are other alternatives that could be done other than putting it [i.e., contaminated soil] in a landfill. Earthquake proof above ground containment facilities could be built. Wc have, however, not seen any cost comparisons in writing. We would like to see that."	The presentation of cost estimates for the construction of earthquake proof, above ground containment facilities is beyond the scope of the NSDD Remedial Action. Please note that the on-site, long-term storage of large volume of NSDD soils in engineered structures **was** not considered due to the expected conditions that most of the soils will contain only low concentrations of residual contamination that are expected to meet the **WAC** of the C-746-U Landfill. If soils containing higher levels of contamination are encountered, they will be disposed of off-site in an appropriate manner.
5	Waste Disposal costs	RACE/M. Donham and CNJ/C. I-Ianson: "Although the agency claims that there is a huge discrepancy between the costs of on-site vs. off-site disposal, with on site being significantly cheaper, there has not been made public a detailed cost analysis of how this conclusion is drawn."	The analysis of waste disposal costs for Sections 1 and **2** of the NSDD Remedial Action considers estimated costs that would be associated with the disposal of approximately 34,000 cubic yards of excavated material and includes consideration of estimated costs for waste packaging, transportation, and final disposal. These estimated costs, which are summarized in the ROD. are discussed below. For off-site disposal (100% of excavated material goes offsite), the approximate total project cost is $27.8 million with **$14.2** million of the total cost allocated for waste disposal. For on-site disposal (10% of excavated material goes offsite, 90% goes to C-746-U Landfill), the approximate total project cost is $12.9 million with **$2.4** million of the total cost allocated for waste disposal.

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Comment Number	Topic	Reviewer and Comnicnt	Resoonsc
6.	Clap Liner	RACE/M. Donham and CNJ/C. Hanson: "What do you project as a cost for cleanup if the clay liner develops cracks and additional contamination of the groundwater occurs?''	If a crack were to occur, the extent of the cracking and the potential for additional groundwater contamination would be evaluated and projcctcd costs for repair/remediation would be developed at that time. However, cracking of the 2 foot thick clay liner that will be placed in the NSDD is unlikely, since it will overlaid by a **2** foot layer of soil that will maintain the moisture content of the clay layer and minimize the possibility of crack formation.
7.	Transportation Issues	RACE/M. Donham and CNJ/C. I-Ianson: "How can a transportation alternative be given serious and fair consideration if the agency hasn't yet completed its analysis of transportation issues?"	An analysis of transportation issues was completed for tlic NSDD Remedial Action and associated costs were considered as part of the waste disposal cost analysis. Please see response to Comment # 5.
8.	Exccssivc Rain Events	RACE/M. Donham and CNJ/C. Hanson: 'What will happen if either a rain event or events occur that is outside of your projections?"	The proposed remedial design will accommodate a 25-yr/24-hr storm event, exceeding tlic state requirement for accommodation of a 10-yr/24-hr storm event. Additionally, tlic remedial design will provide that, if a storm event in excess of current design projections should occur, the runoff in excess of the design amount would be diverted to Outfall 001..
9.	Diversion of Flow	RACE/M. Donham and CNJ/C. Hanson: 'Why push the contamination onto another area when this one seems more prepared, if there is such a thing, to receiving it?"	DOE understands the question to ask why is it preferable to route discharge from the NSDD to the C-616 Lagoon rather than allowing it to continue to flow out the NSDD to Little Bayou Creek. Diversion of tlic 'low from the NSDD to the C-616 Treatment Lagoon will allow reatment of all flow volumes up to that for a 25-year/24-hour storm event prior to release to Bayou Creek. In the event that a storm in excess of the 25-year/ 24-hour volume occurs, the excess amount of runoff would drain through Outfall 001, a regularly monitored outfall, prior to reaching Bayou Creek.

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Comment Number	Topic	Reviewer and Comment	Response
10.	C-746-U Landfill	RACE/M. Donham and CNJ/C. Hanson:	Waste will be characterized to ensure it complies with the landfill **Waste** Acceptance Criteria and authorized limits defined in the Environmental Assessment of the C-746-U Landfill. Also, please see response to Comment # **3.**
11.	C-746-U Landfill	RACE/M. Donham and CNJ/C. Hanson:	The only materials placed in the C-746-U Landfill will be those that are lion-hazardous and qualify to he place in a Subtitle D Landfill and that comply with **DOE** orders. **Also,** please see response to Comment # **3.** Further, there is no data that has definitively established that the C-746-U Landfill is leaking.
12.	Cleanup Levels and Proposed Excavation Volumes	RACE/M. Donham and CNJ/C. Hanson: "I low can the agency predict a total waste load before any kind of limits are set and they know how deep and wide they have to excavate to reach the cleanup levels? Wc think that cleanup levels have to be set up front, as part of the NEPA analysis, and based upon comprcliensive sampling, determine how much dirt will have to be removed to meet the cleanup objective."	The volume of soil that is expected to be excavated was determined using standard calculations that assumed excavation to 4 ft bgs for the entire length of Sections 1 and 2 as specified in the NSDD ROD.
13.	Analytical Data	RACE/M. Donham and CNJ/C. Hanson:	Based on regulatory review of the data used in the evaluation of the NSDD Remedial Action, DOE, **EPA,** and the Commonwealth of Kentucky agree that the data is sufficient to identify any need for remedial action at the **NSDD.**
14.	DOE Responsibilities	RACE/M. Donham and CNJ/C. Hanson: "What arc you going to do about the neighborhood resident's-lands that have been polluted? Why are you only trying to clean up the government land? Don't the contaminated landowners around the facility count? Isn't it time that this issue be addressed?"	This comment addresses matters beyond the scope of this document.

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Comment Number	Topic	Reviewer and Comment	Response
15.	C-746-U Landfill	Coalition for Health Concern/C. Whitehead: "The Coalition for Health Concern vehemently opposes the disposition of waste from DOE PGDP NSDD to the C-746-U Landfill.".	Comment noted; however, please see response to Comment # 3.
16.	Waste Responsibility	Coalition for Health Concern/C. Whitehead: "The DOE PGDP is not licensed by the Nuclear Regulatory Commission. It is only certified." "There are potential legal loopholes that do not guarantee to Kentucky citizens accountability for the ultimate responsibility for the waste. The last thing the state of Kentucky needs is to be held responsible for the billions of pounds of DOE waste at the Paducah site. A replay of the Maxey Flats nuclear dump which has cost Kentucky taxpayers many millions of dollars must not be repeated at Paducah."	Noted. Comment noted.
17.	C-746-U Landfill	Coalition for Health Concern/C. Whitehead: "The mystery owners [?] of the C-746-U Landfill and the unusual action by DOE and others in obtaining special legislation from the Kentucky General Assembly for the C-746-U Landfill raises questions. There were no public hearings or public notice. Who are the insiders? Was there special legislation because C-746-U is operated by a foreign corporation? Or is C-746-U a similar insider operation to the PGDP Cylinders stored offsite for years in a North Grahamville residential neighborhood?"	DOE is the owner of the C-746-U Landfill. Legislation covering the C-746-U Landfill is governed by RCRA, and the C-746-U Landfill is classified as a RCRA, Subtitle D landfill. The C-746-U Landfill is permitted by the Commonwealth of Kentucky and public meetings to discuss information concerning the construction and permitting of the landfill were held by the Kentucky Department of Environmental Protection.
18.	C-746-U Landfill	Coalition for Health Concern/C. Whitehead: "The failed logic of removing DOE waste from the North/South Ditch inside the plant fence to the C-746-U Lhndfill outside the Plant reservation fence so what is accomplished? Poisoning the aquifer at yet another site? All landfills fail. The US EPA and every Agency that deals with landfills and waste have documented for many years the contamination of the groundwater and the migration of the waste in the aquifer. The technology for cleaning up large amount of water with long-lived radionuclides and toxic chemical compounds to safe drinking water standards does not exist."	Please see response to Comment # 3.

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Comment Number	Topic	Reviewer and Comment	Response
19.	Policy Safeguards	Coalition for Health Concern/C. Whitehead: "Finally, the refusal by **DOE** to incorporate policy safeguards for waste management at the Paducah Gaseous Diffusion Plant when a large volume of scientific research documents historic facts of liquefaction, sand blows, and major ground movement in Western Kentucky during the seismic events during 1811/1812. This indicates a callous disregard for the workers, the residents of the adjacent communities and the region."	**DOE** requires a detailed Health and Safety Plan designed to protect workers and the environment. Additionally, a thorough readiness review is conducted prior to the start of all fieldwork.
20.	C-746-U Landfill	Charles and Vicki Jurka: "We adamantly disagree with the proposal to send the untreated excavated material from the ditch to the C-746-U Landfill which is regulated under the Resource Conservation and Recovery Act as a sanitary landfill."	Please see response to Comment # 3.
21.	Estimated Costs	Charles and Vicki Jurka: "Between November 30, 2000, and November 1,2001, the estimated minimum cost for preferred cleanup actions rose from $18 million to $23 million. What factors caused the projected $5 million increase in cost during a recessionary period?"	Variations in the projected expenditures resulted from cost estimate refinements as work on the project progressed. Further refinements of these proposed costs may be expected as work on the project continues. The scope of this **ROD** is for Sections 1 and 2 of the NSDD only. Please see response to Comment #5 for most recent estimates.
22.	**Ah**andoned Section of NSDD	Charles and Vicki Jurka: 'Excavation of the NSDD should not begin until the **U.S.** Justice Department has fully characterized the extent of the contamination in the old filled portion of the ditch and a full remedial action is completed. Sections 4 and **5** of the NSDD are below the "spur" and could become recontaminated from this section."	Excavation outside the security fence is beyond the scope of this ROD, which only involves Sections 1 and 2.
23.	Surge Basin Construction	Charles and Vicki Jurka: 'The surge basin should be built before excavation of section one begins because according to the timetable the most hazardous sections of the ditch are scheduled for excavation during the **wet** season."	Construction of the surge basin will be performed as part of Phase 1 of the remedial action. Excavation of Sections 1 and 2 of the NSDD will occur during Phase 2, following construction of the surge basin.

COMMENT **RESPONSE SUMMARY**
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Comment Number	Topic	Reviewer and Comment	Response
24.	Surge Basin Capacity	Charles and Vicki Jurka: "5.7" of rain in a 24-hour period is not an adequate measurement for determining tlie capacity of the surge basin."	Tlic remedial design proposed for the NSDD allows for containment of 25-year/ 24-hour storm event. A basin of this size actually exceeds requirements established by the Commonwealth of Kentucky.
25.	Waste Disposal Concerns	Charles and Vicki Jurka: "Ultimate disposal concerns should be resolved before excavation begins."	As stated in the NSDD ROD, Phase 11, excavation of Sections 1 and 2 o the NSDD, will not be initiated until waste disposal issues have been resolved.
26.	DOE Responsibilities	A. B. Puckett: "This ditch has been an open sore for contaminants for over forty years. Anyone who worked at the plant knows the ditch cannot be cleaned up. The people who work at the plant who are proposing this plan to spend 23 million on this plan arc working for the contractors. If they arc working for the contractors, then the contractors should pay their salaries and not the taxpayers. DOE should live up to its responsibility to the workers, ex-workers, and neighbors who have been made sick from the plant and not *to* wastc 23 million dollars on a ditch."	Cornmcnt noted. The change in scope of this ROD, discussed in Sectior 2.14, has reduced the cosl for this remediation. See response to Comment #5.
27	PCB Material	John D. Tillson: flow is it that the NSDD soils are not considered to bc a TSCA regulated waste? Since PCBs at greater than 500 ppm were discharged to the ditch (PCB cleaning operations in C-400) and samples of ditch soil tested positive for PCBs. I am not a TSCA expert by any stretch of the imagination, but believe PCB contaminated material from a source greater than 500 ppm would not meet the waste acceptance criteria of a municipal landfill.	The NSDD soils arc not considered a TSCA regulated wastc because the PCB contaminant concentrations in the ditch are below those regulated by TSCA (i.e., less than 50 ppm). Based on the regulations cited below, it is appropriate to manage PCB contaminated soils based on the concentrations detected within the soil, rather than using the concentration of the original source. § 761.61 PCB Remediation Waste This section provides cleanup and disposal options !or PCB remediation waste. Any person cleaning up and disposing of PCBs managed under his section shall do so based on the concentration at which the PCBs ire found. This section does not prohibit any person from implementing emporary emergency measures to prevent, treat, or contain further cont. on next page)

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COMMENT RESPONSE SUMMARY
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(DOE/OR/07-1949&D2/R1)

Comment Number	Topic	Reviewer and Comment	Resnonse
27 (cont.).	PCB Material	John D. Tillson (cont.): For comment **text,** please see preceding page.	(cont.) releases or mitigate migration to the environment of PCBs or **PCB** remediation waste. § 761.61(a)(1)(ii) The self-implementing cleanup provisions shall not be binding upon cleanups conducted under other authorities, including but not limited to, actions conducted under section 104 or section 106 of CERCLA, or section 3004(u) and (v) or section 3008(h) of RCRA. § 761.61(a)(4)(i) **Bulk PCB** Remediation Waste **Bulk PCB** remediation waste includes, but is not limited to, the following non-liquid **PCB** remediation waste: **soil,** sediments, dredged materials, muds, **PCB** sewage sludge, and industrial sludge. § 761.61(a)(5)(i)(B)(2)(ii) **Bulk PCB** remediation wastes with a **PCB** concentration of **less** than 50 **ppm** shall be disposed of in accordance with paragraph (a)(5)(v)(A) of this section. § 761.61(a)(5)(i)(**B**)(2)(iii) **Bulk PCB** remediation wastes with a **PCB** concentration greater than or equal to 50 ppm shall be disposed of in a hazardous waste landfill permitted **by EPA** under section 3004 of RCRA, or **by** a State authorized under section 3006 of RCRA, or a **PCB** disposal facility approved under this **part.**

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APPENDIX C

SUMMARY OF NOVEMBER 1,2001, PUBLIC MEETING ON THE NORTH-SOUTH DIVERSION DITCH PROPOSED REMEDIAL ACTION PLAN

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PGDP
North-South Diversion Ditch Public Meeting
November 1, 2001, 6:00 p.m. – Environmental Information Center

NOTE: This Public Meeting was held after issuance of the PRAP. The PRAP addressed potential response actions for the entire NSDD (i.e., Sections 1, 2, 3, **4,** and 5). At this time DOE, EPA, and the Commonwealth of Kentucky have decided to proceed with remediation of Sections 1 and 2 only; therefore, this ROD documents remedial decisions pertaining to Sections 1 and 2. Response actions for Sections 3, 4, and 5 will be addressed in a later decision document.

Comments made during this Public Meeting were considered in the final remedy selection. however, many comments are no longer applicable to this remediation since it addresses only Section 1 and 2 of the NSDD.

Members of the Public Present: Mark Donham, Ray English, Ruby English, Kristi Hanson, Charles Jurka, Vicki Jurka, Merryman Kemp, Linda Long, Leaf Myzeek, Al Puckett, and Doug Raper.

Regulators Present: Gaye Brewer, Kentucky Division of Waste Management (KDWM); Linda Martin, KDWM; and Tuss Taylor KDWM.

DOE and Related Employees Present: Rudy Bonilla, David Dollins, Dianna Feireisel, Bruce Gardner, Jill Holder, Robin Lampley, Chris Marshall, Glenn Van Sickle, Tom Wheeler, and Stacey Young.

Feireisel, the DOE Deputy Site Manager, welcomed everyone to the meeting and introduced Dollins, DOE Environmental Engineer.

Dollins discussed the Proposed Remedial Action Plan for the North-South Diversion Ditch (NSDD). He said DOE has taken comments from the public and regulators. He said the presentation addresses the history of the NSDD, the analysis of alternatives for cleanup, and the proposed remedial actions for environmental restoration.

The NSDD is two miles long, most of it located outside the security fence. The ditch is **8** to 10 feet wide and 1 to **4** feet deep inside the fence. Outside the fence, the ditch is 15-36 feet wide and up to 15 feet deep. Metals such as beryllium, chromium and nickel; radionuclides such as technetium-99, radium, and plutonium; and PCBs are the contaminants in the soils and sediments. These contaminants are the primary risk drivers for the action.

Dollins discussed the history of the NSDD. The C-400, which began operating in 1956, is a facility that was used for degreasing. There were untreated discharges before regulations were in place. Redirection of the ditch began in 1977 with the building of a lift station. In 1952, a new ditch was built near the landfills. In 1994, DOE installed pipe to route the water around the contamination. An Ion Exchange System treated the C-400 discharges for radionuclides.

The three alternatives were derived from the Focused Feasibility Study. Alternative 1 is to take no action. Alternative 2 is to completely excavate the ditch. Alternative 3 is to excavate the hot spots outside the security fence.

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The alternatives were analyzed for protection of human health and the environment and compliance with requirements. Then the alternatives were analyzed for long-term and short-term effectiveness, reduction of toxicity, implementability, and cost. DOE will incorporate community and state comments in the ROD.

The proposed action is the complete excavation of the ditch. Phase I is intended to cut off-site releases beginning with the worst part first. DOE will reroute process water and block culverts as well as construct a surge basin. Phase II involves the excavation of the ditch and installation of a lining or restoration of the ditch. Phase II assumes the C-746-U Landfill will be operational and able to accept 90 percent of NSDD remediation waste.

The estimated cost of the project is $23 million, with the assumption that the C-746-U landfill will be able to accept waste from the NSDD. Current estimates show about 10 percent of the waste will have to be disposed of at an off-site facility. If all of the material from the remediation of the NSDD has to be sent off-site, the cost will increase to an estimated $45 million. Dollins said that DOE and KDWM are evaluating the C-746-U Landfill to ensure that it will be able to accept the waste.

Dollins discussed the work division for this project. Sections 1 and 2 are located inside the fence. They include the area from the C-400 to C-616 Lift Station and the C-616 Lift Station to the fence line. Section 3 starts at the fence and ends at Ogden Landing Road. Section 4 begins at Ogden Landing Road and ends at the C-746-U Landfill. Section 5 ends at Little Bayou Creek.

The standard for cleanup of the NSDD is based on excess lifetime cancer risk (ELCR) to a human being. Inside the fence, that human is an industrial worker. The surge basin is designed for a 25-year, 24-hour storm event, meaning that 5-7 inches of rain would have to fall within 24 hours to exceed capacity of storage. Workers will regrade the ditch in Section 1 and 2 and line it with 2 feet of clay and 2 feet of soil. The clay will restrict water and provide a good barrier. The proposed process for this step is to dig and characterize the soil and verify the cleanup. In Section 3 through 5, the cleanup standards are recreational and ecological based on ELCR to a human being. Outside the fence, that human is a child recreational user. Ecological receptors also are included. Cleanup will achieve residential standards for approximately 80 percent of contaminants in this area. The goal is to protect recreational users, ecological receptors, minimize land use restrictions, and eliminate postings.

Phase II will not address the old section of the ditch that is now under the S&T Landfills. It will be addressed in the Burial Grounds Operable Unit. There may be portions of the ditch that do not need cleanup.

Dollins said the Public Comment Period continues through November 15, 2001. He said DOE has tried to incorporate the comments of the community and regulators during the past year.

QUESTIONS FROM THE PUBLIC

Donham asked if this was a removal action. Dollins said the action is remedial.

Ray English asked about addressing Little Bayou Creek. Dollins said that if the creek was addressed before the NSDD, the creek could become recontaminated. He added that the Surface Water Operable Unit will address off-site creeks. English said that the system is not big enough to hold much rain. Dollins said there is a huge watershed around the ditch.

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Puckett said when he worked in C-400, the building flooded and went into diversion ditch. He asked about plutonium and other contaminants in the NSDD. Dollins said the only way to address contaminants is to cleanup the ditch. Dollins said there would not be mounds of exposed soil on the ground during cleanup. The soil will be excavated, containerized and sampled. The soil will be sealed in stacked bags, lifted by cranes and taken to staging areas. The assumption is that about 10 percent of this waste must be disposed of offsite.

Vicki Jurka mentioned Paul Patton's 1999 Senate Appropriations Committee speech, where he said NSDD should be addressed and the workers were not informed about transuranics. She asked how DOE proposes to put 90 % of transuranic waste in the C-746-U Landfill. Dollins said a risk evaluation must be done. He said he believes contaminants and concentration levels are low enough to be placed in landfill. Before complete excavation begins, DOE will have to make a decision on waste disposition. Jurka asked how the C-746-U Landfill is designated under Kentucky standards. Dollins said it is designated as a solid waste landfill. Martin said it is a RCRA Subtitle D contained landfill. Jurka asked about acceptance of transuranic waste and PCBs. Dollins said there are less than 50 parts per million in PCBs. Jurka asked if there was mercury contamination in fly ash in ditch. Dollins said mercury has been detected in the ditch, but fly ash is not believed to be the source. Dollins said that the fly ash has caused problems with NSDD. The plant has had to dredge the ditch. Fly ash water will be piped to lift station and bypass the ditch.

Ruby English said that in 1999 there was corrosion in wells of the C-746-U Landfill. She asked if the wells had been replaced. Dollins said the whole well network is an issue and the some wells will be replaced. English asked how far apart the wells are from each other. Dollins said he did not have those numbers. English said there was no liner under the C-746-U Landfill. Martin said C-746-U has a liner. English asked if any CERCLA waste would go to the landfill. Dollins said CERCLA waste is the waste generated by remediation of areas that were contaminated as part of past plant operations. This is a CERCLA cleanup and there is some waste that would meet the waste acceptance criteria for the landfill. English asked about leachate if liner cracks. Dollins said there is always a risk, but there is also compliance monitoring and the key is to be protective. English said she and her family live downwind from the landfill and over a contaminated plume. If the wells are more than 16 feet apart, contaminants can go undetected and then into groundwater. Dollins said this is why DOE and EPA have common goals to meet protection needs. Engiish said clay liners are not as safe as one might think. The landfill could burst if an earthquake occurred. English said she would like DOE to put it in writing that she could be protected.

Mr. Jurka asked why the ditch inside the fence is so much shallower than outside the fence. Dollins said that the steam plant put fly ash in the ditch and some of the ditch outside of fence is natural creek with a larger water shed.

Ms. Jurka asked how much water per day went from the plant to the NSDD. Dollins said the C-400 Building has not been discharging to the NSDD for a few years. The bypass goes to the lift station in an effort to get everything to a central location. Jurka asked about the gradient of the NSDD. (Marshall said the land is steeper closer to the landfills, about 3-5%, and slopes away from landfills to the NSDD.) Jurka asked if WCS, a waste disposal company, was considered in cost projections of off-site shipment. Van Sickle said no, because the company does not yet accept waste for disposal.

Donham commented that 10 % of waste is estimated to be shipped offsite for disposal, but the cost is the same up to the point where it is loaded into trucks. He asked about the cost up to that point for both alternatives. Dollins said he did not know if the costs had been broken down up to that point. Donham said DOE should be able to tell base cost regardless of the alternative. Bonilla said he did not have the information broken down. Marshall said the cost includes packaging and transportation for off-site

shipping. After some discussion by project technical experts. Donham was told the base cost, without any waste shipment costs, was approximately $18 to $19 million.

Donham asked if DOE would try to change the C-746-U from a Subtitle D to a Subtitle C facility. Dollins said no. Donham asked about enforcement for corrective action and if EPA Region IV has information about possible releases. Taylor said there are concerns about elevated metals but suspicions do not point to the C-746-U Landfill because they saw these releases prior to landfill operation. Donham asked if there was anything in writing that said EPA would not approve of the C-746-U disposal until the issue is resolved. Dollins said there is a letter that expresses those concerns. There are ongoing efforts to determine the landfill's effectiveness.

Donham said he still has problems with putting money in this project when there is not a site-wide plan. He said it seems there is a potential risk for recontamination because of the watershed. Money should go to remediation of source areas and then get hot spots on the surface then streams. Donham said during excavation there will be bare soil and rain events and there is potential for groundwater contamination. There should be a more systematic plan to avoid recontamination and cross contamination. He added he was not comfortable with monitoring requirements. He said the Parallax document brought to light the problems of the landfill. He said he would like to know why off-site shipments cost so much more. He said John Tillson brought up the issue of listed waste and that cost is a balancing criterion. Donham added that there needs to be more information made public. Dollins said listed waste is a critical issue and the agencies hope to have something to look at by the **CAB** meeting on November 15, 2001. This may require DOE to look at the plan again. Dollins said DOE is trying to take a systematic approach to cleanup and the current SMP focuses on addressing the worst areas first.

Myzeek said one criterion is long-term effectiveness and placing 40,000 cubic yards of soil in bags and moving them **is** not good. If there is a problem with the landfill, it will be studied for years before anything is done. He asked how many years the C-746-U Landfill will be monitored. Dollins said a landfill will usually be monitored for 30 years on a remedy. Myzeek said this waste has been around for a while and the next generation of workers will have to find another solution.

Hanson said she is opposed to putting waste in the C-746-U Landfill. She asked for an idea of volume of 40,000 cubic yards. Van Sickle said this would fill about 2,500 dump trucks. Hanson said she is opposed to taking waste from inside of fence and placing it outside of the fence. She asked how much it would cost to dig up the landfill if an earthquake hit the region. Dollins said some soil would have to be lifted in case of a significant earthquake. Hanson said landfills leak and are short-lived and that ditch should be dug up and put in aboveground containment inside the fence. Dollins said to not do anything allows contamination and risk of exposure.

Puckett said DOE is trying to deny responsibility and would like to see DOE take responsibility

Ms. Jurka asked where is the nearest landfill that could accept this type of waste. Taylor said DOE is responsible for the radiological components of solid waste if they place it in their landfill on their property. DOE is liable if they place material in their landfill. If DOE places it offsite, other landfill operators may not be willing to share responsibility. Martin said two landfills in this area could accept such waste — LWD and Graves County — but she did not think they would choose to accept waste with a radiation component. Ms. Jurka asked why the Department of Justice felt there were carcinogen concerns in Sections 1-3 and not the other sections. Dollins said the potential carcinogens are not as bad as one moves offsite. Feireissl said DOJ was more concerned about what was alleged to have been dumped into the old ditch.

Donham asked how will workers test soil to find out if it falls within authorized limits for the C-746-U Landfill. Dollins said DOE has been meeting with agencies about sampling protocol and will have to have regulatory input. He said this is a recognized issue and needs to be addressed. Donham asked if one element weighed against another. Marshall said post-excavation sampling would be based on 95 percent confidence in achieving the levels to look for in sampling. The guidelines were developed by different agencies. There are dose limits for the C-746-U Landfill based on 1 mrem per year to the general public.

Donham asked if this limit was for uranium only. Marshall said there are different limits for each transuranic. Puckett asked how neptunium levels are tested. Marshall said there is an analytical method. Donham asked where sampling comes in during process. Marshall said each container would be sampled. Donham asked if every bag would be sampled. Marshall said for volume of soil a representative sample of a number of bags would be sufficient.

English said that the ditch has different levels of contaminants in different areas. Marshall said it would be crosschecked with post-excavation sampling.

Ray English said it seems DOE would consider cleaning up the C-400 Building first and then addressing the ditches. Dollins said they no longer use TCE as a degreaser, so much of the risk from the C-400 has been reduced. He said a cleanup action to remove TCE sources near the facility is planned.

Long asked **if** the state was satisfied to use the landfill to dispose of the soils from the ditch. Martin said the state and **EPA** have looked at the issue. The state can regulate most waste, but if a Risk Assessment is done, the state can look at all waste and evaluate whether it is appropriate for disposal. Martin and Taylor said the state feels comfortable with revised monitoring.

Ruby English asked if waste in the C-746-U Landfill would be hazardous waste. Dollins said no RCRA hazardous waste would go in the C-746-U Landfill.

Jurka said she had been led to believe every truckload of waste would be scanned. Marshall said they have a waste certification package approved by the Commonwealth. Jurka said public was told waste would be scanned as trucks entered and would not be dumped unless it met the criteria. Dollins said he was not aware of what was said.

Donham asked Long how she interpreted the state's answer to her question. Long said she was satisfied. Donham said what he heard was that state has a plan to make DOE do a Risk Assessment and if they follow conservative criteria they will be able to determine whether or not the landfill can accept waste from NSDD remediation. Martin said the EPA and state have looked at the issue because CERCLA waste is involved, EPA has input as to whether the landfill can be used. If DOE uses this just as a solid waste landfill, the state will have less input.

Dollins thanked everyone for attending and said DOE will continue to take public comments through November 15,2001, as a part of the decision making process.

-end-

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APPENDIX D

ARARS AND TBC GUIDANCE
FOR THE
NORTH-SOUTH DIVERSION DITCH REMEDIAL ACTION

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ARARS AND TBC GUIDANCE FOR THE NORTH-SOUTH DIVERSION DITCH REMEDIAL ACTION

CERCLA Section 121(d) specifies, in part, that remedial actions for cleanup of hazardous substances must comply with requirements or standards under federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or particular circumstances at a site or obtain a waiver [see also 40 CFR 300.430(f)(1)(ii)(B)]. Inherent in the application of "applicable" or "relevant and appropriate" requirements (ARARs) is the assumption that protection of human health and the environment is ensured.

ARARs include those federal and state laws/regulations that are designed to protect the environment; *ARARs* do not include occupational safety or worker radiation protection requirements. U.S. Environmental Protection Agency (EPA) requires compliance with the Occupational Safety and Health Administration (OSHA) standards in Section 300.150 of the National Contingency Plan (NCP), independent of the ARARs process. Therefore, neither the regulations promulgated by OSHA nor U.S. Department of Energy (DOE) Orders related to occupational safety are addressed as ARARs. These requirements would be addressed in the required health and safety plans for any action.

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 deemed both relevant and appropriate for compliance to be necessary. In cases where both a federal and state *ARAR* are available, or where two ARARs address the same issue, the more stringent regulation must be selected.

The following terms are 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 environmental or state environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site" (40 *CFR* 300.5).

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

- *'TBC guidance'* – In addition to federal or state-promulgated regulations, there are many criteria, advisories, guidance values, and proposed standards that may be useful in developing CERCLA remedies. These are not potential ARARs but are to be considered (TBC) guidance [40 *CFR* 300.400(g)].

1. CHEMICAL-SPECIFIC ARARS

Chemical-specific requirements set health or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, pollutants, or contaminants (55 *FR* 8741, March 8, 1990). These requirements generally set protective cleanup levels for the COCs in the designated media or otherwise indicate a safe level of discharge that may be incorporated when considering a specific remedial activity.

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1.1 Radiation Protection

Radiological exposures of individual members of the public are limited to an effective dose equivalent (EDE) of 100 mrem/year from all pathways and all sources exclusive of background radiation. medical administration, or voluntary participation in research programs [10 *CFR* 20.1301(a); 902 KAR 100:019 Section 10(1)]. The overriding principle that all exposures of members of the public to radiation shall be as low as reasonably achievable (ALARA) will be met through the use of procedures and engineering controls [10 *CFR* 20.1101(b); 902 KAR 100:019 Section 2(2)]. In addition, soils contaminated with radionuclides will be remediated to risk-based levels consistent with DOE Order 5400.5 guidelines and relevant and appropriate Nuclear Regulatory Commission (NRC) dose limits associated with a decommissioned site. Chemical-specific ARARs limiting exposure to radioactivity are described in Appendix D Table D-1.

1.2 Soils

Soils contaminated with PCBs are considered "bulk PCB remediation waste" under 40 *CFR* 761.3. Under the self-implementing provisions of 40 *CFR* 761.61, PCB cleanup levels vary depending on the whether the remediation site is considered a "high occupancy area" or "low occupancy area" (as defined in 40 *CFR* 761.3). These cleanup levels are specified in Appendix D Table D-1. PCB contaminated soils that are excavated and actively managed for disposal must meet the requirements related to waste management described below.

1.3 Surface Water

Although the surface waters of Little Bayou Creek are not being actively remediated, the source control actions associated with NSDD remedial action are designed to improve surface water quality through reduction of non-point discharges of hazardous substances. The numeric Ambient Water Quality Criteria (AWQC) concentrations in Table 2 of 401 KAR 5:031 Section 4(1)(h) should be met instream following completion of the remedial action.

2. LOCATION-SPECIFIC ARARS

Location-specific requirements restrict the concentration of hazardous substances or the conduct of activities solely because they are in special locations *(55 FR* 8741, March 8, 1990). Some examples of special locations include floodplains, wetlands. historic places, and critical or aquatic habitats.

2.1 Floodplains/Wetlands

Potential effects of any new construction in floodplains and wetlands must be evaluated and mitigative actions taken, to the extent practicable, to avoid adverse effects (10 *CFR* 1022.3) and 40 CFR 230). Effects from dredge and fill activities must be conducted in accordance with the requirements of the Nationwide Permit (NWP) system (33 CFR 330). See Appendix D Table D-2.

2.2 Aquatic Resources

Additionally, the Clean Water Act of 1992, as amended, Section 404 requirements for protection of aquatic resources at 40 CFR 230.10 must be met if the action involves any discharges of dredged or fill material into waters of the United States (e.g., streams, wetlands). See Appendix D Table D-2.

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3. ACTION-SPECIFIC ARARS

Action-specific ARARs include operation, performance, and design requirements based on the waste types, media, and remedial activities *(55 FR* 8741, March 8, 1990). Appendix D Table D-3 specifies the ARARs/TBC for various remedial activities associated with remediation of the NSDD.

3.1 Site Preparation, Construction **and** Excavation Activities

General site preparation activities, excavation of contaminated soils, and construction of support areas, would trigger general requirements for storm water runoff and fugitive dust emissions. Reasonable precautions must be taken during these activities and include the use of best management practices for erosion control to prevent runoff, and application of water on exposed soil/debris surfaces to prevent particulate matter from becoming airborne.

In addition, diffuse or fugitive emissions of radionuclides to the ambient air from the remediation activities, that are only one of potentially many sources of radionuclide emissions at a DOE facility, must comply with the Clean Air Act of 1970 (CAA), as amended requirements in 40 CFR 61.92. Currently, non-point diffuse or fugitive radionuclide emissions are estimated by plant monitoring stations. ARARs for these common activities are listed in Appendix D Table D-3.

3.2 Waste Management Activities

All primary wastes (soil, contaminated waters) and secondary wastes (contaminated PPE, decontamination waste waters) generated during remedial activities will be appropriately characterized as either solid, hazardous, asbestos, PCB, radioactive waste(s), and/or mixed wastes and, respectively, managed in accordance with appropriate SSMPS, CAA, TSCA, 401 KAR Chapters 30-49 or DOE Order/Manual requirements.

A staging area may be constructed and used for storage (for 90 days or less) of waste before transfer to permanent storage facility or disposal facility. Resource Conservation and Recovery Act (RCRA)-hazardous waste may be accumulated onsite provided that the containers meet substantive requirements of 40 *CFR* 265.171-173, Subpart I (401 KAR 35:180, 35:275, 35:280, and 35:281) and are properly marked as hazardous waste [40 CFR 262.34; 401 KAR 32:030 Section 5]. These regulations require that that container integrity is ensured and precautions to prevent release of the waste are taken.

For storage of hazardous waste for periods of greater than 90 days, the storage area requirements found in 40 CFR 264 Subpart I (401 KAR 34: 180) would be applicable rather than those described above for storage (for 90 days or less) in accordance with 40 CFR 262.34 (401 KAR 32:030 Section 5). These regulations include requirements for container condition, compatibility of wastes, and secondary containment area requirements. In addition, the container marking and labeling requirements described for temporary accumulation also apply.

PCBs (including bulk PCB remediation waste) must be marked and stored in containers per 40 CFR 761.65(c). In addition. under the PCB rules, storage of PCB waste may occur in a RCRA compliant storage facility [40 CFR 761.65(b)(2)], which are described above for storage of hazardous waste greater than 90 days.

Due to the level of contaminants in the soil, it is possible that wastewaters resulting from soil de-watering or equipment decontamination has the potential to be RCRA hazardous and/or PCB-regulated waste. Wastewater that is characterized as RCRA hazardous and/or PCB-regulated waste is anticipated to

require treatment at an on-site KPDES permitted wastewater treatment facility. Such wastewaters would need to be evaluated to ensure they would meet the WAC of the receiving facility. All tank systems, conveyance systems and ancillary equipment used to transport (whether piped or trucked) waste to an on-site National Pollutant Discharge Elimination System (NPDES)-permitted wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards [40 CFR 270.1(c)(2)(v); 53 *FR* 34079, September 2, 1988]. If uncontrolled public roads were used for the transportation of wastewater, the U.S. Department of Transportation (DOT) Hazardous Material Regulations would be applicable.

Appendix D, Table D-3, lists the requirements associated with the characterization, storage, treatment, and disposal of the aforementioned waste types.

3.3 Transportation

Any wastes that are transferred off-site or transported in commerce along public right-of-ways must meet the requirements summarized on Table D-3 of Appendix D, depending on the type of waste [e.g., RCRA, PCB, transuranic (TRU) waste, low-level waste (LLW), or mixed]. These include packaging, labeling, marking, manifesting, and placarding requirements for hazardous materials. However, transport of wastes along roads within the PGDP site that are not accessible to the public would not be considered "in commerce."

In addition, CERCLA Section 121(d)(3) provides that the off-site transfer of any hazardous substance, pollutant, or contaminant generated during CERCLA response actions be sent to a treatment, storage, or disposal facility that is in compliance with applicable federal and state laws and has been approved by EPA for acceptance of CERCLA waste (see also the "Off-Site Rule" **at** 40 *CFR* 300.440 *et seq.].* Accordingly, DOE will verify with the appropriate EPA regional contact that any needed off-site facility is acceptable for receipt of CERCLA wastes prior to transfer.

4. CERCLA ON-SITE CONSIDERATIONS

CERCLA Section 121(e) exempts on-site CERCLA activities from administrative permitting requirements [see also 40 CFR 300.400(e)]. The NCP, at 40 CFR 300.5, defines "on site" as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for the implementation of the response action." All contaminated areas in the NSDD vicinity are, for purposes of managing RCRA hazardous wastes, considered to be onsite.

CERCLA on-site remedial response actions must comply only with the substantive requirements of a law or regulation (see EPA guidance, "CERCLA Compliance With Other Laws Manual: Interim Final," August 1988) Substantive requirements pertain directly to the actions or conditions at a site, while administrative requirements facilitate their implementation.

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Table D.1. Chemical-specific ARARs and TBC guidance for the NSDD Remedial Action *

Action/medium	Requirements	Prerequisite	Citation(s)
Remediation of PCB contaminated soil	Must achieve the cleanup levels of 1 ppm PCBs in high occupancy areas (as defined in 40 *CFR* 761.3) without further conditions/restrictions.	Self-implementing cleanup of bulk PCB remediation wastes (e.g., soil and sediments) as defined in 40 *CFR* 761.3 — relevant and appropriate.	40 *CFR* 761.61(a)(4)(i)(A)
	Must achieve the cleanup levels of 25 ppm PCBs in low occupancy areas (as defined in 40 *CFR* 761.3) without further conditions/restrictions.		40 *CFR* 761.61(a)(4)(i)(B)
Remediation of radioactively contaminated soil	Must achieve authorized limits equal to the specific guidelines derived from the basic dose limit using DOE/CH-8901[a] (or equivalent) in accordance with DOE Order 5400.5 (IV)(4)(a).	Residual radioactive materials in soil at a DOE facility —TBC.	DOE Order 5400.5(IV)(5)(a)
Remediation of RCRA contaminated soil	When an environmental media exhibits a "characteristic" or has been mixed with a listed waste, the media must be managed as a hazardous waste until it no longer contains the listed waste or no longer exhibits the characteristic.	EPA "Contained-In" Policy—TBC.	
Protection of Little Bayou Creek classified for *Warm Water Aquatic Habitat* use	Must not exceed the parameters specified in 401 KAR 5:031 Section 4 (1)(a)-(g) and must not exceed the numeric AWQC concentrations in Table 2 of 401 KAR 5:031 Section 4 (1)(h) established for the listed toxic substances.	Discharge of pollutants (i.e., hazardous substances, contaminants) into waters of the state of Kentucky — relevant and appropriate.	401 KAR 5:031 Section 4
Release of radionuclides into the environment	Exposure to individual members of the public from radiation shall not exceed a total EDE of 0.1 rem/year (100 mrem/year) exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs.	Radiation from operations at an NRC licensed facility — relevant and appropriate.	10 *CFR* 20.1301(a)(1) 902 KAR 100:019 Section 10 (1)(a)
	Shall use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA.		10 *CFR* 20.1101(b) 902 KAR 100:015 Section 2 (2)
Release of radionuclides into the environment from a decommissioned site	Radiation shall not cause a total EDE > 25 mrem/year (to an average member of the critical group as defined in 10 *CFR* 20.1003), including that from groundwater sources of drinking water. Residual radioactivity shall be reduced to levels that are ALARA.	Residual radioactivity that is distinguishable from background at a decommissioned NRC-licensed site for unrestricted use — relevant and appropriate.	10 *CFR* 20.1402 902 KAR 100:042

[a] Manual for implementing Guidelines Using RESRAD (most recent version).

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
AWQC = ambient water quality criteria
CFR = *Code of Federal Regulations*
EDE = effective dose equivalent
KAR = *Kentucky Administrative Regulations*
mrem = millirem
ppm = parts per million
TBC = to be considered

Table D.2. Location-specific ARARs and TBC guidance for the NSDD Remedial Action

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)
	Wetlands		
Presence of wetlands as delined in 10 *CFR* 1022.4(v)	Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy, and modification of wetlands. Measures to mitigate adverse effects of actions in a wetlands include, but are not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecologically-sensitive areas as provided in 10 *CFR* 1022.12(a)(3).	Federal actions that involve potential impacts to, or take place within, wetlands—applicable.	10 *CFR* 1022.3(a)
	Take action, to extent practicable, to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.		10 *CFR* 1022.3(b)(5) and (6)
	Potential effects of any new construction in wetlands shall be evaluated. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands.		10 CFR 1022.3(c) and (d)
	Floodplains		
Presence of floodplain as defined in 10 *CFR* 1022.4(i)	Avoid, to the extent possible, the long- and short-term adverse effects associated with occupancy and modification of floodplains. Measures to mitigate adverse effects of actions in a floodplain include, but are not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecologically-sensitive areas as provided in 10 *CFR* 1022.12(a)(3).	Federal actions that involve potential impacts to, or take place within, floodplains—applicable.	10 *CFR* 1022.3(a)
	Potential effects of any action taken in a floodplain shall be evaluated. Identify, evaluate, and implement alternative actions that may avoid or mitigate adverse impacts on floodplains.		10 *CFR* 1022.3(c) and (d)
	Design or modify selected alternatives to minimize harm to or within floodplains and restore and preserve floodplain values.		10 *CFR* 1022.5(b)
Presence of a "base floodplain" as defined in 401 KAR 4:060 Section 1	No fill, deposit, obstruction, excavation, storage of materials, or structure, either alone or in combination with existing or future similar works, that may adversely affect the efficiency or capacity of the regulatory floodway, existing streams, or drainage facilities shall be placed in the regulatory floodway.	Construction across, along, or adjacent to a stream (i.e., base floodplain) or in the regulatory floodway of a stream—applicable.	401 KAR 4:060 Section 4 (1)

Table D.2. (continued)

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)
Construction along a stream (e.g., Little Bayou Creek)	No person shall store materials that are buoyant, flammable, explosive, or injurious to human, animal, or plant life within the regulatory floodway limits.	Placement of structures consistent with open spaces, but that could themselves obstruct flood flows — applicable.	401 KAR 4:060 Section 4 (1)(d)
	Dredging or other removal of material from between the stream banks, if disposal of the dredged material is outside of the regulatory floodway, is allowed if it is not of such a nature as to result in increases in flood elevations.	Activities or structures allowed within the regulatory floodway limits of a stream — applicable.	401 KAR 4:060 Section 4 (2)(d)
	Construction materials must be stable and inert, free from pollutants and floatable objects and shall meet all appropriate engineering standards applicable to the project.	Use of construction materials in stream construction projects — applicable.	401 KAR 4:060 Section 7
	Aquatic resources		
Location encompassing aquatic ecosystem as defined in 40 ***CFR 230.3***(c)	No discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands—applicable.	40 *CFR* 230.10(a)
	No discharge of dredged or fill material shall be permitted unless appropriate, and practicable steps in accordance with 40 CFR 230.70 ***et seq.*** have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands—applicable.	40 *CFR* 230.10(d)
	Allows minor discharges of dredge and fill material or other minor activities for which there is no practicable alternative, provided that the pertinent requirements of the **NWP** system are met.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands — applicable.	33 ***CFR*** 330.5
	Protected or Endangered Species		

Location characteristic(s)	Requirement(s)	Prerequisite	Citation(s)
Location encompassing migratory bird species as identified within the Migratory Bird Treaty Act	Federal Agencies arc encouraged (until requirements are established under a formal MOU) to do the following: • avoid or minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions; • restore and enhance the habitats of migratory birds, as practicable; • prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable; • ensure that environmental analysis of federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans of migratory birds, with emphasis on species of concern; and identify where unintentional take likely will result from agency actions and develop standards and/or practices to minimize such unintentional take.	Action that is likely to impact migratory birds, habitats, and resources--applicable.	16 U.S.C. 703-711 Executive Order 13186
Location encompassing endangered species or critical habitat	Actions that jeopardize the existence of listed species or result in the destruction of adverse modification of critical habitat must be avoided or reasonable and prudent mitigation measures taken.	Action that is likely to jeopardize fish, wildlife, or plant species or destroy or adversely modify critical habitat--applicable.	16 U.S.C. 1531 et seq. Section 7(a)(2)

ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
KAR = *Kentucky Administrative Regulations*
TBC = to be considered
USC = *United States Code*

Table D.3. Action-specific ARARs and TBC guidance for the NSDD Remedial Action

Action	Requirements	Prerequisite	Citation(s)
	Site preparation, construction, and excavation activities.		
Activities causing fugitive dust emissions	Shall take reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions shall include, but are not limited to, the following:	Handling, processing, transporting or storing of any material, demolition of structures, construction operations, grading of roads, or the clearing of land, etc. – applicable.	401 KAR 63:010 Section 3 (1)
	Use of water or chemicals for control of dust where possible;		401 KAR 63:010 Section 3 (1)(a)
	Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stock piles, and other surfaces that can create airborne dusts; and		401 KAR 63:010 Section 3 (1)(b)
	Covering at all times when in motion, open bodied trucks transporting materials likely to become airborne.		401 KAR 63:010 Section 3 (1)(d)
	Shall not cause or permit the discharge of visible fugitive dust emissions beyond the lot line on which the emission originates.		401 KAR 63:010 Section 3 (2)
Activities causing radionuclide emissions	Shall not exceed those amounts that would cause any member of the public to receive an EDE of 100 mrem per year.	Radionuclide emissions from point sources, as well as diffuse or fugitive emissions at a **DOE** facility – applicable.	40 *CFR* 61.92
Activities causing stormwater runoff	Shall provide a narrative description of the following:	Operation of an existing or new storm water discharge associated with construction activity – applicable.	401 KAR 5:060 Section 12 (2)(a)(2)(a)
	Location, including a map, and nature of the construction activity;		401 KAR 5:060 Section 12 (2)(a)(2)(a)
	Total area of the site and the area of the site expected to undergo excavation;		401 KAR 5:060 Section 12 (2)(a)(2)(b)
	Proposed measures, including Best Management Plans, to control pollutants in storm water discharges during and after construction, including a brief description of applicable state or local erosion and sediment control requirements;		401 KAR 5:060 Section 12 (2)(a)(2)(c) and (d) KRS 224.001-400

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
	An estimate of the runoff coefficient of the site and the increase in impervious area after the construction, the nature of the fill material, and existing data describing the soil or quantity of the discharge; and		401 **KAR** 5:060 Section 12 (2)(a)(2)(e)
	The name of the receiving water.		401 **KAR** 5:060 Section 12 (2)(a)(2)(f)
	Waste generation activities		
Characterization of solid waste (e.g., contaminated PPE, equipment, soils, wastewater)	Must determine if solid waste is hazardous waste or if waste is excluded under 40 *CFR* 261.4 [401 KAR 32:010 Section 4]; and	Generation of solid waste as defined in 40 *CFR* 261.2 and which is not excluded under 40 *CFR* 261.4(a) – applicable.	40 *CFR* 262.11(a) 401 **KAR** 32:010 Section (2)(1)
	Must determine if waste is listed under 40 *CFR* 261 [401 **KAR** 31:040]; or		*40 CFR* 262.11(b) 401 **KAR** 32:010 Section (2)(2)
	Must characterize waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.		40 *CFR* 262.11(c) and (d) 401 **KAR** 32:010 Section 3
	If waste is determined to be hazardous, it must be managed in accordance with pertinent sections of 40 *CFR* 261-268 and 273.	Generation of solid waste which is determined to be hazardous – applicable.	40 *CFR* 262.11(d); 401KAR 32:010 Section 4
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) that, at a minimum, contains all the information that must be known to treat, store, or dispose of the waste in accordance with 40 *CFR* 264 and 268.	Generation of **RCRA** hazardous waste for storage, treatment or disposal – applicable.	40 *CFR* 264.13(a)(1) 401 **KAR** 32:020 Section 4(1)(a)
	Must determine the underlying hazardous constituents [as defined in 40 *CFR* 268.2(i)] in the D001, D002, DO 12-DO43 waste.	Generation of **RCRA** characteristic hazardous waste (other than D001 High TOC Subcategory or treated by CMBST or **RORGS)** for storage, treatment or disposal – applicable.	40 *CFR* 268.9(a) 401 **KAR** 37:010 Section 9(1)
	Must determine if the waste is restricted from land disposal under 40 *CFR* 268 ***et seq.*** by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 *CFR* 268.7 401 **KAR** 37:010 Section 7

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
	Must determine each EPA Hazardous Waste number (Waste Code) to determine the applicable treatment standards under 40 CFR 268.40 *et seq.*		40 *CFR* 268.9(a) 401 KAR 37:010 Section 9(1)
Characterization of LLW (e.g., contaminated PPE, equipment, soils, wastewater)	Shall be characterized using direct or indirect methods and the characterization documented in sufficient detail to ensure safe management and compliance with the WAC of the receiving facility.	Generation of **LLW** for storage or disposal at a **DOE** facility –TBC.	DOE M 435.1-1(IV)(I)
	Physical and chemical characteristics;		DOE M 435.1-1 (IV)(I)(2)(a)
	volume, including the waste and any stabilization or absorbent media;		DOE M 435.1-1 (IV)(I)(2)(b)
	weight of the container and contents;		DOE M 435.1-1 (IV)(I)(2)(c)
	identities, activities, and concentrations of major rndionuclides;		DOE M 435.1-1 (IV)(I)(2)(d)
	characterization date;		DOE M 435.1-1 (IV)(I)(2)(e)
	generating source; and		DOE M 435.1-1 (IV)(I)(2)(f)
	any other information that may be needed to prepare and maintain the disposal facility performance assessment or demonstrate compliance with performance objectives.		DOE M 435.1-1 (IV)(I)(2)(g)
Management of PCB waste (e.g., contaminated PPE, equipment, soils, wastewnter)	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D. Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Generation of waste containing PCBs at concentrations ≥50 ppm – applicable.	40 *CFR* 761.50(a)
Management of PCB/radioactive waste	Any person storing such waste 50 ppm PCBs must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 *CFR* 761.65(a)(1), (b)(1)(ii) and (c)(6)(i).	Generation of PCB/radioactive waste for storage and disposal — applicable.	40 *CFR* 761.50(b)(7)(i)

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties.		40 *CFR* 761.50(b)(7)(ii)
	Storage		
Temporary storage of hazardous waste in containers (e.g., PPE, rags, etc.)	A generator may accumulate hazardous waste at the facility provided that these conditions are met:	Accumulation of RCRA hazardous waste on site as defined in 40 *CFR* 260.10 – applicable.	40 *CFR* 262.34(a) 401 KAR 32:030 Section 5
	waste is placed in containers that comply with 40 *CFR* 265.171-173 (Subpart I); and		40 *CFR* 262.34(a)(1)(i) 401 KAR 32:030 Section 5(1)(a)
	tlic date upon which accumulation begins is clearly marked and visible for inspection on each container container is marked with the words "hazardous waste" or;		40 *CFR* 262.34(a)(2); 401 KAR 32:030 Section 5(1)(b) 40 *CFR* 262.34(a)(3) 401 KAR 32:030 Scction 5(1)(c)
	container may be marked with other words that identify the contents.	Accumulation of **55** gal or less of RCRA hazardous waste at or near any point of generation – applicable.	40 *CFR* 262.34(c)(1)(ii) 401 KAR 32:030 Section 5(3)(a)
Use of and management of hazardous waste in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers – applicable.	40 *CFR* 264.171 401 KAR 34:180 Scction 2
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 *CFR* 264.172 401 KAR 34:180 Section 3
	Keep containers closed during storage, except to add/remove waste.		40 *CFR* 264.173(a) 401 KAR 34:180 Section 4(1)
	Open, handle and store Containers in a manner that will not cause containers to rupture or leak.		40 *CFR* 264.173(b) 401 KAR 34:I80 Scction 4(2)
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 *CFR* 264.175(b) [401 KAR 34:180 Section 6(2)].	Storage of RCRA-hazardous waste in containers with free liquids – applicable.	40 *CFR* 264.175(a); 401 KAR 34:180 Scction 6(1)
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or	Storage of RCRA-hazardous waste in containers that do not contain free liquids – applicable.	*40 CFR* 264.175(c) 401 KAR 34:180 Section 6(3)

Table D.3, (continued)

Action	Requirements	Prerequisite	Citation(s)
	containers must be elevated or otherwise protected from contact with accumulated liquid.		
Temporary storage of PCB waste (e.g., soils, PPE, rags) in containers	Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a).	Storage of PCBs and PCB items at concentrations 50 ppm for disposal – applicable.	40 *CFR* 761.65 (a)(1)
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)
	Container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* 171-180.		40 *CFR* 761.65(c)(6)
	The date shall be recorded when PCB items are removed from service and the storage shall be managed such that PCB items can be located by this date (Note: Date should be marked on the container).	PCB items (includes PCB wastes) removed from service for disposal – applicable.	40 *CFR* 761.65(c)(8)
Storage of PCB/radioactive waste in containers (e.g., soils, PPE, wastewaters)	For liquid wastes, containers must be nonleaking.	Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performance standards— applicable.	40 *CFR* 761.65(c)(6)(i)(A)
	For nonliquid wastes, containers must be designed to prevent buildup of liquids if such containers are stored in an area meeting the containment requirements of 40 *CFR* 761.65(b)(1)(ii); and		40 *CFR* 761.65(c)(6(i)(B)
	For both liquid and nonliquid wastes, containers must meet **all** regulations and requirements pertaining to nuclear criticality safety.		40 *CFR* 761.65(c)(6)(i)(C)
Temporary storage of LLW (e.g., staging excavated soils)	Ensure that radioactive waste is stored in a manner that protects the public, workers, and the environment and that the integrity of waste storage is maintained for the expected time of storage.	Management of LLW at a DOE facility – TBC.	DOE M 435.1-1 (IV)(N)(1)
	Shall not be readily capable of detonation, explosive decomposition, reaction at anticipated pressures and temperatures, or explosive reaction with water.		DOE M 435.1-1 (IV)(N)(1)
	Shall be stored in a location and manner that protects the integrity of waste for the expected time of storage.		DOE M 435.1-1 (IV)(N)(3)

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
	Shall be managed to identify and segregate LLW from mixed waste.		DOE M 435.1-1 (IV)(N)(6)
Packaging of LLW (e.g., PPE, rags)	Shall be packaged in a manner that provides containment and protection for the duration of the anticipated storage period and until disposal is achieved or until the waste has been removed from the container.	Storage of LLW in containers at a DOE facility – TBC.	DOE M 435.1-1 (IV)(L)(1)(a)
	Vents or other measures shall be provided if the potential exists for pressurizing or generating flammable or explosive concentrations of gases within the waste container.		DOE M 435.1-1 (IV)(L)(1)(b)
	Containers shall bc marked such that their contents can be identified.		DOE M 435.1-1 (IV)(L)(1)(c)
	Treatment/Disposal		
Treatment of LLW	Treatment to provide more stable waste forms and to improve the long-term performance of a LLW disposal facility shall be implemented, as necessary, to meet the performance objectives of the disposal facility.	Generation of LLW for disposal at a DOE facility – TBC.	DOE M 435.1-1(IV)(O)
Treatment of uranium- and thorium-bearing LLW	Such wastes shall be properly conditioned so that the generation and escape of biogenic gases will not cause cxceedance of **Rn-222** emission limits of **DOE** Order 5400.5(IV)(6)(d)(1)(b) and will not result in premature structure failure of the facility.	Placement of potentially biodegradeable contaminated wastes in a long-term management facility – TBC.	DOE Order 5400.5(IV)(6)(d)(1)(c)
Disposal of LLW at an on-site disposal facility or an off-site disposal facility	LLW shall be certified as meeting waste acceptance requirements before it is transferred to the receiving facility.	Generation of LLW for disposal at a DOE facility –TBC.	DOE M 435.1-1(IV)(J)(2)
Disposal of RCRA/TSCA waste at an off-site comnicrcial facility	Meet authorized limits established in accordance with basic dose limits and consistent with guidelines contained in DOE-EM guidance before release. Authorized limits shall be consistent with limits and guidelines established by other applicable federal and state laws.	Release of hazardous wastes potentially containing residual radioactive material throughout the volume – TBC.	DOE Order 5400.5(II)(5)(c)(6) and 5400.5(IV)(5)(a)

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
Performance-based disposal of PCB remediation waste	May dispose of by one of the following methods: in a high-temperature incinerator approved under Section 761.70(b); by an alternate disposal method approved under Section 761.60(e); in a chemical waste landfill approved under Section 761.75; in a facility with a coordinated approval issued under Section 761.77; or through decontamination in accordance with under 40 *CFR* 761.79.	Disposal of nonliquid PCB remediation waste – applicable.	40 *CFR* 761.61(b)(2) *40 CFR* 761.61(b)(2)(i) 40 *CFR* 761.61(b)(2)(ii)
Disposal of PCB cleanup wastes (PPE, rags, nonliquid cleaning materials)	Shall be disposed of by one of these methods: in a facility permitted, licensed, or registered by a state to manage municipal solid waste under 40 *CFR* 258 or nonmunicipal, nonhazardous waste subject to 40 ***CFR*** 257.5 through 257.30; in a RCRA Subtitle C landfill permitted by a state to accept **PCB** waste; in an approved PCB disposal facility; or through decontamination under 40 *CFR* 761.79(b) or *(c)*.	Generation of nonliquid PCBs at any concentration during and from the cleanup of PCB remediation waste – applicable.	*40 CFR* 761.61(a)(5)(v)(A)
Disposal of PCB cleaning solvents, abrasives, and equipment	May be reused after decontamination in accordance with *CFR* 761.79.	Generation of PCB wastes from the cleanup of PCB remediation waste – applicable.	40 *CFR* 761.61(a)(5)(v)(B)
Disposal of RCRA-hazardous waste in a land-based unit	May be land disposed only if it meets the requirements in the table A "Treatment Standards for Hazardous Waste" at 40 *CFR* 268.40 before land disnosal.	Land disposal, as defined in 40 *CFR* 268.2, of restricted RCRA waste – applicable.	40 *CFR* 268.40(a)

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
	Must be treated according to the alternative treatment standards of 40 *CFR* 268.49(c), or according to the UTSs specified in **40** *CFR* **268.48** applicable **to** the listed and/or characteristic waste contaminating the soil, prior to land disposal.	Land disposal, as dcfiricd in **40** *CFR* **268.2,** of restricted hazardous soils – **applicable.**	**40 CFR** 268.49(b) **401 KAR** 37:040 Section 1
Disposal of RCRA wastewaters	Are not prohibited unless the waters are subject to a specified method of treatment other than **DEALT** in 40 *CFR* **268.40,** or are D003 reactive cyanide.	Restricted **RCRA** characteristic hazardous waste waters managed in a treatment system **that** is NPDES permitted – **applicable.**	**40** *CFR* **268.**1(c)(4)(iv) **401 KAR** 37:010 Scction **(5)**
	Institutional controls		
Radioactively contaminated soil left in place	Use of, and access to, residual radioactive material shall be controlled through appropriate administrative and physical controls.	Long-term management of radioactive material at DOE facility – TBC.	DOE Order 5400.5(IV)(6)(d)(1)(e)
	Controls include, but are not limited to, periodic monitoring as appropriate; appropriate shielding; physical barriers (i.e., fences, warning signs) to restrict access; appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactive material or cause it to migrate.		DOE Order 5400.5(IV)***(6)***(c)**(2)**
	Transportation		
Transportation of LLW waste offsite	LLW wastc shall be packaged and transported in accordance with DOE **O 460.1A** and DOE **O 460.2.**	Shipment of LLW offsite – TBC.	**DOE M** 435.1-1(I)(1)(E)(11)
	To the extent practicable, the volume of waste and number of shipments shall be minimized.		DOE M **435.1-1**(IV)(L)(2)
Transportation of PCB wastes	Must comply with the manifesting provisions at 40 *CFR* **761.207** through **40** *CFR* **761.218.**	Relinquishment of control over PCB wastes by transporting, or offering for transport—a **pplicable.**	**40** *CFR* **761.207** (a)
Transportation of hazardous wastc offsitc	Must comply with the generator requirements of **40** *CFR* **262.20-23** for manifesting; Section **262.30** for packaging; Section **262.3**1 for labeling; Section **262.32** for marking; Scction **262.33** for placarding; Section **262.40, 262.4**1(a) for record keeping requirements; and Section **262.12** to obtain **EPA** ID number.	Off-site transportation of **RCRA** hazardous waste – **applicable.**	**40** *CFR* 262.10(h) **401 KAR** 32:030

Table D.3. (continued)

Action	Requirements	Prerequisite	Citation(s)
	Must comply with the requirements of **40** *CFR* 263.11-263.31. **A** transporter that meets requirements of **49** *CFR* **171-179** and requirements of **40** *CFR* 263.11 and 263.31 will be deemed in compliance with **40** *CFR* 263.	Transportation of hazardous waste within the United States requiring a manifest – applicable.	**40** *CFR* 263.10(a) **401** KAR 33:010
Transportation of hazardous waste onsite	The generator manifesting requirements of **40** *CFR* 262.20 through 262.32(b) do not apply. Generator or transporter must comply with the requirements Set forth in **40** *CFR* 263.30 and *263.8* in the event of a discharge of hazardous waste on private or public right-of-way.	Transportation of hazardous waste on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property **is** divided by a public or private right-of-way – applicable.	40 *CFR* 262.20(f) **401** KAR 32:020 Section 1(1)
Transportation of RCRA wastewaters to wastewater treatment facility	All tank systems, conveyance systems, and ancillary equipment **used** to store or transport waste to an on-site NPDES-permitted wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment units that are subject to regulation under Section **402** or Section 307(b) of the CWA **(NPDES**-permitted) – applicable.	**40** *CFR* **270.1**(c)(2)(v) **401** KAR 38:010 Section 1(2)(b)(5)
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and HMR at **49** *CFR* **171-180.**	Any person who, under contract with a department or agency of the federal government, transports, or causes to be transported or shipped, a hazardous material – applicable.	**49** *CFR* **171.**1(c)

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate
BMP = Best Management Practices
CFR = Code of Federal Regulations
DOE = **U.S.** Department of Energy
DOE M = (Radioactive Waste Management) Manual
DOE O = (Radioactive Waste Management) Order
DOT = **U.S.** Department of Transportation
EDE = effective dose equivalent
HMTA = Hazardous Materials Transportation Act
HMR = Hazardous Materials Regulations
LLW = low level (radioactive) waste;
mrem = millirem
NPDES = National Pollutant Discharge Elimination System
PCB = polychlorinated biphenyl
PPE = personal protective equipment
RCRA = Resource Conservation **and** Recovery Act of 1976
TBC = to **be** considered
TCLP = Toxicity Characteristic Leaching Procedure
TSCA = Toxic Substances Control Act
UTSs = universal treatment standards
WAC = waste acceptance criteria

APPENDIX E

NORTH-SOUTH DIVERSION DITCH SCHEDULE

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NSDD REMEDIAL ACTION SCHEDULE	
Issue D2 ROD for EPA and KNREPC review	*08/02*
D1 RD/RA Phase I Work Plan and Waste Characterization S&A Plan for Phase I (including Phase II schedule for submission of the Phase I D1 RD/RA Work Plan) and D1 LUCIP	Ninety (90) days from date of ROD signature
Begin RA Field Activities – Hard Piping	Thirty (30) days after regulatory approval of Workplan – Hard Piping and D2 LUCIP
Begin RA Field Activities – Surge Basin	1 month after regulatory approval of Workplan – SB
D1 RD/RA Phase II Work Plan and Waste Characterization S&A Plan for Phase II	As specified in approved RD/RA Phase I Work Plan
Phase I and II RA Complete	As specified in approved Phase I and II Work Plans

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