Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

MAY 02 2018

Mr. Brian Begley
Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

PPPO-02-4836243-18A

Ms. Julie Corkran
Federal Facility Agreement Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Begley and Ms. Corkran:

TRANSMITTAL OF THE ENGINEERING EVALUATION/COST ANALYSIS FOR DEMOLITION OF THE C-400 CLEANING BUILDING IN THE C-400 COMPLEX OPERABLE UNIT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-2425&D1)

Please find enclosed the *Engineering Evaluation/Cost Analysis for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-2425&D1 (EE/CA). This EE/CA was developed consistent with the Comprehensive Environmental Response, Compensation, and Liability Act; Federal Facility Agreement (FFA) for the Paducah Gaseous Diffusion Plant; and the Memorandum of Agreement concerning the C-400 Complex dated August 8, 2017.

In accordance with Section XX.G and Appendix F of the FFA, the Kentucky Department for Environmental Protection and the U.S. Environmental Protection Agency have a 30-day review and comment period.

If you have any questions or require additional information, please contact April Ladd at (270) 441-6843.

Sincerely,

Tracey Duncan
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosures:
1. Certification Page
2. EE/CA for Demolition of the C-400 Cleaning Building, DOE/LX/07-2425&D1

e-copy w/enclosures:
april.ladd@lex.doe.gov, PPPO
april.webb@ky.gov, KDEP
brian.begley@ky.gov, KDEP
bruce.ford@pad.pppo.gov, FRNP
bwhatton@tva.gov, TVA
christopher.jung@ky.gov, KDEP
corkran.julie@epa.gov, EPA
edward.winner@ky.gov, KDEP
frnpcorrespondence@pad.pppo.gov, FRNP
gaye.brewer@ky.gov, KDEP
hjlawrence@tva.gov, TVA
james.miller@pad.pppo.gov, FRNP
jana.white@pad.pppo.gov, FRNP
jennifer.woodard@lex.doe.gov, PPPO
joel.bradburne@lex.doe.gov, PPPO
karen.walker@pad.pppo.gov, FRNP
kelly.layne@pad.pppo.gov, FRNP
kim.knerr@lex.doe.gov, PPPO
leo.williamson@ky.gov, KDEP
mike.guffey@ky.gov, KDEP
mmcrae@TechLawInc.com, EPA
myrna.redfield@pad.pppo.gov, FRNP
nathan.garner@ky.gov, KYRHB
pad.rmc@swiftstaley.com, SSI
richards.jon@epamail.epa.gov, EPA
rkdehart@tva.gov, TVA
robert.edwards@lex.doe.gov, PPPO
stephaniec.brock@ky.gov, KYRHB
tracey.duncan@lex.doe.gov, PPPO

DOE/LX/07-2425&D1
Primary Document

Engineering Evaluation/Cost Analysis for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Paducah Gaseous Diffusion Plant Paducah, Kentucky

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Primary Document

Engineering Evaluation/Cost Analysis for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Paducah Gaseous Diffusion Plant Paducah, Kentucky

Date Issued—May 2018

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

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PREFACE

This *Engineering Evaluation/Cost Analysis for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Paducah Gaseous Diffusion Plant*, DOE/LX/07-2425&D1, was prepared to evaluate alternatives for a non-time-critical removal action at the U.S. Department of Energy (DOE) Paducah Gaseous Diffusion Plant. This report was prepared in accordance with requirements of the *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant* (EPA 1998) and the May 22, 1995, joint DOE and U.S. Environmental Protection Agency document, *Policy on Decommissioning Department of Energy Facilities under the Comprehensive Environmental Response, Compensation, and Liability Act* (DOE and EPA 1995).

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CONTENTS

TABLES

FIGURES

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ACRONYMS

ACM	asbestos-containing material
AM	action memorandum
AR	administrative record
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemical or radionuclide of potential concern
CRMP	cultural resources management plan
DOE	U.S. Department of Energy
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FR	*Federal Register*
LLW	low-level waste
MOA	memorandum of agreement
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NNSS	Nevada National Security Site
NRHP	National Register of Historic Places
NTCRA	non-time-critical removal action
PGDP	Paducah Gaseous Diffusion Plant
RAO	removal action objective
RAR	removal action report
RAWP	removal action work plan
RCRA	Resource Conservation and Recovery Act
RGA	Regional Gravel Aquifer
S&M	surveillance and maintenance
SWMU	solid waste management unit
T&E	threatened and endangered
TBC	to be considered
UCRS	Upper Continental Recharge System
VOC	volatile organic compound
WAC	waste acceptance criteria
WAG	waste area group
WKWMA	West Kentucky Wildlife Management Area

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) is planning to implement a removal action at the C-400 Cleaning Building in the C-400 Complex Operable Unit (OU) at the Paducah Gaseous Diffusion Plant (PGDP) under the Federal Facility Agreement (FFA) (EPA 1998). This Engineering Evaluation/Cost Analysis (EE/CA) was developed in accordance with Section X.E of the FFA to satisfy applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act. This EE/CA provides information that has been gathered to develop and evaluate removal action alternatives. Consistent with the *Memorandum of Agreement on the C-400 Complex under the Federal Facility Agreement for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2017a), and in accordance with the joint 1995 DOE and U.S. Environmental Protection Agency policy (DOE and EPA 1995), the demolition activities will be undertaken as a non-time-critical removal action (NTCRA) under CERCLA. The National Environmental Policy Act (NEPA) requires that federal agencies evaluate and document the effect of their proposed actions on the quality of the human environment. This EE/CA summarizes the evaluation of removal action alternatives.

The C-400 Cleaning Building is located within the limited access area of PGDP. The structure was constructed during the 1950s and was used for support operations to the uranium enrichment process and other contractual work. The C-400 Cleaning Building was operational from 1952 until 2014. Currently, deactivation is ongoing at the C-400 Cleaning Building as a non-CERCLA activity prior to demolition of the abovegrade structure. After deactivation, the remaining portions of the C-400 Cleaning Building will contain hazardous substances that are present in the construction materials and from use during operation of the facility.

A removal action is appropriate for the C-400 Cleaning Building. Building degradation over time could result in potential structural failure and contaminant migration. This degradation, including roof and wall deterioration, could allow rainwater to infiltrate the building. Infiltration of rainwater could wash transferable or soluble contaminants out of the building through cracks in the floor or walls, impacting underlying groundwater. Furthermore, there is an increased potential for site personnel involved with surveillance and maintenance activities to be exposed to hazardous substances, including radiological contamination, associated with structural components. There is a potential risk from hazardous substances, including radiological contamination, and exposure to vapors from historical volatile organic compound releases. There is the potential for contamination to be released to the environment if the structural elements of the building that contain the contamination were to fail. Demolition and appropriate disposal of the resulting wastes will reduce the risk of exposure to workers located near this facility. As the facility continues to age, it will become more susceptible to damage from weather, thereby increasing the likelihood of a contaminant release. The structural instability of the C-400 Cleaning Building will make the facility more difficult to repair should it be damaged by a weather-related event such as high winds and/or ice, thereby increasing the probability of a contaminant release. High-risk repairs could lead to a higher potential for other site personnel to be exposed to chemical and radiological hazards. The controlled demolition of this facility will ensure that risks to human health and the environment from actual or potential exposure to hazardous substances are reduced or eliminated. Controlled demolition using engineered safety measures is safer, and it reduces the probability of risks posed by releases of hazardous substances that would result from an uncontrolled collapse (i.e., building "falling in on itself"). Uncontrolled collapse likely would result in spread of hazardous substances and radiological contamination to site personnel and the environment because contamination found in the C-400 Cleaning Building no longer would be contained by the structure.

The following removal action objectives (RAOs) have been developed for the NTCRA and form the basis for identifying and evaluating appropriate response actions:

1. Eliminate, reduce, or otherwise mitigate the potential for releases of hazardous substances from structural deterioration of the C-400 Cleaning Building;

2. Minimize potential threats to human health and the environment that may result from uncontrolled releases from the C-400 Cleaning Building; and

3. Facilitate a comprehensive remedial investigation in support of remedy selection.

The following removal action alternatives were developed and evaluated for effectiveness, implementability, and cost:

1. No action, and
2. Demolition of the C-400 Cleaning Building to slab.

A comparative analysis summary for the two alternatives is provided in Table ES.1.

Table ES.1. Comparative Analysis Summary

Alternative 1 No Action	**Alternative 2 Demolition of the C-400 Cleaning Building to Slab**
Effectiveness	
• Not effective in meeting RAOs • Does not reduce the risk or potential for exposure • Does not comply with applicable or relevant and appropriate requirements (ARARs) • Does not facilitate final remedial action for the C-400 Complex OU	• Effective in meeting RAOs • Reduces potential hazards • Complies with ARARs • Facilitates future remedial action for the C-400 Complex OU
Implementability	
• Implementable and feasible	• Implementable and feasible • Conventional demolition methods currently available • Services and materials needed available now
Cost	
• No costs for this alternative	• Total alternative cost: $36.4M

Based upon evaluations of the effectiveness, implementability, and cost of each proposed alternative, the preferred alternative identified for this removal action is Alternative 2, Demolition of the C-400 Cleaning Building to Slab.

The scope of Alternative 2 includes demolition of the abovegrade structure down to the abovegrade slab; slab stabilization; waste segregation; and waste disposal at both on-site and off-site facilities. Alternative 2 meets all the RAOs and is consistent with the *Memorandum of Agreement on the C-400 Complex under the Federal Facility Agreement for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2017a), and the overall site cleanup strategy, as described in the *Site Management Plan Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Annual Revision—2018*, DOE/LX/07-2418&D1/R1 (DOE 2018a).

1. INTRODUCTION

The U.S. Department of Energy (DOE) is planning to implement a removal action at the C-400 Cleaning Building in the C-400 Complex Operable Unit (OU) at the Paducah Gaseous Diffusion Plant (PGDP) under the Federal Facility Agreement (FFA) (EPA 1998). Consistent with the *Memorandum of Agreement on the C-400 Complex under the Federal Facility Agreement for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (C-400 MOA) (DOE 2017a), demolition activities will be undertaken as a non-time-critical removal action (NTCRA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The National Environmental Policy Act (NEPA) requires that federal agencies evaluate and document the effect of their proposed actions on the quality of the human environment. DOE issued a *Secretarial Policy Statement* on NEPA in June 1994 (DOE 1994) stating that DOE hereafter will rely on the CERCLA process for review of actions to be taken under CERCLA and incorporate NEPA values in CERCLA documents to the extent practicable. NEPA values described herein have been incorporated into this evaluation of removal action alternatives in accordance with the Secretarial Policy. This engineering evaluation/cost analysis (EE/CA) summarizes the evaluation of removal action alternatives and identifies the proposed removal action alternative to be implemented, as outlined in *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* (EPA 1993).

This EE/CA will be made available to the public for review and comment once it is approved by the U.S. Environmental Protection Agency (EPA) and Kentucky Department for Environmental Protection. The action memorandum (AM) will respond to public comments received during the public comment period for the EE/CA, and it will describe the selected response action. Following approval of the AM, DOE will submit a removal action work plan (RAWP) for C-400 Cleaning Building demolition for regulator review and approval. Once approved, DOE will initiate demolition activities at the C-400 Cleaning Building in accordance with the approved RAWP. Following completion of the removal activities, DOE will issue a removal action report (RAR) for the C-400 NTCRA that will be placed in the Administrative Record (AR) for the C-400 Complex OU.

The following is the planning schedule for the C-400 Cleaning Building NTCRA, consistent with the C-400 MOA, dated August 8, 2017 (DOE 2017a) (see Table 1).

Table 1. C-400 Cleaning Building NTCRA Planning Schedule

Documents	Planning Schedule*
D1 AM	August 14, 2018
D1 RAWP	August 17, 2018
Field Start Date	November 27, 2018

*This schedule is included in this document for information purposes only and is not intended to establish enforceable schedules or milestones. Enforcement milestones will be established in the *Site Management Plan Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Annual Revision—FY 2018* (DOE 2018a). The dates are consistent with the C-400 MOA. Per the C-400 MOA, the C-400 dates are based on streamlined assumptions (no extensions and no disputes). If extension(s) or dispute(s) occurs, then future milestones and planning dates may be adjusted pursuant to the FFA.

1.1 CURRENT STATUS OF FACILITY

The C-400 Cleaning Building was operational between 1952 and 2014, although the plant laundry remained operational in the building until July 2016 before it was moved to the C-720 Complex. The facility currently is undergoing deactivation under DOE's Atomic Energy Act authority. The intent of the deactivation process is to place the building in a safe, stable condition and prepare the C-400 Cleaning Building for demolition, which will be conducted as an NTCRA under CERCLA. Complete deactivation

will leave the C-400 Cleaning Building in a demolition-ready state, which includes, but is not limited to, the following:

- Building structure intact, including exterior and internal walls, windows, and roof;
- Floor and foundations intact; and
- Utility systems isolated.

The remaining portions of the C-400 Cleaning Building will contain hazardous substances that are present in the construction materials and from use during operation of the facility. The presence of hazardous substances in the C-400 Cleaning Building has been determined to pose an actual or potential threat of release to the environment and relates to the factors set forth in 40 *CFR* § 300.415 (b)(2)(i), (ii), (v), and (viii), constituting the need for an NTCRA. For example, these hazardous substances include the following:

- Asbestos-containing material (ACM),
- Polychlorinated biphenyls (PCBs),
- Radionuclides,
- Uranium,
- Lead,
- Trichloroethene (TCE), and
- Trichloroethane (TCA).

1.2 SCOPE AND PURPOSE OF C-400 NON-TIME-CRITICAL REMOVAL ACTION

Upon regulatory approval of the EE/CA, AM, and RAWP, the fieldwork for demolition of the C-400 Cleaning Building will be implemented in accordance with the approved RAWP. Building demolition will be conducted as a CERCLA NTCRA in accordance with the FFA.

The purpose of this EE/CA is to evaluate removal action alternatives to achieve the removal action objectives (RAOs) and to provide the opportunity for meaningful public involvement in the decision process. This EE/CA does not address characterization of specific building components for waste disposal or on-site worker safety. Waste management and disposal will be conducted in accordance with applicable or relevant and appropriate requirements (ARARs) and the approved RAWP. Remediation of contaminated soils, other environmental media, and the slab and subgrade structures will be addressed in separate CERCLA actions, as discussed in the C-400 MOA (DOE 2017a) and *Site Management Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Annual Revision—2018*, DOE/LX/07-2418&D1/R1 (DOE 2018a).

The following are the RAOs for this project:

1. Eliminate, reduce, or otherwise mitigate the potential for releases of hazardous substances from structural deterioration of the C-400 Cleaning Building;

2. Minimize potential threats to human health and the environment that may result from uncontrolled releases from the C-400 Cleaning Building; and

3. Facilitate a comprehensive remedial investigation in support of remedy selection.

2. SITE AND FACILITY CHARACTERIZATION

2.1 SITE DESCRIPTION

PGDP is located approximately 10 miles west of Paducah, KY, and 3.5 miles south of the Ohio River in the western part of McCracken County (Figure 1). The plant is located on a 3,556-acre DOE-owned site that is comprised of the following: approximately 628 acres are within a fenced security area, approximately 809 acres are located outside the security fence, 133 acres of acquired easements, and the remaining 1,986 acres are licensed to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area (WKWMA).

2.1.1 Topography

PGDP and the surrounding area are flat with elevations across the site ranging from about 350 ft to 390 ft above mean sea level. The ground surface slopes at a rate of about 27 ft/mile toward the Ohio River. Two main features dominate the landscape in the surrounding area: the loess covered plains and the Ohio River floodplain, which is comprised mostly of alluvial sediments. The terrain is slightly modified by the dendritic drainage systems associated with the two principal streams in the area, Bayou Creek and Little Bayou Creek. These streams have eroded small valleys, which are about 20 ft below the adjacent plain.

The C-400 Cleaning Building is bounded by 10th and 11th Streets to the west and east, respectively, and by Virginia and Tennessee Avenues to the north and south, respectively (see Figure 2). Within this area (referred to as the block), the ground surface slopes gently away from the facility, which is centered in the block. Drainage ditches line the streets on the east and west sides of the block. Ground surface elevations range from 375–376-ft elevation, in ditch bottoms, up to 379-ft elevation, adjacent to the C-400 Cleaning Building. Large concrete aprons cover the north and south ends of the block and provide a constant slope from the top of the floor slab, at 380-ft elevation, down to street level, at 376-ft elevation on the south end, and 378-ft elevation on the north end. Two sets of railroad tracks cross the south end of the block. The C-400 Cleaning Building is situated on the divide between the drainage areas of Bayou Creek and Little Bayou Creek. Most of the storm water from the C-400 Cleaning Building area flows to storm drain inlets around the building and discharges via the storm sewer on the south side of the building to Outfall 008 and then to Bayou Creek on the west side of the plant.

2.1.2 Population and Land Use

The C-400 Cleaning Building addressed in this removal action is in an area under the control of DOE. PGDP is surrounded by WKWMA and some sparsely populated agricultural lands. The closest communities to the plant are Heath, Grahamville, and Kevil, all of which are located within three miles of the DOE Reservation boundaries. The closest municipalities are Paducah, Kentucky (12 miles); Cape Girardeau, Missouri (41 miles); and the cities of Metropolis (5 miles) and Joppa (7 miles), Illinois, which are located across the Ohio River from PGDP.

Historically, the economy of western Kentucky has been based on agriculture. The population of McCracken County is estimated at approximately 65,000 with a population density of 263 persons per square mile. Neighboring Ballard County has an estimated population of approximately 8,000 with a population density of 33 persons per square mile, according to the 2010 U.S. Census, 2016 estimates (USCB 2017).

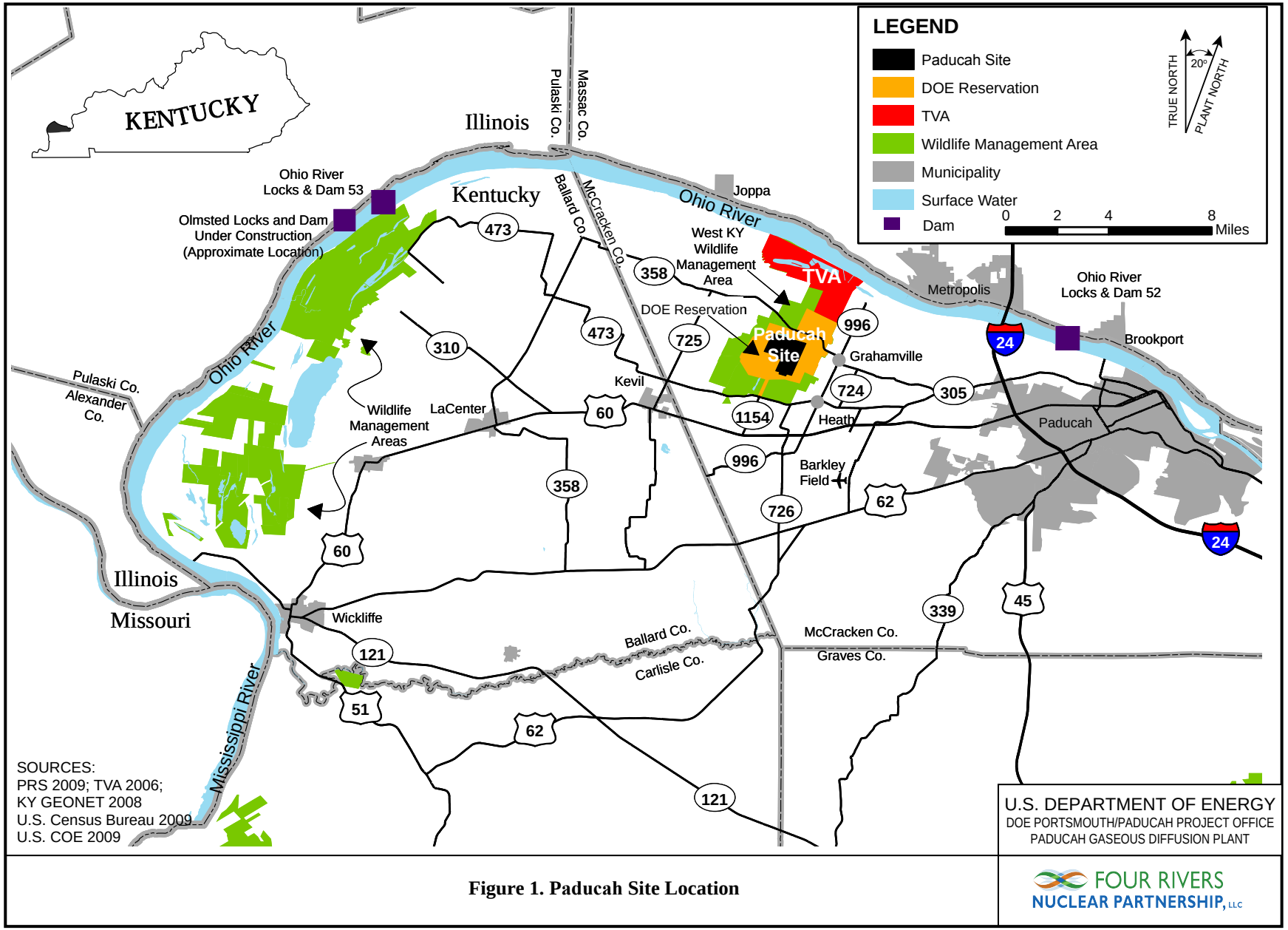

Figure 1. Paducah Site Location

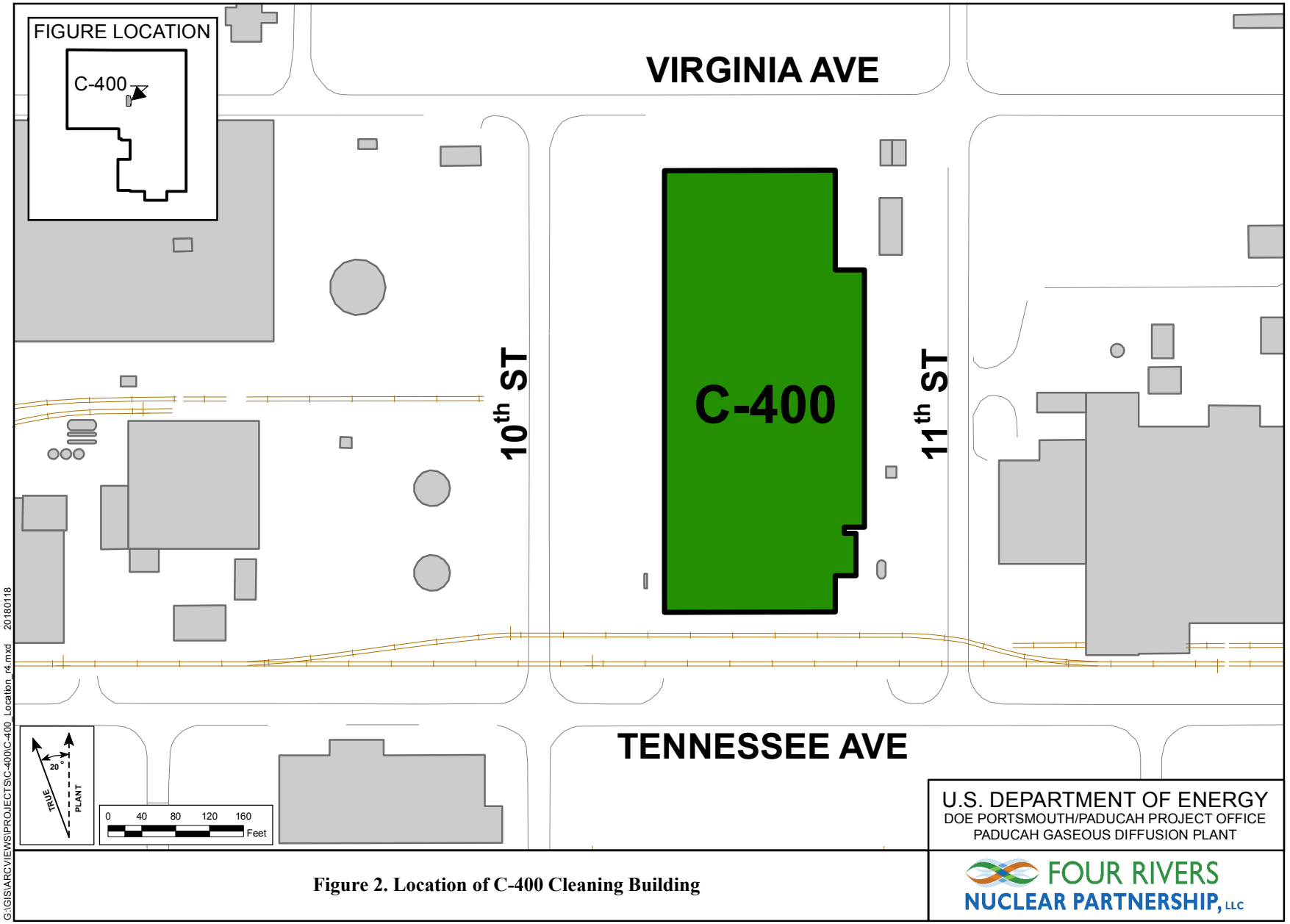

Figure 2. Location of C-400 Cleaning Building

In addition to the residential population surrounding the plant, WKWMA draws thousands of visitors each year for recreational purposes. This area is used by visitors, primarily for hunting and fishing, but other uses include horseback riding, hiking, and bird watching. According to WKWMA management, an estimated 5,000 fishermen visit the area each year. The C-400 Cleaning Building is located within the limited access area of PGDP, and recreational activities do not occur near the facility.

2.1.3 Climate/Meteorology

The 30-year average monthly temperature is 58°F; the coldest month is January, which has an average temperature of 35°F, and the warmest month is July, which has an average temperature of 79°F. The 30-year average monthly precipitation for the period 1981 through 2010 is 4.09 inches, varying from an average of 2.76 inches in August (the monthly average low) to an average of 4.94 inches in May (the monthly average high). Historically, stronger winds are recorded when the winds are from the southwest.

2.1.4 Geology/Lithology

In the immediate vicinity of PGDP, Coastal Plain deposits unconformably overlie Mississippian carbonate bedrock. The full Coastal Plain stratigraphic sequence to the immediate south of PGDP consists of the following three units (from bottom to top): sands and clays of the Clayton/McNairy Formations; the Porters Creek Clay; and Eocene sand and clay deposits (undivided Jackson, Claiborne, and Wilcox Formations). Upper and Lower Continental Deposits unconformably overlie the Coastal Plain deposits, which are, in turn, covered by loess and/or alluvium. Both the loess and alluvium typically are composed of clayey silt.

In the central and northern part of the PGDP site, including the area of the C-400 Cleaning Building, the Coastal Plain sediments are composed exclusively of unconsolidated, interbedded, fine-grained sand, silt, and clay of the Upper Cretaceous-aged McNairy Formation. The thickness of the McNairy Formation at C-400 Cleaning Building is approximately 250 ft. The McNairy in this location is overlain by approximately 100 ft of Continental Deposits.

2.1.5 Hydrogeology and Storm Water

The main hydrogeologic units in the C-400 Cleaning Building area are the Upper Continental Recharge System (UCRS), the Regional Gravel Aquifer (RGA), and the McNairy Flow System. Approximately 56 ft of silt and clay (UCRS), with horizons of sand and gravel lenses, overlies the RGA.

In the area of C-400 Cleaning Building, the UCRS is mostly unsaturated. The RGA, the uppermost aquifer in the C-400 Cleaning Building area, consists of the lowermost sand interval of the Upper Continental Deposits and the underlying sand and gravels of the Lower Continental Deposits to the top of the McNairy Formation. The RGA potentiometric surface is encountered at a depth of approximately 50 ft below ground surface (bgs). Groundwater flow in the RGA generally is to the north, eventually discharging into the Ohio River, although some flow diverges to the east and to the west. Sands and gravels of the RGA are highly permeable.

Below the RGA is the McNairy Formation. The uppermost portion of the McNairy Formation typically contains a significant proportion of clay or silty clay. The hydraulic potential (water level) of the uppermost McNairy Formation is slightly less than that of the RGA. The clayey, uppermost McNairy functions as an aquitard restricting groundwater flow between the RGA and lower McNairy Flow System.

The C-400 Cleaning Building is situated on the divide between the drainage areas of Bayou Creek and Little Bayou Creek. Man-made drainages receive storm water runoff and effluent from the facility.

Shallow surface drainages parallel the west and east sides of the C-400 Cleaning Building. Most of the storm water from the C-400 Cleaning Building area flows to storm drain inlets around the building and discharges via the storm sewer on the south side of the building to Outfall 008 and then to Bayou Creek on the west side of the plant.

2.2 C-400 CLEANING BUILDING

2.2.1 History and Early Environmental Actions

The C-400 Cleaning Building was constructed in the 1950s and was operational from 1952 to 2014, although the former plant laundry remained operational in the building until July 2016 before it was moved to the C-720 Complex. The primary function of the C-400 Cleaning Building included cleaning, metal etching and plating, radioactive materials stabilization and recovery, metals recovery, uranium hexafluoride cylinder washing, uranium trioxide production, diffusion process equipment testing, and uranium tetrafluoride (green salt) pulverization. The building and adjacent structures have been used in a wide variety of functions to support operations at the plant, primarily cleaning and maintaining equipment from the uranium enrichment process buildings, including some from outside contractual work. The building also housed other processes and activities, including recovery of precious metals (other contractual work), and treatment of radiological waste streams.

In June 1986, a routine construction excavation along the 11th Street storm sewer revealed TCE soil contamination. The area of contamination became known as the C-400 TCE Leak Site and was given the designation of Solid Waste Management Unit (SWMU) 11. After the initial discovery of contamination, SWMU 11 and the C-400 Cleaning Building area have been the subject of several investigations, including the Phase II Site Investigation, Waste Area Group (WAG) 6 Remedial Investigation (DOE 1999a), and the C-400 Remedial Design Site Investigation as discussed in Section 1.3 of the C-400 Remedial Design Report (DOE 2008a). TCE was identified in the UCRS and to the base of the RGA during the WAG 6 Remedial Investigation.

Previous actions have remediated some of the soil contamination near the C-400 Cleaning Building. After discovery of the C-400 TCE Leak Site in June 1986, approximately 310 ft^3 of TCE-contaminated soil was excavated and disposed of off-site. The excavation was backfilled with clean soil, and the area was capped with a layer of clay. A 2003 Six-Phase Heating Treatability Study removed approximately 1,900 gal of TCE from the subsurface of a 43-ft diameter treatment area near the southeast corner of the area near the C-400 Cleaning Building. A 2010–2014 phased, interim remedial action removed 535 gal (Phase I) and 1,137 gal (Phase IIa) of TCE from the UCRS and Upper RGA during Phase I and Phase IIa operations.

2.2.2 C-400 Cleaning Building Description

The C-400 Cleaning Building is located inside the plant secured area, near the center of PGDP. The building is bounded by 10th and 11th Streets to the west and east, respectively, and by Virginia and Tennessee Avenues to the north and south, respectively. Figure 2 depicts the location of C-400 Cleaning Building in relation to the plant site. Figures 3 through 9 show the exterior and interior of the C-400 Cleaning Building.

Figure 3. Northeast Corner of the C-400 Cleaning Building Facing West (2016)

Figure 4. Southeast Corner of the C-400 Cleaning Building Facing Northwest (2008)

Figure 5. West Side of the C-400 Cleaning Building Facing Southeast (2017)

Figure 6. East Side Interior of the C-400 Cleaning Building Facing North (2017)

Figure 7. East Side Interior of the C-400 Cleaning Building Facing South (2017)

Figure 8. West Side Interior of the C-400 Cleaning Building Facing North (2017)

Figure 9. West Side Interior of the C-400 Cleaning Building Facing South (2017)

The C-400 Cleaning Building is a rectangular structure (roughly 200 ft by 520 ft plus appurtenances that are incidental and are not included in these dimensions) with a footprint of approximately 116,000 ft^2. The C-400 Cleaning Building floor space is approximately 134,000 ft^2. The large east basement floor is approximately 18,000 ft^2 (approximately 60 ft by 300 ft). The depth of this basement varies with an approximate maximum of 18.5 ft. The east side of the building, as well as the central and southern portions of the west half of the building, housed disassembly and part cleaning equipment. The northwest section encompassed the former laundry area. The C-400 Cleaning Building is constructed of approximately 12-inch thick concrete exterior walls for approximately the first 8 ft of height. Above the concrete walls, the walls consist of windows and corrugated transite panels on steel framing.

2.2.3 C-400 Cleaning Building Contamination

The C-400 Cleaning Building has been the subject of a number of environmental investigations, treatability studies, feasibility studies, and remedial actions since the discovery of off-site groundwater contamination at PGDP in 1988, which provide an extensive AR supporting the removal action. Each of the investigations and activities resulted in the generation of data that documented the presence of contamination associated with the C-400 Cleaning Building. This contamination includes PCBs, radionuclides, specific volatile organic compounds (VOCs) such as TCE and TCA, and specific heavy metals such as uranium and lead. The building also has ACM in its structure. The C-400 Cleaning Building also is a known source of contamination to surrounding ditches and surface soil. The AR includes reports of environmental contamination that is known to be associated with the building and provides a portion of the basis supporting a removal action to demolish the C-400 Cleaning Building (DOE 2017b). The AR includes the reports shown in Table 2.

Chemical contamination—The chemical hazards that exist in the C-400 Cleaning Building include lead and/or other heavy metals, such as uranium metal, ACM in the original building construction, PCBs, and VOCs.

Radiological contamination—Radiological contamination of the C-400 Cleaning Building at the time of demolition will be comprised of surface contamination from the historical processes performed in the facility. The activity associated with the uranium radionuclides constitutes the majority of the radiological inventory present in the facility. Various radionuclides are present as surface contamination. Some recycled uranium or reactor returns were processed at PGDP in the 1960s and 1970s, resulting in the potential for the presence of fission and activation products. Beta-gamma contamination that may be present consists of uranium daughter products and technetium-99. Alpha contamination that may be present includes, for example, uranium, thorium, and transuranic elements (i.e., plutonium isotopes, americium-241, and neptunium-237).

2.2.4 Streamlined Qualitative Risk Evaluation

As discussed in Section 2.2.3, the C-400 Cleaning Building is contaminated with radioactive and nonradioactive hazardous substances. The following discussion provides a qualitative discussion of the risks.

Industrial workers are the most likely receptors that may be exposed to these chemicals or radionuclides of potential concern (COPCs) due to the location of the C-400 Cleaning Building. To be protective of on-site personnel, current access restrictions require personal protective equipment, radiological monitoring and training (e.g., hazardous waste operations and emergency response, radiation worker) prior to entry

Table 2. Reports Included in the C-400 Administrative Record

Year	Title
1991	*Results of the Site Investigation, Phase I, at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (KY/ER-4)
1992	*Results of the Site Investigation, Phase II, at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (KY/sub/13B-97777C P-03/1991/1)
1995	*C-400 Process and Structure Review* (KY/ERWM-38)
1996	*Phase I: Paducah Gaseous Diffusion Plant Waste Area Group 6 Industrial Hydrogeologic Study* (DOE/OR/07-1478&D1)
1999a	*Remedial Investigation Report for Waste Area Grouping 6 at Paducah Gaseous Diffusion Plant Paducah, Kentucky* (DOE/OR/07-1727/V1&D2)
1999b	*Surfactant Enhanced Subsurface Remediation Treatability Study Report for the Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant Paducah, Kentucky* (DOE/OR/07-1787&D1)
1999c	*Bench Scale In-Situ Chemical Oxidation Studies of Trichloroethene in Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant Paducah, Kentucky* (DOE/OR/07-1788&D1)
2001	*Feasibility Study for the Groundwater Operable Unit at Paducah Gaseous Diffusion Plant Paducah, Kentucky* (DOE/OR/07-1857&D2)
2005	*Record of Decision for Interim Remedial Action for the Groundwater Operable Unit for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant Paducah, Kentucky* (DOE/OR/07-2150&D2/R2)
2008a	*Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-0005&D2/R1)
2008b	*Land Use Control Implementation Plan: Interim Remedial Action for the Groundwater Operable Unit for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/07-2151&D2/R2)
2010	*Remedial Action Work Plan for the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-0004&D2/R2/A1)
2012	*Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Phase IIa Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-1272&D2)
2013	*Remedial Action Work Plan for Phase IIa of the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/1271&D2/R3)
2016a	*Treatability Study Report for the C-400 Interim Remedial Action Phase IIb Steam Injection Treatability Study at Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-2202&D2)
2017c	*Solid Waste Management Unit Assessment Report for Solid Waste Management Unit 51* (DOE/LX/07-24127D1)
2018b	*Remedial Action Completion Report for the Interim Remedial Action for the Groundwater Operable Unit for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-2417&D1)

into the C-400 Cleaning Building. Under the current access restrictions, risks to workers from exposure to these COPCs are minimal, but unrestricted industrial exposure could cause risks to workers to exceed generally acceptable risk levels.[1]

Building degradation over time could result in a potential structural failure and contaminant migration. This degradation, including roof and wall deterioration, could allow rainwater to infiltrate the building. Infiltration of rainwater could wash transferable or soluble contaminants out of the building through cracks in the floor or walls impacting underlying groundwater. Furthermore, there is an increased potential for site personnel involved with surveillance and maintenance (S&M) activities to be exposed to hazardous substances, including radiological contamination, associated with structural components. There is a potential risk from hazardous substances, including radiological contamination and exposure to vapors from historical VOC releases. There is the potential for contamination to be released to the environment if the structural elements that contain the contamination were to fail. Demolition and appropriate disposal of the resulting wastes will reduce the risk of exposure to workers located near this facility.

The building structure currently prevents release of contaminants; however, building deterioration could lead to releases and impact human health and ecological receptors.

3. REMOVAL ACTION JUSTIFICATION AND OBJECTIVES

This section summarizes DOE response authority under CERCLA for decommissioning actions, RAOs, justification for demolition of the C-400 Cleaning Building, and proposed ARARs.

3.1 RESPONSE AUTHORITY AND STATUTORY LIMITS

Section 104 of CERCLA addresses the response to releases or threats of release of hazardous substances through removal actions. Executive Order 12580, "Superfund Implementation," delegates to DOE the response authorities for DOE facilities. As lead agency, DOE is authorized to conduct response measures (e.g., removal actions) under CERCLA. A response under CERCLA is appropriate when (1) hazardous substances or contaminants are released or (2) there is a substantial threat of a release into the environment and response is necessary to protect human health and the environment. DOE and EPA issued a joint policy that states facility decommissioning activities should be conducted as NTCRAs, unless circumstances at the facility make it inappropriate (DOE and EPA 1995).

3.2 REMOVAL ACTION OBJECTIVES

The following RAOs have been developed for this removal action and form the basis for identifying and evaluating appropriate response actions:

1. Eliminate, reduce, or otherwise mitigate the potential for releases of hazardous substances from structural deterioration of the C-400 Cleaning Building;

[1] Per guidance, EPA's generally acceptable risk range for site-related exposures is 1E-6 to 1E-4 for carcinogenic risk and below the cumulative hazard index of 1 for noncarcinogens (EPA 1999).

2. Minimize potential threats to human health and the environment that may result from uncontrolled releases from the C-400 Cleaning Building; and

3. Facilitate a comprehensive remedial investigation in support of remedy selection.

3.3 REMOVAL ACTION JUSTIFICATION

As discussed in the *Removal Notification for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-2420&D2 (DOE 2018c), a removal action is appropriate for the C-400 Cleaning Building given the potential risk to workers from exposure to hazardous substances combined with the potential for migration of hazardous substances associated with the deterioration of the facility structural members and ancillary materials. The presence of hazardous substances in the C-400 Cleaning Building has been determined to pose an actual or potential threat of release to the environment and relates to the factors set forth in 40 *CFR* § 300.415 (b)(2)(i),(ii),(v), and (viii). These factors are as follows:

> (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;
>
> (ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

Building degradation over time could result in potential structural failure and contaminant migration. This degradation, including roof and wall deterioration, could allow rainwater to infiltrate the building. Infiltration of rainwater could wash transferable or soluble contaminants out of the building through cracks in the floor or walls impacting underlying groundwater. Furthermore, there is an increased potential for site personnel involved with S&M activities to be exposed to hazardous substances, including radiological contamination, associated with structural components. There is a potential risk from hazardous substances, including radiological contamination, and exposure to vapors from historical VOC releases. There is the potential for contamination to be released to the environment if the structural elements of the building that contain the contamination were to fail. Demolition and appropriate disposal of the resulting wastes will reduce the risk of exposure to workers located near this facility.

> (v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

As the facility continues to age, they will become more susceptible to damage from weather, thereby increasing the likelihood of a contaminant release. The structural instability of the deteriorating C-400 Cleaning Building will make it more difficult to repair should it be damaged by a weather-related event, such as high winds and/or ice, thereby increasing the probability of a contaminant release. High-risk repairs could lead to a higher potential for other site personnel to be exposed to chemical and radiological hazards.

> (viii) Other situations or factors that may pose threats to public health or welfare of the United States or the environment.

The controlled demolition of this facility will ensure that risks to human health and the environment from actual or potential exposure to hazardous substances, including radiological contamination, are reduced or eliminated. Controlled demolition using engineered safety measures is safer and reduces the probability of risks posed by releases of hazardous substances, including radiological contamination, that would result from an uncontrolled collapse (i.e., building "falling in on itself"). Uncontrolled collapse likely would

result in spread of hazardous substances and radiological contamination to site personnel and the environment because contamination found in the C-400 Cleaning Building no longer would be contained by the structure.

Additionally, removal of the building structure allows access needed to investigate and remediate fully the underlying environmental media. A final comprehensive remedial investigation/feasibility study and remedial action are planned following building demolition.

3.4 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with Section 300.415(j) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), on-site removal actions conducted under CERCLA are required to attain ARARs, to the extent practicable considering the exigencies of the situation. ARARs include only federal and state environmental or facility siting laws/regulations; they do not include occupational safety or worker radiation protection requirements. Additionally, per 40 *CFR* § 300.400(g)(3), other advisories, criteria, or guidance may be considered in determining remedies [to be considered (TBC) category]. A list of potential ARARs and TBCs identified to address the removal action alternatives proposed in this EE/CA is included in the appendix to this EE/CA.

4. REMOVAL ACTION TECHNOLOGIES AND DEVELOPMENT OF ALTERNATIVES

There are limited options for removal action alternatives for the C-400 Cleaning Building. The facility can undergo demolition or no action, at this time.

This section summarizes the identification and screening of potential demolition technologies and describes the development of the removal action alternatives for the C-400 Cleaning Building.

4.1 TECHNOLOGY IDENTIFICATION AND SCREENING

This section identifies the technologies and disposal options based on site-specific conditions, contaminants, affected media, and anticipated activities. Technologies for building dismantlement and size reduction are identified based on their ability to meet RAOs, provide safety to workers, the feasibility of the technology under site-specific conditions, and the ability to provide radiological control of the demolition activity. Disposal options for waste streams that will be generated from demolition activities also are presented.

4.1.1 Building Dismantlement and Size-Reduction Technologies

Multiple dismantlement and size reduction technologies exist and could be used for this project. Table 3 identifies the dismantlement and size-reduction technologies that are the most appropriate for this removal action and addresses their applicability and limitations. Dismantlement technologies include conventional disassembly using hand tools, circular cutters, hydraulic shears, and plasma arc and oxyacetylene torches. Size-reduction techniques also have been identified for use in the demolition efforts.

Table 3. Description and Evaluation of Building Dismantlement and Size Reduction Technologies

Technology	Description	Applicability	Limitations	Comments
Conventional disassembly	Hand-held tools and saws; used for hand removal of nuts and bolts.	May be applied to any area.	Labor intensive and slow; recommended for limited application. Vacuuming with high efficiency particulate air filtration will be used for activities that have potential to create large amounts of airborne particulate.	No additional worker training required; rotary saws, grinders, and other high-speed mechanical tools would produce airborne particulates.
Mobile hydraulic shear	Two-bladed cutter attached to excavator; typically uses hydraulic power.	Can cut 1/4-inch thick steel (large-diameter pipe, structural steel, tanks); up to 1-inch thick pipe can be cut, but will reduce blade life.	Pipe ends are pinched, requiring further processing before decontamination, treatment, or disposal; eliminates airborne contamination associated with thermal cutting processes.	Good for structural steel (e.g., I-beams), conduit, and piping.
Circular cutters	Self-propelled; cut as they move around a track on outside circumference.	Metal pipes from 1.25-inch to 20-ft diameter; wall thickness up to 6 inches, depending on type of circular cutter used.	4 inch to 21 inch clearance required, depending on type of circular cutter used; requires multiple passes for thickness greater than 0.75 inch.	There are safety concerns, but these can be managed.
Plasma arc cutting devices	High voltage, low current electricity combines with pressurized gas (air or nitrogen) to create a focused stream of high temperature ionized gas, melting away the metal.	Provides high speed cutting and gouging for most metals up to 2 inches in thickness. Metal thickness may restrict widespread applicability.	May ignite uranium; alloys uranium with the metal, however, generally does not affect cutting operation. Existing worker protection for uranium is adequate for alloying and subsequent segregation that would take place after using plasma arc.	Additional worker protection may be required if plasma arc is used to cut metals that have PCB or lead-based coatings.
Oxy-fuel torch	Oxygen and a fuel gas mixed and ignited at the tip of a torch; the metal is heated and burned away.	Very effective in cutting carbon steel; depth of cut up to 4 to 6 inches; cutting speed up to 30 inches/minute; common technique for structural carbon steel member disassembly.	May ignite uranium; alloys uranium with the metal, however, generally does not affect cutting operation. Existing worker protection for uranium is adequate for alloying and subsequent waste segregation that would take place after using a torch.	Not recommended for aluminum or stainless steel due to formation of refractory oxides; additional worker protection may be required if a torch is used to cut metals that have PCB or lead-based coatings.

4.1.2 Concrete Slab Decontamination and Stabilization Technologies

Multiple decontamination and stabilization technologies exist for the concrete slabs and could be used for this project. Table 4 identifies the technologies considered for the concrete slabs that will remain after removal of the buildings and addresses applicability and limitations of each. These technologies are the most appropriate for this removal action.

The application of fixative/stabilizer coatings (such as latex paints, gums, or resins) is considered a viable technology to fix any contamination found on the concrete slabs. An encapsulant, such as concrete or polymer, could be applied to the concrete that has radioactive or other hazardous contamination. Any fixative, stabilizer, or encapsulant may degrade over time and likely will require maintenance prior to the Comprehensive Site Operable Unit CERCLA action. Table 4 shows technologies that are considered viable for decontamination of the concrete: scabbling, sponge blasting, and abrasive blasting.

Table 4. Description and Evaluation of Concrete Slab Decontamination and Stabilization Technologies

Technology	Description	Applicability	Limitations	Comments
Encapsulation	Fixes wastes by encasement in low-solubility, solid matrix.	Used for wastes that are unstable.	Increases volume and mass of waste.	Reduces potential for leaching to groundwater.
Application of fixative stabilizer coatings	Applies paints, films, and resins used as coatings to fix and stabilize contaminants in place.	Stabilizes PCBs and radioactive contamination.	No removal of contaminant is achieved; experiments to ensure effectiveness of stabilizer generally are required due to site-specific requirements.	Useful for containment of contaminants to minimize worker exposure and the potential for releases to the environment during demolition. The lifespan of the sealer depends on application specifics, including the sealer itself, weather, use of the slab, and the original condition of the slab.
Scabbling	Uses physical means (steel shot, steel rods, carbide cutters, etc.) to loosen and remove surface contamination.	Effective on flat, shatterproof surfaces (concrete).	Effective for near surface contamination; creates additional waste.	Highly effective for removal of surface layer of concrete, technology readily available, and dust can be suppressed.
Abrasive blasting	Uses an abrasive medium (sand, glass beads, grit, or CO2 pellets) suspended in an air spray to loosen and remove surface contamination.	Effective on flat, shatterproof surfaces (concrete, aluminum, steel, and painted or coated surfaces) and on hard to reach areas, such as ceilings.	Effective for surface contaminants up to 0.25-inch (0.64-cm) deep, depending on abrasive technique; creates additional waste; slow, labor-intensive technique that causes high potential for worker exposure.	Can produce substantial amount of contaminated dust; appropriate for items that can be decontaminated effectively for reuse or "clean" disposal; CO2 minimizes additional waste streams.

PCB = polychlorinated biphenyl

4.1.3 Waste Containerization Options

It will be necessary to containerize the waste generated during demolition activities for disposal. Waste generated during the demolition phase of this project will be characterized to ensure that it meets the waste acceptance criteria (WAC) for the proposed disposal facility. If waste from demolition activities is disposed of at the C-746-U Landfill, waste may be transported, for example, by using flatbed trailers, dump trucks, or roll-off boxes. Prior to containerization, and depending on the characteristics and regulatory status of the waste, the debris may be staged temporarily in accordance with the ARARs. A variety of containers is available that would be appropriate for the different waste streams that would be generated. Containers that are anticipated to be appropriate for this removal action include gondola rail cars, Sealand containers, intermodal containers, roll-off boxes, ST-boxes (B-25), steel drums, and polyethylene drums. Due to the variety of waste that will be generated from the demolition activities, multiple container types will be used during implementation of the removal action.

4.1.4 Waste Disposal Options

For demolition of the C-400 Cleaning Building, the estimated waste volume used for cost estimating is approximately 443,000 ft^3.

Waste generated during the demolition portion of this project will be characterized to ensure that it meets the WAC for the receiving disposal facility. Characterization may consist of process knowledge, sampling and analysis, or a combination thereof and will be performed in accordance with ARARs. Results of the characterization efforts will be used to separate the debris into waste streams that conform to the receiving disposal facility's WAC. Table 5 provides a description of anticipated potential waste. The volume of hazardous materials in the waste is expected to be small enough that the combined demolition waste stream is not expected to be hazardous waste based on representative sampling consistent with EPA preamble discussions contained in 57 *FR* 990 (January 9, 1992); it is expected to be low-level waste (LLW). Mixed waste and RCRA hazardous waste will be treated, if necessary, to meet ARARs prior to disposal. Disposal at off-site facilities will depend on the nature of the wastes generated. It is anticipated that the majority of the waste will be classified as LLW, requiring off-site disposal [e.g., DOE's Nevada National Security Site (NNSS) and Energy*Solutions*, Clive, UT].

The C-746-U Landfill is a contained landfill designed for solid waste generated at PGDP. Acceptable waste categories include, but are not limited to, brick, concrete, rock, lumber, vitrified clay materials, roofing materials, and certain metals. ACM material (friable), petroleum-containing soil, and empty containers (aerosol cans, paint cans, pesticide containers, etc.) also are accepted at the C-746-U Landfill. The C-746-U Landfill cannot accept waste that has radiological contamination that exceeds its authorized limits, RCRA hazardous waste, mixed waste, PCB waste (> 49 ppm), or free liquids. Waste generated during demolition of the C-400 Cleaning Building may be disposed of at the C-746-U Landfill if it meets the landfill's WAC.

4.2 DEVELOPMENT OF ALTERNATIVES

In accordance with the NCP and EPA guidance, DOE has identified two removal action alternatives to address the potential risks to human health and the environment associated with the C-400 Cleaning Building:

1. No action, and
2. Demolition of the C-400 Cleaning Building to slab.

Table 5. Anticipated Potential Waste Types

Waste Types	Description
LLW	LLW is defined as waste that has become contaminated with radioactive material. The waste streams can include slag, scrap metal, personal protective equipment, concrete, decontamination materials, transite (also ACM), and miscellaneous waste types from process areas or systems.
Nonhazardous [non-PCB (< 50 ppm)] solid wastes, and debris	Waste streams that can be certified as meeting DOE radiological release criteria and disposal site criteria and are nonhazardous and non-PCB (< 50 ppm). This may be disposed of in the C-746-U Landfill if all WAC are met.
Radioactive ACM	Radioactive ACM from posted radiological material areas and/or that exceeds the authorized limits of the C-746-U Landfill will be disposed of off-site.
Nonradioactive ACM	ACM that can be demonstrated to meet the appropriate radiological release criteria.
PCB wastes (> 50 ppm)	PCB electrical equipment, PCB oils and other wastes that are regulated for disposal under TSCA. PCB wastes may be categorized as radioactive PCB wastes or as nonradioactive PCBs if radiological release criteria are met. PCB wastes include PCB bulk product and PCB remediation wastes.
Mixed wastes	Waste streams that have both a RCRA hazardous component and radioactive component based on surface contamination exceeding release limits, or available characterization data. Among the wastes included in this category are hazardous, radioactively contaminated, nonrecyclable items.
Hazardous wastes	RCRA hazardous waste streams that are not mixed wastes and do not exceed radiological release criteria, but meet the definition of hazardous in 40 *CFR* Part 261.
PCB/RCRA/radiological	PCB/RCRA/radiological wastes are those mixed wastes that also contain PCBs. This category also includes ACM that is commingled with mixed and PCB waste. These wastes may include residual hydraulic fluids, wastewater, ventilation duct gaskets, and deposits within the ventilation ducts.

The No Action alternative serves as a baseline for evaluating other removal action alternatives. No action implies that no activities will be implemented to alter the existing condition of the C-400 Cleaning Building.

The Demolition removal action alternative is included for evaluation as specified in the C 400 MOA, dated August 8, 2017 (DOE 2017a).

Other alternatives (e.g., long-term S&M) are not included for evaluation. If the Demolition removal action alternative were not selected and implemented, then DOE would continue to maintain the C-400 Cleaning Building. S&M costs averaging about $160K/year likely would be required to maintain the facility safely and prevent impacts to the environment.

4.2.1 Alternative 1—No Action

Under this alternative, the C-400 Cleaning Building would be maintained as inactive. No removal action activities will take place as part of this alternative. Assumptions for this alternative include the following:

- Utilities isolated during deactivation will remain disconnected.
- The facility will be left without heating, ventilation, light, or fire systems.
- No routine S&M would be performed (collection of infiltrating water, pest control, relamping, etc.) and no corrective maintenance would be performed (repair of broken windows, failing structures, repair due to storms or natural phenomena).
- Security controls and perimeter administered by PGDP would be maintained outside CERCLA.

4.2.2 Alternative 2—Demolition of the C-400 Cleaning Building to Slab

Under this alternative, the C-400 Cleaning Building would undergo demolition of all abovegrade structure(s).

The key components of demolition include the following:

- Abovegrade structures will be disassembled or demolished to surface slab (e.g., concrete floor slabs and foundations will be left in place).
- Abovegrade concrete slab will be stabilized to mitigate contaminant migration.
- Controls will be used to minimize fugitive dust during demolition.
- Material and waste streams will be segregated into appropriate categories, as necessary.
- Wastes will be disposed of at an approved waste disposition facility.

Details of the removal approach will be established in the RAWP for the C-400 Cleaning Building.

5. ANALYSIS OF REMOVAL ACTION ALTERNATIVES

In accordance with NCP and EPA guidance, the two removal action alternatives presented in Section 4.2 have been evaluated using the criteria of effectiveness, implementability, and cost (EPA 1993). The three criteria are described briefly as follows. Each of the alternatives that was evaluated has activities that will begin after deactivation of the C-400 Cleaning Building has been completed.

- The effectiveness of each alternative considers the RAOs. Other effectiveness considerations may include the following:

  — Ability to protect human health and the environment by reducing potential hazards;

  — Ability to comply with ARARs (a complete listing of ARARs and TBCs is presented in the Appendix);

  — Long-term effectiveness and permanence; and

  — Short-term effectiveness.

- The implementability of each alternative is based on the technical and administrative feasibility and the availability of services and materials required for the alternative. Implementability factors may include the following:

  — Ability to construct and operate the technology;
  — Reliability of the technology;
  — Ease of implementing additional responses (if necessary);
  — Ability to monitor effectiveness;
  — Ability to obtain approval from regulatory agencies;
  — Availability of treatment, storage, and disposal services and capacity; and
  — Availability of equipment, prospective technologies, and specialists.

- The cost of each alternative is presented for comparison purposes. Each cost estimate includes capital costs and S&M costs.

NEPA requires federal agencies to evaluate and document the effect of their proposed actions on the quality of the human environment. DOE issued a *Secretarial Policy Statement* on NEPA in June of 1994 stating that DOE hereafter will rely on the CERCLA process for review of actions to be taken under CERCLA and incorporate NEPA values in CERCLA documents to the extent practicable (DOE 1994). Such values may include analysis of socioeconomic, cultural, ecological, and cumulative impacts and the impacts of waste disposition including off-site transportation. NEPA values described herein have been incorporated into this evaluation of alternatives in accordance with the Secretarial Policy.

5.1 ALTERNATIVE 1—NO ACTION

In this alternative, the C-400 Cleaning Building essentially will be maintained as inactive following completion of deactivation activities. The security controls and perimeter administered by PGDP would be maintained outside of CERCLA to limit public access to the facility. This alternative will not meet

ARARs. No removal action activities will take place as part of this alternative. No waste will be generated as part of this alternative.

5.1.1 Effectiveness

Contamination present in the C-400 Cleaning Building would remain in place under this alternative. The public would be protected from direct exposure as a result of access controls for PGDP; however, on-site workers would not be protected outside of access restrictions, nor would the environment be protected from potential releases as the building degrades. This alternative would not be protective of human health or the environment, and RAOs would not be achieved. This alternative would not meet ARARs. Current levels of exposure to on-site personnel and the environment would continue or increase as the facility deteriorates.

The primary adverse impact expected under Alternative 1 is exposure for the on-site workers to hazardous substances contained in or released from the facility. Because the contaminated materials currently are inside the building, there would be limited impacts to air, soil, and other affected environments in the short term. Air, soil, and other environments would be impacted in the future as the building deteriorated and eventually failed. Wetlands and floodplains are not located in the vicinity of C-400 Cleaning Building and, therefore, would not be affected. No federal- or state-listed threatened or endangered (T&E) plant or animal species have been identified in the area of the C-400 Cleaning Building. The only sensitive resource located in close proximity to PGDP is the nesting habitat for the Indiana bat (*Myotis sodalis*), but PGDP facilities do not provide suitable habitat; therefore, this alternative is not expected to have any adverse impact on T&E species.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations," requires agencies to identify and address disproportionately high and adverse human health or environmental effects that their activities may have on minority and low-income populations. Within 4.5 miles from the center of the Paducah Site, the minority population and the low-income population are lower than the state average (DOE 2016b). Under this alternative, there will be no disproportionately high and adverse off-site impacts.

5.1.2 Implementability

The no action alternative is readily implementable. Under this alternative, there would be no irretrievable commitment of resources, but the land currently occupied by the building would be unavailable for other uses, such as construction of new structures or facilitating a comprehensive remedial investigation supporting final remedy selection for the C-400 Complex OU. No demolition waste would be generated by this alternative, and no treatability studies would be required to implement this alternative.

5.1.3 Cost

The cost for Alternative 1, as described with no further S&M, is $0 because no activities would be performed as part of the No Action removal action alternative. Ultimate costs for cleanup of C-400 Cleaning Building contaminants at a later time may be greatly increased, if a release occurs as a result of building degradation.

5.2 ALTERNATIVE 2—DEMOLITION OF THE C-400 CLEANING BUILDING TO SLAB

This alternative would include demolition of the C-400 Cleaning Building abovegrade structure(s) to ground level slab, slab stabilization, and waste segregation. All generated wastes would be dispositioned.

5.2.1 Effectiveness

Demolition of the C-400 Cleaning Building would prevent, minimize, or eliminate potential and actual risks to on-site personnel and to ecological receptors posed by the release or threat of release of contaminants. At completion, this alternative would facilitate implementation of remedial investigations associated with future final remedial efforts at the C-400 Complex, in accordance with the C-400 MOA (DOE 2017a). Demolition would ensure that contaminants in the abovegrade building structures remain in a controlled environment. The remaining abovegrade slab will be stabilized prior to beginning remedial investigation activities to mitigate contaminant migration until a final remedial action can be accomplished. Dependent on waste types, waste would be disposed of at one or more appropriate sites that would provide long-term containment for any hazardous and/or radioactive constituents.

This alternative is expected to meet the ARARs in the appendix to this EE/CA. The transportation of waste to on-site and/or off-site disposal facilities, and any treatment that may be required to satisfy land disposal restrictions, would be performed in accordance with ARARs (see Appendix). Waste may be shipped by truck or rail. All disposal activities would be conducted in accordance with requirements and disposal site permits, authorizations, or agreements. Disposal at off-site facilities will depend on the nature of the wastes generated. It is anticipated that the majority of the waste will be designated as LLW requiring off-site disposal (e.g., DOE's NNSS and Energy*Solutions*, Clive, UT).

No long-term impacts to air quality will result from demolition. Upon implementation of this alternative, the remaining contamination in the structures is expected to consist of RCRA regulated wastes, radiological contamination and PCB-contaminated paint on the structural steel, and ACM. Short-term impacts to air quality will be limited to the potential release of the contaminants, which will be mitigated by vacuuming, application of fixatives or sealants, and water misting. Perimeter monitoring will be conducted during field activities. During demolition, potential surface water runoff will be controlled by the mitigation activities in the Paducah Site-specific *Best Management Practices Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* PAD-REG-1006/FR1, to prevent release of contamination.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations," requires agencies to identify and address disproportionately high and adverse human health or environmental effects that their activities may have on minority and low-income populations. Within 4.5 miles from the center of the Paducah Site, the minority population and the low-income population are lower than the state average (DOE 2016b). Under this alternative, there will be no disproportionately high and adverse off-site impacts.

DOE developed the *Cultural Resources Management Plan for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, BJC/PAD-691/R1, (CRMP) to define the preservation strategy for PGDP and to ensure compliance with the National Historic Preservation Act and federal archaeological protection legislation (BJC 2006a). An intensive cultural resources survey of PGDP facilities is documented in *Cultural Resources Survey for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (BJC 2006b). The cultural survey and CRMP provide further detail for the buildings and sites on PGDP that are eligible for listing on the National Register of Historic Places (NRHP) and those that are identified as NRHP-eligible properties in the PGDP Historic District. The cultural resources survey identified the C-400 Cleaning Building as NHRP-eligible property.

Demolition will have no impact on geology and only short-term impacts on soils. Short-term soil erosion impacts will be mitigated through the use of best management practice control measures (e.g., covers and silt fences). No conversion of prime farmland soils will occur. Any activity that will create disturbances also will include restoration to the impacted areas.

This alternative would demolish the building before structures deteriorated to the point that demolition would be further complicated. Chemical, radiological, and physical risks to on-site workers would be controlled by engineering controls and/or personal protective equipment.

Demolition of the C-400 Cleaning Building structure will generate a waste stream that may include solid waste such as construction/demolition debris, TSCA waste, radiological waste, RCRA hazardous waste, and mixed waste. It also is expected that ACM will be generated.

5.2.2 Implementability

Technical and administrative feasibility—Demolition is a technically feasible alternative. Conventional construction/demolition techniques will be used to demolish the structure. On-site and/or off-site disposal of waste materials will take place at existing facilities with sufficient capacities.

Availability of services and materials—Sufficient equipment and personnel are available for this alternative. On-site and off-site disposal services are available.

5.2.3 Cost

The total estimated cost for Alternative 2 is $36.4M. A breakdown of the estimated total cost elements is shown in Table 6.

Table 6. Cost Elements for Demolition of the C-400 Cleaning Building

Activity	Approximate Cost
Planning, Documentation, and Field Activities • Project Management Support • C-400 Cleaning Building Demolition and Waste Loading • Building Characterization • Removal Action Report	$8.9M
Waste Management • Waste Management, Containerization, Transportation, and Disposition	$27.5M
Total	$36.4M

Because cost is dependent on the actual waste type and volume, the estimated cost may vary after the wastes are fully characterized and the actual waste volumes are known.

6. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

In this section, the removal action alternatives are compared for each of the criteria used in the analysis. Table 7 summarizes the comparative analysis.

6.1 EFFECTIVENESS

The major subcriteria for evaluating effectiveness are protectiveness, ability to comply with ARARs, and the ability to meet the RAOs.

Table 7. Comparative Analysis Summary

Alternative 1 No Action	Alternative 2 Demolition of the C-400 Cleaning Building to Slab
Effectiveness	
• Not effective in meeting RAOs • Does not reduce the risk or potential for exposure • Does not comply with ARARs • Does not facilitate final remedial action for the C-400 Complex OU	• Effective in meeting RAOs • Reduces potential hazards • Complies with ARARs • Facilitates future remedial action for the C-400 Complex OU
Implementability	
• Implementable and feasible	• Implementable and feasible • Conventional demolition methods currently available • Availability of services and materials needed now
Cost	
• No costs for this alternative	• Total alternative cost: $36.4M

Protectiveness is the primary objective of a removal action. As discussed previously in the streamlined risk assessment, in Section 2.2.4, as the facility continues to age, the threat of substantial release of radiological and hazardous materials increases, and the difficulty of confining these materials from the environment increases. Alternative 1, the no action alternative, is not protective of human health and the environment. Alternative 2, demolition of the C-400 Cleaning Building to slab, would mitigate the hazards from the structure permanently.

Alternative 1 does not achieve RAOs or comply with ARARs. Alternative 2 would achieve the RAOs and complies with ARARs. Alternative 2 achieves the RAOs by removing and disposing of materials contaminated with hazardous substances.

6.2 IMPLEMENTABILITY

Implementability is evaluated based on technical and administrative feasibility and availability of equipment, personnel, services, and disposal facilities.

Both removal action alternatives are technically feasible. The methods for performing Alternative 2 can be planned and engineered using existing available knowledge and procedures. The methods have been

performed at PGDP and elsewhere. Existing on- and off-site disposal facilities are available to receive the waste to be generated by the activities.

No equipment, technologies, or personnel are required for implementation of Alternative 1. Conventional demolition methods would be used for Alternatives 2. Equipment to support Alternative 2 is available either at PGDP or commercially. End-loaders and track hoes with processor end-effectors, transport trucks, and cranes capable of heavy lifts are available both on-site and commercially. Advanced cutting methods are available for cutting contaminated equipment. Trained personnel are available to perform work for Alternative 2. On-site or off-site disposal services are available for the types of wastes expected to be generated under Alternative 2.

6.3 COST

Alternative 1 has no cost, although it does not achieve the RAOs. The cost for the recommended removal action alternative, Alternative 2, is $36.4M. A comparison of these costs is included in Table 6.

7. RECOMMENDED REMOVAL ACTION ALTERNATIVE

As shown in Section 6, Alternative 2 will meet RAOs and reduce potential hazards, while Alternative 1 does not. Alternative 2 complies with ARARs and is highly implementable and feasible, utilizing services and materials that are readily available.

Alternative 2, demolition to slab, is the recommended removal action alternative. Alternative 2 provides protection of human health and the environment in the near future and facilitates a comprehensive remedial investigation supporting final remedy selection for the C-400 Complex.

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APPENDIX

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED GUIDANCE FOR DEMOLITION OF THE C-400 CLEANING BUILDING

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CONTENTS

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ACRONYMS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
CAMU	corrective action management unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CRMP	Cultural Resources Management Plan
DOE	U.S. Department of Energy
EDE	effective dose equivalent
EPA	U.S. Environmental Protection Agency
KAR	*Kentucky Administrative Regulations*
KDWM	Kentucky Division of Waste Management
KPDES	Kentucky Pollutant Discharge Elimination System
LLW	low-level waste
NRHP	National Register of Historic Places
PGDP	Paducah Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act
TBC	to be considered
TSCA	Toxic Substances Control Act

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A.1. INTRODUCTION

Section 300.415(j) of the National Contingency Plan states that removal actions shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws. The ARARs for this removal action are identified in Table A.1 and Table A.2. Attainment of the identified ARARs is expected to be practicable for this action.

ARARs include the substantive requirements of federal or more stringent state environmental or facility siting laws/regulations. Additionally, per 40 *CFR* § 300.400(g)(3), other advisories, criteria, or guidance may be considered in determining remedies [to be considered (TBC) category]. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 121(d)(4) provides several ARAR waiver options that may be invoked, provided that human health and the environment are protected. ARARs do not include occupational safety or worker protection requirements. On-site activities must comply with the substantive, but not administrative requirements. Administrative requirements include applying for permits, recordkeeping, consultation, and reporting. Activities conducted off-site must comply with both the substantive and administrative requirements of applicable laws.

ARARs typically are divided into three categories: (1) chemical-specific, (2) location-specific, and (3) action-specific. "Chemical-specific ARARs usually are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values" [53 *FR* 51394, 51437 (December 21, 1988)]. (In the absence of chemical-specific ARARs, cleanup criteria are based upon risk calculations.) Location-specific ARARs generally are restrictions placed upon the concentration of hazardous substances or the conduct of activities solely because they are in special locations [53 *FR* 51394, 51437 (December 21, 1988)]. Action-specific ARARs usually are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes or requirements to conduct certain actions to address particular circumstances at a site [53 *FR* 51394, 51437 (December 21, 1988)].

When the U.S. Department of Energy (DOE) proposes a response action, Section XXI of the Federal Facility Agreement requires that DOE identify each state and federal permit that otherwise would have been required in the absence of CERCLA § 121(e)(1) and the National Contingency Plan. DOE also must identify the standards, requirements, criteria, or limitations necessary to obtain such permits and provide an explanation of how the proposed action will meet the standards, requirements, criteria, or limitations identified. This evaluation determined that the permits that otherwise would be required may include Kentucky Pollutant Discharge Elimination System (KPDES); Resource Conservation and Recovery Act of 1976 (RCRA) treatment, storage, and disposal facility; and solid waste landfill permits. The Paducah Gaseous Diffusion Plant (PGDP) currently operates under KPDES Permits; Hazardous Waste Facility Operating Permit; and a Solid Waste Permit. The substantive requirements for the otherwise referenced permits associated with this removal action are identified as ARARs in Tables A.1 and A.2.

A.2. CHEMICAL-SPECIFIC ARARs/TBC GUIDANCE

Chemical-specific ARARs provide health- or risk-based concentration limits or discharge limitations in environmental media (i.e., surface water, groundwater, soil, or air) for specific hazardous substances, pollutants, or contaminants. Effluent limits for surface water discharges are presented as part of the

action-specific ARARs. There are no chemical-specific ARARs identified for C-400 Cleaning Building removal action.

A.3. LOCATION-SPECIFIC ARARs/TBC GUIDANCE

Location-specific requirements establish restrictions on activities conducted within protected or environmentally sensitive areas. Table A.1 lists location-specific ARARs for protection of cultural or sensitive resources.

A.3.1 CULTURAL RESOURCES

DOE developed the *Cultural Resources Management Plan for the Paducah Gaseous Diffusion Plant, McCracken County, Kentucky* (CRMP) (BJC 2006a) to define the preservation strategy for PGDP per the National Historic Preservation Act and federal archaeological protection legislation at PGDP. The CRMP provides further detail for the buildings and sites at PGDP that are eligible for listing on the National Register of Historic Places (NRHP) and identifies as NRHP-eligible contributing properties to the PGDP Historic District.

A.3.2 WETLANDS

No wetlands are expected to be impacted by this removal action, nor is it anticipated the action will involve discharge of dredge or fill material into waters of the United States, including jurisdictional wetlands.

A.4. ACTION-SPECIFIC ARARs/TBC GUIDANCE

Action-specific ARARs include operation, performance, and design requirements or limitations based on waste type, media, and activities. ARARs for the removal alternative include requirements related to building demolition; scrap metal removal; transportation of hazardous materials; and waste management and disposal.

A.4.1 GENERAL CONSTRUCTION ACTIVITIES

Requirements for storm-water runoff and fugitive dust emissions may trigger certain ARARs. ARARs for these common activities are discussed here.

A.4.2 STORM WATER RUNOFF

Storm-water discharges from demolition activities will require implementation of good site planning and best management practices. The RAWP will outline the best management practices that will be used during implementation of this action.

A.4.3 FUGITIVE EMISSIONS

Emission of airborne particulate concentrations may result from demolition activities. Fugitive emissions are regulated by 401 *KAR* 63:010. Reasonable precautions must be taken to prevent particulate matter from becoming airborne.

Radionuclide emissions, excluding radon-220 and radon-222, from DOE facilities are addressed in 40 *CFR* § 61, Subpart H. These regulations apply to airborne emissions. National Emissions Standards for Hazardous Air Pollutants limit ambient air radionuclide emissions from DOE facilities to levels that would prevent any individual from receiving an effective dose equivalent (EDE) of 10 millirem per year (mrem/year) or more (40 *CFR* § 61.92). Nonpoint-source fugitive radionuclide emissions are estimated by plant monitoring stations.

A.4.4 COLLECTION/TREATMENT OF VOLATILE ORGANIC CONSTITUENTS

Demolition activities may generate wastewater contaminated with volatile organic compounds (VOCs), which may require treatment, depending on VOC levels, prior to surface water discharge. Prior to emission of collected vapor/gases resulting from any such treatment, contaminants must be removed to comply with 401 *KAR* 63:020 § 3. An off-gas treatment system shall be employed, as necessary, to ensure contaminant emissions do not exceed allowable levels as required by ARARs in Table A.2 (e.g., 40 *CFR* § 63.7885). This system may include such equipment as condensers, accumulators, and/or filters to accomplish the required contaminant removal.

A.4.5 WASTEWATER TREATMENT

Contaminated wastewater, such as decontamination fluid, may be treated before discharge, as needed, to meet discharge limits specified in Table A.2. Wastewater will be discharged through either an existing KPDES-permitted outfall, an existing CERCLA outfall, or managed at an off-site wastewater treatment facility. ARARs for both discharge options are included in Table A.2. Treatment of wastewater in a wastewater treatment unit may be required to meet ARARs prior to discharge. Effluent limits for radionuclides will be established in accordance with CERCLA and the National Contingency Plan.

A.4.6 WASTE MANAGEMENT

Building demolition activities may result in generation of RCRA solid or hazardous waste (e.g., hazardous debris containing lead paint); low-level radioactive waste (LLW); mixed waste; asbestos-containing waste materials; Toxic Substances Control Act (TSCA) of 1976 waste, as amended; polychlorinated biphenyl (PCB) bulk-product waste; and/or PCB remediation wastes. Although some characterization has been performed, additional waste streams may be identified during implementation of the removal action.

PCB bulk-product waste, as defined by 40 *CFR* § 761.3, is derived from manufactured products containing PCBs in a non-liquid state at any concentration where the concentration at the time of designation for disposal was greater than or equal to 50 ppm. 40 *CFR* § 761.50(b)(4) states that PCB bulk product waste is waste that was greater than or equal to 50 ppm when originally removed from service even if current PCB concentration is less than 50 ppm. It includes non-liquid bulk wastes and debris from demolition (of buildings and other man-made structures) that was manufactured, coated, or serviced with

PCBs. Examples of bulk PCB product waste are insulation, dried paints, varnishes, sealants, caulking, and gaskets.

PCB remediation waste, as defined in 40 *CFR* § 761.3, contains PCBs as a result of a spill, release, or other unauthorized disposal. It includes rags and other debris generated as a result of any PCB-spill cleanup in buildings and other man-made structures containing concrete, wood floors, or walls contaminated from leaking PCBs or PCB-contaminated transformers. PCB remediation waste also includes PCB-contaminated nonporous surfaces such as smooth glass, unpainted marble, granite, or porous surfaces such as fiberglass, painted stone, and corroded metal.

All primary wastes (e.g., demolition debris, removed waste materials) and secondary wastes (e.g., contaminated personal protective equipment, decontamination wastes) generated during building demolition will serve as the point of generation and be characterized appropriately as either RCRA (solid or hazardous waste), asbestos, TSCA, LLW, and/or mixed wastes and managed accordingly. In many cases, debris generated from demolition activities can result in heterogeneous waste streams. Characterization activities will focus on determining the overall average properties of the waste streams using both representative sampling and process knowledge in accordance with ARARs and approaches described in EPA preamble discussions contained in 57 *FR* 990 (January 9, 1992). Table A.2 lists the requirements associated with the characterization, storage, treatment, and disposal of the aforementioned waste types.

Based on process knowledge of past operations at the C-400 Cleaning Building and review of existing historic sampling data, waste streams (e.g., demolition debris, environmental media) generated during demolition activities may be contaminated with listed hazardous waste [i.e., trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA)]. If either TCE and/or 1,1,1-TCA is determined to be present based on detectable concentrations of TCE and/or 1,1,1-TCA, the waste stream in question shall be managed as a RCRA hazardous waste per the contained-in policy until such time the waste stream is determined to no longer contain the listed hazardous. Contaminated debris and environmental media is no longer considered to contain hazardous waste: (1) when they no longer exhibit a characteristic of hazardous waste, and (2) when concentrations of the listed hazardous constituents are below health-based levels. Kentucky Division of Waste Management (KDWM) and EPA Region 4 previously have approved site-specific health-based levels for making no longer contained-in/contaminated-with determinations for environmental media and debris at the PGDP with respect to TCE and 1,1,1-TCA. The health-based levels originally were approved by KDWM in the 2003 Agreed Order. The health-based levels originally were approved by EPA in correspondence dated March 5, 2009, and May 19, 2009, and the *Remedial Action Work Plan for the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-0004&D2/R2/A1 (DOE 2010). The approved health-based levels for TCE and 1,1,1-TCA are as follows:

Approved Health-Based Contaminant Levels for Solids and Aqueous Liquids

Listed Constituent	Solids	Aqueous Liquids
TCE	39.2 ppm	0.081 ppb
1,1,1-TCA	2,080 ppm	Not Applicable*

*Aqueous solutions that meet the health-based level for TCE also shall be deemed no longer to contain 1,1,1-TCA.

DOE shall be responsible for comparing characterization data for the environmental media/debris streams suspected as being contaminated with TCE and/or 1,1,1-TCA to the above approved health-based levels.

If, based on DOE's comparison, the total detectable concentrations of TCE and/or 1,1,1-TCA are below the approved health-based levels, the waste stream will be deemed as not to contain or be contaminated with a listed hazardous waste.

A combination of other regulatory methods will be used to provide for efficient and cost-effective management of generated waste, such as application of the area of contamination policy, corrective action management units (CAMUs), and temporary units. RCRA wastes may be managed in accordance with EPA's area of contamination (AOC) policy where appropriate when consolidating wastes and/or contaminated soils within a delineated AOC. EPA Policy Memorandum dated March 13, 1996, "Use of the Areas of Contamination (AOC) Concept During RCRA Cleanups," is hereby being identified as a TBC as part of the ARARs for this project. A RCRA CAMU for storage/treatment, RCRA temporary units (tank or containers), and/or staging piles also may be employed during conduct of this removal action prior to disposal; ARARs for a CAMU for storage/treatment, temporary units, and staging piles are included in Table A.2.

A.4.7 TRANSPORTATION

Any remediation waste transferred off-site or transported in commerce along public rights-of-way must be conducted in compliance with all applicable laws and regulations. These transportation requirements include provisions for proper packaging, labeling, marking, manifesting, recordkeeping, and placarding that must be complied with fully for shipment. Before shipment of CERCLA waste to any off-site facility, DOE must ensure the acceptance of the receiving site under the CERCLA Off-site Rule (40 *CFR* § 300.440 *et seq.*).

Table A.1. Location-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities

Location Characteristic(s)	Summary of Requirements	Prerequisite	Citation
	Cultural Resources		
Presence of historical properties	Federal agencies shall take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.	Federal agency undertaking that may impact historical properties listed or eligible for inclusion on the National Register of Historic Places—**applicable**.	16 *USC* 470(f) [Section 106 of the National Historic Preservation Act]
	Federal agencies must initiate measures to assure that where, as a result of federal action, a historic property is to be substantially altered or demolished, timely steps are taken to make or have made appropriate records.		16 *USC* 470h-2(b)
	Agency shall apply the criteria of adverse effects per 36 *CFR* § 300.5(a)(1) and (2), to historic properties within the area of potential effects.	Federal agency undertaking [as defined in 36 *CFR* § 800.16(y)] that may affect historic property on or eligible for inclusion on the National Register of Historic Places—**applicable**.	36 *CFR* § 800.5(a) and (d)(2)
	Develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate the adverse effects on the property pursuant to 36 *CFR* § 800.6.	Federal agency undertaking [as defined in 36 *CFR* § 800.16(y)] that may affect historic property on or eligible for inclusion on the National Register of Historic Places—**applicable**.	36 *CFR* § 800.6(a)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities

Action	Summary of Requirements	Prerequisite	Citation
General Standards of Performance			
Activities causing fugitive dust emissions	No person shall cause, suffer, or allow any material to be handled, processed, transported, or stored; a building or its appurtenances to be constructed, altered, repaired, or demolished, or a road to be used without taking reasonable precaution to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, when applicable, but not be limited to, the following: • Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land; • Application and maintenance of asphalt, oil, water, or suitable chemicals on roads, materials stockpiles, and other surfaces which can create airborne dusts; • Covering, at all times when in motion, open bodied trucks transporting materials likely to become airborne; • The maintenance of paved roadways in a clean condition; • The prompt removal of earth or other material from a paved street which earth or other material has been transported thereto by trucking or earth moving equipment or erosion by water.	Fugitive emissions from land-disturbing activities (e.g., 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 § 3(1) and (1)(a), (b), (d), (e) and (f)
	No person shall cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate.		401 *KAR* 63:010 § 3(2)
Activities causing radionuclide emissions	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive, in any year, an EDE of 10 mrem/yr.	Radionuclide emissions at a DOE facility—**applicable**.	40 *CFR* § 61.92 401 *KAR* 57:002

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Activities causing toxic substances or potentially hazardous matter emissions	Persons responsible for a source from which hazardous matter or toxic substances may be emitted shall provide the utmost care and consideration in the handling of these materials to the potentially harmful effects of the emissions resulting from such activities. No affected facility shall emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals and plants.	Emissions of potentially hazardous matter or toxic substances as defined in 401 *KAR* 63:020 § 2 (2)—**applicable**.	401 *KAR* 63:020 § 3
Emission standards for stationary emergency engines (e.g., generators)	Must comply with the emission standards in Table 1 Subpart IIII of Part 60.	Operation of pre-200 model year emergency stationary compression ignition internal combustion engines, as defined in 40 *CFR* § 60.4219 with a displacement of less than 10 liters per cylinder that are not fire pump engines—**applicable**.	40 *CFR* § 60.4205(a)
	Must comply with the emission standards for new nonroad compression ignition engines in 40 *CFR* § 60.4202, for all pollutants, for the same model year and maximum engine power for their 2007 model year and later emergency stationary compression ignition internal combustion engines.	Operation of 2007 model year and later emergency stationary compression ignition internal combustion engines with a displacement of less than 30 liters per cylinder that are not fire pump engines—**applicable**.	40 *CFR* § 60.4205(b)
	Must meet the following (1) Reduce nitrogen oxide (NO_x) emissions by 90 percent or more, or limit the emissions of NO_x in the stationary compression ignition (CI) internal combustion engine exhaust to 1.6 grams per KW-hr (1.2 grams per HP-hr). (2) Reduce particulate matter (PM) emissions by 60 percent or more, or limit the emissions of PM in the stationary CI internal combustion engine exhaust to 0.15 g/KW-hr (0.11 g/HP-hr).	Operation of emergency stationary compression ignition internal combustion engines with a displacement of greater than or equal to 30 liters per cylinder—**applicable**.	40 *CFR* § 60.4205(d)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
General standards for process vents used in treatment of volatile organic compounds (VOCs)	Select and meet the requirements under one of the options specified below: (1) Control hazardous air pollutants (HAPs) emissions from the affected process vents according to the applicable standards specified in §§ 63.7890 through 63.7893. (2) Determine for the remediation material treated or managed by the process vented through the affected process vents that the average total volatile organic hazardous air pollutant (VOHAP) concentration, as defined in § 63.7957, of this material is less than 10 ppm. Determination of VOHAP concentration will be made using procedures specified in § 63.7943. (3) Control HAP emissions from affected process vents subject to another subpart under 40 *CFR* Part 61 or 40 *CFR* Part 63 in compliance with the standards specified in the applicable subpart.	Process vents as defined in 40 *CFR* § 63.7957 used in site remediation of media that could emit HAP listed in Table 1 of Subpart GGGGG of Part 63 and vent stream flow exceeds the rate in 40 *CFR* § 63.7885(c)(1)—**relevant and appropriate**.	40 *CFR* § 63.7885(b) 401 *KAR* 63.002 §§ 1 and 2, except for 40 *CFR* § 63.72, as incorporated in § 2(3)
Emission limitations for process vents used in treatment of VOCs	Meet the requirements under one of the options specified below: (1) Reduce from all affected process vents the total emissions of the HAP to a level less than 1.4 kilograms per hour (kg/hr) and 2.8 Mg/yr [3.0 pounds per hour (lb/hr) and 3.1 tons per year (tpy)]; or (2) Reduce from all affected process vents the emissions of total organic compounds (TOCs) (minus methane and ethane) to a level below 1.4 kg/hr and 2.8 Mg/yr (3.0 lb/hr and 3.1 tpy); or (3) Reduce for all affected process vents the total emissions of the HAP by 95 percent by weight or more; or (4) Reduce from all affected process vents the emissions of TOC (minus methane and ethane) by 95 percent by weight or more.	Process vents as defined in 40 *CFR* § 63.7957 used in site remediation of media that could emit HAPs listed in Table 1 of Subpart GGGGG of Part 63 and vent stream flow exceeds the rate in 40 *CFR* § 63.7885(c)(1)—**relevant and appropriate**.	40 *CFR* § 63.7890(B)(1)-(4) 401 *KAR* 63.002 §§ 1 and 2, except for 40 *CFR* § 63.72, as incorporated in § 2(3)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Radiation dose limits for individual members of the public	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.	Dose received from operations—**relevant and appropriate**.	10 *CFR* § 20.1301(a)(1) 902 *KAR* 100:019 § 10 (1)(a)
Activities causing storm water runoff	Implement good construction techniques to control pollutants in storm water discharges during and after construction in accordance with substantive requirements provided by permits issued pursuant to 40 *CFR* § 122.26(c).	Storm water discharges associated with small construction activities as defined in 40 *CFR* § 122.26(b)(15) and 401 *KAR* 5:002 § 1 (157)—**applicable**.	40 *CFR* § 122.26(c)(1)(ii)(C) and (D) 401 *KAR* 5:060 § 8
	Storm water runoff associated with construction activities taking place at a facility with an existing Best Management Practices (BMP) Plan shall be addressed under the facility BMP and not under a storm water general permit.	Storm water discharges associated with small construction activities as defined in 40 *CFR* § 122.26(b)(15) and 401 *KAR* 5:002 § 1 (157)—**TBC**.	Fact Sheet for the KPDES General Permit for Storm Water Discharges Associated with Construction Activities, November 2014
	Best management storm water controls will be implemented and may include, as appropriate, erosion and sedimentation control measures, structural practices (e.g., silt fences, straw bale barriers) and vegetative practices (e.g., seeding); storm water management (e.g., diversion); and maintenance of control measures in order to ensure compliance with the standards in Section C.5. Storm Water Discharge Quality.	Storm water runoff associated with construction activities taking place at a facility [PGDP] with an existing BMP Plan—**TBC**.	Appendix C of the PGDP Best Management Practices Plan (2017)—Examples of Storm water Controls

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Decontamination and Waste Removal Standards			
Release of property with residual radioactive material	Residual Radioactive Material. Property potentially containing residual radioactive material must not be cleared from DOE control unless either: (A) The property is demonstrated not to contain residual radioactive material based on process and historical knowledge, radiological monitoring or surveys, or a combination of these; or (B) The property is evaluated and appropriately monitored or surveyed to determine: 1. The types and quantities of residual radioactive material within the property; 2. The quantities of removable and total residual radioactive material on property surfaces (including residual radioactive material present on and under any coating); 3. That for property with potentially contaminated surfaces that are difficult to access for radiological monitoring or surveys, an evaluation of residual radioactive material on such surfaces is performed which is: a. Based on process and historical knowledge meeting the requirements of paragraph 4.k.(5) of this Order and monitoring and or surveys, to the extent feasible and b. Sufficient to demonstrate that applicable specific or pre-approved DOE Authorized Limits will not be exceeded; and 4. That any residual radioactive material within or on the property is in compliance with applicable specific or pre-approved DOE Authorized Limits. Note: DOE has the sole discretion for evaluating compliance with its own Orders.	Generation of DOE materials and equipment with residual radioactive contamination—**TBC**.	DOE O 458.1 § 4.k(3)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Decontamination of PCB nonporous surface	For unrestricted use, meet standard of • 10 µg/100 cm^2 as measured by a standard wipe test (40 *CFR* § 761.123) at locations selected in accordance with 40 *CFR* § 761, Subpart P, and	Nonporous surfaces previously in contact with liquid PCBs, where no free-flowing liquids are present—**applicable**.	40 *CFR* § 761.79(b)(3)(i)(A)
	• Clean to Visual Standard No. 2 of NACE. Verify compliance by visually inspecting all cleaned areas.	Nonporous surfaces in contact with non-liquid PCBs—**applicable**.	40 *CFR* § 761.79(b)(3)(i)(B)
	For disposal in a smelter operating in accordance with 40 *CFR* § 761.72(b), meet standard of • < 100 µg/100 cm^2 as measured by a standard wipe test (40 *CFR* § 761.123) at locations selected in accordance with 40 *CFR* § 761, Subpart P and	Nonporous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are present—**applicable**.	40 *CFR* § 761.79(b)(3)(ii)(A)
	• Clean to Visual Standard No. 3 of NACE. Verify compliance by visually inspecting all cleaned areas.	Nonporous surfaces in contact with non-liquid PCBs, including nonporous surfaces covered with a porous surface (e.g., paint or coating on metal)—**applicable**.	40 *CFR* § 761.79(b)(3)(ii)(B)
Decontamination of movable equipment contaminated by PCBs	May decontaminate by • Swabbing surfaces that have contacted PCBs with a solvent; • A double wash/rinse as defined in 40 *CFR* § 761.360-378; or • Another applicable decontamination procedure under 40 *CFR* § 761.79.	Movable equipment contaminated by PCBs, tools, and sampling equipment—**applicable**.	40 *CFR* § 761.79(c)(2)
Decontamination of metal surfaces in contact with PCBs	For surfaces in contact with liquid or non-liquid PCBs < 500 ppm, may be decontaminated in an industrial furnace for purposes of disposal in accordance with 40 *CFR* § 761.72.	Use of thermal processes to decontaminate metal surfaces, as required by 40 *CFR* § 761.61 (a)(6)—**applicable**.	40 *CFR* § 761.79 (c)(6)(i)
	For surfaces in contact with liquid or non-liquid PCBs ≥ 500 ppm, may be smelted in an industrial furnace operating in accordance with 40 *CFR* § 761.72(b), but must first be decontaminated in accordance with 40 *CFR* § 761.72(a) or to a surface concentration of < 100 µg/100 cm^2.		40 *CFR* § 761.79 (c)(6)(ii)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Decontamination of PCB-contaminated concrete	If commenced within 72 hours of initial spill, ≤ 10 µg/100 cm^2 as measured by the standard wipe test (40 *CFR* § 761.123).	Spill of liquid PCBs—**applicable**.	40 *CFR* § 761.79 (b)(4)
Decontamination of PCB-contaminated water	For discharge to a treatment works as defined in 40 *CFR* § 503.9 (aa), or discharge to navigable waters, meet standard of < 3 ppb PCBs; or	Water containing PCBs regulated for disposal—**applicable**.	40 *CFR* § 761.79 (b)(1)(ii)
	For unrestricted use, meet standard of 0.5 ppb PCBs.		40 *CFR* § 761.79(b)(1)(iii)
Decontamination of PCB-contaminated liquids	Meet standard of < 2 ppm PCBs.	Organic liquids and nonaqueous inorganic liquids containing PCBs—**applicable**.	40 *CFR* § 761.79(b)(2)
Decontamination of PCB-containers	Must flush the internal surfaces of the container three times with a solvent containing < 50 ppm PCBs. Each rinse shall use a volume of the flushing solvent equal to approximately 10% of the PCB container capacity.	PCB container as defined in 40 *CFR* § 761.3—**applicable**.	40 *CFR* § 761.79(c)(1)
Cleanup of porous surfaces with PCBs (self-implementing option)	May be cleaned up for use in accordance with 40 *CFR* § 761.79(b)(4) or § 761.30(p).	PCB remediation waste porous surfaces (as defined in 40 *CFR* § 761.3) on which PCBs have been spilled—**applicable**.	40 *CFR* § 761.61(a)(4)(iii)
Cleanup verification for self-implementing option(s)	Must collect and analyze the wastes in accordance with 40 *CFR* §§ 761.280-298 (Subpart O).	Collection and analysis of samples to verify cleanup and on-site disposal of bulk PCB remediation wastes and porous surfaces—**applicable**.	40 *CFR* § 761.61(a)(6)(i)
	Must collect and analyze the waste in accordance with 40 *CFR* §§ 761.300-316 (Subpart P).	Collection and analysis of samples from PCB remediation waste non-porous surfaces—**applicable**.	
	Must collect and analyze the waste in accordance with 40 *CFR* § 761.269.	Collection and analysis of samples from liquid PCB remediation waste—**applicable**.	
	May use PCB field screening tests to determine when to sample to verify that cleanup is complete.	Interim sampling during PCB remediation waste cleanup—**applicable**.	

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Cleanup verification for self-implementing option(s) (Continued)	Self-implementing cleanup of PCB remediation waste is complete.	Sample analysis results in measurement of PCBs less than or equal to levels specified in 40 *CFR* § 761.61(a)—**applicable**.	40 *CFR* § 761.61(a)(6)(ii)(A)
	Cleanup is not complete and must either dispose of the sampled PCB remediation waste, or reclean the waste represented by the sample and reinitiate sampling and analysis in accordance with 40 *CFR* § 761.61(a)(6)(i).	Sample analysis results in measurement of PCBs greater than or equal to levels specified in 40 *CFR* § 761.61(a)—**applicable**.	40 *CFR* § 761.61(a)(6)(ii)(B)
Removal of RACM from a facility	Must thoroughly inspect the affected facility or part of the facility where the demolition will occur for the presence of asbestos, including Category I and Category II nonfriable ACM.	Demolition of a facility containing RACM—**applicable**.	40 *CFR* § 61.145(a) 401 *KAR* 58:025
	Procedures for asbestos emission control per 40 *CFR* § 61.145(c)(1) through (10) shall be followed, as appropriate.	Demolition of a facility containing RACM exceeding the volume requirements of 40 *CFR* § 61.145(a)(1)—**applicable**.	40 *CFR* § 61.145(c) 401 *KAR* 58:025
Removal of friable asbestos prior to demolition	Any demolition of a structure or portion of a structure which contains facility components composed of or covered by friable asbestos material shall be preceded by a removal of all such materials prior to demolition, according to the relevant requirements of 401 *KAR* 58:040 § 4 (1) as provided below.	Demolition of a facility which may cause a disturbance of friable asbestos material and the demolition exceed the thresholds in 40 *CFR* § 61.145(a)(1)—**relevant and appropriate**.	401 *KAR* 58:040 § 4(2)(a)
	In lieu of the requirements specified in 401 *KAR* 58:040 § 4 (1)(a), (b), (c), (e), and (l), shall comply with the following requirements:		401 *KAR* 58:040 § 4(2)(b)
	Before beginning a demolition project, all doors, windows, floor drains, vents, and other openings to the outside of the building and to areas within the building that do not contain asbestos materials, shall be sealed off with polyethylene sheeting and waterproof tape.		401 *KAR* 58:040 § 4(2)(b)(1)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Removal of friable asbestos prior to demolition (Continued)	Prior to demolition, clearance air monitoring shall be performed as provided below in 401 *KAR* 58:040 § 4 (1)(s). At least five (5) samples of air per work area, or one (1) sample per room, whichever is greater, shall be obtained for the clearance air monitoring. A sample volume of 3,000 liters of air shall be used. The air samples shall be obtained when the air is being artificially circulated so that the fibers remain airborne during the sampling. Barriers shall not be dismantled, and openings shall not be uncovered, until the final samples show total fiber concentrations of less than or equal to 0.01 fibers per cubic centimeter of air. The method for determining compliance with the provisions of this paragraph shall be either of the methods specified in Appendix M to "Guidance for Controlling Asbestos-Containing Materials in Buildings" (U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances, EPA 560/5-85-024, June 1985). Appendix M, "Detailed Specifications for Sampling and Analyzing Airborne Asbestos," is hereby adopted and filed herein by reference.		401 *KAR* 58:040 § 4(2)(c)
	The following requirements of 401 *KAR* 58:040 § 4 (1), unless specifically deleted in 401 *KAR* 58:040 § 4 (2)(b), shall apply to the demolition abatement activities.		401 *KAR* 58:040 § 4(2)(d)
	Negative pressure ventilation units with HEPA filtration and in sufficient number to provide one (1) workplace air change every fifteen (15) minutes shall be operated continuously for the duration of the project. The duration of the project for this requirement shall be considered to be from the time that a containment area is established and wall and floor sheeting are installed through the time that acceptable final clearance air monitoring results are obtained.		401 *KAR* 58:040 § 4(1)(g)
	All friable asbestos material shall be thoroughly wetted through to the substrate prior to removal.		401 *KAR* 58:040 § 4(1)(h)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Removal of friable asbestos prior to demolition (Continued)	Facility components shall be removed intact or in large sections whenever possible and shall be carefully lowered to the floor. Other friable asbestos material shall be removed in small sections.		401 *KAR* 58:040 § 4(1)(i)
	Materials located at heights greater than fifteen (15) feet but less than or equal to fifty (50) feet above the floor shall be dropped into inclined chutes or onto scaffolding or containerized at their elevated levels for eventual disposal. For materials located at heights greater than fifty (50) feet above the floor, a dust-tight enclosed chute shall be constructed to transport removed material to containers on the floor.		401 *KAR* 58:040 § 4(1)(j)
	At no time shall the friable asbestos material that has been removed be allowed to accumulate or become dry.		401 *KAR* 58:040 § 4(1)(k)
	Following abatement, wall sheeting and floor sheeting shall be removed and containerized for disposal. A sequence of HEPA filtration vacuuming, wet wiping all exposed surfaces, and surface drying shall be performed until no visible residue is observed in the work area. A minimum of twenty-four (24) hours after wet wiping shall be required to ensure that sufficient drying has occurred.		401 *KAR* 58:040 § 4(1)(m)
	All asbestos-containing waste, except for large facility components, shall be thoroughly wetted before being placed into containers for disposal. Large components shall be thoroughly wetted before being wrapped in polyethylene sheeting for disposal.		401 *KAR* 58:040 § 4(1)(n)
	Wet asbestos-containing waste shall be double bagged in polyethylene bags placed in sealed, rigid containers (for example: steel drums, fiber drums, or heavy cardboard boxes) for transport to a landfill. Large facility components may be wrapped in two (2) layers of polyethylene sheeting which are secured with waterproof tape for disposal.		401 *KAR* 58:040 § 4(1)(o)
	All polyethylene sheeting that is used in an asbestos abatement project shall be treated as asbestos-containing waste.		401 *KAR* 58:040 § 4(1)(p)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Removal of friable asbestos prior to demolition (Continued)	All wrapping or containerizing of asbestos-containing waste shall be done in such a manner so as to prevent the outside of the wrapping or container from being contaminated with asbestos fibers.		401 *KAR* 58:040 § 4(1)(q)
	All packaged wastes (boxes, drums, and wrapped components) shall be labeled according to the provisions of 40 *CFR* § 61.152, filed by reference in 401 *KAR* 58:025.		401 *KAR* 58:040 § 4(1)(r)
	Transport and disposal of asbestos-containing waste shall occur in a manner that will not permit the release of asbestos fibers into the outside air.		401 *KAR* 58:040 § 4(1)(t)
	In lieu of the work practice requirements of 401 *KAR* 58:040 § 4 (1)(a) to (e), (g), (i), (m), (n), (p), and (s); and (2)(b) and (c); and (3)(a) and (c), the glove bag technique or other alternative work practice requirements may be used for an asbestos abatement project where the requirements prescribed in this section is not practical or not feasible and that the proposed alternative to the requirements provides an equivalent control of asbestos and is not in conflict with any applicable local, state, or federal law.		401 *KAR* 58:040 § 4(4)
Waste Management			
Management of asbestos-containing waste prior to disposal	Discharge no visible emissions to the outside air, or use one of the emission control and waste treatment methods specified in 40 *CFR* § 61.150(a)(1) through (a)(4).	Collection, processing, packaging, or transporting of any asbestos- containing waste material generated by demolition activities—**applicable**.	40 *CFR* § 61.150(a)
Management of PCB waste	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* § 761, Subpart D.	Storage or disposal of waste containing PCBs at concentrations ≥ 50 ppm—**applicable**.	40 *CFR* § 761.50(a)
	Must dispose of in accordance with 40 *CFR* § 761.60(a) or decontaminate in accordance with 40 *CFR* § 761.79.	Removal of PCB liquids from use (i.e., not PCB remediation waste)—**applicable**.	40 *CFR* § 761.50(b)(1)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Management of PCB remediation waste	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Cleanup and disposal of PCB remediation waste as defined in 40 *CFR* § 761.3—**applicable**.	40 *CFR* § 761.61
Management of PCB Items	Must dispose of in accordance with 40 *CFR* § 761.60(b) or decontaminate in accordance with 40 *CFR* § 761.79.	Removal from use of a PCB Item containing intact, non-leaking PCB Article—**applicable**.	40 *CFR* § 761.50(b)(2)
	Must dispose of as bulk product waste in accordance with 40 *CFR* § 761.62(a) or (c).	Removal from use of a PCB Item where PCB Article is no longer intact and non-leaking—**applicable**.	40 *CFR* § 761.50(b)(2)
Management of PCB/radioactive waste	Any person storing such waste 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 ≥ 50 ppm PCBs—**applicable**.	40 *CFR* § 761.50(b)(7)(i)
	Any person disposing of such waste must do so taking into account A-24 redlineboth its PCB concentration and its radioactive properties. If, taking into account only the properties of the PCBs in the waste (and not the radioactive properties of the waste), the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a state as a municipal or nonmunicipal nonhazardous waste landfill [e.g., PCB bulk-product waste under 40 *CFR* § 761.62(b)(1)], then the person may dispose of PCB/radioactive waste, without regard to the PCBs, based on its radioactive properties in accordance with applicable requirements for the radioactive component of the waste.	Generation of PCB/Radioactive waste ≥ 50 ppm PCBs—**applicable**.	40 *CFR* § 761.50(b)(7)(ii)
Waste Characterization			
Characterization of solid waste	Must determine if solid waste is excluded from regulation under 40 *CFR* § 261.4.	Generation of solid waste as defined in 40 *CFR* § 261.2—**applicable**.	40 *CFR* § 262.11(a) 401 *KAR* 32:010 § 2
	Must determine if waste is listed as a hazardous waste in subpart D of 40 *CFR* Part 261.	Generation of solid waste which is not excluded under 40 *CFR* § 261.4—**applicable**.	40 *CFR* § 262.11(b) 401 *KAR* 32:010 § 2

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Characterization of solid waste (Continued)	Must determine whether the waste is characteristic waste (identified in subpart C of 40 *CFR* Part 261) by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.	Generation of solid waste that is not listed in subpart D of 40 *CFR* Part 261 and not excluded under 40 *CFR* § 261.4—**applicable**.	40 *CFR* § 262.11(c) 401 *KAR* 32:010 § 2
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous waste—**applicable**.	40 *CFR* § 262.11(d) 401 *KAR* 32:010 § 2
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 *CFR* Parts 264 and 268.	Generation of RCRA-hazardous waste for storage, treatment or disposal—**applicable**.	40 *CFR* § 264.13(a)(1) 401 *KAR* 34:020 § 4
Characterization of industrial wastewater	Industrial wastewater discharges that are point source discharges subject to regulation under section 402 of the Clean Water Act, as amended, are not solid wastes for the purpose of hazardous waste management. [Comment: This exclusion applies only to the actual point source discharge. It does not exclude industrial wastewaters while they are being collected, stored or treated before discharge, nor does it exclude sludges that are generated by industrial wastewater treatment.] Note: For purpose of this exclusion, the CERCLA on-site treatment system for groundwater will be considered equivalent to a wastewater treatment unit and the point source discharges subject to regulation under CWA § 402, provided the effluent meets all identified CWA ARARs.	Generation of industrial wastewater for treatment and discharge into surface water—**applicable**.	40 *CFR* § 261.4(a)(2) 401 *KAR* 31:010 § 4
Determinations for land disposal of hazardous waste	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* § 268.40 *et. seq*. Note: This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11	Generation of hazardous waste—**applicable**.	40 *CFR* § 268.9(a) 401 *KAR* 37:010 § 8

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Determinations for land disposal of hazardous waste (Continued)	Must determine the underlying hazardous constituents [as defined in 40 *CFR* § 268.2(i)] in the characteristic waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment or disposal—**applicable**.	40 *CFR* § 268.9(a) 401 *KAR* 37:010 §8
	Must determine if the hazardous waste meets the treatment standards in 40 *CFR* §§ 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste. Note: This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11	Generation of hazardous waste—**applicable**.	40 *CFR* § 268.7(a) 401 *KAR* 37:020 § 7
Characterization of LLW	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)
	Characterization data shall, at a minimum, include the following information relevant to the management of the waste:		DOE M 435.1-1(IV)(I)(2)
	• 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 concentration of major radionuclides;		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)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Characterization of LLW (Continued)	• any other information that may be needed to prepare and maintain the disposal facility performance assessment, or demonstrate compliance with performance objectives. Note: DOE has the sole discretion for evaluating compliance with its own Orders.		DOE M 435.1-1(IV)(I)(2)(g)
Waste Storage and Staging			
Designation of Area of Contamination	EPA guidance provides regulatory flexibility under RCRA for management of hazardous waste, environmental media, or debris generated and managed within the designated AOC. Management activities within the AOC such as movement/consolidation and *in situ* treatment are not considered placement under RCRA and, as such, do not trigger land disposal requirements or minimum technology requirements.	Management of hazardous waste—**TBC**.	EPA Policy Memorandum dated March 13, 1996: Use of the Areas of Contamination (AOC) Concept During RCRA Cleanups
Temporary on-site storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that	Accumulation of RCRA hazardous waste on-site as defined in 40 *CFR* § 260.10—**applicable**.	40 *CFR* § 262.34(a) 401 *KAR* 32:030 § 5
	• waste is placed in containers that comply with 40 *CFR* § 265.171-173;		40 *CFR* § 262.34(a)(1)(i) 401 *KAR* 32:030 § 5
	• the date upon which accumulation begins is clearly marked and visible for inspection on each container;		40 *CFR* § 262.34(a)(2) 401 *KAR* 32:030 § 5
	• container is marked with the words "hazardous waste."		40 *CFR* § 262.34(a)(3) 401 *KAR* 32:030 § 5
	• container may be marked with other words that identify the contents.	Accumulation of 55 gal or less of RCRA hazardous waste or one quart of acutely hazardous waste listed in 40 *CFR* § 261.33(e) at or near any point of generation—**applicable**.	40 *CFR* § 262.34(c)(1) 401 *KAR* 32:030 § 5
Use and management of containers holding hazardous waste	If container is not in good condition or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers—**applicable**.	40 *CFR* § 265.171 401 *KAR* 35:180 § 2

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Use and management of containers holding hazardous waste (Continued)	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* § 265.172 401 *KAR* 35:180 § 3
	Keep containers closed during storage, except to add/remove waste.		40 *CFR* § 265.173(a) 401 *KAR* 35:180 § 4
	Open, handle, and store containers in a manner that will not cause containers to rupture or leak.		40 *CFR* § 265.173(b) 401 *KAR* 35:180 § 4
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 *CFR* § 264.175(b).	Storage of RCRA hazardous waste in containers with free liquids—**applicable**.	40 *CFR* § 264.175(a)
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or Containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA-hazardous waste in containers that do not contain free liquids (other than F020, F021, F022, F023, F026, and F027)—**applicable**.	40 *CFR* § 264.175(c)
Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area	Does not have to meet storage unit requirements in 40 *CFR* § 761.65(b)(1) provided unit.	Storage of PCBs and PCB Items at concentrations ≥ 50ppm designated for disposal—**applicable**.	40 *CFR* § 761.65(b)(2)
	• is permitted by EPA under RCRA § 3004 to manage hazardous waste in containers and spills of PCBs cleaned up in accordance with Subpart G of 40 *CFR* § 761; or		40 *CFR* § 761.65(b)(2)(i)
	• qualifies for interim status under RCRA § 3005 to manage hazardous waste in containers and spills of PCBs cleaned up in accordance with Subpart G of 40 *CFR* § 761; or		40 *CFR* § 761.65(b)(2)(ii)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Storage of PCB waste and/or PCB/radioactive waste in a RCRA-regulated container storage area (Continued)	• is permitted by an authorized state under RCRA § 3006 to manage hazardous waste in containers and spills of PCBs cleaned up in accordance with Subpart G of 40 *CFR* § 761. *NOTE:* For purpose of this exclusion, CERCLA remediation waste, which is also considered PCB waste, can be stored on-site provided the area meets all of the identified RCRA container storage ARARs and spills of PCBs cleaned up in accordance with Subpart G of 40 *CFR* § 761.		40 *CFR* § 761.65(b)(2)(iii)
Storage of PCB waste and/or PCB/radioactive waste in non-RCRA regulated unit	Except as provided in 40 *CFR* § 761.65 (b)(2), (c)(1), (c)(7), (c)(9), and (c)(10), after July 1, 1978, owners or operators of any facilities used for the storage of PCBs and PCB Items designated for disposal shall comply with the storage unit requirements in 40 *CFR* § 761.65(b)(1).	Storage of PCBs and PCB Items at concentrations ≥ 50ppm designated for disposal—**applicable**.	40 *CFR* § 761.65(b)
	Storage facility shall meet the following criteria: • Adequate roof and walls to prevent rainwater from reaching stored PCBs and PCB items;		40 *CFR* § 761.65(b)(1) 40 *CFR* § 761.65(b)(1)(i)
	• Adequate floor that has continuous curbing with a minimum 6-inch high curb. Floor and curb must provide a containment volume equal to at least two times the internal volume of the largest PCB article or container or 25% of the internal volume of all articles or containers stored there, whichever is greater. Note: 6 inch minimum curbing not required for area storing PCB/radioactive waste;		40 *CFR* § 761.65(b)(1)(ii)
	• No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from curbed area;		40 *CFR* § 761.65(b)(1)(iii)
	• Floors and curbing constructed of Portland cement, concrete, or a continuous, smooth, non-porous surface that prevents or minimizes penetration of PCBs; and		40 *CFR* § 761.65(b)(1)(iv)
	• Not located at a site that is below the 100-year flood water elevation.		40 *CFR* § 761.65(b)(1)(v)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Storage of PCB waste and/or PCB/radioactive waste in non-RCRA regulated unit (Continued)	Storage area must be properly marked as required by 40 *CFR* § 761.40(a)(10).		40 *CFR* § 761.65(c)(3)
Risk-based storage of PCB remediation waste	May sample, cleanup, or dispose of PCB remediation waste in a manner other than prescribed in paragraphs (a) or (b) of this section, or store PCB remediation waste in a manner other than prescribed in 40 CFR § 761.65(b) if approved in writing from EPA provided the method will not pose an unreasonable risk of injury to human health or the environment. Note: EPA approval of alternative storage method will be obtained by approval of the FFA CERCLA document.	Storage of waste containing PCBs in a manner other than prescribed in 40 *CFR* § 761.65(b) (see above)—**applicable**.	40 *CFR* § 761.61(c)
Temporary storage of PCB waste (e.g., PPE, rags) in container(s)	Container(s) shall be marked as illustrated in 40 *CFR* § 761.45(a).	Storage of PCBs and PCB Items at concentrations ≥ 50 ppm in containers for disposal—**applicable**.	40 *CFR* § 761.40(a)(1)
	Storage area must be properly marked as required by 40 *CFR* § 761.40(a)(10).		40 *CFR* § 761.65(c)(3)
	Any leaking PCB Items and their contents shall be transferred immediately to a properly marked nonleaking container(s).		40 *CFR* § 761.65(c)(5)
	Container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* §§ 171-180.		40 *CFR* § 761.65(c)(6)
Storage of PCB/radioactive waste in containers	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).		40 *CFR* § 761.65(c)(6)(i)(B)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Storage of PCB/radioactive waste in containers (Continued)	For both liquid and nonliquid wastes, containers must meet all substantive requirements pertaining to nuclear criticality safety. Acceptable container materials include polyethylene and stainless steel provided that the container material is chemically compatible with the waste being stored. Other containers may be used if the use of such containers is protective of health and the environment as well as public health and safety.		40 *CFR* § 761.65(c)(6)(i)(C)
Temporary storage of bulk PCB remediation waste or PCB bulk product waste in a waste pile	May be stored at the clean-up site or site of generation subject to the following conditions: • waste must be placed in a pile designed and operated to control dispersal by wind, where necessary, by means other than wetting; • waste must not generate leachate through decomposition or other reactions. Note: storage time frame may be extended through approval of FFA CERCLA document utilizing the 40 *CFR* § 761.61(c) provision as provided below.	Storage of PCB remediation waste or PCB bulk product waste in a waste pile—**applicable**.	40 *CFR* § 761.65(c)(9) 40 *CFR* § 761.65(c)(9)
	Storage site must have a liner designed, constructed, and installed to prevent any migration of wastes off or through liner into adjacent subsurface soil, groundwater or surface water at any time during the active life (including closure period) of the storage site.		40 *CFR* § 761.65(c)(9)(iii)(A)
	Liner must be: • constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure because of pressure gradients, physical contact with waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;		40 *CFR* § 761.65(c)(9)(iii)(A)(*1*)
	• placed on foundation or base capable of providing support to liner and resistance to pressure gradients above and below the liner to present failure because of settlement compression or uplift;		40 *CFR* § 761.65(c)(9)(iii)(A)(*2*)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Temporary storage of bulk PCB remediation waste or PCB bulk product waste in a waste pile (Continued)	• installed to cover all surrounding earth likely to be in contact with waste.		40 *CFR* § 761.65(c)(9)(iii)(A)(*3*)
	Has a cover that meets the above requirements and installed to cover all of the stored waste likely to be contacted by precipitation, and is secured so as not to be functionally disabled by winds expected under normal weather conditions at the storage site; and	Storage of PCB remediation waste or PCB bulk product waste in a waste pile—**applicable**.	40 *CFR* § 761.65(c)(9)(iii)(B)
	Has a run-on control system designed, constructed, operated and maintained such that:		40 *CFR* § 761.65(c)(9)(iii)(C)
	• It prevents flow on the stored waste during peak discharge from at least a 25-year storm;		40 *CFR* § 761.65(c)(9)(iii)(C)(*1*)
	• It collects and controls at least the water volume resulting from a 24-hour, 25-year storm. Collection and holding facilities (e.g., tanks or basins) must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.		40 *CFR* § 761.65(c)(9)(iii)(C)(*2*)
	Requirements of 40 *CFR* § 761.65(c)(9) may be modified under the risk-based disposal option of 40 *CFR* § 761.61(c).		40 *CFR* § 761.65(c)(9)(iv)
Staging of LLW	Staging of low-level waste shall be for the purpose of the accumulation of such quantities of waste as necessary to facilitate transportation, treatment, and disposal. Note: DOE has the sole discretion for evaluating compliance with its own Orders.	Management of LLW—**TBC**.	DOE M 435.1-1 (IV)(N)(7)
Temporary storage of LLW	Shall not be readily capable of detonation, explosive decomposition, reaction at anticipated pressures and temperatures, or explosive reaction with water.	Management of LLW at a DOE facility—**TBC**.	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 A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Temporary storage of LLW (Continued)	Shall be managed to identify and segregate LLW from mixed waste. Note: DOE has the sole discretion for evaluating compliance with its own Orders.		DOE M 435.1-1(IV)(N)(6)
Packaging of LLW for storage	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 DOE 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 be marked such that their contents can be identified. Note: DOE has the sole discretion for evaluating compliance with its own Orders.		DOE M 435.1-1 (IV)(L)(1)(c)
Packaging of LLW for off-site disposal	Waste shall not be packaged for disposal in a cardboard or fiberboard box.	Packaging of LLW for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56 902 *KAR* 100:021 § 7 (1)(b)
	Liquid waste shall be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.	Preparation of liquid LLW for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56 902 *KAR* 100:021 § 7 (1)(c)
	Solid waste containing liquid shall contain as little freestanding and noncorrosive liquid as is reasonably achievable. The liquid shall not exceed one (1) percent of the volume.	Preparation of solid LLW containing liquid for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56 902 *KAR* 100:021 § 7 (1)(d)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Packaging of LLW for off-site disposal (Continued)	Waste shall not be readily capable of • Detonation; • Explosive decomposition or reaction at normal pressures and temperatures; or • Explosive reaction with water.	Packaging of LLW for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56 902 *KAR* 100:021 § 7 (1)(e)
	Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to a person transporting, handling, or disposing of the waste.	Packaging of LLW for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56 902 *KAR* 100:021 § 7 (1)(f)
	Waste shall not be pyrophoric.	Packaging of pyrophoric LLW for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56 902 *KAR* 100:021 § 7 (1)(g)
	Notwithstanding the provisions in 10 *CFR* § 61.56(a) (2) and (3), liquid wastes, or wastes containing liquid, must be converted into a form that contains as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5 percent of the volume of the waste for waste processed to a stable form.	Preparation of LLW for offsite disposal of the waste container at a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56(b)(2)
Packaging of LLW for off-site disposal	Void spaces within the waste and between the waste and its package shall be reduced to the extent practical.	Preparation of LLW for offsite disposal of the waste container at a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.56(b)(3)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
	Waste Treatment/Disposal		
Transportation or conveyance of collected RCRA wastewater to a WWTU located on the facility	Any dedicated tank systems, conveyance systems, and ancillary equipment used to treat, store or convey wastewater to an on-site KPDES-permitted wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards. Note: For purposes of this exclusion, any dedicated tank systems, conveyance systems, and ancillary equipment used to treat, store or convey CERCLA remediation wastewater to a CERCLA on-site wastewater treatment unit that meets all of the identified CWA ARARs for point source discharges from such a facility, are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment unit (as defined in 40 *CFR* § 260.10) subject to regulation under § 402 or § 307(b) of the CWA (i.e., KPDES-permitted) that manages hazardous wastewaters—**applicable**.	40 *CFR* § 264.1(g)(6) 401 *KAR* 34:010 § 1
Disposal of RCRA hazardous waste in a land-based unit	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 *CFR* § 268.40 before land disposal.	Land disposal, as defined in 40 *CFR* § 268.2, of restricted RCRA waste—**applicable**.	40 *CFR* § 268.40(a)
	All underlying hazardous constituents [as defined in 40 *CFR* § 268.2(i)] must meet the Universal Treatment Standards, found in 40 *CFR* § 268.48 Table UTS prior to land disposal.	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment system that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well—**applicable**.	40 *CFR* § 268.40(e)
Disposal of RCRA hazardous waste debris in a land-based unit (i.e., landfill)	Must be treated prior to land disposal as provided in 40 *CFR* § 268.45(a)(1)-(5) unless EPA determines under 40 *CFR* § 261.3(f)(2) that the debris no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard provided in 40 *CFR* § 268.40 for the waste contaminating the debris.	Land disposal, as defined in 40 *CFR* § 268.2, of restricted RCRA-hazardous debris—**applicable**.	40 *CFR* § 268.45(a)
Disposal of treated hazardous debris	Debris treated by one of the specified extraction or destruction technologies on Table 1 of 40 *CFR* § 268.45 and which no longer exhibits a characteristic is not a hazardous waste and need not be managed in RCRA Subtitle C facility. Hazardous debris contaminated with listed waste that is treated by immobilization technology must be managed in a RCRA Subtitle C facility.	Treated debris contaminated with RCRA-listed or characteristic waste—**applicable**.	40 *CFR* § 268.45(c)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Disposal of hazardous debris treatment residues	Except as provided in 268.45(d)(2) and (d)(4), must be separated from debris by simple physical or mechanical means, and such residues are subject to the waste-specific treatment standards for the waste contaminating the debris.	Residue from treatment of hazardous debris—**applicable**.	40 *CFR* § 268.45(d)(1)
Disposal of RCRA characteristic wastewaters in an NPDES-permitted wastewater treatment unit	Are not prohibited, if the wastes are managed in a treatment system which subsequently discharges to waters of the U.S. pursuant to a permit issued under 402 the CWA (i.e., NPDES permitted) unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* § 268.40, or are D003 reactive cyanide.	Land disposal of RCRA restricted hazardous wastewaters that are hazardous only because they exhibit a hazardous characteristic and are not otherwise prohibited under 40 *CFR* Part 268—**applicable**.	40 *CFR* § 268.1(c)(4)(i) 401 *KAR* 37:010 § 2
On-site Disposal Investigation of PCB-contaminated Wastes	Provides that all identified sites historically used for disposal of PCB-contaminated wastes are being or will be sampled and analyzed to determine the extent of contamination within the context of separate present or pending permits, Agreement(s) or Orders between DOE and EPA. These requirements in the permits, Agreement(s) or Orders will satisfy EPA's historical Spill Cleanup Policy. Note: Investigation activities conducted under the Paducah Federal Facility Agreement serve as the Agreement for investigation of such areas at the Paducah Site.	Unauthorized Disposal of PCB-contaminated wastes—TBC.	TSCA Compliance Agreement, as Modified May 30, 2017, between the EPA and DOE, Attachment l, 1.(B)
Cleanup of Spills of PCBs and PCB-contaminated oil leaks	• Historic spills may be left in place until demolition of the facility, provided public access to the facility is restricted to prevent unauthorized entry. • In the event that a new spill should occur on a historical spill site, and the appropriate standard specified in Section 2(c) of Attachment l of the TSCA CA cannot be met after best efforts to meet the standard are made, DOE may request that EPA consider the efforts DOE has made and classify the spill area as a historical spill for the purposes of the cleanup under this Agreement. Note: Any requests/approvals associated with this provision will be conducted as part of CERCLA documentation submitted under the FFA.	PCBs and PCB-contaminated oil leak onto the building floors—TBC.	TSCA Compliance Agreement, as Modified May 30, 2017, between the EPA and DOE, Attachment l, 2.(C)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Management of PCB-contaminated Slabs	• Provides for leaving PCB-contaminated in place longer than the work completion date (e.g., ten years after work initiation date for each building). • Provides for PCB-contaminated slabs for each building to be maintained according to the requirements of 40 *CFR* § 761.30, except that historical spills as defined in Section 2(C) shall be maintained in accordance with Section 2(C).	PCB-Contaminated slabs are present—TBC.	TSCA Compliance Agreement, as Modified May 30, 2017, between the EPA and DOE, Attachment l, 2.(E-2)
Discharge of Water Containing PCBs	• Provides for any discharge of water containing PCBs in accordance with 40 *CFR* § 761.50(a)(3). • Following any release of PCBs from PCB-contaminated slabs, appropriate measures shall be taken to prevent further discharge of PCB waste.	Generation and Discharge of water containing PCBs—TBC.	TSCA Compliance Agreement, as Modified May 30, 2017, between the EPA and DOE, Attachment l, 2.(E-2)
Disposal of PCB-contaminated nonporous surfaces on-site	Shall be cleaned on-site or off-site to levels in 40 *CFR* § 761.61(a)(4)(ii) using • Decontamination procedures under 40 *CFR* § 761.79, • Technologies approved under 40 *CFR* § 761.60(e), or • Risk-based procedures/technologies under 40 *CFR* § 761.61(c).	PCB remediation waste porous surfaces as defined in 40 *CFR* § 761.3—**applicable**.	40 *CFR* § 761.61(a)(5)(ii)(A)
Disposal of PCB-contaminated porous surfaces	Shall be disposed on-site or off-site as bulk PCB-remediation waste according to 40 *CFR* § 761.61(a)(5)(i) or decontaminated for use according to 40 *CFR* § 761.79(b)(4).		40 *CFR* § 761.61(a)(5)(iii)
Disposal of PCB-contaminated nonporous surfaces off-site	Shall be disposed of in accordance with 40 *CFR* § 761.61(a)(5)(i)(B)(3)(ii) [sic] 40 *CFR* § 761.61(a)(5)(i)(B)(2)(ii). Metal surfaces may be thermally decontaminated in accordance with 40 *CFR* § 761.79(c)(6)(i).	PCB remediation waste nonporous surfaces as defined in 40 *CFR* § 761.3 having surface concentrations < 100 µg/100 cm^2—**applicable**.	40 *CFR* § 761.61(a)(5)(ii)(B)(1)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Disposal of PCB-contaminated nonporous surfaces off-site (Continued)	Shall be disposed of in accordance with 40 *CFR* § 761.61(a)(5)(i)(B)(3)(iii) [sic] [40 *CFR* § 761.61(a)(5)(i)(B)(2)(iii)].	PCB remediation waste nonporous surfaces having surface concentrations ≥ 100 µg/100 cm^2—**applicable**.	40 *CFR* § 761.61 (a)(5)(ii)(B)(2)
	Metal surfaces may be thermally decontaminated in accordance with 40 *CFR* § 761.79(c)(6)(ii).		40 *CFR* § 761.61 (a)(5)(ii)(B)(2)
Disposal of PCB cleanup wastes (e.g., PPE, rags, non-liquid cleaning materials) (self-implementing option)	Shall be either decontaminated in accordance with 40 *CFR* § 761.79((b) or (c), or disposed of in one of the following facilities: • a facility permitted, licensed or registered by a State to manage municipal solid waste under 40 *CFR* § 258; • a facility permitted, licensed, or registered by a State to manage non-municipal non-hazardous waste subject to 40 *CFR* §§ 257.5 thru 257.30, as applicable; or • a hazardous waste landfill RCRA permitted by EPA under Section 3004 of RCRA, or a State authorized under Section 3006 of RCRA; or • in a PCB disposal facility approved under 40 *CFR* § 761; or	Generation of non-liquid cleaning materials at any PCB concentration resulting from the cleanup of PCB remediation waste—**applicable**.	40 *CFR* § 761.61(a)(5)(v)(A)
Reuse of PCB cleaning solvents abrasives, and equipment	May be reused after decontamination under 40 *CFR* § 761.79.	Generation of PCB wastes from the cleanup of PCB remediation waste—**applicable**.	40 *CFR* § 761.61(a)(5)(v)(B)
Performance-based disposal of PCB remediation waste	May dispose of by one of the following methods: • In a high-temperature incinerator approved under 40 *CFR* § 761.70(b); • By an alternate disposal method approved under 40 *CFR* § 761.60(e); • In a chemical waste landfill under 40 *CFR* § 761.75; • In a facility under 40 *CFR* § 761.77; or	Disposal of non-liquid PCB remediation waste as defined in 40 *CFR* § 761.3—**applicable**.	40 *CFR* § 761.61(b)(2) 40 *CFR* § 761.61(b)(2)(i)
	• Through decontamination in accordance with 40 *CFR* § 761.79.		40 *CFR* § 761.61(b)(2)(ii)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Risk-based disposal of PCB remediation waste	May sample, cleanup, or dispose of PCB remediation waste in a manner other than prescribed in paragraphs (a) or (b) of this section, or store PCB remediation waste in a manner other than prescribed in 40 *CFR* § 761.65(b) if approved in writing from EPA provided the method will not pose an unreasonable risk of injury to human health or the environment. Note: EPA approval of alternative sampling, cleanup, or disposal method will be obtained by approval of the FFA CERCLA document.	Disposal of PCB remediation waste —**applicable**.	40 *CFR* § 761.61(c)
Performance-based disposal of PCB bulk product waste	May dispose of by one of the following: • In an incinerator under 40 *CFR* § 761.70;	Disposal of PCB bulk product waste as defined in 40 *CFR* § 761.3—**applicable**.	40 *CFR* § 761.62(a) 40 *CFR* § 761.62(a)(1)
	• In a chemical waste landfill under 40 *CFR* § 761.75;		40 *CFR* § 761.62(a)(2)
	• In a hazardous waste landfill under 3004 of RCRA or under 3006 of RCRA;		40 *CFR* § 761.62(a)(3)
	• Under alternate disposal approved under 40 *CFR* § 7 1.60(e);		40 *CFR* § 761.62(a)(4)
	• In accordance with decontamination provisions of 40 *CFR* § 761.79; or		40 *CFR* § 761.62(a)(5)
	• In accordance with thermal decontamination provisions of 40 *CFR* § 761.79(e)(6) for metal surfaces in contact with PCBs.		40 *CFR* § 761.62(a)(6)
Disposal of PCB bulk product waste in solid waste landfill	May dispose of in a facility permitted, licensed, or registered by a State as a municipal or non-municipal non-hazardous waste landfill.	Non-liquid PCB bulk-product waste (known or presumed to leach < 10 µg/L PCBs) that is not RCRA hazardous—**applicable**.	40 *CFR* § 761.62(b)(1)(i) and (ii)
	May dispose of in a facility permitted, licensed, or registered by a State as a municipal or non-municipal non-hazardous waste landfill if: • The PCB bulk product waste is segregated from organic liquids disposed of in the landfill. • Leachate is collected from the landfill and monitored for PCBs.	Other PCB bulk product waste not meeting conditions of 40 *CFR* § 761.62(b)(1) (e.g., paper/felt gaskets contaminated by liquid PCBs)—**applicable**.	40 *CFR* § 761.62(b)(2) 40 *CFR* § 761.62(b)(2)(i) 40 *CFR* § 761.62(b)(2)(ii)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Risk-based disposal of PCB bulk product waste	May sample or dispose of PCB bulk product waste in a manner other than prescribed in paragraphs (a) or (b) of this section if approved in writing from EPA and the method (based on technical, environmental or waste specific characteristics or considerations) will not pose an unreasonable risk of injury to human health or the environment. NOTE: EPA approval of alternative disposal method will be obtained by approval of the FFA CERCLA document.	Disposal of PCB bulk-product waste—**applicable**.	40 *CFR* § 761.62(c)
Disposal of PCB-contaminated articles	Must remove all free-flowing liquid from the article, disposing of the liquid in compliance with the requirements of 40 *CFR* § 761.60(a)(2) or (a)(3).	Generation for disposal of PCB-contaminated articles (as defined in 40 *CFR* § 761.3) for disposal—**applicable**.	40 *CFR* § 761.60(b)(6)(ii)
	Dispose by one of the following methods: • In accordance with the decontamination provisions at 40 *CFR* § 761.79;	Disposal of PCB-contaminated articles with no free-flowing liquid—**applicable**.	40 *CFR* § 761.60(b)(6)(ii) 40 *CFR* § 761.60(b)(6)(ii)(A)
Disposal of PCB-contaminated articles	• in a facility permitted, licensed, or registered by a State to manage municipal solid waste or non-municipal non-hazardous waste;		40 *CFR* § 761.60(b)(6)(ii)(B)
	• In an industrial furnace operating in compliance with 40 *CFR* § 761.72; or		40 *CFR* § 761.60(b)(6)(ii)(C)
	• In a disposal facility approved under Part 761.		40 *CFR* § 761.60(b)(6)(ii)(D)
Disposal of PCB liquids	Must be disposed of in an incinerator that complies with 40 *CFR* § 761.70, except	PCB liquids at concentrations ≥ 50 ppm—**applicable**.	40 *CFR* § 761.60(a)
	• For mineral oil dielectric fluid may be disposed of in a high-efficiency boiler according to 40 *CFR* § 761.71(a), and	PCB liquids at concentrations ≥ 50 ppm but > 500 ppm—**applicable**.	40 *CFR* § 761.60(a)(1)
	• For liquids other than mineral oil dielectric fluid, may be disposed of in a high-efficiency boiler according to 40 *CFR* § 761.71(b).		40 *CFR* § 761.60(a)(2)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Disposal of decontamination waste and residues	Such waste shall be disposed of at their existing PCB concentration unless otherwise specified in 40 *CFR* § 761.79(g)(1-6).	PCB decontamination waste and residues—**applicable**.	40 *CFR* § 761.79(g)
Disposal of asbestos-containing waste material	Shall be deposited as soon as practicable at	Asbestos-containing waste material or RACM (except Category I non-friable asbestos-containing material) from demolition activities—**applicable**.	40 *CFR* § 61.150(b) 401 *KAR* 58:025
	• A waste disposal site operated in accordance with 40 *CFR* § 61.154, or		40 *CFR* § 61.150(b)(1) 401 *KAR* 58:025
	• A site that converts RACM and asbestos-containing waste material into non-asbestos (asbestos-free) material according to the provisions of 40 *CFR* § 61.155.		40 *CFR* § 61.150(b)(2) 401 *KAR* 58:025
Packaging and Transportation			
Determination of radionuclide concentration	The concentration of a radionuclide may be determined by an indirect method, such as use of a scaling factor which relates the inferred concentration of one (1) radionuclide to another that is measured or radionuclide material accountability if there is reasonable assurance that an indirect method may be correlated with an actual measurement. The concentration of a radionuclide may be averaged over the volume or weight of the waste if the units are expressed as nanocuries per gram.	Preparation for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.55 (a)(8) 902 *KAR* 100:021 § 6(8)(a) and (b)
Labeling of LLW packages	Each package of waste shall be clearly labeled to identify if it is Class A, Class B, or Class C waste, in accordance with 10 *CFR* § 61.55 or Agreement State waste classification requirements.	Preparation for off-site shipment of LLW to a commercial NRC or Agreement State licensed disposal facility—**relevant and appropriate**.	10 *CFR* § 61.57 902 *KAR* 100:021 § 8
Transportation of RCRA hazardous waste on-site	The generator manifesting requirements of 40 *CFR* §§ 262.20–262.32(b) do not apply.	Transportation of hazardous wastes 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 § 1

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Transportation of RCRA hazardous waste off-site	Must comply with the generator requirements of 40 *CFR* §§ 262.20–23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking, Sect. 262.33 for placarding, Sect. 262.40, 262.41(a) for record keeping requirements, and Sect. 262.12 to obtain EPA ID number.	Preparation and offering of hazardous waste for transport off-site—**applicable**.	40 *CFR* § 262.10(h) 401 *KAR* 32:010 § 1
Transportation of PCB wastes off-site	Must comply with the manifesting provisions at 40 *CFR* §§ 761.207 through 218.	Relinquishment of control over PCB wastes by transporting, or offering for transport—**applicable**.	40 *CFR* § 761.207(a)
Transportation of radioactive waste	Shall be packaged and transported in accordance with the substantive requirements of DOE O 460.1B and DOE O 460.2. Note: DOE has the sole discretion for evaluating compliance with its own Orders.	Preparation of shipments of radioactive waste—**TBC**.	DOE M 435.1-1(I)(1)(E)(11)
Transportation of LLW	To the extent practical, the volume of the waste and the number of the shipments shall be minimized. Note: DOE has the sole discretion for evaluating compliance with its own Orders.	Preparation of shipments of LLW—**TBC**.	DOE M 435.1-1(IV)(L)(2)
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMR at 49 *CFR* Parts 171–180 related to marking, labeling, placarding, packaging, emergency response, etc.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material—**applicable**.	49 *CFR* § 171.1(c)
Transportation of hazardous materials on-site	Shall comply with 49 *CFR* Parts 171-174, 177, and 178 or the site- or facility-specific Operations of Field Office approved Transportation Safety Document that describes the methodology and compliance process to meet equivalent safety for any deviation from the Hazardous material Regulations [i.e., Transportation Safety Document for On-Site Transport within the Paducah Gaseous Diffusion Plant, PRS-WSD-0661, (PRS 2007b)]. Note: DOE has the sole discretion for evaluating compliance with its own Orders.	Any person who, under contract with the DOE, transports a hazardous material on the DOE facility—**TBC**.	DOE O 460.1D(4)b

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Transportation of hazardous materials off-site	Off-site hazardous materials packaging and transfers shall comply with 49 *CFR* Parts 171-174, 177, and 178 and applicable tribal, State, and local regulations not otherwise preempted by DOT and special requirements for Radioactive Material Packaging. Note: DOE has the sole discretion for evaluating compliance with its own Orders.	Preparation of off-site transfers of LLW—**TBC**.	DOE O 460.1D(4)a
Discharge of Wastewater from Treatment System through an Existing KPDES Outfall			
Operation and maintenance of treatment system	Properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used to achieve compliance with the effluent standards. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.	Generation of wastewater requiring treatment prior to surface water discharge—**relevant and appropriate**.	401 *KAR* 5:065 § 2(1) 40 *CFR* § 122.41(e)
Technology-based treatment requirements for wastewater discharge	To the extent that EPA promulgated effluent limitations are inapplicable, shall develop on a case-by-case best professional judgment basis under § 402(a)(1)(B) of the CWA, technology based effluent limitations by applying the factors listed in 40 *CFR* § 125.3(d) and shall consider:	Discharge of wastewater to surface waters from other than a publicly owned treatment works—**applicable**.	40 *CFR* § 125.3(c)(2)
	• The appropriate technology for this category or class of point sources, based upon all available information; and • Any unique factors relating to the discharger.		
Water quality-based effluent limits for wastewater discharge	Must develop water quality based effluent limits that ensure that: • The level of water quality to be achieved by limits on point source(s) established under this paragraph is derived from, and complies with all applicable water quality standards; and • Effluent limits developed to protect narrative or numeric water quality criteria are consistent with the assumptions and any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 *CFR* § 130.7.	Discharge of wastewater to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a State water quality standard established under § 303 of the CWA—**applicable**.	40 *CFR* § 122.44(d)(1)(vii) 401 *KAR* 5:065 § 2(4)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Water quality-based effluent limits for wastewater discharge (Continued)	Must attain or maintain a specified water quality through water quality related effluent limits established under § 302 of the CWA.	Discharge of wastewater to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a State water quality standard—**applicable**.	40 *CFR* § 122.44(d)(2) 401 *KAR* 5:065 § 2(4)
	If a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above the numeric criterion for whole effluent toxicity using the procedures in paragraph (d)(1)(ii), must develop effluent limits for whole effluent toxicity.	Discharge of wastewater that causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity—**applicable.**	40 *CFR* § 122.44(d)(1)(iv) 401 *KAR* 5:065 § 2(4)
Monitoring requirements for wastewater treatment system discharges	In addition to 40 *CFR* §122.48(a) and (b) and to assure compliance with effluent limitations, one must monitor, as provided in subsections (i) thru (iv) of 122.44(i)(1). Note: Monitoring parameters, including frequency of sampling, will be developed as part of the CERCLA process and included in a remedial design, RAWP, or other appropriate FFA CERCLA document.	Discharge of wastewater to surface waters—**applicable**.	40 *CFR* § 122.44(i)(1) 401 *KAR* 5:065 § 2(4)
	All effluent limitations, standards, and prohibitions shall be established for each outfall or discharge point, except as provided under § 122.44(k).		40 *CFR* § 122.45(a) 401 *KAR* 5:065 § 2(5)
	All effluent limitations, standards and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as: • Maximum daily and average monthly discharge limitations for all discharges.	Continuous discharge of wastewater to surface waters—**applicable**.	40 *CFR* § 122.45(d)(1) 401 *KAR* 5:065 § 2(5)
Surface Water Standards	Table 1 of 401 *KAR* 10:031 § 6(1) provides allowable instream concentrations of pollutants that may be found in surface waters or discharged into surface waters.	Discharge of wastewater to surface waters of the Commonwealth designated as *Warm Water Aquatic Life Habitat*—**applicable**.	401 *KAR* 10:031 § 6(1)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Discharge of Wastewater from Treatment System through a CERCLA Outfall			
Minimum criteria applicable to all surface waters	Surface waters shall not be aesthetically or otherwise degraded by substances that: • Settle to form objectionable deposits; • Float as debris, scum, oil, or other matter to form a nuisance; • Produce objectionable color, odor, taste, or turbidity; • Injure, are chronically or acutely toxic to or produce adverse physiological or behavioral responses in humans, animals, fish, and other aquatic life; • Produce undesirable aquatic life or result in the dominance of nuisance species; 1. Cause fish flesh tainting. 2. The concentration of phenol shall not exceed 300 mg/L as an instream value.	Discharge of wastewater to surface waters—**applicable**.	401 *KAR* 10:031 § 2(1)(a-f)
Minimum criteria applicable to all surface waters	The water quality criteria for the protection of human health related to fish consumption in Table 1 of 401 *KAR* 10:031 § 6 are applicable to all surface water at the edge of assigned mixing zone except for those points where water is withdrawn for domestic water supply use.		401 *KAR* 10:031 § 2(3)(a) and (b)
	(a) The criteria are established to protect human health from the consumption of fish tissue and shall not be exceeded. (b) For those substances associated with a cancer risk, an acceptable risk level of not more than one (1) additional cancer case in a population of 1,000,000 people, (or 1×10^{-6}) shall be utilized to establish the allowable concentration.		

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Criteria for surface water designated as warm water aquatic life habitat	The following parameters and associated criteria shall apply for the protection of productive warm water aquatic communities, fowl, animal wildlife, arborous growth, agricultural, and industrial uses: • Natural alkalinity as $CaCO_3$ shall not be reduced by more than 25 percent; • pH shall not be less than 6.0 nor more than 9.0 and shall not fluctuate more than 1.0 pH units over a period of 24 hours; • Flow shall not be altered to a degree that will adversely affect the aquatic community; • Temperature shall not exceed 31.7°C (89°F); • Dissolved oxygen shall be maintained at a minimum concentration of 5.0 mg/L as a 24 hour average; instantaneous minimum shall not be less than 4.0 mg/L; • Total dissolved solids or specific conductance shall not be changed to the extent that the indigenous aquatic community is adversely affected; • Total suspended solids shall not be changed to the extent that the indigenous aquatic community is adversely affected; • Addition of settleable solids that may alter the stream bottom so as to adversely affect productive aquatic communities shall be prohibited; • Concentration of the un-ionized ammonia shall not be greater than 0.05 mg/L at any time instream after mixing; Instream concentrations for total residual chlorine shall not exceed an acute criteria value of 19 µg/L or a chronic criteria value of 11 µg/L.	Discharge of wastewater to surface waters designated as warm water aquatic life habitat—**applicable**.	401 *KAR* 10:031 § 4(1)(a)-(i) and (k)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Criteria for surface water designated as warm water aquatic life habitat (Continued)	The allowable instream concentration of toxic substances, or whole effluents containing toxic substances, which are noncumulative or nonpersistent with a half-life of less than 96 hours, shall not exceed: (a) 0.1 of the 96 hour median LC_{50} of representative indigenous or indicator aquatic organisms; or (b) A chronic toxicity unit of 1.00 utilizing the 25 percent inhibition concentration, or LC_{25}.	Discharge of wastewater to surface waters designated as warm water aquatic life habitat—**applicable**.	401 *KAR* 10:031 § 4(1)(j)(1)
	The allowable instream concentration of toxic substances, or whole effluents containing toxic substances, which are bioaccumulative or persistent, including pesticides, if not otherwise regulated, shall not exceed: (a) 0.01 of the 96 hour median LC_{50} of representative indigenous or indicator aquatic organisms; or (b) A chronic toxicity unit of 1.00 utilizing the LC_{25}.		401 *KAR* 10:031 § 4(1)(j)(2)
	In the absence of acute criteria for pollutants listed in Table 1 of 401 *KAR* 10:031 § 6, for other substances known to be toxic but not listed in this regulation, or for whole effluents that are acutely toxic, the allowable instream concentration shall not exceed the LC_1 or 1/3 LC_{50} concentration derived from toxicity tests on representative indigenous or indicator aquatic organisms or exceed 0.3 acute toxicity units.		401 *KAR* 10:031 § 4(1)(j)(3)
	If specific factors have been determined for a toxic substance or whole effluent such as an acute to chronic ratio or water effect ratio, they may be used instead of the 0.1 and 0.01 factors upon demonstration that such factors are scientifically defensible. NOTE: Demonstration that such factors are scientifically defensible will be reflected in the appropriate CERCLA document.		401 *KAR* 10:031 § 4(1)(j)(4)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Criteria for surface water designated as warm water aquatic life habitat (Continued)	If a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above the numeric criterion for whole effluent toxicity using the procedures in paragraph (d)(1)(ii), develop effluent limits for whole effluent toxicity.	Discharge of wastewater causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity—**applicable**.	40 *CFR* § 122.44(d)(1)(iv)
Mixing zone requirements for discharge of pollutants to surface water	The relevant requirements provided in 401 *KAR* 10:029 § 4 shall apply to a mixing zone for a discharge of pollutants. Note: Determination of the appropriate mixing zone will, if necessary, involve consultation with KDEP and will be documented in the CERCLA remedial design or other appropriate FFA CERCLA document.	Discharge of wastewater to surface waters of the Commonwealth [*Bayou Creek*]—**applicable**.	401 *KAR* 10:029 § 4
CAMUs, Temporary Units, and Staging Piles			
Designation and management of CAMUs	To implement remedies under § 264.101 or RCRA Section 3008(h), or to implement remedies at a permitted facility that is not subject to § 264.101, the Regional Administrator may designate an area at the facility as a corrective action management unit under the requirements in this section. CAMUs means an area within a facility that is used only for managing CAMU-eligible wastes for implementing corrective action or cleanup at the facility. A CAMU must be located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated. One or more CAMUs may be designated at a facility. Note: Designation of a CAMU will be documented in a CERCLA decision document [e.g., Action Memorandum (AM)]subject to review and approval under the FFA process.	Management of CAMU-eligible wastes within a CAMU—**applicable**.	40 *CFR* § 264.552(a)
	CAMU-eligible waste means: All solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris that are managed for implementing cleanup. As-generated wastes (either hazardous or non-hazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes.		40 *CFR* § 264.552(a)(1)(i)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Designation and management of CAMUs (Continued)	Wastes that would otherwise meet the description in paragraph (a)(1)(i) of this section are not "CAMU-Eligible Wastes" where: (A) The wastes are hazardous wastes found during cleanup in intact or substantially intact containers, tanks, or other non-land-based units found above ground, unless the wastes are first placed in the tanks, containers or non-land-based units as part of cleanup, or the containers or tanks are excavated during the course of cleanup.		40 *CFR* § 264.552(a)(1)(ii)(A)
	Notwithstanding paragraph (a)(1)(i) of this section, where appropriate, as-generated non-hazardous waste may be placed in a CAMU where such waste is being used to facilitate treatment or the performance of the CAMU.		40 *CFR* § 264.552(a)(1)(iii)
	Placement of CAMU-eligible wastes into or within a CAMU does not constitute land disposal of hazardous wastes.		40 *CFR* § 264.552(a)(4)
Designation, design, operation, and closure of a CAMU used for storage and/or treatment only	CAMUs used for storage and/or treatment only are CAMUs in which wastes will not remain after closure. Such CAMUs must be designated in accordance with all of the requirements of this section, except as follows.	Management of CAMU-eligible wastes within a CAMU used for storage and/or treatment only—**applicable**.	40 *CFR* § 264.552(f)
	CAMUs that are used for storage and/or treatment only and that operate in accordance with the time limits established in the staging pile regulations at § 264.554(d)(1)(iii), (h), and (i) are subject to the requirements for staging piles at § 264.554(d)(1)(i) and (ii), § 264.554(d)(2), § 264.554(e) and (f), and § 264.554(j) and (k) in lieu of performance standards and requirements for CAMUs in this section at paragraphs (c) and (e)(3) through (6). Note: It is recognized that a CAMU for storage and/or treatment may need to be operated past the two-year time limit. Any time period for storage and/or treatment of waste greater than two years will be documented and justified in the appropriate FFA CERCLA primary document subject to review and approval under the FFA process.	CAMU used for storage and/or treatment only and that operate in accordance with the time limits established in the staging pile regulations at 40 *CFR* § 264.554(d)(1)(iii), (h), and (i)—**applicable**.	40 *CFR* § 264.552(f)(1)

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Designation, design, operation, and closure of a CAMU (Continued)	(g) CAMUs into which wastes are placed where all wastes have constituent levels at or below remedial levels or goals applicable to the site do not have to comply with the requirements for liners at paragraph (e)(3)(i) of this section, caps at paragraph (e)(6)(iv) of this section, ground water monitoring requirements at paragraph (e)(5) of this section or, for treatment and/or storage-only CAMUs, the design standards at paragraph (f) of this section.		40 *CFR* § 264.552(g)
Temporary tanks and container storage areas used to treat or store hazardous remediation wastes	(a) For temporary tanks and container storage areas used to treat or store hazardous remediation wastes during remedial activities required under § 264.101 or RCRA 3008(h), or at a permitted facility that is not subject to § 264.101, the Regional Administrator may designate a unit at the facility, as a temporary unit. A temporary unit must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the temporary unit originated. For temporary units, the Regional Administrator may replace the design, operating, or closure standards applicable to these units under this part 264 or part 265 of this chapter with alternative requirements which protect human health and the environment. (b) Any temporary unit to which alternative requirements are applied in accordance with paragraph (a) of this section shall be: (1) Located within the facility boundary; and (2) Used only for treatment or storage of remediation wastes. Note: The designation of temporary units will be documented in a CERCLA decision document (e.g., AM) subject to review and approval under the FFA process. Alternate design, operating, and/or closure requirements for a temporary unit will be documented in the appropriate FFA CERCLA primary document subject to review and approval under the FFA process.	Use of temporary tanks and container storage areas to treat or store hazardous remediation wastes during remedial activities—**applicable**.	40 *CFR* § 264.553(a) and (b) 401 *KAR* 34:287

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Temporary tanks and container storage areas used to treat or store hazardous remediation wastes (Continued)	In establishing standards to be applied to a temporary unit, the Regional Administrator shall consider the following factors: (1) Length of time such unit will be in operation; (2) Type of unit; (3) Volumes of wastes to be managed; (4) Physical and chemical characteristics of the wastes to be managed in the unit; (5) Potential for releases from the unit; (6) Hydrogeological and other relevant environmental conditions at the facility which may influence the migration of any potential releases; and (7) Potential for exposure of humans and environmental receptors if releases were to occur from the unit.	Use of temporary tanks and container storage areas to treat or store hazardous remediation wastes during remedial activities—**applicable**.	40 *CFR* § 264.553(c) 401 *KAR* 34:287
	(d) The Regional Administrator shall specify in the permit or order the length of time a temporary unit will be allowed to operate, to be no longer than a period of one year. The Regional Administrator shall also specify the design, operating, and closure requirements for the unit. (e) The Regional Administrator may extend the operational period of a temporary unit once for no longer than a period of one year beyond that originally specified in the permit or order, if the Regional Administrator determines that: (1) Continued operation of the unit will not pose a threat to human health and the environment; and (2) Continued operation of the unit is necessary to ensure timely and efficient implementation of remedial actions at the facility. Note: It is recognized that a treatment unit may need to be operated past the one-year limit. Any time period for operating greater than one year will be documented and justified in the appropriate CERCLA primary document subject to review and approval under the FFA process.	Use of temporary tanks and container storage areas to treat or store hazardous remediation wastes during remedial activities—**applicable**.	40 *CFR* § 264.553(d) and (e) 401 *KAR* 34:287

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Temporary tanks and container storage areas used to treat or store hazardous remediation wastes (Continued)	(g) The Regional Administrator shall document the rationale for designating a temporary unit and for granting time extensions for temporary units and shall make such documentation available to the public. NOTE: The rationale for designating temporary units will be documented in a CERCLA decision document (e.g., AM) subject to review and approval under the FFA process. Any time extensions for a temporary unit along with the rationale will be documented in the appropriate FFA CERCLA primary document subject to review and approval under the FFA process.	Use of temporary tanks and container storage areas to treat or store hazardous remediation wastes during remedial activities—**applicable**.	40 *CFR* § 264.553(g) 401 *KAR* 34:287
Temporary on-site storage of remediation waste in staging piles (e.g., demolition waste)	• May be temporarily stored (including mixing, sizing, blending, or other similar physical operations intended to prepare the wastes for subsequent management or treatment) at a facility if used only during remedial operations provided that the staging pile will be	Accumulation of non-flowing hazardous remediation waste in staging pile (or remediation waste otherwise subject to land disposal restrictions)—**applicable**.	40 *CFR* § 264.554(a)(1) 401 *KAR* 34:287 § 5
	• located within the contiguous property under the control of the owner/operator where the wastes to be managed in the staging pile originated;		40 *CFR* § 264.554(a) 401 *KAR* 34:287 § 5
	• designed to facilitate a reliable, effective, and protective remedy;		40 *CFR* § 264.554(d)(1)(i) 401 *KAR* 34:287 § 5
	• designed to prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, run-off/run-on controls, as appropriate).		40 *CFR* § 264.554(d)(1)(ii) 401 *KAR* 34:287 § 5

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Temporary on-site storage of remediation waste in staging piles (e.g., demolition waste) (Continued)	In determining the design, the following factors must be considered: (i) Length of time the pile will be in operation; (ii) Volumes of wastes intended to be stored in the pile; (iii) Physical and chemical characteristics of the wastes to be stored in the unit; (iv) Potential for releases from the unit; (v) Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and (vi) Potential for human and environmental exposure to potential releases from the unit.		40 *CFR* § 264.554(d)(2) 401 *KAR* 34:287 § 5
	Must not place ignitable or reactive remediation waste in a staging pile unless the remediation waste has been treated, rendered, or mixed before placed in the staging pile so that	Storage of ignitable or reactive remediation waste in staging piles in—**applicable**.	40 *CFR* § 264.554(e) 401 *KAR* 34:287 § 5
	• The remediation waste no longer meets the definition of ignitable or reactive under 40 *CFR* § 261.21 and § 261.23; and		40 *CFR* § 264.554(e)(1)(i) 401 *KAR* 34:287 § 5
	• You have complied with 40 *CFR* § 264.17(b), General Requirements for Ignitable, Reactive, or Incompatible Wastes.		40 *CFR* § 264.554(e)(1)(ii) 401 *KAR* 34:287 § 5
	Alternatively, instead of meeting the above requirements in 40 *CFR* § 264.554(e)(1), the remediation waste may be managed to protect it from exposure to any material or condition that may cause it to ignite or react.		40 *CFR* § 264.554(e)(2) 401 *KAR* 34:287 § 5
	Must not place in the same staging pile unless you have complied with 40 *CFR* § 264.17(b).	Storage of incompatible remediation waste in staging piles in—**applicable**.	40 *CFR* § 264.554(f)(1) 401 *KAR* 34:287 § 5
	Must not pile remediation waste on the same base where incompatible wastes or materials were previously piled, unless the base has been decontaminated sufficiently to comply with 40 *CFR* § 264.17(b).		40 *CFR* § 264.554(f)(3) 401 *KAR* 34:287 § 5

Table A.2. Action-Specific ARARs and TBC Guidance for Decommissioning the Paducah Gaseous Diffusion Plant Facilities (Continued)

Action	Summary of Requirements	Prerequisite	Citation
Temporary on-site storage of remediation waste in staging piles (e.g., demolition waste) (Continued)	Must separate the incompatible materials or protect them from one another by using a dike, berm, wall, or other device.	Storage of remediation waste in a staging pile that is incompatible with any waste or material stored nearby in containers, other piles, open tanks or land disposal units (for example, surface impoundments)—**applicable**.	40 *CFR* § 264.554(f)(2) 401 *KAR* 34:287 § 5

CERTIFICATION

Document Identification: ***Engineering Evaluation/Cost Analysis for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,*** **DOE/LX/07-2425&D1, dated May 2018**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Four Rivers Nuclear Partnership, LLC

Myrna E. Redfield,
Deputy Program Manager

5/2/18
Date Signed

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. Department of Energy

Jennifer Woodard, Paducah Site Lead
Portsmouth/Paducah Project Office

5/2/18
Date Signed