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DOE Contract No. DE-AC05-03OR22980
Job No. 23900
LTR-PAD/MP-AM-05-0182
August 5, 2005

RECORD COPY

Mr. William E. Murphie, Manager
Portsmouth/Paducah Project Office
U.S. Department of Energy
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513

Dear Mr. Murphie:

DE-AC05-03OR22980: Transmittal—*Engineering Evaluation/Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2227&D2

Enclosed is the D2 Engineering Evaluation/Cost Analysis for your review and approval. Also enclosed are the corresponding Comment Response Summary and a draft transmittal letter for your use in providing the document to the U.S. Environmental Protection Agency and the Kentucky Department for Environmental Protection.

If you have any questions, or need additional information, please contact Brad Montgomery of my staff at (270) 441-5075.

Sincerely,

Glenn E. VanSickle
Paducah Manager of Projects

GEV:ams

Enclosures (2): As stated

c/enc: R. H. Blumenfeld, PPPO/LEX
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I-05112-0043

Date

Mr. R. Bruce Scott, Direct
Division of Waste Management
Kentucky Department for Environmental Protection
14 Reilly Road
Frankfort Office Park
Frankfort, Kentucky 40601

Mr. David G. Williams
U.S. Environmental Protection Agency
Region IV
DOE Remedial Section
Federal Facilities Branch
Waste Management Division
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Scott and Mr. Williams:

ENGINEERING EVALUATION/COST ANALYSIS FOR THE C-402 LIME HOUSE, C-405 INCINERATOR, AND C-746-A WEST END SMELTER AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/OR/07-2227&D2)

Enclosed for your review are copies of the Engineering Evaluation/Cost Analysis (EE/CA) for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant. Also enclosed is the Comment Response Summary that addresses your comments on the D1 EE/CA. A prompt approval would help to further reduce the overall schedule.

If you have questions, or require additional information, please call David Dollins at (270) 441-6819.

Sincerely,

William E. Murphie
Manager
Portsmouth/Paducah Project Office

Enclosures

cc w/o enclosures:
G. A. Bazzell, PPPO/Paducah
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Comment Response Summary

for the

Engineering Evaluation/Cost Analysis
for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter
at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky
DOE/OR/07-2227&D1, issued June 2005

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

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COMMENT RESPONSE SUMMARY
for the
Engineering Evaluation / Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Paducah Gaseous Diffusion Plant, Paducah, Kentucky
DOE/OR/07-2227&D1, issued June 2005

Number	Location	Reviewer and Comment	Response
1.	General; and Section 4.1.4.3, page 4-6; and Table 4.6, page 4-7	US EPA: "The Environmental Protection Agency (EPA) has received your Engineering Evaluation / Cost Analysis (EE/CA) for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/OR/07-2227&D1). Based upon the information and date presented in the EE/CA, EPA concurs with the Department of Energy selection of Alternative 2 (remove contents, demolish structure, and dispose wastes) for the planned decontamination and decommissioning activities for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter. A correction, however, should be made to the document on page 4-6, Section 4.1.4.3, **On-Site Disposal: C-746-U Landfill** and on page 4-7, Table 4.6, **Summary of Disposal Options for D&D Wastes**. The C-746-U Landfill is considered by EPA to be an On-Site Landfill only for disposal of CERCLA non-hazardous wastes associated with the North South Diversion Ditch Interim Remedial Action and the Scrap Metal Yard Removal Action. (See enclosed letter from EPA to DOE, dated July 8, 2004, Notice of Acceptability Pursuant to the CERCLA Off-Site Rule). Once this correction has been made to the EE/CA for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter, EPA would support preparation of Removal Action Work Plans for implementation of Alternative 2 at the three subject facilities as supported by the EE/CA."	Agree that in the July 2004 letter, EPA made an "acceptability determination" for disposal of nonhazardous CERCLA waste in the C-746-U landfill. DOE does not agree that the C-746-U landfill is "off-site" for purposes of this removal action. However, DOE believes that it is not necessary to resolve this issue at the present time, as the C-746-U landfill would be available for the disposal of waste generated under the removal action regardless of whether or not the landfill is deemed to be "on-site." To accommodate EPA's comment, DOE has revised the EE/CA to be silent as to whether or not the landfill is "on-site" for purposes of this removal action.

COMMENT RESPONSE SUMMARY
for the
Engineering Evaluation / Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Paducah Gaseous Diffusion Plant, Paducah, Kentucky
DOE/OR/07-2227&D1, issued June 2005

Number	Location	Reviewer and Comment	Response
2.	General	Kentucky Department for Environmental Protection (KDEP): "The EE/CA makes numerous references to EPA guidance contained in 57 FR 990 in the context of making waste determinations. The Division has reviewed this guidance and is in agreement with EPA that separating certain debris such as restaurant stainless steel counters from other restaurant building debris is not necessary and that a representative sample could include the stainless steel, concrete, brick, wood, plaster and glass in the same proportions as they are found in restaurant demolition debris. That being said, the Division is cautious of drawing close parallels between demolition debris from a restaurant with that from a gaseous diffusion plant. Please be advised that the Division will be requiring specificity in the sorting, segregation and characterization of individual waste streams within these three removal action work plans to ensure that all hazardous waste streams are properly identified and that no hazardous waste(s) are dispositioned to the C-746-U Solid Waste Landfill."	Agree that the removal action work plans will contain more specificity regarding the sorting, segregation, and characterization wastes. (No modifications to the EE/CA have been made in response to this comment.)
3.	General	KDEP: "Under the Previous Investigations Section for each structure, the Environmental Compliance Improvement Program (ECIP) from 2003 is referenced; yet the source of this information is not found in the reference section of this document nor has the Division seen the ECIP. Please append the reference section in the EE/CA and provide the Division with an electronic copy of this document."	Agree that this requires clarification. Sections 2.2.2, 2.3.2, and 2.4.2 of the EE/CA have been revised to indicate that walkdowns of the three facilities were conducted during development of the Environmental Compliance Improvement Plan (ECIP). The ECIP (BJC 2003) has been added as a reference in Chapter 8 of the EE/CA, and a current version of the ECIP will be provided to the Administrative Record, EPA, and KDEP.

COMMENT RESPONSE SUMMARY
for the
Engineering Evaluation / Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Paducah Gaseous Diffusion Plant, Paducah, Kentucky
DOE/OR/07-2227&D1, issued June 2005

Number	Location	Reviewer and Comment	Response
4.	General	KDEP: "There is a lack of documentation for the radiation survey data for the buildings. The lack of documentation includes the distribution of contamination in the building contents. Identifying the distribution of contamination with real-time radiation screens and surveys would support cost-effective and efficient segregation and disposition of D&D materials."	Agree that further characterization activities are warranted. These activities will be addressed in more detail in the removal action work plans. (No modifications to the EE/CA have been made in response to this comment.)
5.	Section 2.3.1, Page 2-4, Final paragraph	KDEP: "Process knowledge of the C-405 Incinerator indicates that X-ray film was incinerated. Silver (Ag) was not mentioned in this document. The incinerator ash residue should be analyzed for Ag (TCLP)."	Agree. The referenced text has been revised to identify the incineration of X-ray film, and the removal action work plan for this facility will address characterization of the incinerator ash residue for silver using TCLP methods.
6.	Section 2.4.1, Page 2-6, C-746-A West End Smelter	KDEP: "Please elaborate on the coordination of closure activities with this removal action. Does DOE proposed to demonstrate achievement of the 401 KAR 34:070 closure performance standard under this repose action, or will attainment of the closure performance standard be deferred to the PGDP D&D OU? If DOE intends to demonstrate attainment of the standard under this response action, 401 KAR 34:070 must be listed as an ARAR."	Agree that elaboration is appropriate. Section 2.4.1 of the EE/CA has been revised to more clearly state that the removal activities will achieve the closure standards for the C-746-A West End Smelter. Appendix B, Section B.4.5, also has been revised to elaborate on the closure requirements and standards. The closure performance standard, 401 KAR 34:070 Section 2, is cited in Appendix B, page B-21 of the EE/CA.
7.	Section 3, Page 3-3, Figure 3.1, D&D Summary Table	KDEP: "The general planning schedule with target dates for this EE/CA has allotted a 30-day public comment period. Although this time frame is consistent with the CERCLA process, past comment periods have been extended to 45 days, allowing the Citizens Advisory Board ample time to comment as a board."	Agree that a 45-day public comment period is acceptable. Figure 3-1 of the EE/CA has been revised to indicate that the public comment period for this EE/CA has a 45-day duration.

COMMENT RESPONSE SUMMARY
for the
Engineering Evaluation / Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Paducah Gaseous Diffusion Plant, Paducah, Kentucky
DOE/OR/07-2227&D1, issued June 2005

Number	Location	Reviewer and Comment	Response
8.	Section 4.1, Page 4-2, Table 4.1	KDEP: "In the oxyacetylene torch comment section various incompatibilities are listed for using this technology. If an oxyacetylene torch is used to cut metals that have PCB coatings, dioxins may form and cause worker exposure issues. Please add this limitation to the oxyacetylene torch comment section."	Agree. An additional statement identifying this worker protection concern has been added to the "comments" cell of Table 4.1.
9.	Appendix B, Table B.3, Action-Specific ARARs	KDEP: "Please include 401 KAR 30:031 Section 7 and 401 KAR 47:030 Section 8 as ARARs for this response action."	Agree. The referenced regulations have been added to Table B.3 as action-specific ARARs.
10.	Appendix B, Table B.3, Action-Specific ARARs	KDEP: "Since the EE/CA evaluates alternatives to address the potential for migration and release of hazardous substances, please incorporate the following Kentucky Administrative Regulations (KAR) where applicable. • 401 KAR 57:002. (40 C.F.R. Part 61 national emission standards for hazardous air pollutants), • 401 KAR 63:002. (40 C.F.R. Part 63 national emission standards for hazardous air pollutants), • 401 KAR 63:010. Fugitive emissions, • 401 KAR 63:020. Potentially hazardous matter or toxic substances, • 401 KAR 58:005. Accreditation of asbestos professionals, • 401 KAR 58.020. (40 C.F.R. Part 61 national emission standard for asbestos), • 401 KAR 58:040. Requirements for asbestos abatement entities."	Generally agree. The referenced regulations have been added to Table B.3 as action-specific ARARs and/or TBCs.

COMMENT RESPONSE SUMMARY
for the
Engineering Evaluation / Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky Paducah Gaseous Diffusion Plant, Paducah, Kentucky
DOE/OR/07-2227&D1, issued June 2005

Number	Location	Reviewer and Comment	Response
11.	Appendix B, Page B-17, Table B.3, Disposal of PCB-contaminated nonporous surfaces off-site	KDEP: "Please ensure that dioxins will not form if metal surfaces are thermally decontaminated in accordance with 40 CFR 761.79(c)(6)(ii)."	Regulations cited do not appear to apply to dioxins. However, if thermal decontamination methods are utilized, DOE will implement all precautions to protect human health and the environment. (No modifications to the EE/CA have been made in response to this comment.)

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Engineering Evaluation/Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

AUGUST 2005

CLEARED FOR PUBLIC RELEASE

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

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

CERTIFICATION

Document Identification: ***Engineering Evaluation/Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky***
(DOE/OR/07-2227&D2)

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 assure 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 (DOE)
Owner and Operator

David Dollins for
William E. Murphie, Manager
Portsmouth/Paducah Project Office

8/4/05
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 assure 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.

Bechtel Jacobs Company LLC
Co-Operator

Glenn Van Sickle
Glenn E. VanSickle, Paducah Manager of Projects

8/4/05
Date Signed

DOE/OR/07-2227&D2
Primary Document

Engineering Evaluation/Cost Analysis for the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

August 2005

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

Environmental Management Activities at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky 42001
managed by
Bechtel Jacobs Company LLC
for the
U.S. Department of Energy
under contract DE-AC05-03OR22980

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ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
cm	centimeter
CO_2	carbon dioxide
COPC	contaminant of potential concern
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
ECIP	Environmental Compliance Improvement Plan
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FR	*Federal Register*
ft	foot
ha	hectares
km	kilometer
kPa	kilopascal
LCF	latent cancer fatalities
LDR	land disposal restriction
LLW	low-level waste
m	meter
NEPA	National Environmental Policy Act of 1969
OU	operable unit
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PGDP	Paducah Gaseous Diffusion Plant
PPE	personal protective equipment
ppm	parts per million
psi	pounds per square inch
RAO	removal action objective
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act of 1976
S&M	surveillance and maintenance
SWMU	solid waste management unit
T&E	Threatened and Endangered
TBC	to be considered
TRU	transuranic
TSCA	Toxic Substances Control Act of 1976
WAC	waste acceptance criteria
^{99}Tc	technetium-99
^{237}Np	neptunium-237
^{137}Cs	cesium-137
^{239}Pu	plutonium-239
^{230}Th	thorium-230

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) is planning to conduct decontamination and decommissioning (D&D) activities under the existing Federal Facility Agreement (FFA) for three facilities at the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky. In accordance with DOE policy, the D&D activities will be undertaken as a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). This engineering evaluation/cost analysis (EE/CA) report summarizes the evaluation of removal alternatives for the following three PGDP facilities, which also are identified as solid waste management units (SWMUs):

- C-402 Lime House (SWMU 480);
- C-405 Incinerator (SWMU 55); and
- C-746-A West End Smelter (SWMU 464).

Each of these facilities is located within the secure portion of PGDP. Each of the facilities was constructed during the 1950s and used for its intended purpose until the 1970s or 1980s. Previous investigations have confirmed that each of these facilities is contaminated. Contaminants of potential concern include asbestos, polychlorinated biphenyls (PCBs), and radionuclides (e.g., cesium-137 [^{137}Cs], neptunium-237 [^{237}Np], plutonium-239 [^{239}Pu], technetium-99 [^{99}Tc], thorium-230 [^{230}Th], and uranium isotopes). Currently, risks to workers are minimized through the use of access restrictions, but risks to workers could exceed *de minimis* levels (i.e., cumulative cancer risk less than 1×10^{-6} and a cumulative hazard index less than 1) if exposure were unrestricted. In addition, uncontrolled contaminant releases from these facilities could create minimal risks to ecological receptors in Bayou Creek.

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

- Prevent potential health and safety hazards to on-site personnel from deterioration of the contaminated structures; and

- Minimize or eliminate the potential health and environmental hazards of radiation and hazardous material exposure caused by the potential uncontrolled release of contaminated dust, equipment, and building materials.

D&D of these facilities is appropriate to meet these RAOs. D&D of these facilities will prevent, minimize, or eliminate potential and actual risks to workers and ecological receptors posed by the release or threat of release of contaminants. In addition, D&D of these facilities, at this time, is appropriate, because there is no present or foreseeable future need for these facilities. Based on their current physical condition and the presence of contamination, no beneficial reuse has been identified. Controlled demolition, using engineered safety measures, is safer and more cost-effective than an uncontrolled collapse and will meet the DOE objective to control legacy hazards.

The scope of this non-time-critical removal action includes the building contents and the building structures. The scope does not require removal of external utilities and ancillary equipment, the concrete building slabs or foundations, or the underlying soil; these items will be addressed at a later time as part of subsequent actions [e.g., Soils Operable Unit (OU), Gaseous Diffusion Plant D&D]. Since these facilities are in poor structural condition and there are no plans for future use, the range of removal alternatives is limited. The following two removal alternatives were developed and evaluated for effectiveness, implementability, and cost.

- Alternative 1 – No action
- Alternative 2 – Remove contents, demolish structures, characterize and dispose of wastes

Alternative 1 is a baseline to which the other alternative may be compared. This alternative is ineffective at achieving the RAOs or reducing actual or potential risks to workers and the environment. This alternative is implementable and would have no cost.

Alternative 2 consists of removing the contents of each facility, demolishing the structures, and characterizing and disposing of all wastes. Specifically, the alternative includes these activities: removing, characterizing, and disposing of all equipment and materials stored in each facility; disconnecting and removing utilities from inside the facilities; disassembling and removing each structure down to the concrete slab (no subsurface removal is required); containerizing, characterizing, and disposing of all waste from the structures; and decontaminating and/or stabilizing the concrete slabs to prevent the migration of any contaminants.

Alternative 2 is effective for achieving the RAOs and reducing risks to human health and the environment. This alternative is technically and administratively implementable. The estimated cost for implementing this alternative is approximately $8,500,000.

Alternative 2 is the recommended alternative for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter.

1. INTRODUCTION TO THE D&D PROCESS

The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA) and the Commonwealth of Kentucky regulators have agreed to conduct decontamination and decommissioning (D&D) activities under the existing Federal Facility Agreement (FFA) for the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky (EPA 1998). Facilities planned for D&D will be treated as D&D operable units (OUs).

In accordance with the requirements of Section X (E) of the PGDP FFA, this engineering evaluation/cost analysis (EE/CA) document evaluates alternatives to address the potential for migration and release of hazardous substances that are present in the process buildings associated with the following three PGDP facilities, which also are identified as solid waste management units (SWMUs) (Fig. 1.1):

- C-402 Lime House (SWMU 480);
- C-405 Incinerator (SWMU 55); and
- C-746-A West End Smelter (SWMU 464).

1.1 REGULATORY SETTING

Many of the DOE facilities across the nation that will undergo D&D are located on or near sites being remediated under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority. With this in mind, DOE proposed that D&D efforts would be governed by CERCLA regulations and carried out under the CERCLA regulatory framework for facilities where a known release of hazardous substances had occurred or that pose a threat of release of hazardous substances to the environment. On May 22, 1995, a memorandum entitled Policy on Decommissioning Department of Energy Facilities under the Comprehensive Environmental Response, Compensation, and Liability Act (DOE and EPA 1995) established an approach agreed upon by DOE and EPA for conducting decommissioning activities as non-time-critical removal actions, unless circumstances made such an approach inappropriate. This policy built upon the foundation established in an earlier guidance document issued by EPA/DOE/U.S. Department of Defense, Guidance on Accelerating CERCLA Environmental Restoration at Federal Facilities (August 22, 1994).

DOE issued a Secretarial Policy Statement on the National Environmental Policy Act of 1969 (NEPA) (DOE 1994a) stating that DOE will address and incorporate NEPA values into CERCLA documents to the extent practicable, with more attention given to those aspects of the proposed action having the greater anticipated effects. Such values may include analysis of socioeconomic, cultural, ecological, and cumulative impacts, as well as environmental justice and land use issues, and the impacts of off-site transportation of wastes. NEPA values have been incorporated into this document in accordance with Secretarial Policy.

The process for regulatory review and approval by EPA and Kentucky regulators defined in Section X (E) of the PGDP FFA will be followed.

1.2 PHASES OF THE D&D PROCESS

The D&D process encompasses activities that take place after a facility has been deactivated and placed in an ongoing surveillance and maintenance (S&M) program by DOE. Decontamination includes the removal or reduction of radioactive or hazardous contamination from facilities. Decommissioning can entail decontamination and dismantlement. Dismantlement involves disassembly or demolition and the interim or long-term disposal of waste materials in compliance with applicable requirements.

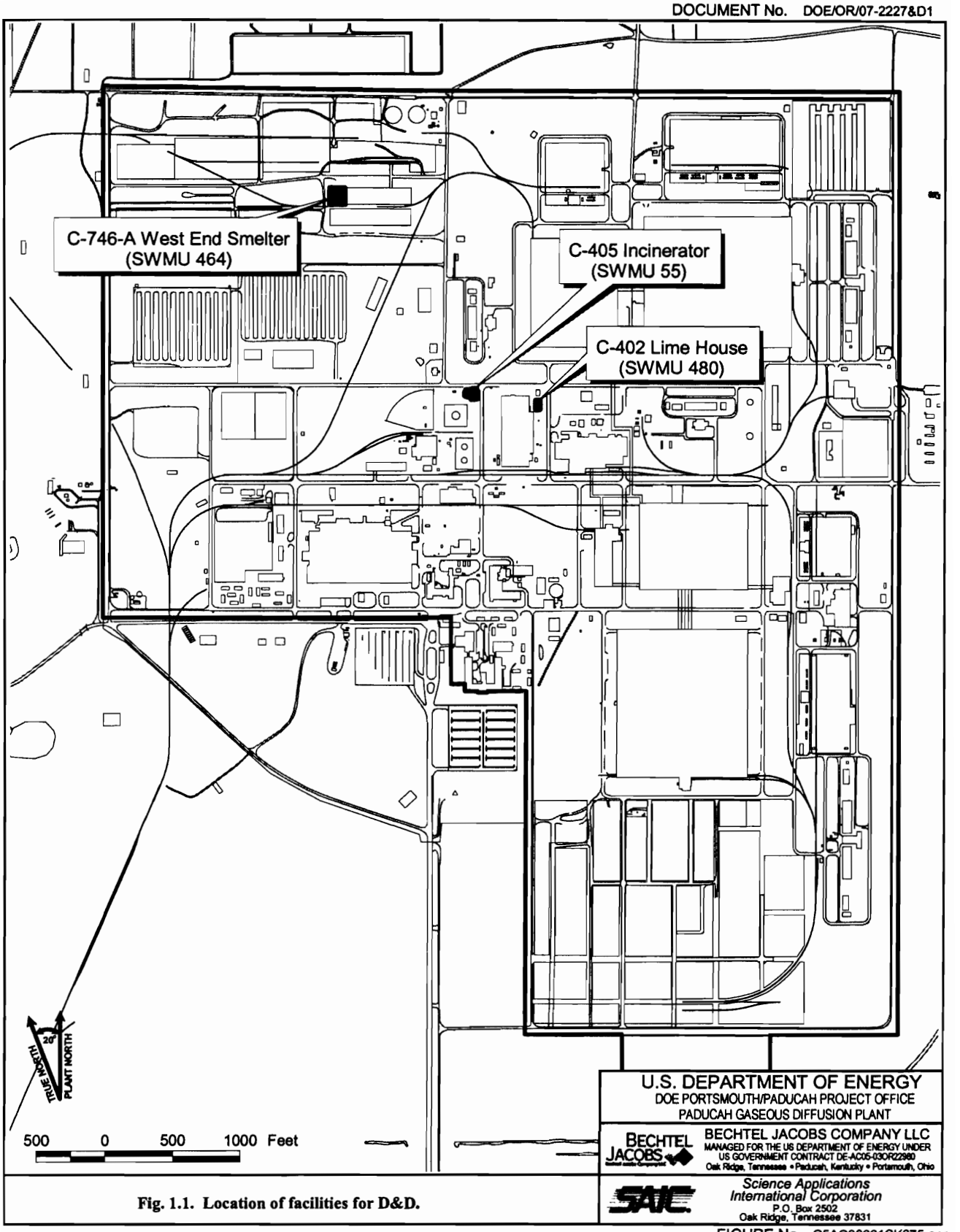

Fig. 1.1. Location of facilities for D&D.

FIGURE No. C5AC90001SK675.apr
DATE 06-03-05

The D&D operation will be conducted as a non-time-critical removal action for the three facilities.

1.3 PURPOSE

The purpose of this EE/CA is to evaluate alternatives to reduce the potential for future contaminant releases from each of these three facilities in a manner that protects both human health and the environment.

This action is being documented with an EE/CA in accordance with the FFA and the *Policy on Decommissioning of Department of Energy Facilities under the Comprehensive Environmental Response, Compensation, and Liability Act* (DOE and EPA 1995). This policy states that unless the circumstances at a facility make it inappropriate, decommissioning activities will be conducted as non-time-critical removal actions. The FFA for PGDP and CERCLA (through Presidential delegation of authority) authorize DOE to develop and perform removal actions to abate, minimize, stabilize, mitigate, or eliminate a release or the threat of a release of hazardous substances, pollutants, or contaminants or hazardous wastes and hazardous constituents at or from PGDP (EPA 1998). Based on past usage and current characterization data, each of these buildings represents a threat of a release of contaminants into the environment. Because no imminent danger is known to exist that would necessitate an early cleanup, the removal action is categorized as non-time-critical.

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2. SITE CHARACTERIZATION

2.1 PGDP DESCRIPTION AND BACKGROUND

PGDP is located in western Kentucky, on the lower end of the Ohio River Valley. The site occupies approximately 1439 ha (3556 acres) in McCracken County approximately 19 km (12 miles) west of Paducah, Kentucky (Fig. 2.1). The Ohio River is located 5.8 km (3.6 miles) north of the site.

2.1.1 Topography

PGDP and the surrounding area are flat with elevations across the site ranging from about 107 m (350 ft) to 119 m (390 ft) above mean sea level. The ground surface slopes at a rate of about 5.1 m/km (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 dominated by 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 6 m (20 ft) below the adjacent plain.

2.1.2 Stormwater

PGDP is located in the western portion of the Ohio River drainage basin. The plant is within the drainage areas of Bayou Creek and Little Bayou Creek, situated on the divide between the two creeks. Man-made drainages receive storm water and effluent from PGDP. The plant monitors 17 outfalls, which have a combined average daily flow of 4.9 million gal per day.

Stormwater drainage from the C-402 Lime House and C-405 Incinerator discharges through outfall ditch 001 into Bayou Creek. Stormwater drainage from the C-746-A West End Smelter discharges through outfall ditch 015 into Bayou Creek.

2.1.3 Geology and Hydrology

The Mississippian limestone bedrock under the fenced area of PGDP lies from 107 to 137 m (351 to 449 ft) below the ground surface (bgs). Overlying soils are poorly stratified layers of clay, silt, gravel, and sand.

Three major fault systems are recognized in the PGDP area. These include New Madrid, Rough Creek, and Saint Genevieve. The Rough Creek fault system appears to be inactive. The St. Genevieve fault system is active from south of St. Louis into western Kentucky. Historically, a large number of earthquakes associated with the New Madrid fault system have occurred in northeastern Arkansas and southeastern Missouri.

The regional groundwater flow system occurs within the Mississippian Bedrock, Cretaceous McNairy Formation, Eocene Sands, Pliocene Terrace Gravel, Pleistocene Lower Continental Deposits, and Upper Continental Deposits (DOE 2000a). Gravel and sand lenses within the Lower Continental Deposits, at a depth of approximately 55 to 90 ft bgs, comprise the uppermost aquifer, termed the Regional Gravel Aquifer. The overlying sediments of the Upper Continental Deposits, comprised mainly of silts and clays with thin sand and gravel lenses, have been designated the Upper Continental Recharge System.

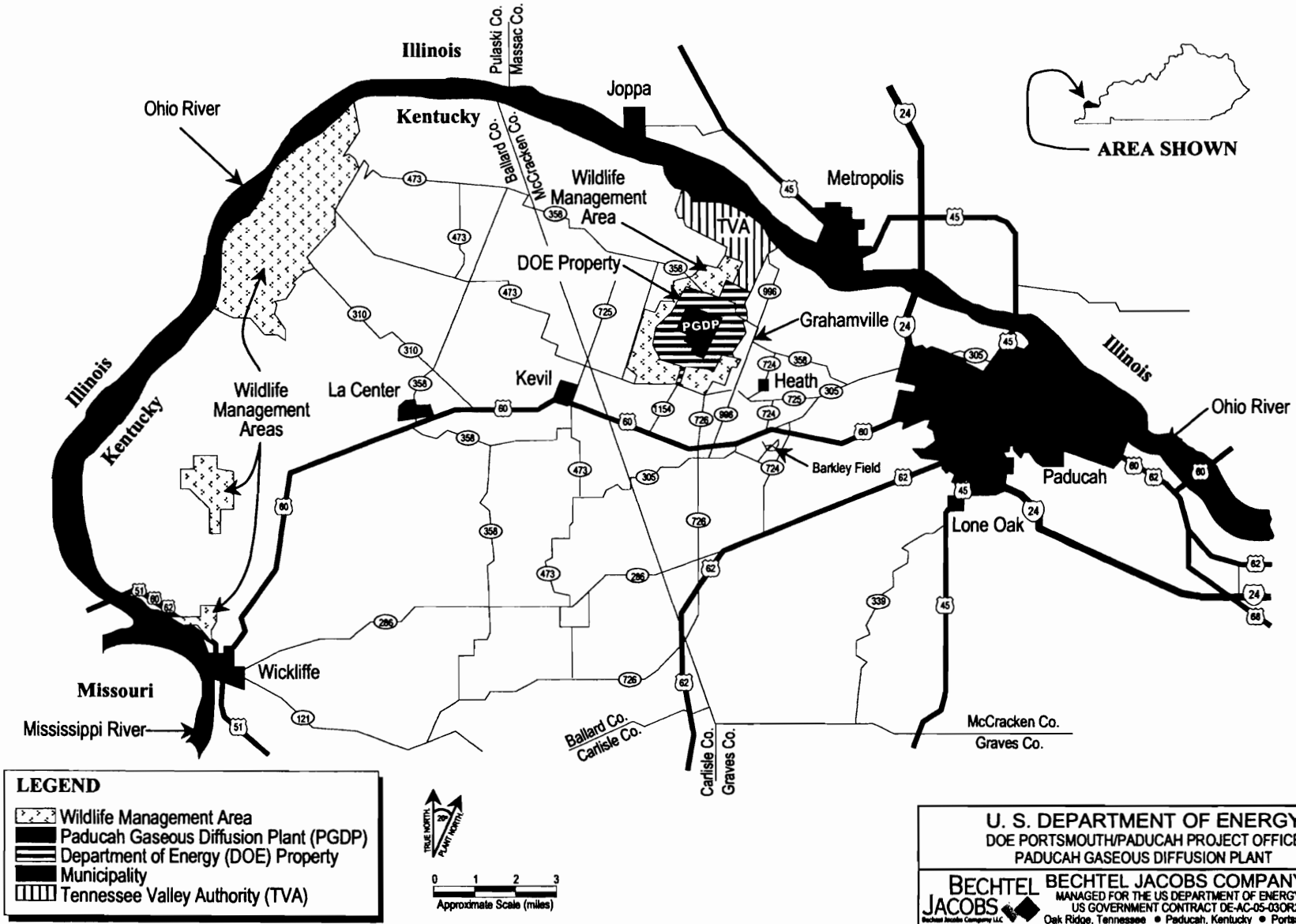

Fig. 2.1. Paducah Gaseous Diffusion Plant vicinity map.

U. S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL JACOBS COMPANY, LLC
MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER
US GOVERNMENT CONTRACT DE-AC-05-03OR22980
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

Science Applications International Corporation
P.O. Box 2502
Oak Ridge, Tennessee 37831

FIGURE No. VICINITY.ppt
DATE 06-03-05

2.1.4 Climate/Meteorology

Prevailing winds at PGDP are from the south to southwest at a mean annual speed of 3.5 m/s (7.9 mph). The 13-year average monthly precipitation is 10 cm (3.96 inches), varying from an average of 6.58 cm (2.59 inches) in August to an average of 12.0 cm (4.72 inches) in February. The 13-year average monthly temperature is 14.4 °C (57.9 °F), varying from 4.0 °C (34.5 °F) in January to 26.4 °C (79.5 °F) in July (DOE 2000a).

2.1.5 Land Use and Population

PGDP is heavily industrialized; however, the land surrounding the DOE Property is sparsely populated and rural (Fig. 2.1). Within an 8-km (5-mile) radius of PGDP, 75% of the land is in agricultural use or is dedicated to open space. The West Kentucky Wildlife Management Area bordering PGDP is popular among quail and deer hunters. The nearest communities are Grahamville and Heath. The C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter are located inside the secured portion of the PGDP.

2.2 C-402 LIMEHOUSE FACILITY

The following sections contain summary descriptions of the C-402 Lime House facility, previous investigations and removal actions, contamination nature and extent, analytical data, and streamlined risk evaluation.

2.2.1 General Facility Description

The C-402 Lime House is located immediately east of the C-400 Building and just south of the C-403 Neutralization Pit. The facility was built in 1953 to supply lime slurry to the C-403 Neutralization Pit and to produce magnesium fluoride pellets. The facility ceased operations prior to 1978. It was used later as a storage facility.

The building is constructed of reinforced concrete with a partial, below-grade basement that is located in the northern third of the building. On the main (south) facade is an entrance with original double doors of two-light steel and glass design. Above the entrance is a steel-louvered vent. This entrance is accessed by a concrete and steel staircase and concrete loading-dock platform. On the east, west, and north facades are original, nine-light fixed-steel windows with concrete sills.

The facility consists of equipment for handling and opening bags of lime and a slaker tank that is located in the basement. Pelletizing equipment also is located in the facility.

In addition to the electrical and water services required for the facility, there is an underground line connecting C-402 to C-403. This line exits C-402 from the north side of the basement. A drain in the basement also connects to the storm sewer system.

This facility was identified as SWMU 480 in 2001. The facility was placed in the D&D OU in the 2004 Site Management Plan (DOE 2004).

2.2.2 Previous Investigations

Walkdowns of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter facilities were conducted in 2003 during development of the Environmental Compliance Improvement Plan (ECIP)

(BJC 2003). During the 2003 walkdown of the C-402 Lime House, the potential was identified for a small quantity of Resource Conservation and Recovery Act (RCRA) waste to be generated from fuses in the equipment and from the building electrical system, if such items were removed from the facility as a distinct waste stream. Oil in the equipment could contain PCBs. No RCRA or Toxic Substances Control Act-(TSCA) wastes were definitively identified, but there is the potential for asbestos-containing material (ACM) to be present due to the age of the facility.

2.2.3 Previous removal actions

No previous removal actions have been conducted at this facility.

2.2.4 Nature and extent of contamination

The building is radiologically contaminated, and potential ACM also is present.

Some limited sampling was performed in 2000. Wipe samples indicated total uranium levels ranging from 543 to 3,830 pCi/wipe sample. Samples for other radionuclides, including technetium-99 (^{99}Tc) and transuranics (TRU), were less than detectable with the exception of a single sample for neptunium-237 (^{237}Np) that was just above the detection limit.

Samples taken in 1991 in support of a reroofing project did not indicate the presence of any hazardous (RCRA) constituents in the roofing material removed during the project.

2.2.5 Streamlined risk evaluation

No quantitative risk assessments or evaluations are available for the C-402 Lime House; however, descriptions in the previous sections indicate that asbestos, polychlorinated biphenyls (PCBs), and uranium are contaminants of potential concern (COPCs) present within the facility. Additionally, the C-402 Lime House is posted as a radiologically contaminated area. Workers are the most likely receptors that may be exposed to these COPCs due to the location of this facility. Risks to workers under current access restrictions from exposure to these COPCs are minimal, but unrestricted industrial exposure could cause risks to workers to exceed *de minimis* levels.[1] Additionally, releases of the COPCs from this facility could impact ecological receptors in Bayou Creek through surface migration through Outfall 001; however, amounts of COPCs present indicate that any impacts to these ecological receptors likely would be minimal.

2.3 C-405 INCINERATOR FACILITY

The following sections contain summary descriptions of the C-405 Incinerator facility, previous investigations and removal actions, contamination nature and extent, analytical data, and streamlined risk evaluation.

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[1] Per guidance in *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky. Volume 1. Human Health* (DOE/OR/07-1506&D2), *de minimis* risk is defined as a cumulative cancer risk less than 1×10^{-6} and a cumulative hazard index less than 1 (DOE 2000b). For comparison, the EPA acceptable cancer risk range for site-related exposures is 10^{-6} to 10^{-4} (EPA 1999).

2.3.1 General Facility Description

The C-405 Incinerator was constructed in the 1950s. It was used for the incineration of radiologically contaminated and uncontaminated items and classified documents, including X-ray film.

The building is a steel-frame structure with transite (asbestos) siding and roof and was built on a concrete slab. On the main (north) facade are two garage bays with overhead-track, four-light steel and glass doors. On the west facade is a pedestrian door of single-light transite and steel design. A window on this facade is of six-light steel and glass awning design. The east facade has similar windows. On the south facade are two 12-light steel and glass windows with inserted four-light awning panels.

The facility houses two inactive incinerators that were utilized to destroy specific material generated at PGDP, including X-ray film. One incinerator was used for contaminated items, and one was used for uncontaminated items, including classified documents.

This facility was identified as SWMU 55 in 1991 and has not operated since 1986. The facility was placed in the D&D OU in the 2004 Site Management Plan.

2.3.2 Previous Investigations

During the 2003 walkdown, no RCRA or PCB wastes were definitively identified. Due to the age of the facility, ACM is expected to be present inside the facility. Ash residue in the incinerators may contain potential RCRA-hazardous constituents, although the presence of such constituents has not been confirmed. Residue from the incineration of X-ray film may contain small levels of silver. Electrical equipment pumps, motors, and other auxiliary equipment could contain RCRA hazardous constituents and/or PCBs.

2.3.3 Previous removal actions

No previous removal actions have been conducted at this facility.

2.3.4 Nature and extent of contamination

Data from samples collected in the building in 2000 are summarized in Table 2.1. Although the analytical data cannot be tied to any specific item of equipment or surface in the facility, the purpose of this data collection effort was to determine the levels of contamination present in the building.

2.3.5 Streamlined risk evaluation

No quantitative risk assessments or evaluations are available for the C-405 Incinerator; however, descriptions in the previous sections indicate that asbestos and radionuclides (e.g., cesium-137 [^{137}Cs], ^{237}Np, plutonium-239 [^{239}Pu], ^{99}Tc, thorium-230 [^{230}Th], and uranium isotopes) are COPCs present within the facility. Additionally, the C-405 Incinerator is posted as a radiologically contaminated area. RCRA and PCB wastes also may be present. Workers are the receptors most likely to be exposed to these COPCs, due to the location of this facility. Risks to workers under current access restrictions from exposure to these COPCs are minimal, but unrestricted industrial exposure could cause risks to workers to exceed *de minimis* levels. Additionally, releases of the COPCs from this facility could impact ecological receptors in Bayou Creek through surface migration through Outfall 001; however, amounts of COPCs present indicate that any impacts to these ecological receptors likely would be minimal.

Table 2.1. Summary of C-405 detected transferable contamination measurements

Radionuclide	Sample Type	Number of Samples	Number of Non-Detect Samples	Range of Detected Results
Alpha	Wipe	1	0	31.23 pCi/wipe
Am-241	Wipe	4	4	None
Beta	Wipe	1	0	118.83 pCi/wipe
Cs-137	Wipe	4	3	5.73 pCi/wipe
Co-60	Wipe	4	4	None
Np-237	Wipe	8	5	0.42 – 5.4 pCi/wipe
Np-237	Solid	3	0	1.23 – 128.6 pCi/g
Pu-239/240	Wipe	4	1	1.55 – 11.4 pCi/wipe
Pu-239	Solid	3	0	1.5 – 86.5 pCi/g
Sr-90	Wipe	4	2	20.2 – 123 pCi/wipe
Tc-99	Wipe	4	0	88.3 – 36,200 pCi/wipe
Tc-99	Solid	3	0	298 – 359,039 pCi/g
Th-230	Solid	3	0	4.2 – 2201 pCi/g
Th-230	Wipe	4	1	20.2 – 254 pCi/wipe
H-3	Wipe	4	2	162 – 220 pCi/wipe
Total U	Wipe	8	0	259 – 16,800 pCi/wipe
Total U	Solid	3	0	76.6 – 56,569 pCi/g

2.4 C-746-A WEST END SMELTER

The following sections contain summary descriptions of the C-746-A West End Smelter facility, previous investigations and removal actions, contamination nature and extent, analytical data, and streamlined risk evaluation.

2.4.1 General Facility Description

The West End Smelter was erected in 1954 and used until 1985 for the smelting of various metals. Two aluminum reverbatory furnaces and associated equipment are located in the facility. The facility has electrical, fire protection, and sanitary sewer service.

Building C-746-A is a one-story prefabricated metal building. The building has a concrete slab and foundation, a gable roof of steel panels, and exterior walls of steel panels. The building has three attached sections with gable roofs. On the east facade, the central section has an overhead steel-track garage-bay door. Adjacent to this entrance is a three-light steel and glass pedestrian door. The flanking two sections of this building have three-light steel and glass doors on the east facade. The south two sections also have a roof addition of steel panels, and this addition has a gable roof. The south facade has several bays with sliding-track doors. There are no doors or windows on the west facade. The north facade has six garage bays with overhead steel-track doors and six pedestrian doors of solid steel.

The scope of this D&D removal action is limited to the West End Smelter; the central and eastern portions of the building are not included in this removal action (Fig. 2.2). This facility was identified as SWMU 464 in 2001 and currently is an unused warehouse. The West End Smelter is listed in the PGDP's RCRA Part A application as a unit requiring RCRA closure, because RCRA hazardous light bulbs were stored in the facility. These wastes have been removed from the facility for storage or disposal in another permitted facility. Preliminary characterization of other waste materials has occurred (i.e., slag), and no other hazardous wastes are known to be present in the facility at this time.

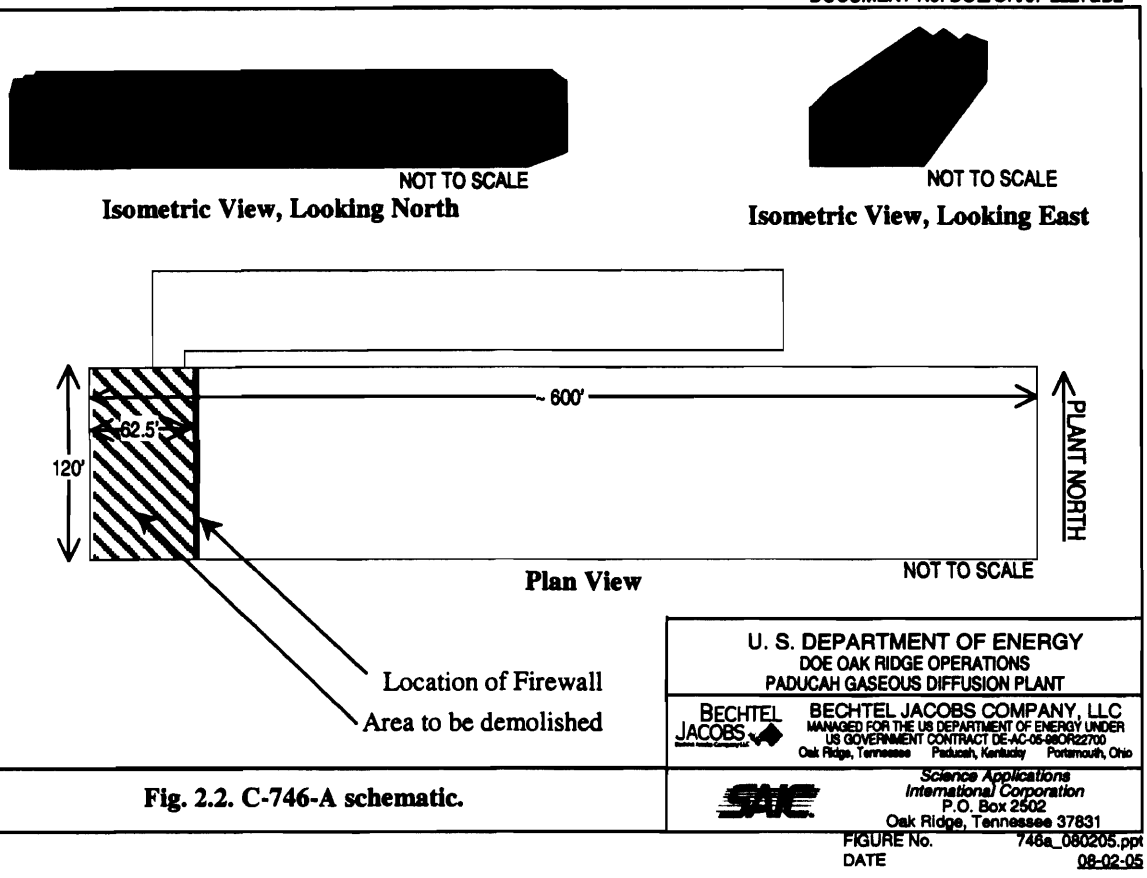


Fig. 2.2. C-746-A schematic.

2.4.2 Previous Investigations

During the 2003 walkdown, ACM was identified as being present in the smelter ovens and in materials stored in the surrounding area. The potential for RCRA hazardous constituents and PCBs exists in electrical equipment (e.g., fuses and light bulbs) and other equipment (e.g., motors and pumps) stored in the area. A small container of an unidentified white powder also was found during the inspection. No RCRA constituents or PCBs were definitively identified. Routine survey data indicated the presence of radiological contamination.

2.4.3 Previous removal actions

An underground fuel tank used for the furnaces was located just north of facility. The tank was removed during a previous project.

2.4.4 Nature and extent of contamination

The building is radiologically contaminated, and ACM also is present. Data from samples collected in the building between 1984 and 2002 are summarized in Table 2.2. At this time, the analytical data cannot be tied to any specific item or surface in the facility.

Table 2.2. Summary of C-746-A transferable contamination measurements

Radionuclide	Sample Type	Number of Samples	Number of Non-Detect Samples	Range of Detected Results
Alpha	Solid	3	2	50.3 pCi/g
Am-241	Solid	7	6	0.05 pCi/g
Am-241	Wipe	10	10	None
Beta	Solid	3	0	15.7 – 691 pCi/g
Cs-134	Solid	3	3	None
Cs-137	Solid	7	4	0.01 – 0.13 pCi/g
Cs-137	Wipe	10	10	None
Co-60	Solid	7	7	None
Co-60	Wipe	10	10	None
Np-237	Wipe	10	5	8.47 – 67.6 pCi/wipe
Np-237	Solid	7	1	0.23 – 3.26 pCi/g
Pu-238	Solid	4	4	None
Pu-238	Wipe	3	3	None
Pu-239	Solid	3	3	None
Pu-239/240	Solid	4	2	0.17 – 0.21 pCi/g
Pu-239/240	Wipe	3	1	4.76 – 6.58 pCi/wipe
Sr-90	Wipe	1	1	None
Tc-99	Wipe	3	0	193 – 25,400 pCi/wipe
Tc-99	Solid	7	0	2.42 – 7,737 pCi/g
Th-228	Solid	4	0	0.089 – 0.22 pCi/g
Th-228	Wipe	3	0	None
Th-230	Wipe	3	1	16.2 – 26.2 pCi/ sample
Th-230	Solid	7	4	0.11 – 0.93 pCi/g
Th-232	Solid	4	2	0.074 – 0.123 pCi/g
Th-232	Wipe	3	2	0.113 pCi/ sample
Th-234	Solid	1	0	17.4 pCi/g
Total U	Solid	4	0	2.9 – 156 pCi/g
Total U	Wipe	18	9	1.6 – 701 mg/kg
Total U	Wipe	140	88	1.76 – 353 ug/wipe
Total U	Wipe	10	3	145 – 1,420 pCi/sample

2.4.5 Streamlined risk evaluation

No quantitative risk assessments or evaluations are available for the C-746-A West End Smelter; however, descriptions in the previous sections indicate that asbestos, PCBs, and radionuclides (e.g., ^{237}Np, ^{239}Pu, ^{99}Tc, and uranium isotopes) are COPCs present within the facility. Additionally, the C-746-A West End Smelter is posted as a radiologically contaminated area. Workers are the most likely receptors that may be exposed to these COPCs due to the location of this facility. Risks to workers under current access restrictions from exposure to these COPCs are minimal, but unrestricted industrial exposure could cause risks to workers to exceed *de minimis* levels. Additionally, releases of the COPCs from this facility could impact ecological receptors in Bayou Creek through surface migration through Outfall 001; however, amounts of COPCs present indicate that any impacts to these ecological receptors likely would be minimal.

3. REMOVAL ACTION SCOPE, OBJECTIVES, AND SCHEDULE

This chapter summarizes DOE's response authority under CERCLA for D&D actions, removal action scope, removal action objectives (RAOs), justification for D&D, and schedule for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter.

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 are released or there is a substantial threat of such release into the environment or (2) there is a release or substantial threat of release into the environment of any pollutant or contaminant, which may present an imminent and substantial danger to the public health or welfare. DOE and EPA have issued a joint policy statement (DOE and EPA 1995) stating that building D&D activities should be conducted as non-time-critical removal actions unless circumstances at the facility make it inappropriate.

3.2 REMOVAL ACTION SCOPE

The scope of this non-time-critical removal action includes the building contents and the building structures. The scope does not require removal of external utilities and ancillary equipment, the concrete building slabs or foundations, or the underlying soil; these items will be addressed as part of subsequent actions (e.g., Soils OU, Gaseous Diffusion Plant D&D). The removal action supports the long-term remediation of the PGDP. This removal will eliminate materials causing potential risks, thereby, significantly reducing the risk to current employees and potential off-site receptors in the event of building failure or further degradation. Additionally, removal of the buildings will facilitate future investigation and any necessary remediation by making underlying soils and areas more accessible. The risk of a release from the buildings will be greatly reduced by the removal of the building contents and the building structures.

3.3 REMOVAL ACTION OBJECTIVES

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

- Prevent the potential health and safety hazards to on-site personnel from deterioration of the contaminated structures; and

- Minimize or eliminate the potential health and environmental hazards of radiation and hazardous material exposure caused by the potential uncontrolled release of contaminated dust, equipment, and building materials from the facilities.

3.4 REMOVAL ACTION JUSTIFICATION

The C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter buildings and their contents have the potential to present risks above *de minimis* levels to workers if exposure was not restricted through access controls. These facilities also might impact ecological receptors in Bayou Creek via surface migration if contaminants were released through infrastructure failure. Based upon these potential risks, the D&D of these facilities is appropriate and would prevent, minimize, or eliminate

potential and actual risks posed by the potential release or threat of release of hazardous substances, pollutants or contaminants.

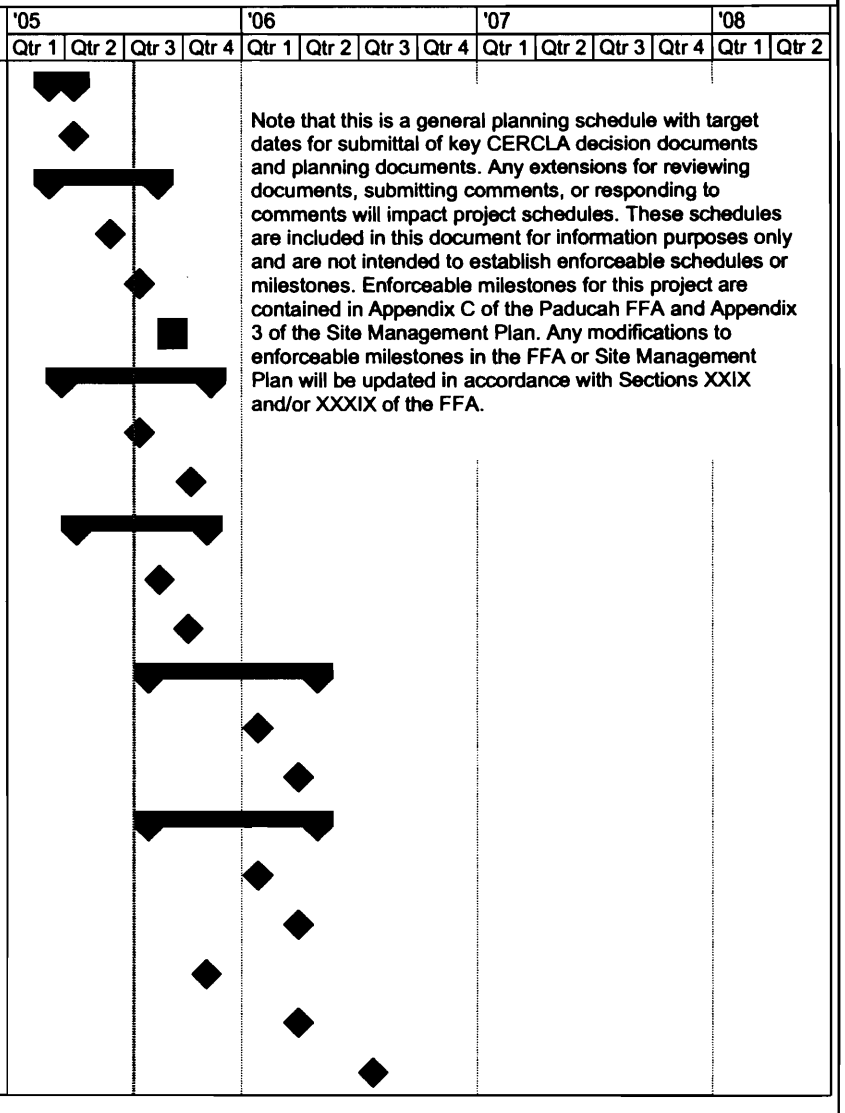
In addition, D&D of these buildings would meet the DOE objectives to control legacy hazards.

3.5 REMOVAL ACTION PLANNING SCHEDULE

As indicated in Fig. 3.1, a Removal Notification, EE/CA, and Action Memorandum must be prepared and approved before the physical D&D work begins. In addition, three building-specific Removal Action Work Plans (RAWPs) will be prepared and submitted to state and federal regulatory agencies. The RAWPs will contain the sequence of activities to implement the removal action and also may include supporting information (e.g., health and safety plan, waste management plan, data management plan, quality assurance project plan, transportation plan, etc.).

General Planning Schedule with Target Dates for D & D of C-402 Limehouse, C-405 Incinerator, and C-746-A West End Smelter

ID	Task Name	Duration	Start	Finish
1	**Removal Notification**	**38 days**	**3/9/2005**	**4/15/2005**
4	Removal Notification issued (completed)	0 days	4/15/2005	4/15/2005
5	**Engineering Evaluation / Cost Analysis (EE/CA)**	**168 days**	**3/9/2005**	**8/23/2005**
10	D1 EE/CA issued (completed)	0 days	6/10/2005	6/10/2005
11	D2 EE/CA issued (completed)	0 days	8/11/2005	8/11/2005
12	EE/CA Public Comment Period	45 days	9/13/05	10/27/05
13	**Action Memorandum (AM)**	**232 days**	**3/28/2005**	**12/14/2005**
18	D1 AM issued	0 days	9/13/2005	9/13/2005
19	D2 AM issued	0 days	11/9/2005	11/9/2005
20	**C-402 Removal Action Work Plan (RAWP)**	**203 days**	**4/20/2005**	**11/21/2005**
25	D1 RAWP issued	0 days	9/8/2005	9/8/2005
26	D2 RAWP issued	0 days	10/21/2005	10/21/2005
27	**C-405 Removal Action Work Plan (RAWP)**	**263 days**	**4/20/2005**	**3/28/2006**
32	D1 RAWP issued	0 days	12/21/2005	12/21/2005
33	D2 RAWP issued	0 days	2/27/2006	2/27/2006
34	**C-746-A Removal Action Work Plan (RAWP)**	**263 days**	**4/20/2005**	**3/28/2006**
39	D1 RAWP issued	0 days	12/21/2005	12/21/2005
40	D2 RAWP issued	0 days	2/27/2006	*2/27/2006*
41	**C-402 Start of D&D Fieldwork ***	**0 days**	**12/14/2005**	**12/14/2005**
42	**C-405 Start of D&D Fieldwork ***	**0 days**	**3/30/2006**	**3/30/2006**
43	**C-746-A Start of D&D Fieldwork ***	**0 days**	**7/7/2006**	**7/7/2006**



Revisior 7: 8/4/2005
Durations shown in calendar days.

Summary Task Milestone

Figure 3.1. D & D summary schedule.

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4. DEVELOPMENT OF REMOVAL ACTION ALTERNATIVES

This chapter summarizes the identification and screening of technologies and the development of the two removal action alternatives for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter.

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 were 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 D&D activity. Disposal options for waste streams that would be generated from D&D 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 4.1 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 oxyacetylene torches. Size-reduction techniques also have been identified for use in the D&D efforts. Compaction has been used as the representative process option, since this technique can be easily applied to a variety of materials and results in substantial volume reduction.

4.1.2 Concrete Slab Decontamination, Stabilization, and Removal Technologies

Multiple decontamination, stabilization, and removal technologies exist for the concrete slabs and could be used for this project. Table 4.2 identifies the technologies considered for the concrete slabs that will remain after removal of the buildings and addresses their applicability and limitations; 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 having radioactive or other hazardous contamination.

The following technologies are considered viable for decontamination of the concrete: scabbling, sponge blasting, and abrasive blasting. Current plans do not include removal of the concrete slabs.

4.1.3 Waste Containerization Options

It will be necessary to containerize the waste generated during D&D activities for transportation and/or disposal. The waste streams and volume of waste requiring containers will depend heavily on the D&D technologies that are used and the disposal options that are selected. A large variety of containers are available that would be appropriate for the different waste streams that would be generated. The containers that are the most appropriate for this removal action include gondolas, Sea-land 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 D&D activities, it is possible that multiple container options will be used during implementation of the removal action.

Table 4.1. 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.	No additional worker training required; rotary saws, grinders, and other high-speed mechanical tools would produce airborne particulates and fines that may need to be collected.
Mobile hydraulic shear	Two-bladed cutter attached to excavator; typically uses hydraulic power from excavator.	Can cut 0.6-cm-(1/4-inch)-thick steel (large-diameter pipe, structural steel, tanks); up to 2.5-cm-(1-inch)-thick pipe can be cut with reduced blade life.	Pipe ends are pinched, requiring further processing before decontamination, treatment, or disposal; eliminates airborne contamination associated with thermal cutting processes.	Good for conduit and small piping.
Circular cutters	Self-propelled; cut as they move around a track on outside circumference.	Metal pipes from 3.175 cm (1.25 inch) to 6 m (20-ft) diameter; wall thickness up to 15 cm (6 inches), depending on type of circular cutter used.	10-cm (4-inch) to 5.3-cm (21-inch) clearance required, depending on type of circular cutter used; requires multiple passes for thickness greater than 1.9 cm (0.75 inches).	Safety concerns.
Oxyacetylene torch	Oxygen and a fuel gas mixed and ignited at the tip of a torch; metal heated to 816 °C (1,500 °F) is burned away.	Very effective in cutting carbon steel; depth of cut up to 10 to 15 cm (4 to 6 inches); cutting speed up to 76 cm/min (30 inches/min); common technique for structural carbon steel member disassembly.	Alloys uranium with the metal; however, generally does not affect cutting operation.	Not recommended for aluminum or stainless steel due to formation of refractory oxides. Additional worker protection may be required if torch is used to cut metals that have PCB coatings.
Compaction (crushing) and super compaction	Compresses wastes using hydraulic mechanical technology to achieve volume reduction.	Scrap metal, concrete, glass, rubble, plastic material, rubber, paper, and cloth.	Limited to compressible wastes; supercompactors operating at 29,000 to 150,000 kPa (4,000 to 22,000 psi) required to compact most items.	Greatly reduces the volume of reactors, tanks, etc. Volume reduction factors of 4 to 5 can be achieved for scrap metal resulting in densities as high as 150 lb/ft^3.
Shredding	Shreds waste to provide waste volume reduction.	Waste materials with large void spaces and thin metals.	Waste size restrictions for most shredders [>3.175 cm (>1.25-inch) rebar, 3.75 cm (1.25-inch) steel cable, and 10 cm (4.0-inch) Schedule 40 pipe]; primarily for metal wastes.	Not recommended due to limitations on size of material that can be shredded.

Table 4.2. Description and evaluation of concrete slab decontamination, stabilization and removal 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.
Applying fixative stabilizer coatings	Application of 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.	Also useful for containment of contaminants on transite siding or other building materials.
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 is readily available. Dust can be suppressed.
Sponge blasting	Uses a sponge grit 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 near surface contamination; creates additional waste.	Sponge grit can be recycled.
Abrasive blasting	Uses an abrasive media (sand, glass beads, grit, or CO_2 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 0.64 centimeters (0.25 inches) deep, depending on abrasive technique; creates additional waste; slow, labor-intensive technique, which causes high potential for worker exposure.	Can produce substantial amount of contaminated dust; appropriate for items that can be effectively decontaminated for reuse or "clean" disposal; CO_2 minimizes additional waste streams.
Destruction and Removal	Jackhammers that are hand-held or mounted to a backhoe may be used to break up concrete. Standard construction equipment may be used for removal.	Applicable for reducing the size of large pieces of concrete.	No removal of contaminant is achieved; slow, labor-intensive technique, which increases potential for worker exposure. (Metal cutting methods may be required if rebar is present.)	Technology and equipment are readily available. Highly effective for removal. Can produce substantial amount of contaminated dust, but dust can be suppressed.

CO_2 = carbon dioxide.
PCBs = polychlorinated biphenyls.

4.1.4 Waste Disposal Options

Table 4.3 summarizes the waste volumes that are anticipated from each facility. When combined, the total waste volume is anticipated to be approximately 19,000 ft^3.

Table 4.3. Summary of anticipated waste volumes

Facility	Contents	Structure	Totals
C-402 Lime House	4,000 ft^3 (equipment)	3,500 ft^3 (reinforced concrete)	7,500 ft^3
C-405 Incinerator	3,000 ft^3 (equipment)	1,000 ft^3 (steel & asbestos)	4,000 ft^3
C-746-A West End Smelter	4,500 ft^3 (equipment)	3,000 ft^3 (steel)	7,500 ft^3

4.1.4.1 Waste Streams

Although some characterization data exists, the wastes will be characterized prior to disposal. Characterization may consist of process knowledge, sampling and analysis, or a combination. Much of this material may require disposal as low-level radioactive waste, RCRA or TSCA hazardous waste, mixed waste, or nonhazardous solid waste. A listing of anticipated potential waste streams is presented in Table 4.4. Hazardous waste determinations will be made based on a representative sample in accordance with EPA guidance contained in 57 *FR* 990; this allows consideration of RCRA hazardous constituents in the same proportions as they are found with the associated construction/demolition debris and does not require sorting and segregation of such items for management as a separate waste stream.

Disposal options that can be considered for the disposal of certain waste generated during D&D activities may be limited if radionuclide contamination is present at levels that exceed the industrial/sanitary landfill limits of the receiving disposal facility.

Although a variety of waste streams will be generated, the primary waste streams are expected to be construction/demolition debris and radiologically contaminated materials identified as low-level waste (LLW). Wastes such as PCB-containing liquids and electrical components, nonradioactive RCRA and/or mixed waste sludges or liquids, and petroleum products also may be generated. Mixed waste and RCRA waste will be treated, if necessary, to meet RCRA land disposal restrictions (LDRs) prior to disposal. Results of the characterization efforts will be used to separate the debris using reasonable efforts into waste streams that conform to the proposed disposal facility waste acceptance criteria (WAC). A discussion of the primary waste disposal facilities being considered for waste from the D&D activities and a summary of their respective WAC is presented in the following sections. In addition, if wastes are generated that cannot meet the WAC for the facilities discussed here (currently unidentified mixed waste, RCRA waste, or PCB waste), other commercial disposal facilities may be available for these wastes.

4.1.4.2 Off-Site 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. Off-site disposal facilities (e.g., DOE's Nevada Test Site and Envirocare of Utah, LLC) will be evaluated upon characterization of the waste.

Table 4.4. Description of anticipated potential waste streams

Waste streams	Description
LLW	LLW is defined as radioactively contaminated, nonconsolidated, solid material and is managed separately from nondebris LLW because of differing characterization requirements. The waste streams within this category can include slag, scrap metal, personal protective equipment (PPE), concrete, decontamination materials, transite (also ACM), and miscellaneous waste types from process areas or systems.
Nonradioactive, Nonhazardous [Non-PCB (<50 ppm)] Solid Wastes	The waste streams in this category consist of wastes that can be certified as meeting radiological release criteria and disposal site criteria and are nonhazardous and non-PCB (< 50 ppm).
Radioactive ACM	This waste category includes ACM derived from process areas or systems such as process pipe insulation, concrete dusts from scabbling or blasting ACM material, and transite.
Nonradioactive ACM	This waste category consists of ACM that can be demonstrated to meet the appropriate radiological release criteria.
PCB Wastes (>50 ppm)	This waste category encompasses PCB electrical equipment, PCB oils, process ventilation system components, and other wastes that are contaminated from regulated sources. PCB wastes may be categorized as radioactive PCB wastes or nonradioactive PCBs if radiological release criteria are met. These include PCB bulk product and PCB remediation wastes. Most of the waste is expected to meet the definition of PCB remediation waste and not require incineration.
Mixed Wastes	This waste category includes waste streams that have both a RCRA hazardous component and a radioactive component based on their origin within a radioactive materials management area, surface contamination exceeding release limits, or available characterization data. Among the wastes included in this category are inherently hazardous nonrecyclable metal items, trap materials, concrete dusts from decontamination of [process] floors where lube oil leakage occurred, and radioactively contaminated lamps.
Hazardous Wastes	This waste category encompasses RCRA-hazardous waste streams (that are not mixed wastes and do not exceed radiological release criteria).
PCB/RCRA/Rad	PCB/RCRA/Rad wastes are those mixed wastes that also contain PCBs. This category also includes ACM that is co-mingled with mixed waste and PCBs. These wastes may include residual hydraulic fluids, concrete dust and wastewater, ventilation duct gaskets, and deposits within the ventilation ducts.
Classified materials	This category includes materials that must receive special handling because of security concerns. This would include enriched uranium or items whose composition or function could divulge classified information on uranium enrichment technology.
TRU	TRU elements were detected in wipe samples and the possibility exists that small quantities of TRU waste could be encountered.

ACM = asbestos-containing material.
LLW = low-level waste.
PCB = polychlorinated biphenyl.
PPE = personal protective equipment.
RCRA = Resource Conservation and Recovery Act.
TRU = transuranic.

4.1.4.3 C-746-U Landfill

The C-746-U Landfill is a contained landfill designed for solid waste generated at PGDP. Accepted waste categories include (but are not limited to) certain CERCLA wastes, brick, concrete, rock, lumber, vitrified clay materials, polyvinyl chloride pipe, polyethylene sheeting, roofing materials, and certain metals. Asbestos-containing building material (friable), petroleum-contaminated soil, and empty containers (aerosol cans, paint cans, pesticide containers, etc.) also are accepted at C-746-U Landfill. The C-746-U Landfill cannot accept waste that exceeds the authorized limits, RCRA-hazardous waste, mixed waste, PCB waste (>50 ppm), or free liquids (see Table 4.5).

Table 4.5. C-746-U Landfill waste acceptance limitations

Size limitations	Weight limitations	Waste limitations
Case-by-Case	Case-by-Case	• Authorized limits for radioactive material (DOE 2003): Neptunium-237 3 pCi/g Plutonium-238 3 pCi/g Plutonium-239 3 pCi/g Plutonium-240 3 pCi/g Technetium-99 500 pCi/g Total Thorium 15 pCi/g Total Uranium 150 pCi/g • < 50 ppm PCBs (including waste origination concentration) • No RCRA hazardous waste • No free liquids • No batteries • No bulky metal objects (desks, filing cabinets, etc.) • No circuit boards • No classified waste • No light bulbs (except "green-end" fluorescent)

PCB = polychlorinated biphenyl. RCRA = Resource Conservation and Recovery Act.

4.1.4.4 Summary of Disposal Options

A summary of the waste disposal options for the various waste streams is presented in Table 4.6.

4.2 DEVELOPMENT OF ALTERNATIVES

In accordance with the National Oil and Hazardous Substances Pollution Contingency Plan and EPA guidance, DOE has identified two alternatives to address the RAOs that were specified in Chapter 3. The removal action does not require removal of the exterior utilities, removal of the concrete slabs or foundations, or the nearby/underlying soil; these will be addressed in a later phase of the remedial actions for PGDP. Since these facilities are in poor structural condition and there are no plans for future use, the range of removal alternatives is limited (e.g., there is no intent to remove the contents and retain the structures, etc.). The removal alternatives are summarized in the following sections.

Table 4.6. Summary of disposal options for D&D wastes

Facility	Low-level radiological waste	Mixed waste	Hazardous (RCRA) waste	Nonradioactive, nonhazardous, non-PCB solid waste	PCB (TSCA) waste	Radioactive and nonradioactive ACM	Liquid waste	Classified material	TRU
PGDP:									
• C-746-U Landfill				X		X			
Off-Site:									
• Envirocare of Utah, LLC	X	X (treated)	X (mixed)		X (w/ rad)	X (w/ rad)			
• DOE Nevada Test Site	X					X (w/ rad)		X	
• Other permitted, commercial facilities	X	X	X	X	X	X	X		
• Waste Isolation Pilot Plant									X

Notes: All waste accepted at Nevada Test Site and Envirocare of Utah must be radiological waste.
ACM = asbestos containing material
RCRA = Resource Conservation and Recovery Act.
TSCA = Toxic Substances and Control Act.
TRU = transuranic.

4.2.1 Alternative 1 — No Action

Inclusion of a no action alternative is provided as a baseline for comparison to the other alternatives. In the no action alternative, S&M would be discontinued, the buildings would be allowed to deteriorate, and D&D would not be performed on the buildings. The following are key components of this alternative:

- Deactivation activities likely would be performed as part of other programs to isolate the buildings from major utility feeds (e.g., water and electric).

- Final disposition of contaminants generated by building degradation or failure would be deferred until a future decision document.

4.2.2 Alternative 2 — Remove Contents, Demolish Structure, and Dispose Wastes

In this alternative, the building structures and all contents would be removed and disposed in appropriate disposal facilities. General waste segregation and sampling/characterization would be performed, but extensive decontamination, processing, and treatment of wastes would not be performed (unless treatment is necessary to meet LDRs). The removal of the contents and internal utilities would be sequenced to facilitate dismantling of the building structures, and the specific order in which systems are taken out of service and dismantled would be determined during the design phase.

The following are key components of this alternative.

- **Contents:** All equipment and materials stored in each facility will be removed, sized, and placed in appropriate containers for disposal. Resulting wastes will be segregated as appropriate. The wastes will be characterized to determine the appropriate waste type and disposed in an appropriate (on-site or off-site) facility. If specific waste items cannot be disposed, they would be placed into a proper storage facility until such time as an appropriate disposition path can be identified. Extensive decontamination, processing, and treatment of wastes are not planned at this time (unless treatment is necessary to meet LDRs). (Hazardous waste determinations will be made based on a representative sample in accordance with EPA guidance contained in 57 *FR* 990; this allows characterization of construction/demolition debris based on the average properties of the materials, assuming all materials are present in the same proportions as they are found in the resulting demolition debris. Results of the characterization efforts using the above approach will be used to separate the debris using reasonable efforts into waste streams that conform to the proposed disposal facility WAC.)

- **Utilities:** All utilities (e.g., electrical, water, etc.) will be disconnected and cutoff, or removed, from the facilities.

- **Structures:** Each structure will be disassembled or demolished down to the building slab. Appropriate measures will be taken to prevent the release of fugitive dust or other contaminants during this operation. The wastes generated by disassembly/demolition of the structures will be segregated as appropriate. These wastes will be characterized to determine the appropriate waste type and disposed of in an appropriate facility. If specific waste items cannot be disposed, they would be placed into a proper storage facility until such time as an appropriate disposition path can be identified. No decontamination or treatment is planned at this time (unless treatment is necessary to meet LDRs).

- **Concrete slabs and foundations:** If excessive contamination remains on these concrete slabs, they will be decontaminated and/or stabilized, as necessary, to prevent the migration of any contaminants and to reduce or eliminate restrictions for workers to access them.[2] The partial basement of the C-402 building will be left intact and modified to reduce the potential for the collection of water and contaminants and to ensure worker safety. Only the western end of the C-746-A Building that houses the West End Smelter will be demolished to the building slab; the remaining portion of the C-746-A Building will remain intact (refer to Fig. 2.2).

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[2] Although removal of concrete slabs and foundations is not required, DOE may, at its sole discretion, elect to remove and dispose of concrete slabs and/or foundations as part of this removal action. Hereinafter, anywhere this document references decontamination or stabilization of the concrete slabs or foundations as part of Alternative 2 (or the recommended alternative), such references should be construed to allow, at DOE's sole discretion, the option of removing and disposing of the concrete slabs and/or foundations.

5. ANALYSIS OF REMOVAL ACTION ALTERNATIVES

In accordance with the National Contingency Plan and EPA guidance (EPA 1993), the alternatives developed in Section 4.2 have been evaluated against the short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost. Subcriteria are summarized in Table 5.1. These evaluations were used to draw sufficient distinctions among the alternatives to allow selection of a recommended alternative.

Table 5.1. Criteria to be used for evaluation of removal action alternatives

EFFECTIVENESS

- Protectiveness
  - Protective of public health and community (short- and long-term)
  - Protective of workers during implementation (short-term)
  - Protective of the environment (short- and long-term)
  - Complies with applicable or relevant and appropriate requirements (ARARs)
- Ability to Achieve Removal Action Objectives
  - Level of treatment/containment expected
  - No residual effect concerns
  - Will maintain control until long-term solution implemented

IMPLEMENTABILITY

- Technical Feasibility
  - Construction and operational considerations
  - Demonstrated performance/useful life
  - Adaptable to environmental conditions
  - Contributes to remedial performance
- Availability
  - Equipment
  - Personnel and services
  - Outside laboratory testing capacity
  - Off-site treatment and disposal capacity
  - Post-removal site control
- Administrative Feasibility
  - Permits required
  - Easements or right-of-ways required
  - Impact on adjoining property
  - Ability to impose institutional controls
  - Likelihood [of] obtaining exemption from statutory limits (if needed)

COST

- Capital cost
- Post-removal site control cost
- Present worth cost

(EPA 1993)

NEPA values associated with short- and long-term effectiveness may include potential impacts upon the following resources: land use, socioeconomics, air quality and noise, vegetation, wildlife, threatened and endangered species, cultural resources, groundwater, surface water, floodplains, wetlands, soils and prime farmland, transportation, and cumulative impacts.

5.1 ALTERNATIVE 1 – NO ACTION

In this alternative, the facilities would be left in their current condition. Existing institutional controls that limit public and worker access to the on-site facilities would be maintained. No new controls would be implemented. Support systems (i.e., fire protection) would be maintained in an operable condition. No repairs or modifications to the facilities would be undertaken. Demolition of the facilities would not take place until a future date.

5.1.1 Effectiveness

Protectiveness and ability to achieve RAOs – Since this alternative consists of no action, the short-term risks to the public, the workers, and the environment would remain unchanged. Existing hazards to workers and the public would continue to be controlled with institutional controls that restrict access to the facilities.

In the long term, a gradual reduction in protection of human health and environment would result from the deterioration of the facilities, with the potential for risk to on-site worker health and safety resulting from the eventual failure of building structures. Releases of contaminants to the atmosphere and surface water pathway could potentially occur. ACM also could be released as the structures deteriorate. The release of hazardous constituents to the surface water pathway could result in unacceptable concentrations of such constituents at site compliance monitoring points. Animal intruders, such as mice and birds, could track contamination outside of the facilities. The inevitable deterioration of these facilities eventually could result in the release of contamination to the environment. This could present a hazard to on-site workers due to physical dangers associated with roof and building structure failure and the release of contaminants and to the off-site public from the potential migration of releases.

With regard to NEPA values, this alternative could inhibit future land use, since the existing structures would remain in place. The contaminants in each building would present limited impacts to air, soil, and other affected environments, unless a catastrophic release occurred. Wetlands and floodplains would not be affected. No federal- or state-listed Threatened and Endangered (T&E) plant or animal species have been identified at these facilities. The federally endangered Indiana bat (*Myotis sodalis*) potentially occurs in the vicinity, but these structures do not provide suitable habitat. This alternative would not have any direct or indirect adverse impacts on local socioeconomic resources.

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 their activities may have on minority and low-income populations. No census tracts near the PGDP include a higher proportion of minorities than the national average. Some nearby tracts meet the definition of low-income populations, but there would be no disproportionate or adverse environmental justice impacts to any minority or low-income populations.

5.1.2 Implementability

Technical and administrative feasibility – The no action alternative is readily implementable. No specialized services or equipment are required. No off-site or on-site waste disposal is required.

Availability of services and materials – Existing site services can maintain current institutional controls.

5.1.3 Cost

The cost for Alternative 1 as described, with no further surveillance and maintenance activities, is $0, as no activities would be performed. However, maintenance costs likely would be required to address regulatory requirements and limit impacts on other facilities. Ultimate costs for cleanup of contaminants from these facilities at a later time could be greatly increased if a release occurred as a result of building degradation.

5.2 ALTERNATIVE 2 – REMOVE CONTENTS, DEMOLISH STRUCTURE, AND DISPOSE OF WASTES

In this alternative, the building contents would be removed and the building structure dismantled to the top of the ground-level slab. In the case of C-402, the basement structure would be left intact and protected to prevent the migration of contaminants that may remain. Limited decontamination and/or stabilization of the slabs might be required to prevent the migration of any contaminants.

5.2.1 Effectiveness

Protectiveness and ability to achieve RAOs – Based on the streamlined risk evaluation, the D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter would prevent, minimize, or eliminate potential and actual risks to workers and ecological receptors posed by the release or threat of release of the COPCs. Removal of the structures, equipment, and materials would prevent any migration of RCRA, PCB, or radioactive materials or constituents to the environment. The decontamination and/or stabilization of the remaining building slabs would isolate any remaining constituents from the environment. Maintenance of institutional controls to prevent the degradation or unauthorized modification of the remaining structures would ensure that the migration of remaining constituents is prevented.

Compliance with environmental ARARs would be maintained or enhanced by this alternative. All on-site CERCLA actions would comply with substantive ARARs requirements. The ARARs for this alternative are presented in Appendix B. The transportation of waste to on-site and/or off-site disposal facilities (and any treatment that may be required to satisfy LDRs) would be performed in accordance with DOT requirements, and shipments may be performed by truck or rail. All disposal activities would be conducted in accordance with disposal site permit requirements. Implementation of this alternative would have no adverse impact on any known cultural or archeological resources.

This alternative would permanently remove contaminants in the above grade building structure from an uncontrolled environment. Wastes would be disposed of at an appropriate site that would provide long-term containment for any hazardous and/or radioactive constituents. The decontamination and/or stabilization of the remaining slab structures and the C-402 basement, along with the maintenance of existing institutional controls, would prevent any residual effects on the environment, worker health and safety, and public health and safety. Institutional controls would maintain the integrity of the remaining structures until a long-term solution is implemented.

With regard to NEPA values, leaving the concrete slabs in place could inhibit future land use. The remaining fixed contaminants would present little or no impacts to air, soil, and other affected environments. Wetlands and floodplains would not be affected. No federal- or state-listed T&E plant or animal species have been identified at these facilities. The federally endangered Indiana bat (*Myotis*

sodalis) potentially occurs in the vicinity, but these facilities do not provide suitable habitat. This alternative would not have any direct or indirect adverse impacts on local socioeconomic resources.

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 their activities may have on minority and low-income populations. No census tracts near the PGDP include a higher proportion of minorities than the national average. Some nearby tracts meet the definition of low-income populations, but there would be no disproportionate or adverse environmental justice impacts to any minority or low-income populations.

Decontamination and/or stabilization of the concrete slabs and basement of C-402 will significantly reduce the mobility of hazardous and radioactive materials.

Building deterioration that would result in any significant increase in contaminant release would not be expected during implementation of Alternative 2. Risks to on-site workers and the public would increase slightly during implementation; however, these risks are manageable by adherence to health and safety requirements and PGDP procedures. Chemical, radiological, and physical risks to workers would be controlled by engineering controls and/or PPE.

If wastes are shipped to off-site disposal facilities, there would be increased cargo- and vehicle-related transportation risks[3] to transportation workers (i.e., crew) and members of the public. A radioactive material release resulting from a transportation accident would be of minor consequence, however, because it would be quickly contained and recovered. Additionally, shipping the waste by rail rather than by truck would reduce these risks. Transportation risks for off-site waste shipments have been modeled for two similar PGDP projects.

1. In the *Engineering Evaluation/Cost Analysis for Scrap Metal Disposition at the Paducah Gaseous Diffusion Plant*, the cargo- and vehicle-related risks resulting from road and rail shipment of waste to disposal facilities in Nevada and Utah were estimated (DOE 2001a). In this analysis, the cargo-related risks, reported as the probability of latent cancer fatalities (LCF), and the vehicle-related risks, reported as expected accidents and expected fatalities resulting from accidents, were determined to be less than 1.

2. In the *Final Environmental Assessment for Waste Disposition Activities at the Paducah Site*, the cargo- and vehicle-related risks resulting from road and rail shipment of waste over a 10-year period to disposal facilities in Texas, Washington, Nevada, Tennessee, and Utah were estimated (DOE 2002). In this analysis, the cargo-related risks, reported as the probability of LCF to crew and the public, were determined to be less than 1. The cargo-related risks to a hypothetical maximum exposed individual were less than 1 in 1 million for all destinations modeled. The vehicle-related risks, reported as expected accidents and fatalities from accidents, ranged from 1.1 to less than 1, respectively. Over all shipments to all locations, the total number of accidents and fatalities predicted for the 10-year period was less than 2 and less than 1, respectively.

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[3] Vehicle-related transportation risks are independent of the types of material sent, but are related to the method of transportation (e.g., road, rail), the number of shipments, and the distance traveled. Cargo-related transportation risks are concerned with the risks to expected receptors (e.g., drivers, members of the public) from hypothetical exposure to waste transported.

Transportation risks for this removal action alternative are expected to be less than those derived in the two earlier studies. The total waste volume for this removal action will be less than that associated with the two prior studies, and the contaminant concentrations in waste will be similar to or less than those associated with the two prior studies. If waste is shipped to the C-746-U Landfill as part of the alternative, transportation risks will be markedly lower than those calculated in earlier studies because use of public roads would be minimized and waste would be transported a short distance, relative to shipment to off-site locations considered.

5.2.2 Implementability

Technical and administrative feasibility – This alternative is technically feasible. Conventional construction/demolition techniques would be used to remove the equipment and building infrastructure. Decontamination and/or stabilization of the concrete slabs and the C-402 basement would utilize techniques that have been effectively used at PGDP in other areas with similar concerns. On-site and/or off-site disposal of waste materials would take place at existing facilities with sufficient existing capacities.

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

5.2.3 Cost

The escalated estimated cost of Alternative 2 is approximately $8,500,000, total for all three facilities. (Cost is dependent on the actual waste type and volume, so the estimated costs may vary once the wastes are fully characterized and the actual volumes are known.)

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6. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

In this section, the alternatives are compared against each other for each of the criteria used in the analysis. Table 6.1 the comparative analysis.

6.1 EFFECTIVENESS COMPARISON

The no action alternative does not provide a long-term solution. The building structures would remain in place and would be subject to deterioration. Hazardous and radioactive constituents potentially would be released to the environment at an increasing rate.

Alternative 2 would result in greater short-term risks than Alternative 1, but with the appropriate planning and controls, these risks could be controlled at an acceptable level.

The demolition alternative would be the most effective alternative to isolate the facility contaminants from the environment. This alternative would provide a long-term solution by removing the contaminants to an appropriate disposal facility.

6.2 IMPLEMENTABILITY COMPARISON

Alternative 1 would be easiest to implement technically because no additional activities would be required; however, both alternatives are implementable using existing technologies and services.

6.3 COST COMPARISON

Cost estimates are presented in Table 6.1. The cost for the No-Action alternative is clearly less than the cost for Alternative 2. However, because Alternative 1 simply delays the D&D of these facilities, additional limited costs could be incurred for continuing S&M. In addition, the (undiscounted) cost would continue to increase, and the future inevitable D&D of the facilities would add future cost to this alternative that could be expected to be similar to the cost of Alternative 2.

Table 6.1. Comparative analysis of removal action alternatives

Alternative	Effectiveness	Implementability	Cost [A]
1. No Action	• Will not achieve RAOs. • Will not remove hazardous and radioactive constituents. • Least protective of human health and the environment. • Highest potential for environmental release. • Does not provide a long-term solution or permanent solution. • Results in no progress toward site cleanup goals.	• Readily implementable technically. • Generates no wastes.	$ 0
2. Removal of facility infrastructure, equipment, and stored materials	• Will achieve RAOs. • Most protective of human health and the environment. • Could be implemented in compliance with ARARs. • Could be implemented in such a manner that is protective of workers and the public. • Potential off-site shipments of waste would create transportation risks. • Provides a long-term solution. • Results in progress toward site cleanup goals. • Most effective at isolating contaminants from the environment.	• Readily implementable. • Generates wastes	$ 8,500,000

A – Escalated estimated cost

7. RECOMMENDED REMOVAL ACTION ALTERNATIVE

The recommended removal action alternative for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter is Alternative 2. This alternative consists of the following components:

- Remove, characterize, transport, and dispose of all equipment and materials stored in each facility at an appropriate on- or off-site disposal/storage facility (including any treatment that may be necessary to meet LDRs);

- Disconnect and remove utilities from inside the facilities;

- Disassemble and remove each structure down to the building slab (no subsurface removal required);

- Containerize, characterize, transport, and dispose of all waste from the structures or slabs/foundations at an appropriate on- or off-site disposal/storage facility (including any treatment that may be necessary to meet LDRs); and

- Stabilize and/or decontaminate the concrete slabs, as necessary, to prevent the migration of any contaminants (including the basement of the C-402 Lime House). Although not required, if DOE elects, at its sole discretion, to remove slabs and/or foundations, the wastes generated by such removal will be disposed at an appropriate on- or off-site disposal/storage facility (including any treatment that may be necessary to meet LDRs).

This alternative has been determined to be the most cost-effective approach that satisfies the RAOs for D&D of these facilities.

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APPENDIX A

PHOTOGRAPHS

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Figure A.1 C-402 Lime House

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Figure A.2 C-405 Incinerator

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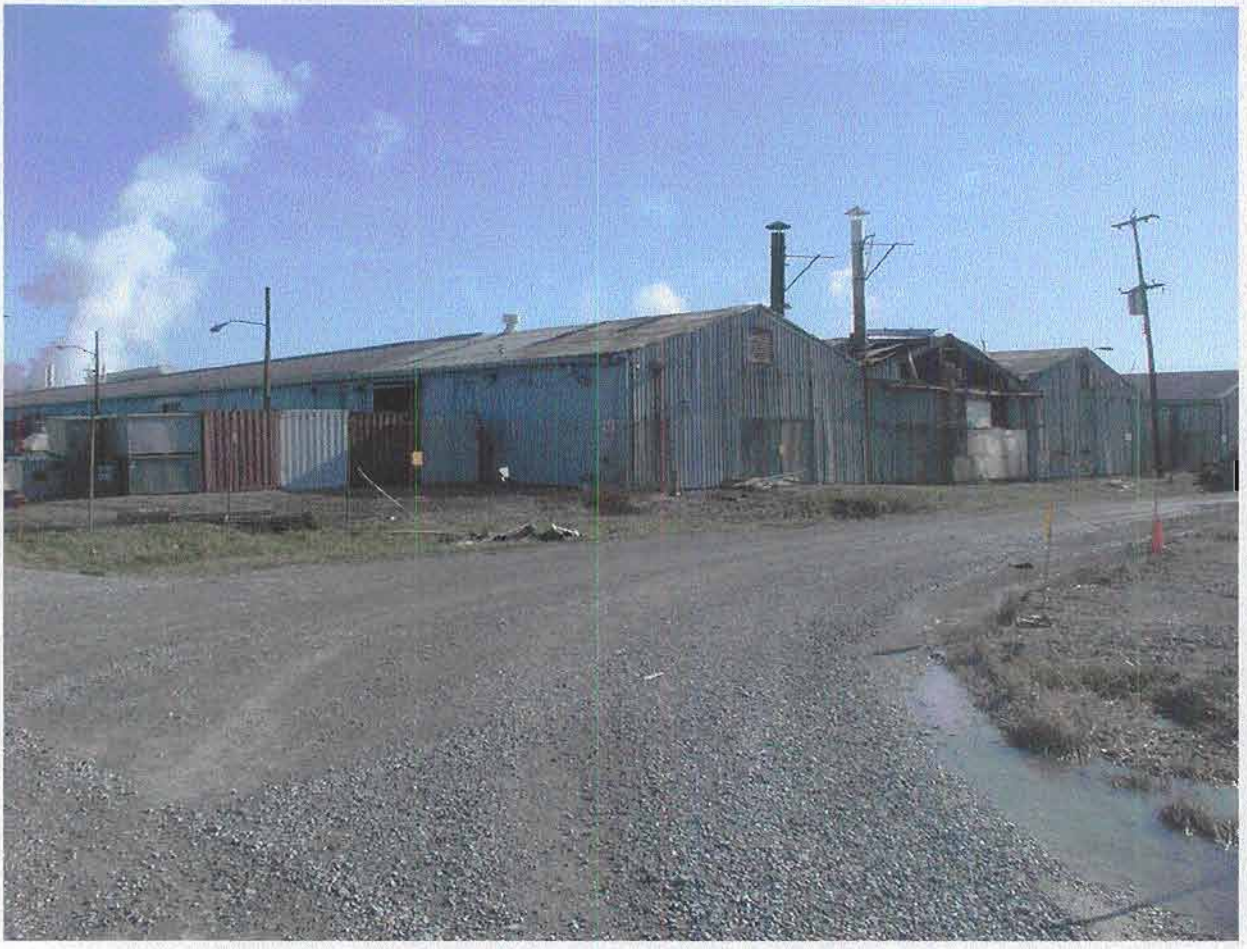

Figure A.3 C-746-A West End Smelter

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APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) AND TO-BE-CONSIDERED (TBC) GUIDANCE

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ACRONYMS FOR APPENDIX B

ALARA	as low as reasonably achievable
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
CAA	Clean Air Act of 1970, as amended
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
CFR	*Code of Federal Regulation*
CWA	Clean Water Act
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDE	effective dose equivalent
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
KAR	*Kentucky Administrative Regulations*
LLW	low-level (radioactive) waste
NHPA	National Historic Preservation Act of 1966
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act of 1976, as amended
SHPO	State Historic Preservation Officer
SWMU	solid waste management unit
TBC	to be considered
T&E	threatened and endangered
TSCA	Toxic Substances Control Act of 1976, as amended

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B-1. INTRODUCTION

In accordance with Sect. 40 *Code of Federal Regulations* (*CFR*) Section 300.415(j) of the National Oil and Hazardous Substances Pollution Contingency Plan and U.S. Department of Energy (DOE) Headquarters guidance, DOE on-site removal actions conducted under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, are required to attain applicable or relevant and appropriate requirements (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 300.405(g)(3), other advisories, criteria, or guidance may be considered in determining remedies [to-be considered (TBC) category]. The decontamination and decommissioning (D&D) removal action alternatives include removal of stored materials, equipment, infrastructure, and any waste materials generated during the removal action; demolition of the building structures; and characterization and disposal of the generated wastes. The removal action alternatives (i.e., other than no action) would comply with all identified ARARs/TBCs and would not require an ARAR waiver.

ARARs are typically divided into three groups: (1) chemical-specific, (2) location-specific, and (3) action-specific. Tables B.1, B.2, and B.3 list the chemical-, location-, and action-specific ARARs/TBCs, respectively, for the D&D removal action. In some cases, the conditions associated with the prerequisite requirements have not been confirmed to be present; if the subject condition is encountered during implementation of the action, then the specified ARAR would apply. A brief description of key ARAR/TBC topics follows.

B-2. CHEMICAL-SPECIFIC ARARs/TBCs

Chemical-specific ARARs provide health or risk-based concentration limits or discharge limitations in various environmental media (i.e., surface water, groundwater, soil, and air) for specific hazardous substances, pollutants, or contaminants; these are listed on Table B.1 and discussed below.

The radiation dose to members of the public must not exceed 100-millirem (mrem)/year total effective dose equivalent from all sources excluding dose contributions from background radiation, medical exposures, or voluntary participation in medical/research programs [10 *CFR* 20.1301(a)(1); 902 *KAR* 100:019 Section 10(1)] and must be reduced below this limit as low as reasonably achievable (ALARA) per 10 *CFR* 20.1101(b); 902 *KAR* 100:015 Section 2. This dose limit addresses exposure to radiation from all sources and activities (including both operations and removal/remedial actions) at a facility. In addition, DOE is required to use procedures to maintain the dose ALARA. Thus, the actual dose that the public might receive from any individual activity such as this removal action is expected to be a very small fraction of the 100-mrem/year dose limit.

B-3. LOCATION-SPECIFIC ARARs/TBCs

Location-specific requirements establish restrictions on permissible concentrations of hazardous substances or establish requirements for how activities will be conducted because they are in special locations (e.g., wetlands, floodplains, critical habitats, historic districts, and streams). Table B.2 lists federal and state location-specific ARARs for protection of cultural or sensitive resources.

B.3.1 FLOODPLAINS AND WETLANDS

None of the activities associated with the removal action alternatives would be conducted within any floodplain. In addition, no wetlands are present at or near the vicinity of the buildings. Thus, no impacts to either floodplains or wetlands would result from any of the alternatives considered for this proposed removal action.

B.3.2 THREATENED AND ENDANGERED SPECIES

None of the removal action alternatives would adversely impact any federally or state-listed threatened or endangered (T&E) species located or seen at Paducah Gaseous Diffusion Plant (PGDP). Consequently, none of the requirements for protection of T&E species or critical habitat are included as ARARs.

B.3.3 CULTURAL RESOURCES

No archeological surveys have been conducted at PGDP; however, this removal action will not involve any outdoor excavation.

Historic buildings and structures at PGDP are located within the boundaries of the National Register of Historic Places (NRHP)-eligible PGDP Historic District, which was identified in the *Cultural Resource Survey for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (BJC/PAD-688). The three facilities that are the subject of this removal action are considered to be contributing to the character of the district. Prior to demolition of these structures, the DOE NHPA Coordinator will provide the Kentucky State Historic Preservation Officer (SHPO) with the following documentation, consistent with Section III(D)(1) of the *Programmatic Agreement for Management of Historic Properties at the Paducah Gaseous Diffusion Plant*: (1) Kentucky Intensive Historic Resource Inventory Forms, (2) photographs showing all exterior elevations, interior woodwork and architectural elements, and other significant, character defining details, and (3) measured drawings (optional). Consultation with and concurrence of the SHPO and the Council are administrative, legal requirements that are not applicable to this CERCLA removal action in accordance with CERCLA Section 121(e)(1) and Section XXI of the PGDP FFA.

B-4. ACTION-SPECIFIC ARARs/TBCs

Action-specific ARARs include operation, performance, and design requirements or limitations based on the waste types, media, and removal/remedial activities. ARARs for the D&D alternatives include requirements related to waste characterization, scrap metal removal, decontamination, waste storage, treatment and disposal and transportation of hazardous materials.

B.4.1 BUILDING REMEDIATION

The D&D alternatives include removal of scrap metal, equipment, infrastructure, any waste materials and debris, and where necessary, stabilization of concrete surfaces, etc. Requirements under the Clean Air Act (CAA) of 1970, as amended for control of asbestos and/or radionuclide emissions included in Table B.3 would have to be met.

B.4.2 WASTE MANAGEMENT

Building remediation activities may result in generation of, RCRA solid or hazardous waste, low level radioactive waste (LLW), mixed waste, asbestos-containing waste materials, Toxic Substances Control Act (TSCA) of 1976, as amended, polychlorinated biphenyls (PCBs) in fluorescent light ballasts, capacitors or drained equipment, 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 where the concentration at the time of designation for disposal was greater than or equal to 50 parts per million (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., D&D debris, removed waste materials) and secondary wastes (e.g., contaminated personal protective equipment, decontamination wastes) generated during building remediation activities must be appropriately characterized and managed in accordance with appropriate RCRA, CAA, TSCA, or DOE Order requirements as specified in the ARARs Tables. Hazardous waste determinations will be made based on a representative sample in accordance with EPA guidance contained in 57 *FR* 990; this allows consideration of RCRA hazardous constituents in the same proportions as they are found with the associated construction/demolition debris and does not require sorting and segregation of individual waste items (e.g., fuses) for separate management. Table B.3 lists the requirements associated with the characterization, storage, treatment, and disposal of the aforementioned waste types. For this project the Area of Contamination (AOC) includes (but is not necessarily limited to) the footprint of the three facilities. Consistent with EPA policy, the movement, consolidation, and storage of hazardous waste within the AOC do not trigger RCRA storage or disposal requirements. Hazardous and other waste may be accumulated and stored at the work site for the duration of the project. Although the generation of TRU waste is not anticipated, it is possible that a small volume of TRU waste could be generated as a result of the action. Accordingly, as a contingency, standards for TRU waste management are included in Table B.3.

B.4.3 LAND USE CONTROLS

In accordance with DOE Order 5400.5(IV)(6)(c), interim controls, including physical barriers (i.e., fences, signs) to prevent access, and appropriate radiological safety measures will be used, if necessary to prevent disturbance of any residual radioactive material that may remain on/in the concrete foundations.

B.4.4 TRANSPORTATION

Any wastes transferred off-site or transported in commerce along public right-of-ways must meet the requirements summarized on Table B.3, depending on the type of waste (e.g., RCRA, PCB, LLW, or mixed). These include packaging, labeling, marking, manifesting, and placarding requirements for hazardous

materials at 49 *CFR* 170–180 *et seq.* However, transport of D&D wastes along roads within the PGDP site that are not accessible to the public would not be considered "in commerce."

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

B.4.5 RCRA CLOSURE REQUIREMENTS

The West End Smelter was identified as Solid Waste Management Unit (SWMU) 464 in 2001 and currently is an unused warehouse. The West End Smelter is listed in the PGDP's RCRA Part A application as a unit requiring RCRA closure, because RCRA hazardous light bulbs were stored in the facility. These wastes have been removed from the facility. No release of hazardous waste or hazardous constituents is known to have occurred as a result of the storage of the light bulbs. Previous characterization of other materials has occurred (e.g., slag), and no other hazardous wastes are known to be present in the facility.

The removal action will comply with the substantive requirements of storage facility closure standards, as listed in Table B.3, as follows.

A visual inspection of the floors and any associated equipment where the RCRA hazardous light bulbs were previously stored will be conducted to verify that there have been no releases or residues from the previously stored hazardous waste light bulbs. In the event any additional hazardous waste is discovered in storage in the West End Smelter, such waste will be removed from the facility and a visual inspection of the waste package, the surrounding floor, and nearby equipment will be conducted to ascertain whether releases of such stored hazardous waste have occurred or whether residues of such waste are present. If there is affirmative evidence of a release or residue of any such stored hazardous waste, DOE either will (a) satisfy the closure performance standard for decontaminating equipment or floors contaminated with such releases or residues or, (b) at DOE's sole option, DOE will notify EPA and Kentucky of intent to defer attainment of such closure performance standard to follow-on response actions under the D&D OU.

Decontamination of the floor may be performed using one of the technologies set forth in Section 4.1.2 of the EE/CA. Confirmatory sampling will be conducted as appropriate. Parameters analyzed will be based on the hazardous waste and hazardous waste constituents in the waste stream.

The C-402 Lime House and C-405 incinerator are not subject to RCRA closure requirements.

B.4.6 PERMIT EXEMPTION

In accordance with CERCLA Section 121(e)(1) and Section XXI of the PGDP Federal Facility Agreement (FFA), the portions of this removal action conducted entirely on-site are exempted from the requirements to obtain federal, state, or local permits. Per EPA guidance, the permit exemption applies to all administrative requirements, whether or not they actually are styled as permits. The portion of the removal action conducted entirely on-site will comply with the substantive requirements of the ARARs identified herein.

Table B.1. Chemical-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter

Action/medium	Requirements	Citations
Release of radionuclides into the environment	Exposure to individual members of the public from radiation shall not exceed a total EDE of 0.1 rem/year (100 mrem/year), exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs — **relevant and appropriate.**	10 *CFR* 20.1301(a)(1); 902 *KAR* 100:019 Section 10 (1)
	Shall use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA — **relevant and appropriate.**	10 *CFR* 20.1101(b); 902 *KAR* 100:015 Section 2

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
D&D = decontamination and decommissioning
EDE = effective dose equivalent
KAR = *Kentucky Administrative Regulations*
mrem = millirem
TBC = to be considered.

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Table B.2. Location-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter

Location characteristics	Requirements	Prerequisite	Citations
	Cultural resources		
Presence of historic properties (including artifacts, records, or remains located within such properties)	Must consider the adverse effects on historic properties per Sect. 106 of the NHPA.	Undertaking [as defined in 36 *CFR* 800.16(y)] that has the potential to affect historic property on or eligible for inclusion on the NRHP — **ARAR**.	36 *CFR* 800.1(a) 36 *CFR* 800.3
	Determine adverse effects per 36 *CFR* 800.5(a)(1), and if found, evaluate alternatives or modifications to the undertaking to avoid, minimize, or mitigate the adverse effects on the property.		36 *CFR* 800.5(a) and (d) 36 *CFR* 800.6

ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
D&D = decontamination and decommissioning
NHPA = National Historic Preservation Act of 1966
NRHP = National Register of Historic Places
TBC = to be considered

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter

Action	Requirements	Prerequisite	Citations
	General construction standards		
Activities causing airborne radionuclide emissions	Shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 mrem per year. NESHAP analysis required prior to conducting activity.	Radionuclide emissions from point sources, as well as diffuse or fugitive emissions, at a DOE facility — **applicable.**	40 *CFR* 61.92; 401 *KAR* 57:002; 401 *KAR* 63:002;
Standards for fugitive dust emissions	Take reasonable precaution to prevent particulate matter from becoming airborne; this may include use of water or chemicals for control of dust in the demolition of existing buildings or structures and covers for open bodied trucks transporting materials likely to become airborne. 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.	Generation of fugitive dust emissions — **applicable**.	401 *KAR* 63:010
Emission of potentially hazardous matter or toxic substances	In the absence of other specific regulations, provide the utmost care and consideration when handling such materials and do not allow any facility to emit such materials in such quantities or duration as to be harmful to the health and welfare of humans, animals, and plants.	Emission of potentially hazardous matter or toxic substances — **TBC**.	401 *KAR* 63:020
	Decontamination and waste removal standards		
Removal of regulated asbestos-containing material (RACM) from a facility	Substantive requirements for asbestos emission control per 40 *CFR* 61.145(c)(1-10) 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 58:020; 401 *KAR* 57:002; 401 *KAR* 63:002
Requirements for asbestos abatement activities	Substantive requirements for asbestos abatement activities.	Asbestos abatement activities — **applicable** (substantive portions).	401 *KAR* 58:005; 401 *KAR* 58:040
	Waste generation, characterization, segregation, and storage—removed wastes, debris, and secondary wastes		
Characterization of solid waste ***(all primary and secondary wastes)***	Must determine if solid waste is hazardous waste or if waste is excluded under 40 *CFR* 261.4(b) [401 *KAR* 32:010 Section 4]; and	Generation of solid waste (as defined in 40 *CFR* 261.2) that is not excluded under 40 *CFR* 261.4(a) — **applicable.**	40 *CFR* 262.11(a); 401 *KAR* 32:010 Section 2(1)
	Must determine if waste is listed under 40 *CFR* Part 261[401 *KAR* 31:040]; or		40 *CFR* 262.11(b); 401 *KAR* 32:010 Section 2(2)
	Must characterize waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.		40 *CFR* 262.11(c); 401 *KAR* 32:010 Section 3

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	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 that is determined to be hazardous — **applicable.**	40 CFR 262.11(d); 401 *KAR* 32:010 Section 4
Characterization of hazardous waste ***(all primary and secondary wastes)***	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* 264 and 268.	Generation of RCRA hazardous waste for storage, treatment, or disposal — **applicable.**	40 *CFR* 264.13(a)(1); 401 *KAR* 34:020 Section 4(1)(a)
	Must determine the underlying hazardous constituents [as defined in 40 CFR 268.2(i)] in the D001, D002, D012-D043 waste.	Generation of RCRA characteristic hazardous waste [other than D001 High total organic carbon (TOC) Subcategory or treated by technology codes "CMBST" or "RORGS"] for storage, treatment or disposal — **applicable.**	40 CFR 268.9(a) 401 *KAR* 37:010 Section 9(1)
	Must determine if the waste is restricted from land disposal under 40 *CFR* 268 *et seq.* by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 *CFR* 268.7; 401 *KAR* 37:010 Section 7
	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 CFR 268.40 *et. seq.*		40 CFR 268.9(a) 401 *KAR* 37:010 Section 9(1)
Temporary 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 Section 5
	• waste is placed in containers that comply with 40 CFR 265.171–173, and		40 *CFR* 262.34(a)(1)(i); 401 *KAR* 32:030 Section 5(1)(a)
	• 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 Section 5(1)(b)
	• container is marked with the words "hazardous waste," or		40 *CFR* 262.34(a)(3); 401 *KAR* 32:030 Section 5(1)(c)
	• container may be marked with other words that identify the contents.	Accumulation of 55 gal. or less of RCRA hazardous waste at or near any point of generation — **applicable.**	40 *CFR* 262.34(c)(1); 401 *KAR* 32:030 Section 5(3)(a)
Management of hazardous waste in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers — **applicable.**	40 *CFR* 265.171; 401 *KAR* 34:180 Section 2

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	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* 34:180 Section 3
	Keep container closed during storage, except to add/remove waste.		40 *CFR* 265.173(a); 401 *KAR* 34:180 Section 4(1)
	Open, handle, and store containers in a manner that will not cause containers to rupture or leak.		40 *CFR* 265.173(b); 401 *KAR* 34:180 Section 4(2)
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 *CFR* 264.175(b) [401 *KAR* 34:180 Section 6(2)]. Requirement for a permit is exempted as an administrative requirement in accordance with Section XXI of the PGDP FFA and Section 121 of CERCLA.	Storage of RCRA-hazardous waste in containers with free liquids — **applicable.**	40 *CFR* 264.175(a); 401 *KAR* 34:180 Section 6(1)
	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. Requirement for a permit is exempted as an administrative requirement in accordance with Section XXI of the PGDP FFA and Section 121 of CERCLA.	Storage of RCRA-hazardous waste in containers that do not contain free liquids — **applicable.**	40 *CFR* 264.175(c); 401 *KAR* 34:180 Section 6(3)
Storage of RCRA lamps ***(e.g., fluorescent, mercury vapor)***	Must contain any lamp in containers or packages that are structurally sound, adequate to prevent breakage, and compatible with the contents of the lamps.	Management of "universal waste lamp" as defined in 40 CFR 273.9 that are RCRA characteristic hazardous waste — **applicable.**	40 CFR 273.13(d)(1); 401 *KAR* 43:020 Section 4(4)(a)
	Containers must be closed, structurally sound, compatible with the contents of the lamps and must lack evidence of leakage, spillage, or damage that could cause leakage or releases of mercury or other hazardous constituents to the environment under reasonably foreseeable conditions.		40 CFR 273.13(d)(2); 401 *KAR* 43:020 Section 4(4)(a)
	Each lamp or a container or package in which such lamps are contained must be labeled or marked clearly with one of the following phrases: "Universal Waste-Lamp(s)," or "Waste Lamps," or "Used Lamps."		40 CFR 273.14(e); 401 *KAR* 43:020 Section 5(5)
	Mark or label the individual item with the date the lamp(s) became a waste, or mark or label the container or package with date wastes received.		40 CFR 273.15(c)(1)-(6); 401 *KAR* 43:020 Section 6(3)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
Characterization of LLW ***(e.g., radioactively contaminated equipment, debris)***	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)(a)
	• 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)
	• any other information that may be needed to prepare and maintain the disposal facility performance assessment or demonstrate compliance with performance objectives.		DOE M 435.1-1(IV)(I)(2)(g)
Temporary storage of LLW ***(e.g., radioactively contaminated equipment, debris)***	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)
	Shall be managed to identify and segregate LLW from mixed waste.		DOE M 435.1-1(IV)(N)(6)
Packaging of solid LLW for storage ***(e.g., radioactively contaminated equipment, debris)***	Shall be packaged in a manner that provides containment and protection for the duration of the anticipated storage period and until disposal is achieved or until the waste has been removed from the container.	Storage of LLW in containers at a DOE facility — **TBC.**	DOE M 435.1-1(IV)(L)(1)(a)
	Vents or other measures shall be provided if the potential exists for pressurizing or generating flammable or explosive concentrations of gases within the waste container.		DOE M 435.1-1(IV)(L)(1)(b)
	Containers shall be marked such that their contents can be identified.		DOE M 435.1-1(IV)(L)(1)(c)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
Management of asbestos-containing waste prior to disposal ***(e.g., transite siding, pipe lagging, insulation, and ceiling tiles)***	Discharge no visible emissions to the outside air, or use one of the emission control and waste treatment methods specified in paragraphs (a)(1) through (a)(4) of 40 *CFR* 61.150.	Collection, processing, packaging, or transporting of any asbestos-containing waste material generated by demolition activities — **applicable.**	40 *CFR* 61.150(a); 401 *KAR* 58:020; 401 *KAR* 57:002; 401 *KAR* 63:002
Management of PCB waste ***(e.g., PCB liquids, PCB-contaminated articles, PCB bulk-product wastes)***	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D.	Generation of waste containing PCBs— **applicable.**	40 *CFR* 761.50(a)
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Generation of PCB remediation waste (as defined in 40 *CFR* 761.3) — **applicable.**	40 *CFR* 761.61
Management of PCB/ radioactive waste ***(e.g., PCB liquids, PCB-contaminated articles, PCB bulk-product wastes)***	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).	Storing PCB/radioactive waste with ≥50 ppm PCBs — **applicable.**	40 *CFR* 761.50(b)(7)(i)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties. If, after taking into account only the PCB properties in 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)], the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone in accordance with applicable requirements.		40 *CFR* 761.50(b)(7)(ii)
Temporary storage of PCB waste ***(e.g., PCB liquids, PCB-contaminated articles, PCB bulk-product wastes)***	Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a).	Storage of PCBs and PCB items at concentrations ≥50 ppm for disposal — **applicable.**	40 *CFR* 761.65(a)(1)
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)
	Any leaking PCB items and their contents shall be transferred immediately to a properly marked non-leaking container(s).		40 *CFR* 761.65(c)(5)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	The date shall be recorded when PCB items are removed from service, and the storage shall be managed such that PCB items can be located by this date. (Note: Date should be marked on the container.)	PCB items (includes PCB wastes) removed from service for disposal — **applicable.**	40 *CFR* 761.65(c)(8)
	Container(s) shall be in accordance with requirements set forth in DOT hazardous materials regulations (HMR) at 49 *CFR* 171–180.		40 *CFR* 761.65(c)(6)
Storage of PCB/radioactive waste in containers ***(e.g., PCB liquids, PCB-contaminated articles, PCB bulk-product wastes)***	For liquid wastes, containers must be non-leaking. For non-liquid 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).	Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performances standards — **applicable.**	40 *CFR* 761.65(c)(6)(i)(A) 40 *CFR* 761.65(c)(6)(i)(B)
	For both liquid and non-liquid wastes, containers must meet all regulations and requirements pertaining to nuclear criticality safety.		40 *CFR* 761.65(c)(6)(i)(C)
Storage of PCB waste and/or PCB/radioactive waste in a non-RCRA regulated unit	Storage facility must have or be	Storage of PCBs and PCB items at concentrations ≥50 ppm for disposal — **applicable.**	40 *CFR* 761.65(b)(1)
	• adequate roof and walls to prevent rainwater from reaching stored PCBs and PCB items;		40 *CFR* 761.65(b)(1)(i)
	• adequate floor that has continuous curbing with a minimum 6-in.-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 in. 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, nonporous surface that prevents or minimizes penetration of PCBs; and		40 *CFR* 761.65(b)(1)(iv)
	• not located at a site that is below 100-year flood water elevation		40 *CFR* 761.65(b)(1)(v)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)
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 meets one of the following criteria:	Storage of PCBs and PCB items designated for disposal — **applicable**.	40 *CFR* 761.65(b)(2)
	• is permitted by EPA under RCRA Sect. 3004, and PCB spills are cleaned up in accordance with Subpart G of 40 *CFR* 761;		40 *CFR* 761.65(b)(2)(i)
	• qualifies for interim status under RCRA Sect. 3005, and PCB spills are cleaned up in accordance with Subpart G of 40 *CFR* 761;		40 *CFR* 761.65(b)(2)(ii)
	• is permitted by an authorized state under RCRA Sect. 3006, and PCB spills are cleaned up in accordance with Subpart G of 40 *CFR* 761; or		40 *CFR* 761.65(b)(2)(iii)
	• is approved or otherwise regulated pursuant to a State PCB waste management program, or is subject to a TSCA Coordinated Approval or has a TSCA PCB waste management approval.		40 *CFR* 761.65(c)(1)(iv)-(vi)
Temporary storage of PCB remediation waste or bulk PCB bulk-product waste in a waste pile	Waste must be placed in a pile that	Storage of PCB remediation waste or PCB bulk-product waste at cleanup site or site of generation for up to 180 days — **applicable**.	40 *CFR* 761.65(c)(9)(i)
	• is designed and operated to control dispersal by wind, where necessary, by means other than wetting;		
	• does not generate leachate through decomposition or other reactions; and		40 *CFR* 761.65(c)(9)(ii)
	• is at a storage site with a liner designed, constructed, and installed to prevent any migration of wastes off or through liner into adjacent subsurface soil, groundwater, or surface water.		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 prevent failure because of settlement compression or uplift; and		40 *CFR* 761.65(c)(9)(iii)(A)(2)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	• 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.		40 *CFR* 761.65(c)(9)(iii)(B)
	Has a run-on control system designed, constructed, operated, and maintained such that it prevents flow on the stored waste during peak discharge from at least a 25-year storm, and collects and controls at least the water volume resulting from a 24-hour, 25-year storm.		40 *CFR* 761.65(c)(q)(iii)(e)(1) and (2)
	Requirements of 40 *CFR* 761.65(c)(9) of this part may be modified under the risk-based disposal option of 40 *CFR* 761.61(c) if it will not pose an unreasonable risk to human health and the environment.		40 *CFR* 761.65(c)(9)(iv)
	Treatment/disposal of waste—removed wastes, debris, and secondary wastes		
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); 401 *KAR* 37:040 Section 1
Disposal of RCRA wastewaters	Are not prohibited unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40, or are D003 reactive cyanide. (RCRA regulations contain exemption from CWA permit.)	Restricted RCRA characteristic hazardous waste waters managed in a treatment system that is NPDES permitted — **applicable.**	40 *CFR* 268.1(c)(4)(iv); 401 *KAR* 37:010 Section 2 (5)(e)
Disposal of hazardous debris	May be land disposed if it meets the requirements in the table "Alternative Treatment Standards for Hazardous Debris" at 40 *CFR* 268.45 before land disposal 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); 401 *KAR* 37:040 Section 6(1)
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.	Treated debris contaminated with RCRA-listed or characteristic waste — **applicable.**	40 *CFR* 268.45(c); 401 *KAR* 37:040 Section 6(3)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	Hazardous debris contaminated with listed waste that is treated by immobilization technology must be managed in a RCRA Subtitle C facility.		
Disposal of hazardous debris treatment residues	Except as provided in 268.45(d)(2) and (d)(4), residues from treatment of hazardous debris must be separated from debris, and such residues are subject to the waste-specific treatment standards for the waste contaminating the debris.	Treated debris contaminated with RCRA-listed or characteristic waste — **applicable.**	40 *CFR* 268.45(d)(1); 401 *KAR* 37:040 Section 6(4)(a)
Packaging of LLW for disposal ***(e.g., radioactively contaminated equipment, debris)***	Must not be packaged for disposal in cardboard or fiberboard boxes.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(b)
	Must be solidified or packaged in sufficient absorbent material to absorb twice the volume of liquid.	Generation of liquid LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(c)
	Shall contain as little free standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.	Generation of solid LLW containing liquid for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(d)
	Must not be capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures or of explosive reaction with water.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(e)
	Must not contain, or be capable of generating, quantities of toxic gases, vapor, or fumes.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(f)
	Must not be pyrophoric.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(g)
	Gaseous waste must be packages at a pressure not to exceed 1.5 atmospheres at 20°C.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(h)
	Wastes containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the nonradiological materials.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(1)(I)
	Must have structural stability either by processing the waste or placing the waste in a container or structure that provides stability after disposal.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(2)(a)(2)
	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% of the volume of the waste for waste processed to a stable form.	Generation of liquid LLW or LLW containing liquids for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(2)(b)
	Void spaces within the waste and between the waste and its package must be reduced to the extent practicable.	Generation of LLW for disposal at a LLW disposal facility — **relevant and appropriate.**	902 *KAR* 100:021 Section 7(2)(c)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
Treatment of LLW	Treatment to provide more stable waste forms and to improve the long-term performance of a LLW disposal facility shall be implemented as necessary to meet the performance objectives of the disposal facility.	Generation of LLW for disposal at a LLW disposal facility — **TBC.**	DOE M 435.1-1(IV)(O)
Treatment of uranium and thorium bearing LLW	Such wastes shall be properly conditioned so that the generation and escape of biogenic gases will not cause exceedance of Rn-222 emission limits of DOE Order 5400.5(IV)(6)(d)(1)(b) and will not result in premature structure failure of the facility.	Placement of potentially biodegradable contaminated wastes in a long-term management facility — **TBC.**	DOE Order 5400.5(IV)(6)(d)(1)(c)
Disposal of solid LLW ***(e.g., radioactively contaminated equipment, debris)***	LLW shall be certified as meeting waste acceptance requirements before it is transferred to the receiving facility.	Generation of LLW for disposal at a DOE facility — **TBC.**	DOE M 435.1-01(IV)(J)(2)
Disposal of asbestos-containing waste material ***(e.g., transite siding, pipe lagging, insulation, and ceiling tiles)***	Shall be deposited as soon as practicable at • an approved waste disposal site operated in accordance with 40 *CFR* 61.154 or • an EPA-approved site that converts RACM and asbestos-containing waste material into non-asbestos (asbestos-free) material according to the provisions of 40 *CFR* 61.155.	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* 58:020; 401 *KAR* 57:002; 401 *KAR* 63:002 40 *CFR* 61.150(b)(1); 401 *KAR* 58:020; 401 *KAR* 57:002; 401 *KAR* 63:002 40 *CFR* 61.150(b)(2); 401 *KAR* 58:020; 401 *KAR* 57:002; 401 *KAR* 63:002
Disposal of fluorescent light ballasts	Must be disposed of in a TSCA-approved disposal facility, as bulk-product waste under 40 *CFR* 761.62, or in accordance with the decontamination provisions of 40 *CFR* 761.79.	Generation for disposal of fluorescent light ballasts containing PCBs in the potting material — **applicable.**	40 *CFR* 761.60(b)(6)(iii)
Disposal of PCB capacitor(s)	Shall comply with all requirements of Sect. 761.60 unless it is known from label or nameplate information, manufacturer's literature, or chemical analysis that the capacitor does not contain PCBs.	Generation of PCB Capacitors with ≥50 PCBs for disposal — **applicable.**	40 *CFR* 761.60(b)(2)(i)
	May dispose of in a municipal solid waste landfill unless subject to 40 *CFR* 761.60(b)(2)(iv).	Generation for disposal of intact, non-leaking PCB small capacitors (as defined in 40 *CFR* 761.3) — **applicable.**	40 *CFR* 761.60(b)(2)(ii)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	Shall dispose of in accordance with either of the following: • disposal in an incinerator that complies with 40 *CFR* 761.70 or • disposal in a chemical waste landfill that complies with 40 *CFR* 761.75.	PCB large capacitor that contains ≥500 ppm PCBs — **applicable.**	40 *CFR* 761.60(b)(2)(iii)
	Shall dispose of in one of the following disposal facilities approved under this part: • incinerator under 40 *CFR* 761.70, • chemical waste landfill under 40 *CFR* 761.75, • high-efficiency boiler under 40 *CFR* 761.70, or • scrap metal recovery oven and smelter under 40 *CFR* 761.71.	Disposal of large capacitors that contain ≥50 ppm but <500 ppm PCBs — **applicable.**	40 *CFR* 761.60(b)(4)(ii)
Disposal of PCB-contaminated electrical equipment (except capacitors)	Must remove all free-flowing liquid from the electrical equipment and dispose of the removed liquid in accordance with 40 *CFR* 760.61(a) and	Generation of PCB-contaminated electrical equipment (as defined in 40 *CFR* 761.3) for disposal — **applicable.**	40 *CFR* 761.60(b)(4)
	Dispose of by one of the following methods: • in a facility permitted, licensed, or registered by a state to manage municipal solid waste or nonmunicipal, nonhazardous waste; • in an industrial furnace operating in compliance with 40 *CFR* 761.72; or • in a disposal facility approved under this part.	Drained PCB-contaminated electrical equipment including any residual liquids — **applicable.**	40 *CFR* 761.60(b)(4)(i)(A) 40 *CFR* 761.60(b)(4)(i)(B) 40 *CFR* 761.60(b)(4)(i)(C)
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 PCB-contaminated precipitation, condensation, leachate, or load separation	May be disposed of in a chemical waste landfill which complies with 40 *CFR* 761.75 if • disposal does not violate 40 *CFR* 268.32(a) or 268.42(a)(1) and • liquids do not exceed 500 ppm PCB and are not an ignitable waste as described in 40 *CFR* 761.75(b)(8)(iii).	PCB liquids at concentrations ≥50 ppm from incidental sources and associated with PCB articles or non-liquid PCB wastes — **applicable.**	40 *CFR* 761.60(a)(3) 40 *CFR* 761.60(a)(3)(i) 40 *CFR* 761.60(a)(3)(ii)
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).	PCB remediation waste porous surfaces (as defined in 40 *CFR* 761.3) — **applicable.**	40 *CFR* 761.61(a)(5)(iii)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
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 Sect. 761.61(c).	PCB remediation waste nonporous surfaces (as defined in 40 *CFR* 761.3) — **applicable.**	40 *CFR* 761.61(a)(56)(ii)(A)
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) 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)
	Shall be disposed of in accordance with 40 *CFR* 761.61(a)(5)(i)(B)(3)(iii) 40 *CFR* 761.61(a)(5)(i)(B)(2)(iii)]. Metal surfaces may be thermally decontaminated in accordance with 40 *CFR* 761.79(c)(6)(ii).	PCB remediation waste nonporous surfaces having surface concentrations ≥100 μg/100 cm^2 — **applicable.**	40 *CFR* 761.61 (a)(5)(ii)(B)(2)
Disposal of PCB-contaminated articles ***(e.g., hydraulic machines, electrical equipment)***	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) and	Generation for disposal of PCB-contaminated articles (as defined in 40 *CFR* 761.3) — **applicable.**	40 *CFR* 761.60(b)(6)(ii)
	dispose of by one of the following methods:	Disposal of PCB-contaminated articles with no free-flowing liquid — **applicable.**	40 *CFR* 761.60(b)(6)(ii)
	• in accordance with the decontamination provisions at 40 *CFR* 761.79;		40 *CFR* 761.60(b)(6)(ii)(A)
	• in a facility permitted, licensed, or registered by a state to manage municipal solid waste or nonmunicipal, nonhazardous 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 this part.		40 *CFR* 761.60(b)(6)(ii)(D)
Disposal of PCB articles	Must be disposed of	Generation of PCB articles (with ≥500 ppm PCBs) for disposal — **applicable.**	40 *CFR* 761.60(b)(6)(i)
	• in an incinerator that complies with 40 *CFR* 761.70 or		40 *CFR* 761.60(b)(6)(i)(A)
	• in a chemical waste landfill that complies with 40 *CFR* 761.75 [provided all liquids are removed (i.e., drained) and disposed in an incinerator that complies with 40 *CFR* 761.70].		40 *CFR* 761.60(b)(6)(i)(B)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
Disposal of PCB liquids ***(e.g., from drained electrical equipment)***	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 • for liquids other than mineral oil dielectric fluid, may be disposed of in a high-efficiency boiler according to 40 *CFR* 761.71(b).	PCB liquids at concentrations ≥50 ppm and <500 ppm — **applicable.**	40 *CFR* 761.60(a)(1) 40 *CFR* 761.60(a)(2)
Performance-based disposal of PCB remediation waste ***(e.g., contaminated building structure or materials)***	May dispose of by one of the following methods:	Disposal of non-liquid PCB remediation waste (including porous and nonporous surfaces contaminated from a leaking PCB transformer) — **applicable.**	40 *CFR* 761.61(b)(2)
	• 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 approved under 40 *CFR* 761.75, • in a facility with a coordinated approval issued under 40 *CFR* 761.77, or • through decontamination in accordance with 40 *CFR* 761.79.		40 *CFR* 761.61(b)(2)(i)
Disposal of PCB cleanup wastes ***(e.g., contaminated PPE, non-liquid cleaning materials)***	Shall be disposed of in one of these: • in a facility permitted, licensed, or registered by a state to manage municipal solid waste under 40 *CFR* 258 or nonmunicipal, nonhazardous waste subject to 40 *CFR* 257.5 through 257.30; • in a RCRA Subtitle C landfill permitted by a state to accept PCB waste; • in an approved PCB disposal facility; or • through decontamination under 40 *CFR* 761.79(b) or (c).	Generation of non-liquid PCBs at any concentration during and from the cleanup of PCB remediation waste — **applicable.**	40 *CFR* 761.61(a)(5)(v)(A)
Disposal of PCB cleaning solvents, abrasives, and equipment	May be reused after decontamination in accordance with 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 bulk-product waste	May dispose of by one of the following:	Disposal of PCB bulk-product waste (as defined in 40 *CFR* 761.3) — **applicable.**	40 *CFR* 761.62(a)

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
(e.g., equipment, debris with PCB painted surfaces)	• in an incinerator approved under 40 *CFR* 761.70,		40 *CFR* 761.62(a)(1)
	• in a chemical waste landfill approved under 40 *CFR* 761.75,		40 *CFR* 761.62(a)(2)
	• in a hazardous waste landfill permitted by EPA under Sect. 3004 of RCRA or by authorized state under Sect. 3006 of RCRA,		40 *CFR* 761.62(a)(3)
	• under alternate disposal approved under 40 *CFR* 761.60(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 nonmunicipal, nonhazardous 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 nonmunicipal, nonhazardous waste landfill if • PCB bulk-product waste is segregated from organic liquids disposed of in the landfill and • 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)
Risk-based disposal of PCB bulk-product waste	May dispose of in a manner other than prescribed in 40 *CFR* 761.62(a) or (b) if the method (based on technical, environmental, or waste-specific characteristics) will not pose an unreasonable risk of injury to human health or the environment.	Disposal of PCB bulk-product waste — **applicable.**	40 *CFR* 761.62(c)
Disposal of PCB contaminated waste ≥1 ppm and ≤49 ppm	Must be disposed of in residual landfills (in accordance with their permit) and special waste and contained landfills.	Disposal of PCB waste — **applicable.**	401 *KAR* 30:031, Section 7; 401 *KAR* 47:030, Section 8

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	Generation, management and disposal of transuranic (TRU) wastes		
Generation and management of TRU wastes.	Shall be characterized, managed, packaged, certified and disposed of as specified.	Generation and management of TRU waste at a DOE facility requiring disposal — **TBC**.	DOE M 435.1-1(III)
	Land use controls—contaminated structures and facilities left in place		
Radioactive material above guidelines left in place	A property may be maintained under interim management provided administrative controls are established to protect members of the public.	Residual radioactive material above guidelines in inaccessible locations, which would be unreasonably costly to remove — **TBC.**	DOE Order 5400.5(IV)(6)(c)(1)
	Controls include, but are not limited to, periodic monitoring as appropriate, appropriate shielding, physical barriers (i.e., fences, warning signs) to prevent access, appropriate radiological safety measures during maintenance, renovation, demolition, or other activities that might disturb the residual radioactive material or cause it to migrate.		DOE Order 5400.5(IV)(6)(c)(2)
	Transportation		
Transportation of hazardous materials (including Class 7 radioactive materials)	Shall be subject to and must comply with all applicable provisions of the Hazardous Materials Transportation Act (HMTA) and HMR at 49 *CFR* 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 radioactive waste	Shall be packaged and transported in accordance with DOE Order 460.1A and DOE Order 460.2.	Shipment of LLW and/or TRU waste off-site — **TBC.**	DOE M 435.1-(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.	Shipment of LLW off-site — **TBC.**	DOE M 435.1-1(IV)(L)(2)
Transportation of PCB wastes	Must comply with the manifesting provisions at 40 *CFR* 761.207 through 40 *CFR* 761.218.	Relinquishment of control over PCB wastes by transporting, or offering for transport — **applicable.**	40 *CFR* 761.207(a)
Transport of RCRA wastewaters to wastewater treatment facility	All tank systems, conveyance systems, and ancillary equipment used to store or transport waste to an on-site NPDES-permitted wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment units that are subject to regulation under Section 402 or Section 307(b) of the CWA (NPDES-permitted) — **applicable.**	40 CFR 270.1(c)(2)(v) 401 *KAR* 38:010 Section 1(2)(b)(5)
Transportation of hazardous 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.	Off-site transportation of RCRA-hazardous waste — **applicable.**	40 *CFR* 262.10(h); 401 *KAR* 32:030

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
	Must comply with the requirements of 40 *CFR* 263.11–263.31. A transporter who meets all applicable requirements of 49 *CFR* 171–179 and the requirements of 40 *CFR* 263.11 and 263.31 will be deemed in compliance with 40 *CFR* 263.	Transportation of hazardous waste within the United States requiring a manifest — **applicable.**	40 *CFR* 263.10(a); 401 *KAR* 33:010
Transportation of hazardous waste on-site	The generator manifesting requirements of 40 *CFR* 262.20–262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 *CFR* 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	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 Section 1(1)
		RCRA Closure (C-746-A West End Smelter)	
Remove/Dispose of Hazardous Waste from Facility	Identify the hazardous waste and properly package for disposal. Remove hazardous waste from facility and transfer to either permitted on-site storage or off-site storage. Waste may be land-disposed if it meets land disposal criteria.	Hazardous waste stored in facility — **applicable.**	401 *KAR* 34:070 Section 2; 401 *KAR* 34:180 Section 9
Decontamination of floor	Unless deferred as discussed in Section B.4.5, remove hazardous waste or hazardous waste residues if present; minimize need for further maintenance; minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere.	Affirmative evidence of releases of stored hazardous waste or of residues of stored hazardous waste — **applicable.**	401 *KAR* 34:070 Section 2; 401 *KAR* 34:180 Section 9

Table B.3. Action-specific ARARs and TBC guidance for D&D of the C-402 Lime House, C-405 Incinerator, and C-746-A West End Smelter (continued)

Action	Requirements	Prerequisite	Citations
Decontamination of Equipment	Unless deferred as discussed in Section B.4.5, remove hazardous waste or hazardous waste residues if present on equipment; minimize need for further maintenance; minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere.	Affirmative evidence of releases of stored hazardous waste or of residues of stored hazardous waste — **applicable.**	401 *KAR* 34:180 Section 9

ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
CMBST = technology code defined in Table 1 of 40 *CFR* 268.42; summarized as "high temperature organic destruction technologies ... and certain non-combustive technologies..."
CWA = Clean Water Act
D&D = decontamination and decommissioning
DEACT = deactivation
DOE = U.S. Department of Energy
DOE M = *Radioactive Waste Management Manual*
DOT = U.S. Department of Transportation
EDE = effective dose equivalent
HMR = hazardous materials regulations
HMTA = Hazardous Materials Transportation Act
KAR = Kentucky Administrative Regulations
mrem = millirem
RACM = regulated asbestos-containing material
RORGS = technology code defined in Table 1 of 40 *CFR* 268.42; summarized as "recovery of organics utilizing one or more of the ... technologies" specified in Table 1.
TOC = total organic carbon
TRU = transuranic

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