

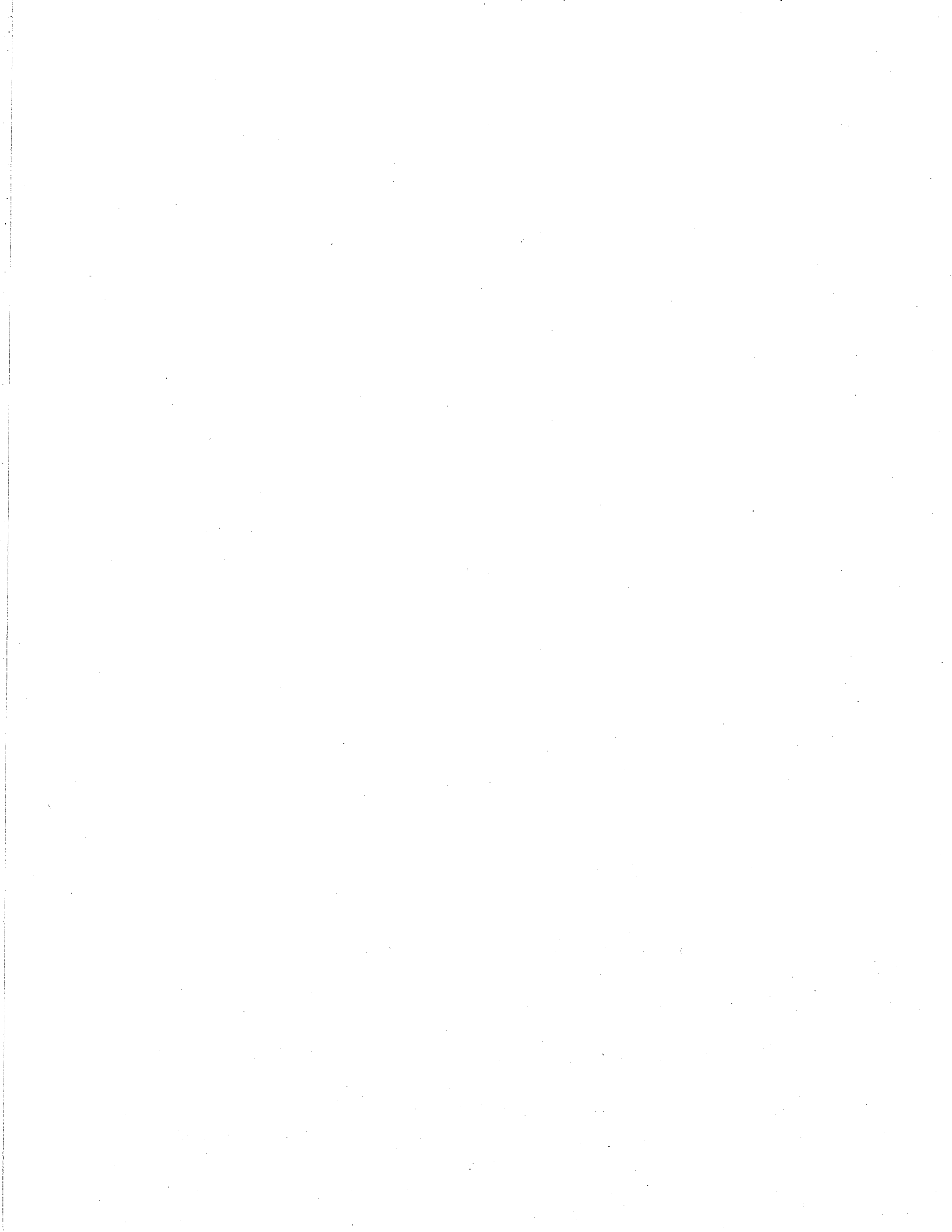
**Removal Action Report  
for the C-746-A West End Smelter Inactive Facility at the  
Paducah Environmental Remediation Project,  
Paducah, Kentucky**



This document is approved for public release per review by:

*MB Brennan*  
Paducah Classification and Control Office  
Swift and Staley Team

OCT 07 08  
Date



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Secondary Document**

**Removal Action Report  
for the C-746-A West End Smelter Inactive Facility at the  
Paducah Environmental Remediation Project,  
Paducah, Kentucky**

Date Issued—October 2008

Prepared for the  
U.S. DEPARTMENT OF ENERGY  
Office of Environmental Management

PADUCAH REMEDIATION SERVICES, LLC  
managing the  
Environmental Remediation Activities at the  
Paducah Gaseous Diffusion Plant  
under contract DE-AC30-06W05001

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## ACRONYMS

ACM	asbestos-containing material
AL	authorized limit
ARAR	applicable or relevant and appropriate requirement
CA	contamination area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
<i>CFR</i>	<i>Code of Federal Regulations</i>
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EMS	Environmental Management System
HEPA	high-efficiency particulate air
ISMS	Integrated Safety Management System
<i>KAR</i>	<i>Kentucky Administrative Regulations</i>
LLW	low-level waste
MLLW	mixed low-level waste
NTS	Nevada Test Site
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
PRS	Paducah Remediation Services, LLC
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
S&M	surveillance and maintenance
SWMU	solid waste management unit
TCLP	toxicity characteristic leaching procedure
TSCA	Toxic Substances Control Act

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## EXECUTIVE SUMMARY

The C-746-A West End Smelter structure was located in the northwest portion of the Paducah Gaseous Diffusion Plant off Tenth Street. The C-746-A West End Smelter was identified as Solid Waste Management Unit (SWMU) 464 in 1991 and was placed in the Decontamination and Decommissioning (D&D) Operable Unit. This Removal Action Report documents activities associated with the D&D of the C-746-A West End Smelter.

The D&D of the C-746-A West End Smelter was performed as a non-time-critical removal action under the Paducah Federal Facility Agreement (EPA 1998). Comprehensive Environmental Response, Compensation, and Liability Act documents described the logic for this project and the basis for its implementation. These are as follows: "Removal Notification for the C-405 Incinerator (SWMU 55), C-402 Limehouse (SWMU 480), and C-746-A West End Smelter (SWMU 464) at the Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky" (BJC 2005); *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) (DOE 2005a); *Action Memorandum for the Removal of the C-402 Lime House, the C-405 Incinerator, and the C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/07-2237&D2) (DOE 2005b); *Removal Action Work Plan for the C-405 Incinerator and C-746-A West End Smelter Inactive Facility D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-0002&D2) (DOE 2006).

The Engineering Evaluation/Cost Analysis analyzed two removal alternatives for the C-746-A West End Smelter: (1) no action and (2) removal of building contents, demolition of the structure, and characterization and disposal of waste. The alternatives were evaluated for effectiveness, implementability, and cost. The removal action objectives for this action were to accomplish the following:

- 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 facility.

The alternative selected for C-746-A West End Smelter was the removal and disposal of the building contents and structure to the concrete slab. This alternative met the removal action objectives and was performed safely and in compliance with applicable or relevant and appropriate requirements. The total demolition cost, exclusive of waste disposition, will be approximately \$1,054,000. The estimated cost for waste disposition will be \$315,000. The C-746-A West End Smelter infrastructure removal began on July 9, 2007. The structural demolition was complete on April 30, 2008.

The fire suppression system was not relocated as specified in the Removal Action Work Plan (DOE 2006). The system piping was supported and utilities required for operation were rerouted. The system continues to service the central portion of the C-746-A Building. Since the facility still is in the active status, a fire suppression system is required to be in place.

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## 1. INTRODUCTION

This Removal Action Report has been prepared to document completion of activities described in the *Action Memorandum for the Removal of the C-402 Lime House, the C-405 Incinerator, and the C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/07-2237&D2) (DOE 2005b) and its basis 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* (DOE/OR/07-2227&D2) (DOE 2005a), as well as the *Removal Action Work Plan for the C-405 Incinerator and C-746-A West End Smelter Inactive Facility D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/LX/07-0002&D2) (DOE 2006). These documents outline the activities and requirements for the infrastructure and structure removal phases of the C-746-A West End Smelter. The building structure was demolished to the concrete slab. Fixative was applied to the concrete slab, and it was posted as a fixed contamination area (CA).

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## 2. SITE DESCRIPTION

### 2.1 LOCATION

The C-746-A West End Smelter structure was located in the northwest portion of the Paducah Gaseous Diffusion Plant (PGDP) off Tenth Street (see Figure 1). An exterior view photograph of the C-746-A West End Smelter is provided as Figure 2. Interior views of C-746-A West End Smelter are provided in Figures 3 and 4.

### 2.2 DESCRIPTION

The C-746-A West End Smelter was constructed in the 1950s and used until 1985 for the smelting of aluminum and lead. After the smelting operations ceased, the building was used as a warehouse for plant stores, maintenance, and waste management. The building was a one-story, prefabricated metal building. The building encompassed 72,000 ft<sup>2</sup> of floor area. Originally built to store materials during the construction of PGDP, the building was composed of three gabled spans of approximately 40 ft each (for a total of 120 ft of width) and was approximately 600 ft in total length. It had a concrete slab and foundation, a lightweight steel frame, and steel panels for the exterior walls and roof. The building was divided transversely into three separate use areas: (1) west end (West End Smelter), (2) east end, and (3) central section.

The West End Smelter housed two reverberatory furnaces and associated equipment used primarily for smelting aluminum. An office area was located in the northeast corner of the West End Smelter. The office consisted of concrete block outer walls and an interior metal wall partition with metal ceiling, windows, and doors. A locker room was located on the north side of the West End Smelter. The locker room consisted of lockers, showers, lavatories, and sinks. A large portion of floor space was consumed with loose material. A fire suppression system located in the West End Smelter provided service to the West End Smelter and to the central section of C-746-A.

The scope of the removal action at C-746-A was limited to the West End Smelter only; the central and eastern portions of the building were not included in the removal action. The C-746-A West End Smelter was that portion of C-746-A located west of a 12-inch masonry fire separation wall (see Figure 5). The West End Smelter encompassed 8,100 ft<sup>2</sup> of floor area (120 ft x 67.5 ft). The scope of the removal action included the removal of all materials and equipment (except the fire suppression system) inside the West End Smelter and demolition of the building structure.

The facility was in shutdown/inactive status, under surveillance and maintenance (S&M) in the decontamination and decommissioning (D&D) program. The C-746-A West End Smelter facility included a number of auxiliary systems, including the following:

- **Water:** Water was supplied to the West End Smelter from the PGDP sanitary water system via a 6-inch transite water main located to the west of the C-746-A West End Smelter. The waterlines that serviced the showers were removed and the line was cut and capped flush to the floor.
- **Electricity:** Electricity was fed to the facility from a 2400-volt, 3-phase lighting circuit. Connections to the main power panel have been removed at Pole #W-18 located at the southwest corner of the facility. Items removed included panels, electrical conduit, etc.

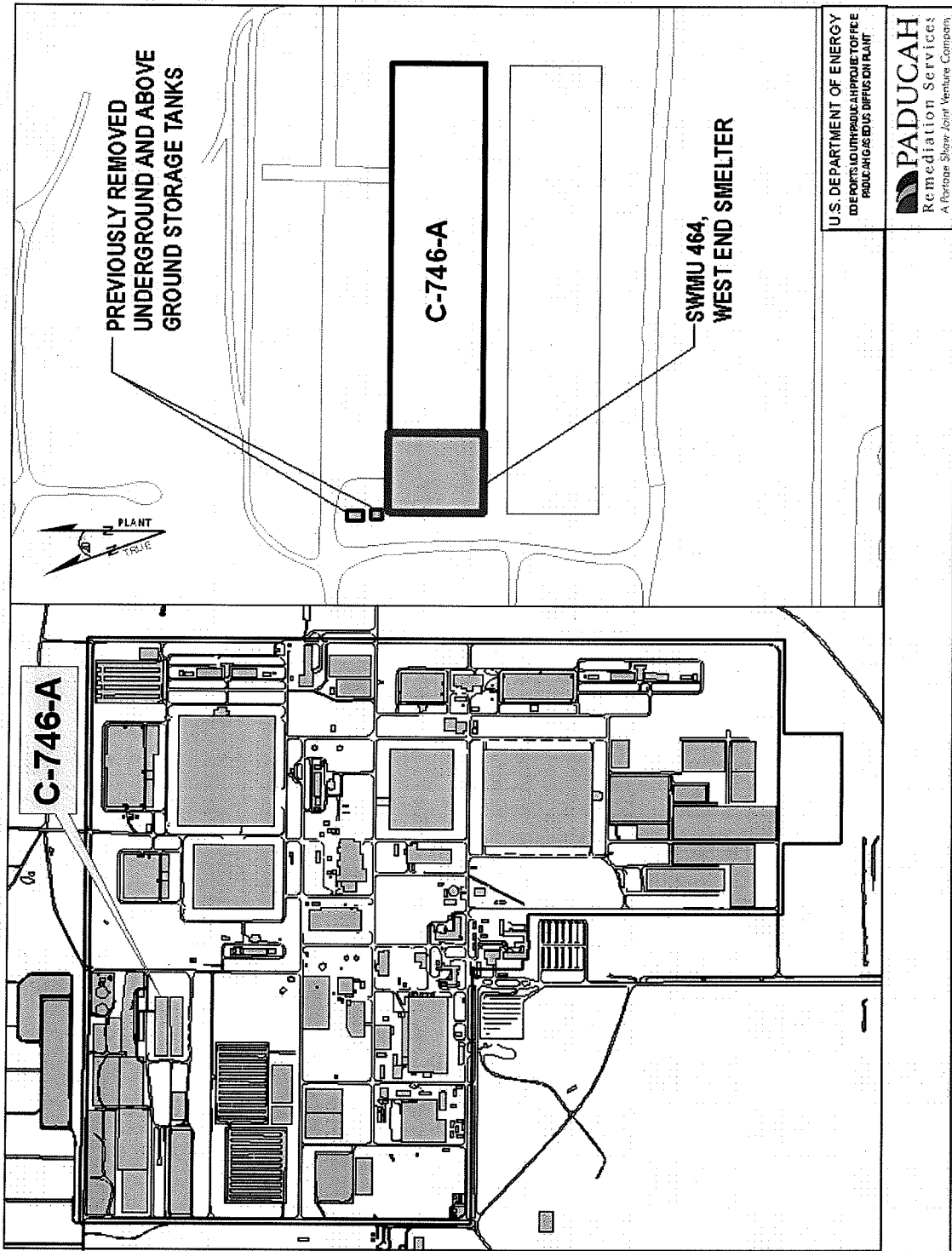
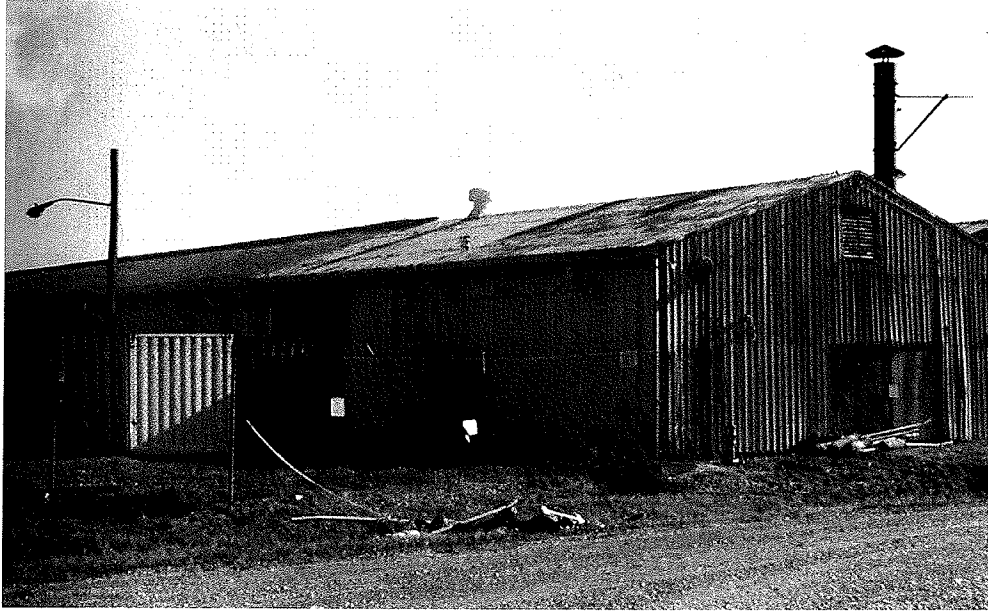
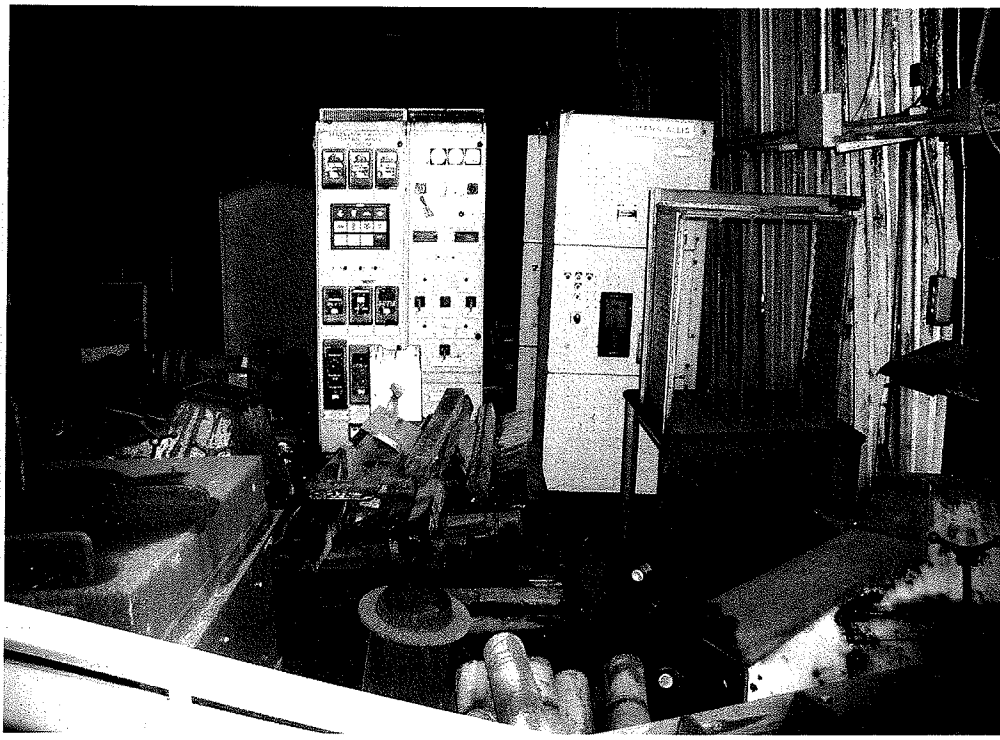


Figure 1. C-746-A West End Smelter Location





**Figure 2. Photograph of Exterior of C-746-A West End Smelter**



**Figure 3. Photograph of C-746-A West End Smelter Interior**



**Figure 4. Photograph of C-746-A West End Smelter Interior**

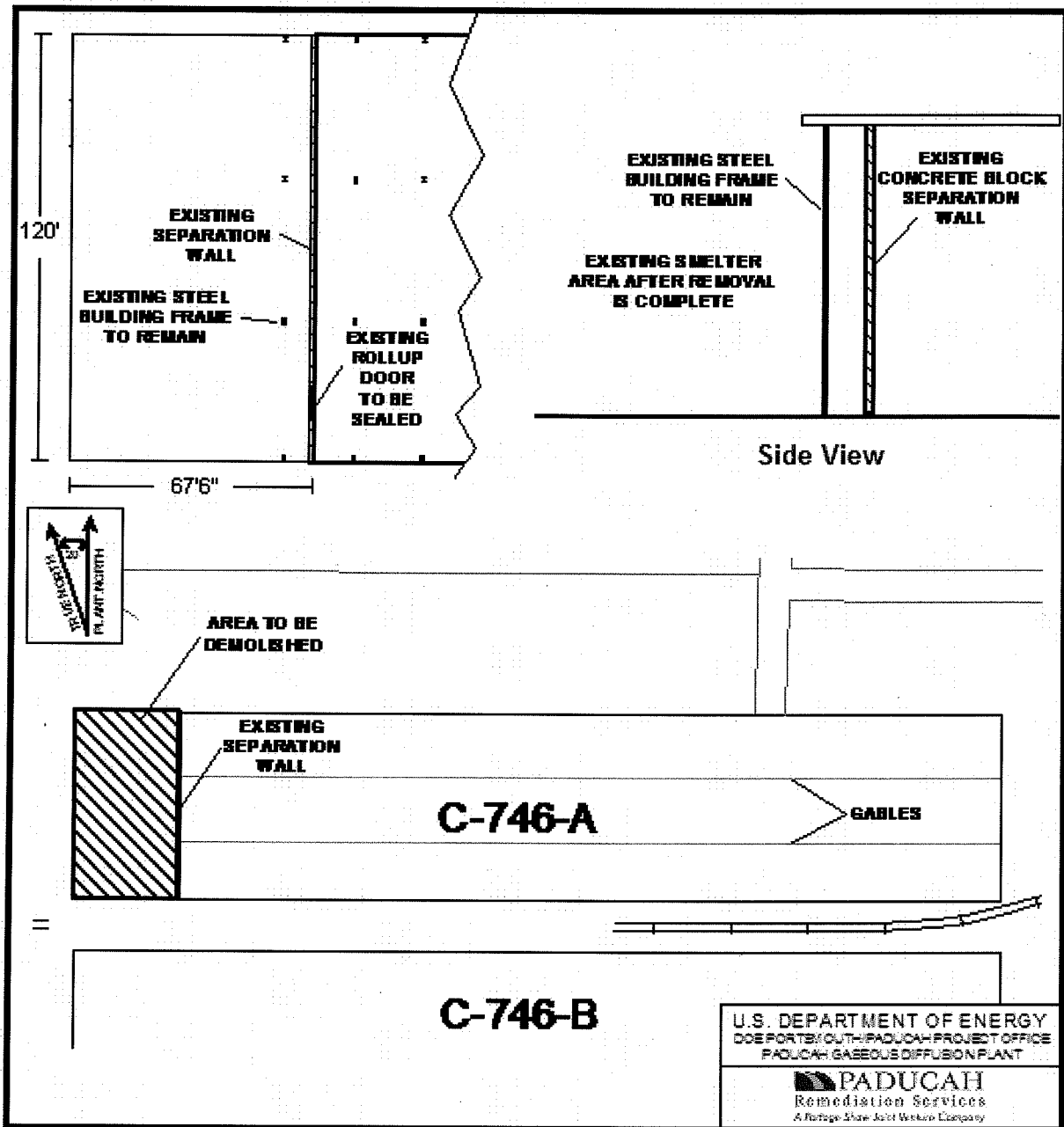


Figure 5. C-746-A West End Smelter After Demolition

- **Lighting:** Lighting in the facility was provided by 200-watt incandescent fixtures. There were halogen security lights active on the exterior walls of the building. These were powered from a separate source. The security lights were traced and disconnected from their source of power. Materials removed included fixtures, conduit, etc.
- **Oil/Gas:** The reverberatory furnaces originally were fired by an oil-fired system fed from a belowground 4,000-gal storage tank located northwest of the building. Natural gas was used to operate the unit heaters. Liquid propane also was used as fuel for the furnace. The liquid propane was fed from an aboveground 1,000-gal tank located approximately 40 ft northwest of the building. Both tanks were removed during a prior project.

## 2.3 CONTAMINANTS

C-746-A West End Smelter waste contained the following contaminants:

### (1) Radionuclides

The primary radionuclides are uranium and technetium-99 trace amounts of other radionuclides were also identified; the majority of the low-level waste (LLW) was generated from the furnace debris.

### (2) Asbestos

Asbestos-containing materials (ACMs) were generated from the furnace door insulation and transite siding in the office area.

### (3) Polychlorinated biphenyl (PCB) bulk product

PCB bulk product was generated from applied dried paint on various surfaces in the C-746-A West End Smelter.

### (4) Mixed LLW (MLLW)/Resource Conservation and Recovery Action (RCRA) waste

MLLW/RCRA waste included lead counterweights, circuit boards, small capacitors, and floor sweepings (lead), and furnace ash containing lead and cadmium. The primary radionuclides are uranium and technetium-99 trace amounts of other radionuclides were also identified.

## 2.4 PREVIOUS INVESTIGATIONS/ACTIONS

A walk down of the C-746-A West End Smelter was conducted in 2003. As a result, the potential for ACM to be present in the smelter ovens and in materials stored in the surrounding area was expected. Although there was an expectation that RCRA hazardous constituents and PCBs would be present in electrical equipment (e.g., fuses and light bulbs) and other equipment (e.g., motors and pumps) stored in the area, the presence of RCRA constituents or PCBs was not identified definitively during the walk down. Routine survey data indicated the presence of radiological contamination.

An underground fuel tank used to fire the furnaces in C-746-A West End Smelter was located just northwest of the building. An aboveground liquid propane tank also used to fuel the furnaces was located northwest of the building. Both tanks were removed during a previous action.

### **3. PROJECT DESCRIPTION**

#### **3.1 SCOPE AND PURPOSE**

The scope of this non-time-critical removal action included the characterization, removal, and disposal of the C-746-A West End Smelter contents and structure to the existing concrete slab. The scope did not include the central and eastern portions of the building, removal of external utilities and ancillary equipment, the fire suppression system and associated utilities located in the West End Smelter, the concrete building slab, building foundation, or the soil in SWMU 464. The slab, foundation, and soil will be addressed as part of subsequent actions (i.e., Soils Operable Unit, Gaseous Diffusion Plant D&D).

#### **3.2 REMOVAL ACTION OBJECTIVES**

The removal action objectives form the basis for the C-746-A West End Smelter removal action. The removal action objectives for this action were these:

- 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 facility.

#### **3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS**

In accordance with 40 *CFR* § 300.415(j) of the National Oil and Hazardous Substances Pollution Contingency Plan, U.S. Department of Energy (DOE) on-site removal actions conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) are required to attain applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the scope and urgency of the action.

The approved ARARs for this removal action can be found in Appendix B of the Engineering Evaluation/Cost Analysis (DOE 2005a). The demolition and disposal of C-746-A were performed in compliance with ARARs through the use of a comprehensive environment, safety and health, and quality programs and PRS policies and procedures.

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## 4. REMOVAL ACTION ACTIVITIES

### 4.1 PROCESS DEFINITION

The general activities of the removal action included the following:

- Site set up and temporary power installation;
- Removal of loose material;
- Removal of overhead safety hazards, such as lighting fixtures, unit heaters, damaged roof, furnace stacks;
- Removal of internal utility systems, such as electrical, potable water, liquid propane, natural gas, diesel fuel;
- Office removal;
- Dismantlement and removal of furnaces;
- Locker room removal;
- Structure removal;
- Site cleanup—demobilization of equipment/materials, fixative applied to concrete slab, radiological posting of the slab;
- Disposal of waste at C-746-U Solid Waste Landfill and at an off-site treatment, storage, and disposal facility.

### 4.2 PROCESS SEQUENCE

The C-746-A West End Smelter D&D was performed by DOE prime contractor Paducah Remediation Services, LLC, (PRS). Fieldwork began on July 9, 2007, under the PRS work control program. Work control documents and/or PRS procedures were utilized to perform all work activities. All work planning incorporated the Integrated Safety Management System (ISMS) and Environmental Management System (EMS) processes. ISMS/EMS ensured that worker safety, public safety, and protection of the natural environment were incorporated into all aspects of the planning and execution of work activities. The core functions utilized included defining the scope of work, analyzing the hazards, mitigating the hazards, executing the work, and providing worker feedback and continuous improvement. Radiological control technicians and a safety and health representative provided full-time support to the project and monitored activities to ensure control of contamination.

Prior to the C-746-A West End Smelter D&D, the building was in shutdown/inactive status under S&M in the D&D program. The exterior building walls were in good shape with all steel panels intact. The roof had significant damage and several steel roof sections had rusted through on the west side of the structure. The reverberatory furnaces and associated equipment were abandoned in place. Loose material and debris consumed the south floor area. All conduit and mechanical piping were in good physical condition.

Building access was controlled by the facility manager and the entrance requirements for S&M activities were established and defined on a radiological work permit. Access to the building was controlled by a locked gate and a posted radioactive materials area/fixd CA placard.

#### **4.2.1 Site Set Up and Temporary Power Installation**

During the site set up phase of this project, all support equipment and tools were mobilized to the work area just north of the C-746-A West End Smelter. The sliding gate controlling access to the building was repaired to allow equipment egress/ingress. Temporary construction power was established on both the north and south ends of the C-746-A West End Smelter providing power to tools and lighting throughout the duration of the project.

#### **4.2.2 Loose Material Removal**

Once site set up was complete, the loose material inside the C-746-A West End Smelter was removed (see Figure 6). All loose material was inspected visually and a radiological survey was performed prior to removal of the material from the building. The loose material included wooden pallets and ladders, electrical cabinets, metal railings and cabinets, empty compressed gas cylinders, pump and motor assemblies, and other miscellaneous debris. Some loose material was size reduced prior to loading into waste containers for disposal. Components suspected of being characteristically hazardous were declared to be MLLW, segregated, containerized, and transported to a permitted on-site storage facility for future disposition.



**Figure 6. Photograph of Loose Material Removal at C-746-A West End Smelter**

#### **4.2.3 Removal of Overhead Hazards**

There were several overhead hazards identified during an initial walk down of the building. It was determined that several ceiling-mounted light fixtures and natural gas unit heaters, roof stacks, and roof sections were safety hazards that must be addressed prior to performing work in the areas of concern. The light bulbs and reflectors were removed from the specified light fixtures and the fixtures were secured for future removal. The unit heaters were removed once the natural gas was isolated and air gapped. The



damaged steel roof sections and purlins were removed as well as the two roof stacks. The presence of beryllium contamination on all piping and structure 8 ft above floor level, based on routine surveys of the area in 2001, also was a safety concern. A fixative was applied to all surfaces 8 ft above floor level to lock the contamination in place to mitigate this hazard. In accordance with the beryllium plan, workers were required to wear respiratory protection pending air monitoring results. After 10 days of monitoring, the results were negative for beryllium, and it was determined, per the requirements of the plan, that respiratory protection was not required and no additional measures were required.

#### **4.2.4 Isolation and Removal of Utilities**

The utilities that were isolated and removed included electrical power, potable water, liquid propane, natural gas, and diesel fuel. The electrical power supplied to the West End Smelter was a 120-volt/240-volt circuit that operated heaters and lighting. PRS electricians isolated the power supply and removed and containerized all light fixtures and conduit for disposal. The potable water entered the building through the concrete floor of the locker room. The water supply line was verified empty, cut just above floor level, and capped. All water piping was removed and containerized for disposal. The liquid propane tank was removed during a previous project, but the aboveground piping remained. Once the piping was verified empty, it was removed and containerized. Natural gas was supplied to the unit heaters and the smelting furnaces. The supply valve located exterior to the C-746-A West End Smelter was closed and the piping was evacuated. The unit heaters and piping were removed and containerized for disposal. The diesel fuel tank was removed under the Paducah underground storage tank closure project, but the aboveground piping remained. Once the piping was verified empty, it was removed and containerized.

Section 2.2 of the Removal Action Work Plan (RAWP) (DOE 2006) states, "The fire suppression system will be required to be relocated...." During the demolition, it was determined that the relocation of the fire suppression system would not be practical from technical, schedule, and cost considerations; therefore, the fire suppression system remains intact and available to provide service to the central portion of the C-746-A Building. This change was considered a minor change. It was discussed with the U.S. Environmental Protection Agency (EPA) and Commonwealth of Kentucky personnel during tours and phone conversations in the spring of 2008. This removal action completion report documents this change for the administrative record as agreed to between EPA, Kentucky, and DOE. This change does not affect the removal action objectives.

#### **4.2.5 Office Removal**

A two-room office was located at the northeast corner in the C-746-A West End Smelter. The office was constructed of concrete block outer walls with a metal ceiling and a metal partition interior wall. The office windows and doors were removed and containerized. The metal ceiling and metal partition were size reduced and properly packaged for disposition. The concrete block walls were removed and all fastening devices were cut flush with the remaining separation concrete wall and slab. A hand-held sprayer provided water to mist the concrete block wall for dust suppression during demolition. General housekeeping activities were performed to clean the area during and after the office removal. High-efficiency particulate air (HEPA) filter vacuums were utilized to collect any remaining floor debris.

#### **4.2.6 Dismantlement and Removal of Furnaces**

Both furnaces in the C-746-A West End Smelter were equipped with ancillary equipment and instrumentation required for operation. Prior to furnace removal, all ancillary equipment and piping, instrumentation, conduit, and wiring were removed and packaged for disposal. Each furnace was equipped with an asbestos gasket in the furnace door. All applicable asbestos management practices [Occupational Safety and Health Act (29 CFR § 1926.1101 and 401 KAR 58:025)] were followed for

removal of the furnace doors, as specified in the ARARs. Other material removed from the furnaces included ash and slag. The furnaces were dismantled into smaller, more manageable sections for ease of movement and packaging. General housekeeping activities were performed throughout the duration of this phase. HEPA filter vacuums were utilized during all asbestos abatement activities.

#### **4.2.7 Locker Room Removal**

The locker room was located on the north side of the C-746-A West End Smelter. The locker room was constructed of transite walls and ceiling panels fastened to a steel structure. All sinks, showers, lavatories, and water heaters were removed and packaged for disposal. The removal of the transite walls and ceiling panels was performed in accordance with all applicable federal and state regulations for asbestos, as defined in the ARARs. The structure was removed and the fastening devices were cut flush with the concrete slab.

#### **4.2.8 Structure Removal**

At this point in the D&D phase, only the building structure and fire suppression system remained. Since the central portion of the building was to continue operation after the West End Smelter D&D, modifications to the gutters were made and the downspouts were rerouted. A new chain link fence was installed west of the building to serve as a boundary control to the C-746-A Building. Pipe supports were fabricated and installed to support the fire suppression system piping that remained to service the central portion of C-746-A. The utilities required for the operation of the fire suppression system were rerouted. The roof sections and wall sections were removed and packaged for disposal (see Figure 7). The columns were removed and size reduced prior to packaging for disposal. A row of columns were kept intact to provide the required support to the roof of the central portion of the building. All fasteners were cut flush with the existing concrete floor.



**Figure 7. Photograph of Structure Removal of C-746-A West End Smelter**

#### 4.2.9 Site Cleanup

After demolition of the building was complete, all equipment and materials associated with building demolition were demobilized and site cleanup activities began. General housekeeping activities were performed on the concrete slab and around the building grounds. Radiological surveys of the concrete slab were performed to determine the posting requirements. A fixative was applied to the concrete pad to fix the low-level radiological concerns (8,604 dpm/100 cm<sup>2</sup> total beta/gamma, 157 dpm/100 cm<sup>2</sup> total alpha). Postings clearly demarcate the area as a fixed CA (see Figure 8).

Upon completion of the demolition, engineering personnel performed a walk down to verify the removal action was performed in compliance with the RAWP. The demolition and disposal of C-746-A West End Smelter met all objectives for removal in compliance with the RAWP.



**Figure 8. Photograph of C-746-A West End Smelter Post D&D**

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## 5. WASTE MANAGEMENT AND TRANSPORTATION ACTIVITIES

Waste management activities were conducted in accordance with the ARARs and the *Waste Management Plan for the C-746-A West End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (PRS-FCD-0738) (PRS 2007a).

### 5.1 WASTE CHARACTERIZATION

One of the first steps in the planning phase of the project was to characterize the building to determine health and safety requirements for initial entry and to assess potential hazards. This was accomplished by reviewing available radiological survey data and documentation that described the processes that had taken place in the building.

A Sampling and Analysis Plan was developed and implemented to characterize waste for compliance with treatment and disposal regulations. Selection of sample locations and media was based on observations of material and waste in the building, previous radiological survey data, waste characterization criteria for the proposed disposal facility, and other relevant historical data on known or suspected hazards. Examples of media and waste targeted for sampling and analysis included the following: (1) floor sweepings; (2) liquids; (3) applied dry paint; (4) insulation, caulking, firebrick, mortar, and other waste suspected of being ACM. Hexane wipe samples were collected on oil-stained debris and analyzed for PCBs.

Field screening was used as a qualitative indicator of the presence or absence of regulated materials. The most frequently used field screening tests were for lead and PCBs. Positive field screening results were used as segregation criteria for liquids and debris prior to disposal. Liquids were characterized by laboratory analysis prior to disposal. Debris that had positive field screening results for lead was declared MLLW.

Prior to D&D of the C-746-A West End Smelter, waste samples of the slag from the exterior of the furnaces were collected. The sample results characterized the slag as nonhazardous for RCRA characteristics. After the furnace doors were removed during demolition, waste with different physical characteristics from the slag was identified inside the furnaces. Samples of the waste inside the furnaces were collected and analyzed for TCLP metals. Based on the results of these samples, 1,980 ft<sup>3</sup> of the demolition debris was recharacterized as RCRA hazardous due to the presence of lead and cadmium.

Information on the types, volumes, and disposition of waste generated from C-746-A West End Smelter D&D is summarized in Table 1.

### 5.2 WASTE PACKAGING

Waste materials generated during the D&D of the C-746-A West End Smelter were containerized for transportation and disposal. The MLLW scheduled for disposal at the Nevada Test Site (NTS) will be repackaged for disposal prior to shipment. The type of packaging chosen for each waste stream depended on the following:

- U.S. Department of Transportation (DOT) classification,
- Quantity of the waste stream generated, and
- Requirements of the selected disposal facility.

Containers purchased for off-site shipments were/will be purchased in accordance with *Procurement, Inspection, and Management of Items Critical for Paducah Off-Site Waste Shipments* (PRS-WSD-3012)

(PRS 2007b). Additional guidance for waste packaging is included in procedure PRS-WSD-3015, *Waste Packaging* (PRS 2007c).

All waste generated during the infrastructure and structure removal phases of the C-746-A West End Smelter D&D was containerized for disposal, with the exception of the MLLW scheduled for disposal at NTS. This waste will be repackaged prior to shipment. All waste materials were segregated according to the waste acceptance criteria of the disposal facility. Approximately 72% of the generated waste was disposed of at the PGDP C-746-U Solid Waste Landfill. Approximately 21% of the waste will be shipped to the NTS. The remaining 6% of the waste will be disposed of at the EnergySolutions facility in Clive, Utah. Less than 1% of the waste generated has been bulked with other waste streams and will be disposed of under the other programs. Refer to Table 1, C-746-A West End Smelter Waste Categories, Volumes, and Disposition.

**Table 1. C-746-A West End Smelter Waste Categories, Volumes, and Disposition**

Waste Stream	Waste Volume	Projected Disposition Location
Demolition Debris Less than the PGDP ALs	12,841 ft <sup>3a</sup>	PGDP C-746-U Solid Waste Landfill
MLLW/RCRA <sup>b,d</sup>	1,980 ft <sup>3</sup>	NTS
LLW	1,840 ft <sup>3</sup>	NTS
LLW/PCB Bulk Product Waste	1,100 ft <sup>3</sup>	EnergySolutions
MLLW/RCRA—Hazardous Waste (includes lead counterweights, circuit boards, small capacitors, and floor sweeping) <sup>d</sup>	52 ft <sup>3</sup>	Transferred to interim storage for bulking or accumulation
MLLW/RCRA—Hazardous Waste (oil) <sup>c,d</sup>	44 ft <sup>3</sup>	Bulked for shipment to TSCA Incinerator

<sup>a</sup> Actual volume of debris that met the PGDP ALs (i.e., sanitary/industrial) was approximately 45% higher than estimated in Table 1 of the Waste Management Plan (PRS 2007a). Approximately 1,600 ft<sup>3</sup> was redirected from the NTS waste stream to the C-746-U waste stream with the remainder attributable to swell.

<sup>b</sup> The waste designated for disposal at NTS originally was characterized as LLW, per Seaborg 2002. New waste material was found during the furnace demolition. The new waste was sampled, and results indicated high levels of lead were present. The elevated lead levels resulted in a change in the characterization of approximately 1,980 ft<sup>3</sup> of furnace debris from LLW to MLLW.

<sup>c</sup> Table 1 of the Waste Management Plan was completed under the assumption that lubricating and transformer oil contained regulated levels of PCBs (PRS 2007a). Once characterization results were received, the data indicated that there were no regulated PCB-contaminated liquids.

<sup>d</sup> Will be treated in accordance with RCRA, as appropriate.

AL	= authorized limits	PCB	= polychlorinated biphenyl
LLW	= low-level waste	PGDP	= Paducah Gaseous Diffusion Plant
MLLW	= mixed low-level waste	RCRA	= Resource Conservation and Recovery Act
NTS	= Nevada Test Site	TSCA	= Toxic Substances Control Act

### 5.3 WASTE TRANSPORTATION

Waste to be shipped off-site for disposal will be in compliance with all applicable DOT regulations. Guidance for on-site and off-site transportation compliance is contained in the off-site shipping procedure (PRS 2008); the On-Site Transportation Safety Document (PRS 2007d); and the waste packaging procedure (PRS 2007c).

## 5.4 WASTE DISPOSAL

The D&D of the C-746-A West End Smelter generated six distinct waste streams: (1) demolition debris meeting the authorized limits (ALs) for the PGDP C-746-U Solid Waste Landfill; (2) MLLW/RCRA hazardous waste [Nevada Test Site (NTS)]; (3) low-level demolition debris; (4) low-level/PCB bulk product waste with or without asbestos; (5) MLLW/RCRA hazardous waste (*EnergySolutions*), and (6) MLLW/RCRA oil requiring incineration. Each of these waste streams is being stored in either the appropriate CERCLA storage area, a permitted facility (e.g. C-746-A, C-752), or a staging area in preparation for shipment. When the waste is ready for shipment it will be staged at the designated staging areas. As of September 2008 all of the 12,841 ft<sup>3</sup> of demolition debris waste was disposed of at the PGDP C-746-U Solid Waste Landfill. All other waste identified in the Table 1 is currently on-site in compliant storage being prepared for disposal. The waste will be disposed of per the schedule identified in Section 6.1.

The largest volume of waste generated is the demolition debris consisting of nonhazardous metal and construction/demolition debris that met the authorized limits for radioactive contamination at the PGDP C-746-U Solid Waste Landfill.

The second waste stream consisted of waste to be sent to the NTS including hazardous and nonhazardous low-level demolition debris generated from the demolition of the furnaces. The MLLW will require macroencapsulation prior to shipment for disposal.

The third waste stream is nonhazardous LLW generated primarily from demolition of the furnaces in the West End Smelter.

The fourth waste stream is LLW/PCB bulk product waste with or without asbestos. The majority of this waste stream was generated from the demolition of the office in the West End Smelter.

The fifth waste stream generated was declared MLLW/RCRA hazardous waste. This waste stream, consisting of lead counterweights, circuit boards, and small capacitors, is being accumulated for off-site treatment by macroencapsulation and disposal at the *EnergySolutions* facility in Utah. This waste was bulked/combined with other similar waste due to the small volumes and cost efficiencies.

The sixth waste stream generated is MLLW/RCRA oil waste. Approximately 44 ft<sup>3</sup> of radiologically contaminated oil was removed from a large transformer stored in the C-746-A West End Smelter. The oil did not have regulated levels of PCBs and was bulked with other similar waste due to the small volume.

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## 6. PROJECT COST AND SCHEDULE

### 6.1 PROJECT SCHEDULE

Key milestones included the following:

- Issued Removal Notification April 8, 2005
- Issued D1 Engineering Evaluation/Cost Analysis June 13, 2005
- Issued D1 Action Memorandum September 28, 2005
- Issued D1 Removal Action Work Plan June 30, 2006
- Received regulatory approval on RAWP November 27, 2006
- Started infrastructure removal July 9, 2007
- Completed structure D&D April 30, 2008
- Completed demobilization June 13, 2008
- Projected completion of waste disposition January 30, 2009<sup>1,2</sup>

### 6.2 PROJECT COST

The total demolition cost, exclusive of waste disposition will be approximately \$1,054,000. The estimated cost of waste disposition is \$315,000.

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<sup>1</sup> Projected schedules for completion of activities set forth herein are estimates provided for informational purposes only and are not considered to be enforceable elements of the removal action or this document. Enforceable milestones are set forth in Appendix C and Appendix G of the Federal Facility Agreement. Any additional milestones, timetables, or deadlines for activities included as part of the removal action will be identified and established in accordance with the existing Federal Facility Agreement protocols.

<sup>2</sup> Except for the bulked waste scheduled for disposal under the Facilities Disposition C-410 Project and the burn plan for the TSCA Incinerator.

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- PRS 2008. *Off-Site Shipping*, PRS-WSD-3028, Paducah Remediation Services, LLC, Kevil, Kentucky January 2008.
- PRS. Demobilization/Site Restoration Work Package, WP-07-FD-P019.
- PRS. Demolition of Walls, Roof, and Structure of C-746-A West Smelter Area Work Package, WP-07-FD-P020.
- PRS. Furnaces Removal Work Package, WP-07-FD-P018.
- PRS. Mobilization and Site Set-Up for Decontamination and Decommissioning of C-746-A West Smelter Area Work Package, WP-07-FD-P0009.

PRS. Prepare for Decontamination and Decommissioning of C-746-A West Smelter Area Work Package, WP-07-FD-P017.

PRS. Removal of Loose Material from C-746-A West End Smelter Work Package, WP-07-FD-P005.

Seaborg, W. Don, November 8, 2002. U.S. Department of Energy, Paducah, KY, letter to Michael V. Welch, Kentucky Department for Environmental Protection, Frankfort, KY.