Department of Energy

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OCT 29 2010

Mr. W. Turpin Ballard
U.S. Environmental Protection Agency, Region 4
Federal Facilities Branch
61 Forsyth Street
Atlanta, Georgia 30303

PPPO-02-998296-11

Mr. Edward Winner, FFA Manager
Kentucky Department for Environmental Protection
Division of Waste Management
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

Dear Mr. Ballard and Mr. Winner:

TRANSMITTAL OF D2 REMOVAL ACTION WORK PLAN FOR THE C-340 COMPLEX DECOMMISSIONING AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-0344&D2)

Please find enclosed the certified copy of the D2 *Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0344&D2. Additionally, please find enclosed comment response summaries addressing comments received from the U.S. Environmental Protection Agency and the Commonwealth of Kentucky and a red-lined document showing revisions made.

This document includes changes that were not requested by the regulatory agencies. The first change is in Appendix D, List of Procedures. As a result of the remediation contractor transition and subsequent blue-sheet procedure recovery process, several procedure numbers have changed. These changes are reflected in this document. Additionally, on page 12, a reference is made to the use of "6 millimeter plastic sheeting" for wrapping transite panels removed during demolition. The correct reference is "6 mil plastic sheeting." Finally, editorial and grammatical changes were made for document clarity and consistency.

If you have any questions or require additional information, please contact Rob Seifert at (270) 441-6823.

Sincerely,

Reinhard Knerr
Paducah Site Lead
Portsmouth/Paducah Project Office

Enclosures:
1. Certification Page
2. D2 RAWP for C-340 Complex (clean copy)
3. D2 RAWP for C-340 Complex (red-lined copy)
4. EPA and Kentucky Comment Response Summaries

cc:
AR File/Kevil

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CERTIFICATION

Document Identification: **Transmittal of *D2 Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, and the Comment Response Summary* (DOE/LX/07-0344&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.

LATA Environmental Services of Kentucky, LLC
Operator

Barbara A. Mazurowski
Barbara A. Mazurowski
Paducah Project Manager

10-28-10
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.

U.S. Department of Energy (DOE)
Owner

Reinhard Knerr, Paducah Site Lead
Portsmouth/Paducah Project Office

10/29/10
Date Signed

DOE/LX/07-0344&D2
Primary Document

Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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DOE/LX/07-0344&D2
Primary Document

Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—October 2010

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-10CC40020

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TABLES

FIGURES

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ACRONYMS

ACM	asbestos-containing material
AHA	Activity Hazard Assessment
AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ES&H	Environment, Safety, and Health
FFA	Federal Facility Agreement
FIMS	Facilities Information System
HASP	Health and Safety Plan
HF	hydrogen fluoride
ISMS	Integrated Safety Management System
KDEP	Kentucky Department for Environmental Protection
LLW	low-level waste
NTCRA	non-time-critical removal action
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act
RAWP	Removal Action Work Plan
SWMU	solid waste management unit
TBC	to be considered
WAC	Waste Acceptance Criteria
WMP	Waste Management Plan

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EXECUTIVE SUMMARY

This Removal Action Work Plan (RAWP) describes the decommissioning (structural demolition) of several buildings within the C-340 Complex at the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky. The primary emphasis of this RAWP is to provide details regarding project management, execution, and regulatory compliance measures related to the removal action.

The work will be performed as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) non-time-critical removal action (NTCRA) as part of the decontamination and decommissioning of the C-340 Complex. This particular removal action will include demolition of the C-340-A, C-340-B, and C-340-C Buildings to the slab, as well as the removal of nonprocess systems in these buildings. The following documents have been prepared and approved for the removal action covered in this RAWP:

- *Engineering Evaluation/Cost Analysis for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0131&D2 (EE/CA) (DOE 2010a); and

- *Action Memorandum for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter Non-Time-Critical Removal Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0290&D1 (AM) (DOE 2010b).

The C-340 Complex is undergoing deactivation under the U.S. Department of Energy (DOE) Atomic Energy Act authority, using accelerated funding from the American Recovery and Reinvestment Act. The project is being conducted in accordance with applicable DOE, state, and federal regulations. The deactivation will be followed by the decommissioning outlined in this document.

During the deactivation activities, all accessible interior asbestos-containing materials will be removed and chemical- and/or radionuclide-containing systems (e.g., process piping, equipment) will be emptied of residual material in accordance with applicable requirements. Additionally, certain wastes such as polychlorinated biphenyl (PCB) capacitors, mercury switches, or manometers, etc., will have been removed. The building surfaces and remaining infrastructure that are designated to be removed during structural demolition (i.e., floors, walls, residual piping, and equipment) will be vacuumed and sealed to the extent practicable to contain and minimize airborne releases during the demolition process.

The CERCLA NTCRA decommissioning activities included in this RAWP will involve the structural demolition of the C-340 Complex, specifically C-340-A, C-340-B, and C-340-C and the removal of nonprocess systems within these buildings. C-340-D, C-340-E, and the south annex of C-340-B will be decommissioned as non-CERCLA removal actions and are not addressed in this Plan. Unless otherwise noted, "C-340 Complex" refers only to buildings addressed in this removal action.

Activities addressed by this RAWP include the structural demolition of the C-340 Complex and removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping), and residual waste material. This removal action meets the following removal action objectives agreed to by DOE, the U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection, as defined in the AM:

- Reduce the potential exposure to on-site personnel from hazardous substances due to the structural deterioration of these facilities; and

- Reduce risks of releases to the environment and exposure to future industrial workers that may result from uncontrolled releases of hazardous substances, including radiological contamination, from these facilities.

This removal action supports the long-term remediation of the PGDP. Demolishing the structures will remove a source of a potential release to the environment thereby reducing the risk that would be posed if the structures were left standing. Demolition also will satisfy the substantive Resource Conservation and Recovery Act closure requirements for any areas where hazardous waste is discovered during deactivation, as summarized in DOE's letter "American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste," of October 6, 2009 (DOE 2009), which was approved by Kentucky on October 20, 2009 (KDEP 2009a).

The major radiological contaminants of concern, as documented in the EE/CA and AM, are uranium and the associated daughter products. Other materials that may be present at the C-340 Complex include asbestos-containing materials; PCBs; selenium; and heavy metals, such as lead, chromium, mercury, and cadmium.

Specific activities that will be performed during the decommissioning activities include characterization; demolition; segregation; packaging; transportation and disposition of demolition debris, piping, and small quantities of hazardous materials. The project also will entail leaving the groundlevel slabs, pits, and foundations in a protective state. The slabs and underlying soil will be addressed as described in the AM.

Demolition debris generated from this removal action will be treated, if necessary, and disposed of at an approved on-site or off-site facility with possible reuse/recycle of equipment from the C-340 Complex in accordance with applicable state laws, EPA, DOE policies, and applicable or relevant and appropriate requirements.

The DOE's prime remediation services contractor will perform the work described in this RAWP, using subcontractors as necessary. The project will be implemented in accordance with Integrated Safety Management System practices and principles, including worker involvement. The Demolition Plan, the Removal Action Verification Plan, the Health and Safety Plan, and a list of procedures are included as appendices to the RAWP.

1. INTRODUCTION AND PURPOSE

This Removal Action Work Plan (RAWP) addresses the structural demolition of specific buildings (defined previously) of the C-340 Complex as a non-time-critical removal action (NTCRA). The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection (KDEP) have agreed to address decommissioning activities under the existing Federal Facility Agreement (FFA) (EPA 1998) and in accordance with the joint EPA and DOE policy statement with respect to decommissioning of DOE facilities (DOE and EPA 1995). The regulatory approach for this project was approved by EPA by letter dated July 1, 2009 (EPA 2009), and by KDEP by letter dated September 25, 2009 (KDEP 2009b).

Deactivation activities including removal of the hazardous materials located within the facility, as well as the infrastructure that may contain such material, was initiated under DOE's Atomic Energy Act authority and is presently ongoing.

The approach in this removal action anticipates that some infrastructure will be left in place following deactivation to be decommissioned with the facility structures. After the deactivation is completed, it is anticipated that all accessible interior asbestos-containing materials (ACM) will have been removed in accordance with applicable regulations and DOE policy. Chemical and/or radionuclide containing systems (e.g., process piping) will have been emptied of residual material to the extent practicable. Certain wastes, such as polychlorinated biphenyl (PCB) capacitors, mercury switches, manometers, etc., will have been removed. The building surfaces and remaining infrastructure that will be removed during structural demolition (i.e., floors, walls, residual piping, and equipment) will have been vacuumed and sealed to the extent practicable to contain and minimize airborne releases during the demolition process.

The structures and nonhazardous process systems that remain following the deactivation of the C-340 Complex are expected to contain low-level waste (LLW), PCB bulk product waste, and/or ACM. Small quantities of hazardous substances, such as paint chips or vacuum dust, also may be generated during building demolition. These small quantities are not expected to make the demolition debris waste stream Resource Conservation and Recovery Act (RCRA)-hazardous waste.

Demolishing the C-340 structures will remove a source of a potential release to the environment, thereby reducing the risk that would be posed by the structures were they left standing. This removal action meets the removal action objectives defined in Section 2.2 and supports the long-term remediation of the Paducah Gaseous Diffusion Plant (PGDP).

This RAWP defines the demolition of the building structures to the slab and removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping, etc.) and residual waste material. The activities addressed by this RAWP include the characterization; structural demolition; segregation; on-site or off-site treatment (if necessary); packaging; disposal; transportation; disposition of demolition debris, piping, and small quantities of hazardous materials; and possible reuse/recycle of reusable equipment from the C-340 buildings.

1.1 PURPOSE OF THE REMOVAL ACTION WORK PLAN

The purpose of this RAWP is to provide details on how the NTCRA will be executed in accordance with the Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum (AM). The EE/CA describes the evaluation of alternatives that could be used to address the potential threats posed to human health and the environment from the release or potential release of hazardous substances from the C-340 Complex. The AM documents the decision to proceed with structural demolition of the C-340 Complex as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) NTCRA.

1.2 SCOPE OF THE REMOVAL ACTION WORK PLAN

This RAWP was prepared in accordance with requirements of CERCLA and the Paducah FFA.

This RAWP includes the following:

- Planning schedule for the decommissioning of the C-340 structures and for subsequent documents;
- Description of plans and objectives for the structural demolition removal action; and
- Strategy for waste characterization during demolition of the C-340 structures.

The primary emphasis of the RAWP is to supplement the AM information and to provide greater detail regarding project management, project execution, and applicable or relevant and appropriate requirement (ARAR) compliance measures.

The distinct structures in these complexes that are part of the NTCRA are listed in Table 1, and the associated solid waste management units (SWMUs) are listed in Table 2.

Table 1. C-340 Complex

C-340 Complex	
Facility Number	**Facility Name[1]**
C-340-A	Powder Building*
C-340-B	Metals Plant*
C-340-C	Slag Building*

*except for the south end annex

[1] The Facilities Information Management System (FIMS) for the Paducah GDP lists the five facilities for the C-340 Complex: C-340 (as a separate facility), C-340-A, C-340-B, C-340-C, and C-340-D. FIMS does not include C-340-E. C-340 is included in the C-340-A, C-340-B, and C-340-C (main facility) listing for American Recovery and Reinvestment Act work. C-340-E is an approximately 100 ft^2 building that housed the emergency propane generator external to the C-340 main facility.

Table 2. C-340 Complex SWMUs

C-340 Complex SWMU No.	SWMU Name
101	C-340 Hydraulic System
378	G-340-01 Generator Staging Area
379	G-340-03 Generator Staging Area
380	G-340-04 Generator Staging Area
381	G-340-05 Generator Staging Area
382	G-340-06 Generator Staging Area[2]
434	S-340-01 Satellite Accumulation Area
477	C-340 Metals Plant
514	C-340-D Reject Magnesium Fluoride Storage Silo
515	C-340 "Dirty" Dust Collection System
516	C-340 Derby Preparation Area Sludge Collection System
521	C-340 Saw System Degreaser
522	C-340 Work Pit Located at Ground Floor Level at B-7-B-9
523	C-340 Metals Plant Pit Ground Floor at F-6 to F-11
524	C-340 Pickling Sump B-10 and B-11
529	C-340 Power Plant Sump at Ground Floor Level

[2] SWMU 382 has been determined to be a "No Further Action" site in the PGDP Site Management Plan (DOE 2010c).

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2. PROJECT DESCRIPTION

2.1 FACILITY DESCRIPTION

The C-340 Complex is located on the eastern side of the PGDP site as shown in Figure 1. Figure 2 is a photograph of the exterior of the facility. As it pertains to this CERCLA NTCRA, the C-340 Complex consists of three inactive buildings as depicted in Figure 1:

- C-340-A Powder Building,
- C-340-B Metals Building, and
- C-340-C Slag Building.

The areas of the C-340 Complex that are addressed in this RAWP include the C-340-A Powder Building (42,000 ft^2); C-340-B Metals Building (17,920 ft^2); and C-340-C Slag Building (4,400 ft^2). C-340-A, B, and C are physically adjoining structures (See Figure 2). C-340-A is a seven-level structure; C-340-B consists of a single level with operating platforms; and C-340-C includes four floors. These are metal frame structures with corrugated asbestos transite exterior walls, built-up roofs with concrete slab foundations, and steel plate upper floors. These facilities are located within a fence that, for all practical purposes, represents the boundary of the facility.

The C-340 Complex produced uranium tetrafluoride (UF_4) and uranium metal from 1956 into the 1980s. The powder unit, which produced UF_4 in the C-340 Complex, operated from 1956 until 1977. These operations generated high levels of airborne UF_4, magnesium powders, uranium metal oxides, and magnesium fluoride (MgF_2) dust. Just before the hydrogen fluoride (HF) production operations ceased, the equipment (conveyors, towers, etc.) was "run until empty." Operations continued until bulk quantities of uranium hexafluoride (UF_6) and UF_4 no longer were present in the facility.

After 1977, the facility also served as an electrical shop, training school, and valve-testing facility, which are not expected to have introduced additional contamination to the structures. From 1978 to 1982, the facility served as a shipping point for UF_4 product. In 1985 and 1986, special melting operations were conducted in C-340-B. The last two operations involved the same chemicals and radiological contamination as materials used during normal operations; therefore, the nature and distribution of contamination were not altered.

In December 1991, utilities were shut off with the exception of power for building lighting. In 1994, the facility was fenced and locked. Until 2009, ongoing activities were limited to routine surveillance and maintenance. In 2009, facility deactivation activities began. The facility has not been the subject of any previous CERCLA response actions.

The C-340 Complex is considered a radiological contamination area, and access is restricted. The C-340-A Powder Building contains heated reactor towers used for the UF_6 to UF_4 reduction process. In this process, UF_6 gas reacted with hydrogen gas in the reactor towers at high temperatures to form UF_4 and HF. The resulting solid UF_4 was dropped into a product/storage hopper and was transferred into drums for further storage. The off-gases, consisting primarily of HF, nitrogen, and hydrogen, passed through a cyclone separator, activated carbon chemical traps, condensers, and a potassium hydroxide scrubbing system. The HF condensed in this process was converted to an anhydrous liquid form, which was stored in tanks.

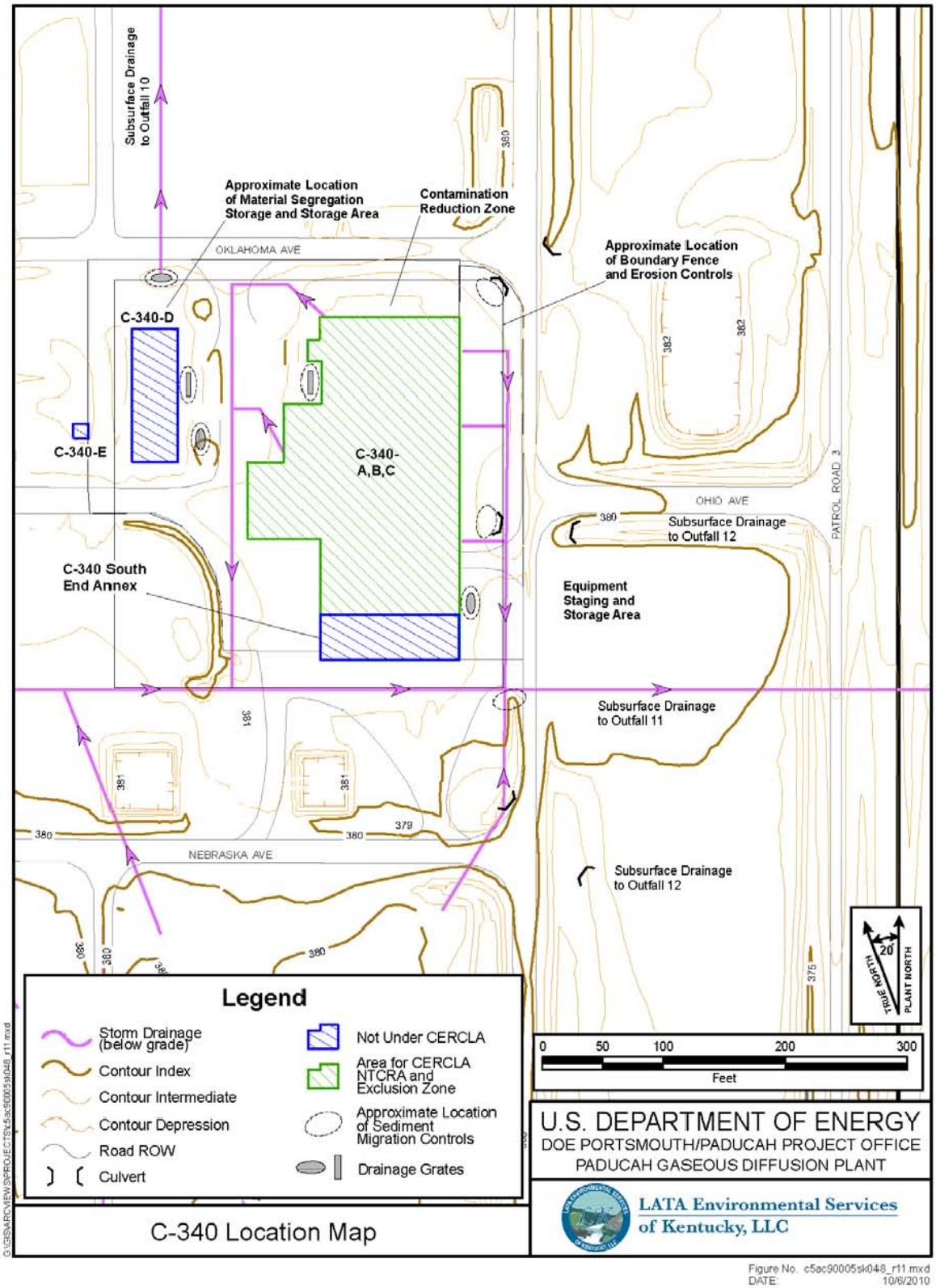

Figure 1. Location of the C-340 Complex Removal Areas

Figure 2. Exterior of the C-340 Complex

The C-340-B Metals Building houses reduction furnaces that converted some of the UF_4, to uranium metal through the firing of UF_4 and a powdered magnesium mixture at high temperatures. The UF_4 was mixed with magnesium and fed into MgF_2-lined firing reduction vessels, which then were placed in furnaces and heated until the magnesium ignited, precipitating the reaction between the magnesium and UF_4 resulting in molten uranium metal and MgF_2. The molten uranium then was formed into a metal ingot. The metal ingots were removed from the reduction vessel, cleaned and cut, processed further (as needed), staged for shipment, and finally shipped to customers. Hard MgF_2 slag was formed during the reaction.

The C-340-C Slag Building processed the hard MgF_2 slag from C-340-B to powder for reuse as liner material in the firing process. The slag was crushed and then sent through a vibrating feeder to screens that removed larger particles.

The radiological contamination in the C-340 Metals Reduction Plant Complex is comprised of surface contamination from the historical processes performed in the facility. Uranium currently present in the C-340 Metals Reduction Plant Complex exists as residual UF_4 powder, present in the facility as residual/leftover material in process equipment and uranium metal. The chemical hazards that are known to exist in the C-340 Metals Reduction Plant Complex include lead and/or other heavy metals and PCBs in paint; asbestos-containing materials in the transite siding; mercury; and metals-contaminated dust (potentially containing lead, arsenic or other heavy metals). The presence of contamination is known based on process knowledge and data from sample analyses. Small volumes of hazardous waste, such as paint chips or vacuum dust, may be generated during building demolition, and to the extent practicable, these waste streams will be segregated from the building debris and managed in accordance with applicable regulations.

2.2 REMOVAL ACTION SCOPE AND OBJECTIVES

Decommissioning of C-340 will entail demolishing and packaging the building structures, including any remaining piping and equipment. It also includes removing the corrugated asbestos transite siding on the structures and packaging it for disposition. The demolition will not involve removal of the groundlevel slabs and/or foundations. Sumps and pits, including four SWMUs, 522, 523, 524, and 529, will be backfilled with flowable fill or similar material and the slabs will be decontaminated and a fixative will be applied. The exact

location of SWMUs 522, 523, 524, and 529 will be noted and delineated, and the backfill activities will be recorded so that the information will be available to the Soils and Slabs Operable Unit, associated with activities post-gaseous diffusion plant shutdown. Wastes generated will be packaged and dispositioned in accordance with ARARs.

The following are the removal action objectives for this project:

- Reduce the potential exposure to on-site personnel from hazardous substances due to the structural deterioration of these facilities; and

- Reduce risks of releases to the environment and exposure to future industrial workers that may result from uncontrolled releases of hazardous substances, including radiological contamination, from these facilities.

2.3 REMOVAL ACTION APPROACH

The decontamination and decommissioning (D&D) of the C-340 Complex will be compliant with ARARs and environment, safety, and health requirements. The DOE Integrated Safety Management System (ISMS) process will be utilized during the entire project. Decommissioning activities will be performed using work control documents, proper waste characterization, and appropriate management and disposition of waste to meet ARARs and Waste Acceptance Criteria (WAC) of the disposition facility.

The ongoing deactivation activities at the C-340 Complex have removed the contaminated loose materials. The process infrastructure and asbestos insulation inside the buildings, but not the exterior transite siding, will be removed prior to the initiation of the decommissioning activity described in this RAWP.

Chemical- and/or radionuclide-containing systems (e.g., process piping) will have been emptied of residual material. Additionally, certain wastes, such as PCB capacitors, mercury switches, manometers, etc., will have been removed. The structural support systems and remaining infrastructure designated for structural demolition (i.e., floors, walls, residual piping, and equipment) will have been vacuumed and sealed to contain and minimize airborne releases during the demolition process.

Small volumes of hazardous waste, such as paint chips or vacuum dust, may be generated during building demolition, and to the extent practicable, these waste streams will be segregated from the building debris and managed in accordance with applicable regulations. The small amount of contaminants that may remain after deactivation is expected to include radiological contamination from uranium, PCBs in paint, small amounts of hazardous substances, and dust potentially containing lead. Any hazardous materials that may be present in nonprocess systems and become commingled with the demolition debris are expected to be in sufficiently low quantities that they would not require the building debris to be regulated as RCRA hazardous waste. The demolition debris will be characterized and is expected to consist of various types of waste such as LLW, PCB bulk product waste, and solid waste.

The decommissioning phase of this project, including the demolition of the building and remaining equipment and piping, will be accomplished in a manner consistent with ARARs. Sumps and pits will be backfilled with flowable fill or similar material, and slabs will be decontaminated or a fixative will be applied. Wastes generated during the decommissioning activities will be packaged and dispositioned.

To accomplish the project safely and on schedule, the following activities will be performed:

- Planning
- Hazard Analysis
- Hazard Mitigation/Controls
- Characterization
- Demolition
- Waste Material Disposition
- Demobilization

2.3.1 Planning

The decommissioning of the C-340 Complex will require a highly integrated approach to ensure compliance with all technical, environmental, and safety requirements. Planning for decommissioning the C-340 Complex will incorporate the ISMS process.

2.3.2 Hazard Analysis

Every D&D activity is subjected to an Activity Hazard Assessment (AHA) to ensure the safety of the operating personnel, the public, and the environment. Activity-specific AHAs and work packages are prepared for each activity. These work packages and AHAs are reviewed and approved by the appropriate technical managers, industrial hygiene professionals, Health Physics professionals, Environment, Safety, and Health (ES&H) professionals, subject matter experts, and work force peers before any work is performed. These procedures have been, and continue to be, modified as new and improved methods of assessment and response are identified and new situations arise during the D&D activities.

Prior to initiating each activity, the field team will walk down the area to define and assess the hazards involved in performing the specific activity. The field team may include support from Health Physics professionals, ES&H technicians, technical team members, subject matter experts, field engineers and work force personnel.

Structural components will be evaluated to assess hazards related to the demolition process. Prior to initiating the decommissioning process, material and equipment will be inspected to identify physical hazards. Information relating to the physical condition of the equipment and structure will be obtained from available personnel who worked in the C-340 Complex. The hazard analysis will include identification of each potential hazard related to securing, dismantling, and removing each component. Hazardous energy sources, such as power connections and associated supply sources, will be de-energized and verified as such prior to dismantlement of the facility.

If hazards are identified, they will be assessed and included in the AHAs and work packages for the activity. These documents definitively establish the procedures that must be used for each activity, the hazards involved, and detailed methods to accomplish these activities. Each of the parties involved in the walk down and subsequent assessment will review the work package prior to initiation of the work.

If additional characterization data is required to complete the hazard assessment, support from the field sampling and/or waste management groups will be requested. Activity-specific procedures and protocols have been developed and approved for collection, management, and analysis of samples during the D&D activities. The results of this additional characterization will be integrated into the development of AHAs/work packages.

2.3.3 Hazard Mitigation and Controls

DOE has implemented ISMS that incorporates five core functions and is based on eight guiding principles. The objective of ISMS is to integrate safety and environmental protection into the planning and execution of all work activities. The term safety encompasses nuclear safety, industrial safety, industrial hygiene, occupational health, health physics, and environmental compliance. ISMS requirements flow down to DOE's prime contractor and their subcontractors and are included in the Health and Safety Plan (HASP) (Appendix C).

The five core functions of ISMS are as follows:

(1) Define scope of work
(2) Analyze hazards
(3) Develop and implement hazard controls
(4) Perform work within those controls
(5) Provide feedback for continuous improvement

Following are the eight guiding principles of ISMS:

(1) Line management responsibility for safety
(2) Clear roles and responsibilities
(3) Competence commensurate with responsibility
(4) Balanced priorities
(5) Identification of safety standards and requirements
(6) Hazard control tailored to work being performed
(7) Operations authorization
(8) Worker involvement

During implementation of this removal action, environmental impacts and worker safety will be controlled through various mechanisms including, but not limited to, work sequencing and work practices (such as proper personal protective equipment). Fugitive dust emissions will be mitigated by misting surfaces with water prior to dismantlement and applying fixative to surfaces prior to demolition. Use of water will be controlled in an effort to eliminate an additional waste stream.

Air monitoring in the areas around the structures will allow for identification and mitigation of airborne contamination. Asbestos-control procedures will be instituted during the removal of the ACMs. These procedures will be implemented in compliance with ARARs. ACMs will be managed in accordance with the ARARs from time of removal until they are appropriately disposed of in C-746-U Landfill or an approved off-site landfill.

Contaminants that may be monitored during C-340 D&D activities are the following:

- Lead dust from paint;
- Additional metals, such as cadmium, silver, and beryllium, as needed;
- Asbestos; and
- Uranium.

These constituents will be monitored in the work area using the appropriate type of sampling pumps. Asbestos fibers will be monitored by conducting visual inspections of personal protective equipment and the work environment. In the event that any of these constituents is detected above threshold levels, work will be

paused or stopped and the source of the excursion investigated. An appropriate response will be initiated according to the conditions that warranted the excursion. Detection of asbestos fibers could result in examining and possibly changing the wetting practices used in the demolition and/or changing respiratory filters.

Decontamination is required for large field equipment or equipment components that come in contact with contaminated material. Except for instances where field decontamination is appropriate, cleaning and decontamination of all equipment shall occur at a designated area (decontamination pad) on the site. Disassembly of equipment may be required for areas that are inaccessible (i.e., tracks, pumps, etc.). Decontamination shall be accomplished using brushes or pressure washers with appropriate solvents, and/or tap water and soap, if necessary, to remove particulate matter and surface films. All equipment will be surveyed for radiation contamination prior to release from the plant.

Erosion control structures will be erected to control surface drainage around the facility to minimize sediments in receiving streams. Stormwater containment structures will be constructed, where necessary, to prevent off-site migration of potentially contaminated stormwater. The stormwater inlets will be protected by the installation of silt fences. Other sediment barriers and/or temporary stormwater control structures such as ditches or retention basins will be installed, as needed, to minimize excessive erosion and resulting sediment entering the receiving stream. These controls are similar to existing structures installed during the ongoing deactivation activities.

Hazardous Energy. Hazardous energy sources, such as steam and electrical power, will be identified and de-energized, air gapped, and marked during the deactivation process. Removal activities that could be affected by these sources will be initiated only after verifying that the energy sources have been isolated (i.e. Lock out/Tag out). All hazardous energy sources will be considered active until proven otherwise. Temporary energy sources installed to support decommissioning activities will be managed in the same manner as permanent sources.

Water. The decommissioning activities are not expected to generate significant wastewater volumes. The nature of the materials identified within the C-340 Complex would preclude the use of water to decontaminate the wastes generated. Water used to decontaminate personnel will be containerized, transported, and treated, if necessary, prior to discharge through an existing Kentucky Pollution Discharge Elimination System-permitted outfall. All identified floor drains in the C-340 Complex will be plugged to eliminate the uncontrolled discharge of water from the building. Shower water for personnel will be treated in the PGDP Sanitary Wastewater Collection Treatment System. Water used for dust control will be minimized.

Water used for wetting ACM and dust suppression will be used inside the erosion/runoff control structures around the C-340 structure and collected in basins or sumps and treated, if necessary, prior to discharge. The locations of the erosion control structures are shown on Figure 1. Water usage will be minimized by using low flow “fogging” nozzles to create effective dust control spray and/or through use of specialty demolition equipment such as a “dust boss.” A dust boss uses a high volume fan and high pressure water misting system to create an ultrafine water mist that can be focused on the demolition area, suppressing dust generation.

Air. The C-340 decommissioning activities may generate airborne particulates that may be radiologically and/or chemically contaminated. The migration pathways for airborne emissions during deactivation include vents, broken windows, wall penetrations, and open doorways. If the seals on these migration pathways are broken during deactivation, they will be resealed. During the structural demolition, if the seal on a vent, penetration, or window that is located away from the active demolition area is determined to be broken, and resealing the opening is feasible and would reduce potential for contaminant migration, then the seal will be

repaired. Mitigation measures will include, but are not limited to, water spray, vacuuming, and fixative application techniques for fugitive dust emissions.

Hazardous Materials. The systems left in place, following deactivation, may contain small quantities of hazardous substances. The levels are not expected to result in the building debris being characterized as a RCRA hazardous waste. Small volumes of hazardous waste such as paint chips or vacuum dust may be generated during building demolition. These waste streams will be segregated from the building debris and managed in accordance with ARARs. Most of the resulting waste from building demolition is expected to be LLW and/or PCB bulk product waste. ACM will be managed in accordance with ARARs.

Transite Removal. The only ACM expected to remain after the deactivation activites will be the transite siding on the exterior of the buildings. The hazards associated with the removal of transite include the fugitive ACM emissions from possible breakage of the transite panels and the lead in the "lead heads" of the screw fasteners that attach the panels to the buildings. All transite panels shall be removed intact or in large sections and shall be carefully lowered to the ground using a crane or a specially equipped manlift.

The panels will be removed by detaching the screws from the building. The lead-headed screws will be collected as they are removed and packaged for disposal in appropriately labeled containers. Plastic sheeting placed on the ground beneath the work area will prevent the loss of any lead-headed screws into the soils.

Transite siding will be placed on two 4-inch x 4-inch x 12-ft long wood posts and stacked approximately 2-ft high and double wrapped with 6-mil thick plastic sheeting and one layer of absorbent material for disposition. Misting with water will be utilized during the transite removal process to minimize airborne contamination. Care will be taken not to break or crush the transite panels during removal.

2.3.4 Characterization

Characterization is necessary to ensure a safe working environment, as well as to determine the proper disposition of materials from the project. The waste materials that will be generated during the decommissioning process will be sampled/analyzed to (1) determine the potential exposures to the workers and environment, (2) establish the levels of personal protection required, (3) establish disposal requirements, and (4) develop appropriate documentation for shipment of the material.

Characterization activities include physical sampling, evaluation of analytical results developed during the deactivation activities, development and application of process knowledge, and historic data research. The need to collect samples will be determined on a case-by-case basis based on the process knowledge of the facility components. Where necessary, sampling will be utilized to verify historical data and/or process knowledge.

Depending upon the characteristics of the waste material, it may be treated, as required, and dispositioned in compliance with ARARs, in addition to the WAC of the designated disposal facility. Characterization will be necessary to segregate the waste material in accordance with the compliance criteria of the disposition facilities. The activities will involve the application of process knowledge and/or sampling and analysis of the waste materials in accordance with sampling and analysis plans.

2.3.5 Demolition

Demolition of C-340 will be performed in accordance with the approach described in the Demolition Plan (Appendix A). Standard construction equipment will be used during demolition. A listing of typical equipment that may be used on the project is included in Table 3. Select contractor-developed procedures for

Table 3. Demolition Equipment

Technology	Description	Applicability	Limitations	Comments
Conventional disassembly	Hand-held tools and saws; used for hand removal of nuts and bolts.	May be applied to any area.	Labor intensive and slow; recommended for limited application. Vacuuming with high efficiency particulate air filtration will be used for activities creating large amounts of airborne particulate.	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 1/4-inch (0.6-cm) thick steel (large-diameter pipe, structural steel, tanks); up to 1-inch (2.5-cm) 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 1.25 inch (3.175 cm) 20 ft (6 m) diameter; wall thickness up to (6 inch) (15 cm), depending on type of circular cutter used.	4 inch (10-cm) to 21 inch (53 cm) clearance required, depending on type of circular cutter used; requires multiple passes for thickness greater than 0.75 inch (1.9 cm).	There are safety concerns, but these can be managed.
Plasma arc cutting devices	High voltage low current electricity combines with pressurized gas (air or nitrogen) to create a focused stream of high temperature ionized gas, melting away the metal.	Provides high speed cutting and gouging for most metals up to 2 inches (5.8 cm) in thickness. Metal thickness may restrict widespread applicability.	May ignite uranium; alloys uranium with the metal, however, generally does not affect cutting operation. Existing worker protection for uranium is adequate for alloying and subsequent segregation that would take place after using a torch.	Additional worker protection may be required if torch is used to cut metals that have PCB or lead-based coatings.
Oxy-fuel torch	Oxygen and a fuel gas mixed and ignited at the tip of a torch; the metal is heated and burned away.	Very effective in cutting carbon steel; depth of cut up to 4 to 6 inches (10 to 15 cm); cutting speed up to 30 inches/min (76 cm/min); common technique for structural carbon steel member disassembly.	May ignite uranium; alloys uranium with the metal, however, generally does not affect cutting operation. Existing worker protection for uranium is adequate for alloying and subsequent waste segregation that would take place after using a torch.	Gasoline will be the primary fuel source for most applications. 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 or lead-based coatings.

PCB = polychlorinated biphenyl

work controls and implementation of decommissioning are listed in Appendix D. These procedures will be used during decommissioning activities. Specific task instructions addressing the hands-on demolition, waste packaging, and other support activities will be developed, reviewed, and approved by subject matter experts and experienced demolition personnel. These work instructions will be developed in accordance with the work control procedures listed in Appendix D.

The C-340 demolition will not involve removal of the groundlevel slabs, subslab penetrations, and/or foundations. After demolition of the C-340 structure, the slab will be inspected, and the presence and characteristics of the cracks or breakage in the slab will be noted and placed in project files for future investigations. The slabs that will remain after structural demolition will be inspected visually, surveyed, decontaminated, as appropriate, and sealed to minimize the possibility of spreading contamination. It is anticipated that after decontamination, a fixative/stabilizer coating, such as InstaCote Epoxy Surface Protector or an equivalent will be applied. Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent that the substrate forms a surface that will bond well with the fixative/stabilizer. Subslab penetrations, such as basements, pits, and sumps will be backfilled to prevent accumulation of water and eliminate hazards to on-site personnel. Figure 3 depicts the slab floors of the C-340 Complex following demolition, and the locations of SWMUs that have been filled with flowable fill.

2.3.6 Waste Material Disposition

Demolition of C-340 will generate different types of waste streams. The primary waste stream will be construction/demolition debris, which is expected to be categorized as LLW. This waste likely will be disposed of at an off-site commercial disposal facility or the Nevada Test Site. Solid waste will be disposed of on-site in C-746-U Landfill in accordance with the ARARs and the WAC.

Most waste generated during this action will be loaded directly into shipping containers in areas adjacent to the C-340 Complex. Staging areas, such as the C-759 Scrap Metal Staging Area or the C-760 North-South Diversion Ditch Laydown Gravel Pad, will be used for storage of loaded containers prior to loading containers onto conveyances (railcars or trucks) for shipment. Existing waste storage facilities may be used, as appropriate, for staging and storage of waste (e.g., hazardous or PCB waste) prior to shipment for disposal. Wastewater will be transferred to temporary storage pending characterization and treatment. All waste storage locations will be located inside the DOE controlled area. All waste storage will adhere to the substantive waste storage requirements established in the ARARs.

Waste materials will be sorted and segregated on-site, size reduced, packaged, and/or staged for disposal in accordance with ARARs. Any required on-site treatment such as stabilization or dewatering will be conducted in accordance with ARARs. Waste material shipped off-site will be shipped in accordance with U.S. Department of Transportation (DOT) requirements. ACM will be managed as a separate waste stream in accordance with ARARs and disposed of in C-746-U Landfill or an approved off-site landfill in accordance with applicable regulations and WAC.

Dust suppression techniques used at container storage areas will consist of using reasonable precaution to prevent particulate matter from becoming airborne. These reasonable precautions may include, but not be limited to, using water sprays and mists or chemicals to control dust and covering open bodied trucks when they are in motion and transporting materials that likely could become airborne.

2.3.6.1 Waste material segregation and treatment

Waste materials will be separated into waste streams that conform to the WAC of the proposed disposal facility. The majority of this waste is expected to be LLW and ACM (from corrugated asbestos transite

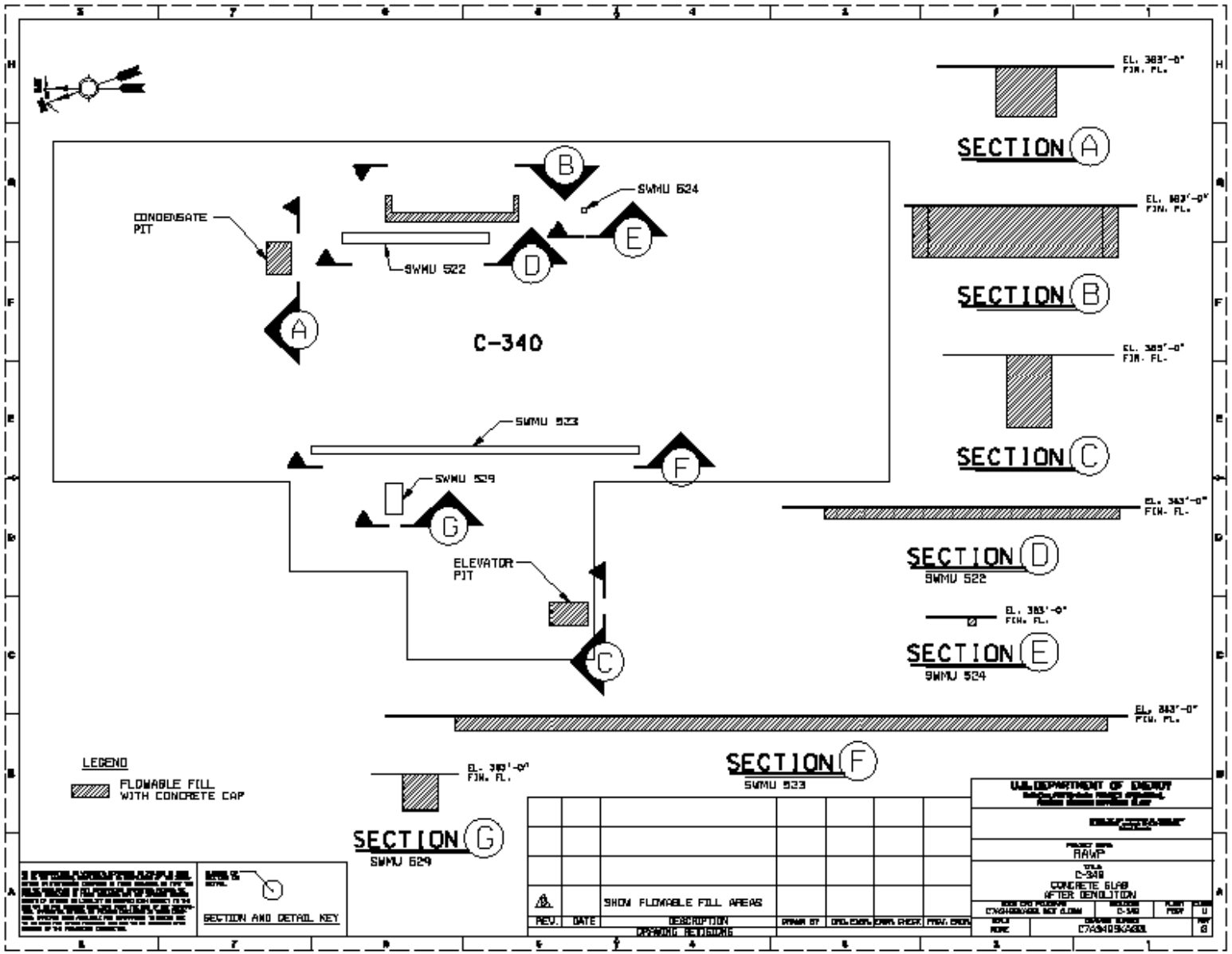

Figure 3. Configuration of the Slabs of the C-340 Complex

panels); however, small volumes of contaminated material, such as paint chips or vacuum dust potentially containing lead, and/or PCB bulk product waste, may be generated during building demolition. Where possible, these materials will be segregated from the building debris by vacuuming or other physical means and managed in accordance with ARARs.

Demolition debris will be staged at CERCLA storage areas in preparation for disposal. Where appropriate, some components may be size reduced to meet transportation or disposal criteria.

Materials removed from the C-340 Complex may require on-site or off-site treatment in order to comply with environmental regulatory requirements prior to disposal. If needed, on-site treatment activities may include dewatering, heavy metals stabilization, encapsulation of paint chips, or other methods. On-site treatment will be performed in accordance with ARARs. Off-site treatment activities will be in accordance with applicable regulations.

Standard industry control measures will be used for dust control at segregation, packaging, and treatment areas. During segregation, sizing, and packaging of demolition debris (steel, concrete from walls or upper floors, etc.), dust suppression methods (amended water sprays or mists and "dust bosses") will be utilized to prevent generation of fugitive dusts. Use of enclosures and dust collection systems during segregation, treatment, and packaging is not anticipated.

2.3.6.2 Waste packaging

The waste generated during D&D will be packaged for transportation and disposal. The waste packaging methods will be dictated by the waste sizes and configurations and selected transportation and disposal options. Waste volumes will be minimized by utilizing methods for component disassembly and size reduction. A variety of containers are available that would be appropriate for the various waste streams generated. Some examples of appropriate transportation packages include Sealand containers, intermodal containers, ST-90 boxes (B-25), steel drums, polyethylene drums, and railcar gondolas. All wastes generated during this project will be packaged in accordance with ARARs.

The waste streams may be described with one of the following DOT proper shipping names:

- Low Specific Activity
- Surface Contaminated Objects
- Hazardous Waste
- Solid/Liquid PCBs
- Solid/Liquid Asbestos
- Solid Waste

Wastes not meeting the above classifications will be evaluated on a case-by-case basis for proper classification and packaging.

2.3.6.3 Waste shipping

Wastes generated from this decommissioning activity may be transported by a variety of methods depending upon the characteristics of the waste and the disposal facility. Typically, the wastes designated for off-site disposal will be shipped in one of these:

- Intermodal containers on over-the-road trucks
- Intermodal containers on flatbed railcars

- Gondola railcars
- Semi dump trailers

Materials designated for disposal in the on-site landfill will be transported in roll-off bins, in tandem dump trucks, or similar conveyances.

Processed material destined for off-site shipment will be packaged in accordance with applicable DOT regulations and placed in a staging area pending transportation to the final treatment/disposal site. Transportation of waste material to the on-site landfill will be conducted in accordance with PGDP and DOE procedures.

Samples collected during the course of this project that must be shipped off-site will be shipped in accordance with applicable DOT regulations if transported by ground. Samples shipped by air are governed by applicable International Air Transport Association/International Civil Aviation Organization and DOT regulations. On-site transportation of samples will be conducted in accordance with PGDP and DOE procedures.

2.3.6.4 Waste disposal

Disposal options that will be considered for the wastes generated during D&D of the C-340 Complex are limited by the presence of radioisotopes at levels that exceed most industrial/sanitary landfills radioisotope limits. Three disposal alternatives are being evaluated as primary disposal options for the waste generated from the D&D activities. These include Nevada Test Site, an off-site commercial disposal facility, and on-site disposal of nonhazardous solid waste at the on-site C-746-U Landfill. Disposal at the on-site landfill will be consistent with WAC developed through an authorized limits evaluation and performance evaluation for the landfill. In the event that these facilities cannot accept certain wastes, other facilities may be evaluated.

2.3.7 Demobilization

Project demobilization includes completing assessments and documentation verifying that the activities described in this RAWP have been performed in a satisfactory manner, dismantlement of all site support equipment and materials, removal of all support equipment, and site restoration. The Removal Action Verification Plan, Appendix B, provides additional details regarding the verification and completion of the removal action objectives.

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3. PLANS AND WORK CONTROL DOCUMENTS

The following project-specific plans either have been or will be developed to ensure the proper execution of decommissioning the C-340 Complex and to ensure compliance with the AM and ARARs.

3.1 DEMOLITION PLAN

The Demolition Plan (Appendix A) includes the details of demolishing the C-340 Complex and is intended to serve as the design report.

3.2 DEMOLITION REMOVAL ACTION VERIFICATION PLAN

The Demolition Removal Action Verification Plan (Appendix B) identifies sampling and/or monitoring necessary to confirm that the groundlevel slabs and foundations have been left in a protective state that will prevent the migration of contaminants from the facility slabs after the facility structures have been demolished.

3.3 SAMPLING AND ANALYSIS PLANS

Sampling and Analysis Plans for the C-340 Complex will be developed for sampling and analyses of waste streams generated by this removal action. The plans will enable contaminants of concern to be identified, sampled, and analyzed. The plans will define the process for establishing sampling requirements for each activity and subactivity, selection of the proper sampling protocols, and communication of sampling for use in future activities.

3.4 PROJECT HEALTH AND SAFETY PLAN

A HASP outlining the necessary controls and requirements to protect worker health and safety has been prepared and is included in Appendix C. The HASP is consistent with the requirements of 29 *CFR* § 1910.120 and addresses the safety and health concerns for decommissioning the C-340 Complex. During implementation of the removal action, specific work instruction and hazard controls will be developed at the activity level for use by the personnel performing the work. The ISMS process will be used in preparation of these work instructions.

3.5 WASTE MANAGEMENT PLAN

Waste Management activities will be performed in accordance with the approved ARARs. The Paducah FFA does not have a specific requirement for the inclusion of the Waste Management Plan (WMP) in a RAWP, although it is not precluded. This Plan does not include a WMP due to the prescriptive nature of the ARARs relative to the waste management activities expected and the well-defined waste stream volume and characteristics expected to be generated for this removal action. Work instructions and procedures that incorporate and flow down the requirements of ARARs either are in place or will be developed for the field personnel to utilize when performing day to day operations.

3.6 QUALITY ASSURANCE PROJECT PLAN

The programmatic *Quality Assurance Program and Implementation Plan for the Paducah Environmental Remediation Project*, PAD-PLA-QM-001, (LATA Kentucky 2010) documents the processes and procedures that will be used to ensure that the analytical data of acceptable quality are used to make waste disposition decisions. It also explains other aspects of the Quality Assurance Program that are applicable to this project.

3.7 SPECIFIC WORK DOCUMENTS AND PLANS

Additional special condition documents including, but not limited to, work control documents, activity hazard analyses, and work permits also will be developed, as appropriate.

3.8 OTHER PLANS AND DOCUMENTS

It may be necessary to develop other plans and documents in addition to those identified previously. These may include, but are not limited to, the following:

- Security Plan
- Transportation Plan
- Procurement documents

4. PROJECT SCHEDULE

Table 4 provides key schedule elements and projected implementation dates for the decommissioning of the C-340 Complex. This schedule is based on present budget projections and continued funding by the American Recovery and Reinvestment Act.

Project 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. The enforceable milestones for performance of activities included as part of the removal action are set forth in the Site Management Plan (DOE 2010c). Any additional milestones, timetables, or deadlines for activities included as part of the removal action will be identified and established independent of this RAWP, in accordance with existing FFA protocols.

Table 4. Project Schedule for D&D of the C-340 Complex

Activity	Milestone[3]
Issue D2 AM to KY/EPA	May 2010
Issue D1 RAWP to KY/EPA	July 2010
Removal Action (Demolition) Start	January 2011
Removal Completion Report	December 2012
Complete Demolition	April 2011

[3] These are general planning dates for submittal of the CERCLA decision documents. Any extensions for reviewing documents, submitting comments, or responding to comments will impact the schedule. This schedule is included in this document for information purposes only and is not intended to establish enforceable schedules or milestones. Enforceable milestones, if any, will be established in the FFA or Site Management Plan and will be updated in accordance with Sections XXIX and/or XXXIX of the FFA.

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5. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with 40 *CFR* § 300.415(j), on-site removal actions conducted under CERCLA are required to meet ARARs to the extent practicable considering the urgency of the situation and the scope of the removal. DOE will comply with ARARs and to-be-considered (TBC) guidance as set forth in the EE/CA when conducting this removal action. The ARARs and TBC guidance are included in the AM for the C-340 and C-746-A Facilities and are incorporated in this RAWP by reference.

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6. REFERENCES

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APPENDIX A

DEMOLITION PLAN FOR THE C-340 COMPLEX

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DEMOLITION PLAN FOR THE C-340 COMPLEX

The Demolition Plan defines the detailed activities required to remove the structures of C-340-A, C-340-B, and C-340-C to the slabs and to decontaminate/stabilize the slabs and subsurface pits, trenches, and sumps for subsequent actions under the Soils and Slabs Operable Unit activities.

General

The C-340 Reduction and Metals Complex, also known as the metals plant, is a DOE facility consisting of five facility units (C-340-A Powder Building, C-340-B Metals Building, and C-340-C Slag Building.) The facility is inactive and was accepted to the decontamination and decommissioning (D&D) program in 1992. This Demolition Plan excludes concrete foundations, which are being deferred to Soils and Slabs Operable Unit. This plan also excludes the removal of the ground floor concrete slabs.

The C-340 Complex is located in the east portion of Paducah Gaseous Diffusion Plant (PGDP) between Oklahoma and Nebraska Avenues and is approximately 280 ft long, 172 ft wide, and 121 ft tall at the high roof. Hydrogen fluoride (HF) reactors, coreless electrical induction furnaces, and numerous material handling/transfer, dust collection, and support systems exist inside the complex.

The C-340 Metals Plant Complex consists of the following operations buildings/areas:

- C-340-A Powder Building
- C-340-B Metals Building
- C-340-C Slag Building

C-340-A, C-340-B, and C-340-C are to be demolished as a CERCLA Non-Time-Critical Removal Action and are included as a part of this Removal Action Work Plan (RAWP).

Facility Description

The C-340 Complex is made up of five distinct facility units grouped in a general "T" configuration with a total floor area of 68,332 ft^2 (6,348 m^2). The location of the C-340 Complex is shown in Figure A.1, and Figure A.2 shows an exterior view of the C-340 Complex. The three primary facility units are located within a single structure the C-340-A Powder Building (seven stories), the C-340-B Metals Building (single story with operating platforms), and the C-340-C Slag Building (four stories).

Contamination areas are located within C-340-A, -B, and -C. Access to the facility is restricted and requires special entry procedures. Facility Buildings A, B, C, and D are located within a security fence that represents the boundary of the facility. C-340-D, the Magnesium Storage Building, was demolished previously, and was connected to the main building by an enclosed drum conveyor system. The conveyor gallery was demolished during the C-340-D demolition; therefore, these facilities are not addressed in this plan.

The structure that contains C-340-A, C-340-B, and C-340-C has a steel beam framework with corrugated asbestos exterior wall paneling with some concrete block walls. The built-up roof is made of insulation, felt, and tar and gravel layers. Metal decking supports the roofing material.

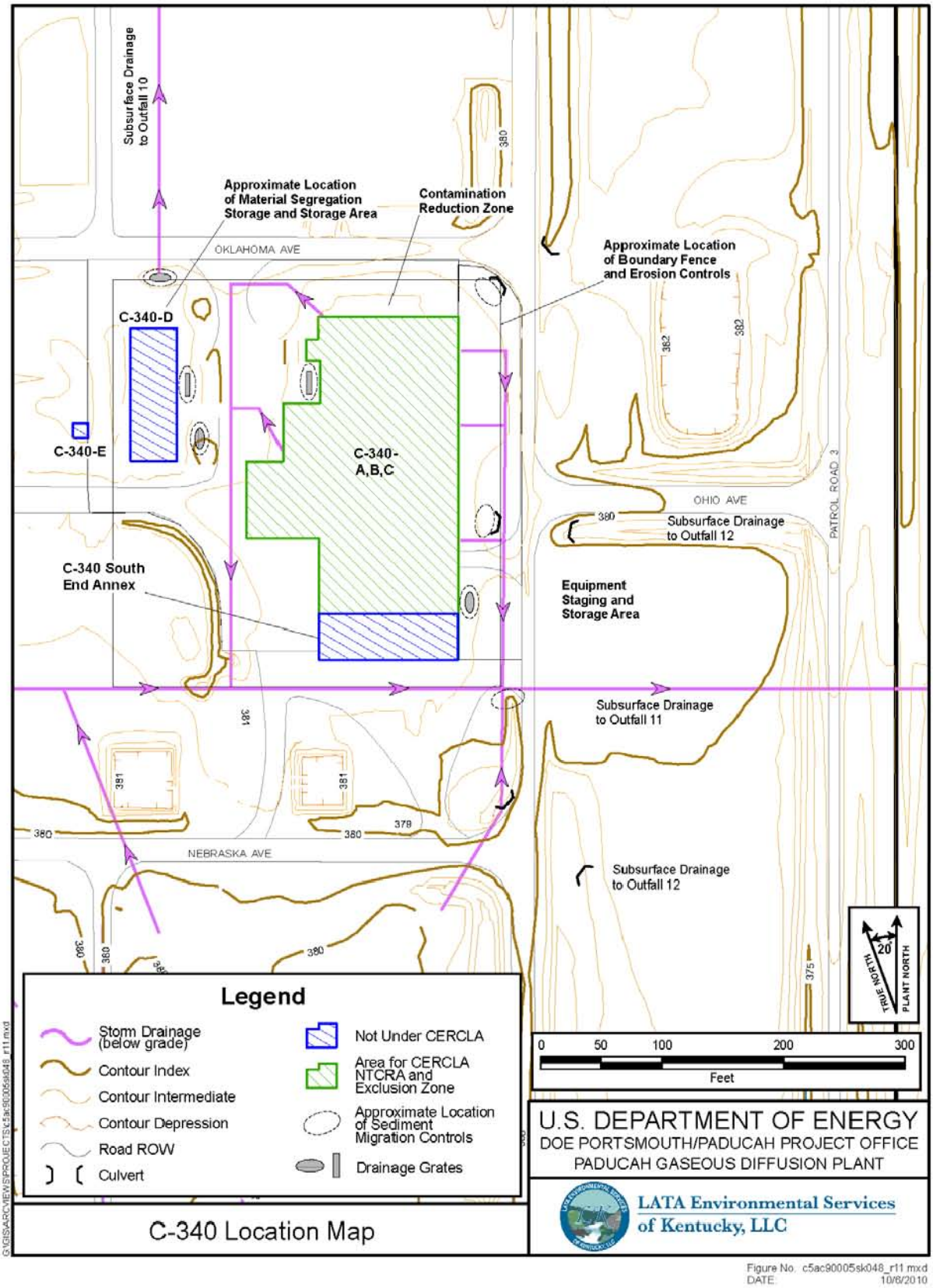

Figure A.1. Location Map of the C-340 Complex

Figure A.2. Exterior view of the C-340 Metals Reduction Plant Complex

Auxiliary Systems

The C-340 Complex includes a number of auxiliary systems. The following is a listing of auxiliary systems which will be removed from service (Lock out/Tag out) and air gapped during the deactivation activities.

Water: The C-611 Water Plant and PGDP water system supplied potable water and cooling water.

Electricity: Large transformers provided electricity. The transformers were dismantled and disposed of during a polychlorinated biphenyl (PCB) remedial action.

Heat: Steam-heated air units heated the entire Complex. Exhaust fans vented the air. Outside air entered through wall-mounted intake louvers with automatic dampers. Steam tracing, steam-heated air, as well as electrical resistance heated process piping.

Exhaust air: Air exhausted from the complex discharged through roof ventilation stacks.

Cooling: A chilled water unit cooled the plant control room, change house, and lunchroom. Individual window-mounted air conditioners cooled office areas on the south side of C-340.

Lighting: Explosion-proof incandescent fixtures provided lighting in hazardous areas, with vapor-tight incandescent lighting used in other process areas. Fluorescent lighting lit office and shipping areas.

Refrigeration: Refrigeration systems recovered HF from the process. Condensers cooled by Freon™-22 transformed HF gas to liquid form. Three-stage compression liquefied the Freon™-22 refrigerant.

It is anticipated that all accessible interior asbestos-containing material will have been removed and any systems (e.g., process piping, equipment) containing chemical and/or radionuclides will have been emptied of residual material, in accordance with applicable requirements, during the deactivation activities. Additionally, certain wastes, such as PCB capacitors, mercury switches, or manometers, etc., will have been removed. During the deactivation process the building surfaces and infrastructure (i.e., floors, walls, residual piping, and equipment) will be vacuumed and sealed to contain and minimize airborne releases.

The decommissioning phase of this project will be accomplished in a manner consistent with applicable or relevant and appropriate requirements. The buildings and remaining infrastructure will be removed, size reduced, packaged, and transported to a designated disposal location. The slab will be cleaned and coated with fixative. The subsurface pits, trenches, and sumps will be backfilled. Any pits or sumps will be cleaned, inspected, and surveyed prior to backfilling, and the condition prior to filling will be noted in the revised solid waste management unit assessment report.

The small amounts of contaminants that may remain after deactivation are expected to include radiological contamination from uranium, PCBs in paint, and small amounts of hazardous substances that cannot be accessed for removal and dust potentially containing lead. Any hazardous material that may be present in non-process systems and become commingled with the demolition debris is expected to be in sufficiently low quantities that they would not require the building debris to be regulated as Resource Conservation and Recovery Act hazardous waste. The demolition debris will be characterized and is expected to consist of various types of waste such as low-level radiologically contaminated waste, PCB bulk product waste, and solid waste. In the event that asbestos is discovered after demolition begins and it cannot be removed safely, the exposed regulated asbestos-containing material and any asbestos-contaminated debris will be treated as asbestos-containing waste material and will be kept adequately wet at all times until it is disposed. Further, if asbestos material is commingled with other types of debris during demolition, the commingled debris will be disposed of as asbestos-contaminated waste.

Other Deactivation and Pre-Demolition Activities:

The following activities will be completed during the deactivation of the facility.

(1) All utilities will be isolated and air gapped.

(2) Grout plugs will be installed in all floor drains and sanitary sewer drains.

(3) C-340-D and C-340-E Structures have been demolished, and the conveyer that connects the C-340-D Building to the C-340-A, -B, and -C Buildings has been demolished.

(4) All process systems, ventilation, and electrical equipment will be removed or stabilized.

(5) Exhaust stacks, exterior ventilation fans, ductwork, and structures will be removed or properly stabilized for removal during demolition.

(6) The overhead pipe chase that exited C-340-A on the West Side and connected to other PGDP facilities has been isolated and air gapped.

(7) Temporary power system and generators have been removed or are reconfigured to provided power needed for structural demolition.

(8) All process systems and electrical equipment will be stabilized and/or removed from buildings prior to demolition.

(9) All basements, pits, trenches, and sumps in zones scheduled for immediate demolition will be vacuumed. Structures that contain free liquids will be pumped to remove any free liquids. All sludge, debris, or foreign material will be removed, analyzed, and appropriately packaged for disposal.

(10) All surfaces will be sprayed with fixative to ensure the containment of transferrable materials.

(11) The slab surface will be decontaminated by washing, scabbling, or other physical means to reduce the removable contamination levels on the slab surface.

(12) Dust suppression will be practiced during any mobilization activities that have the potential to generate dusts.

(13) Fencing delineating the demolition exclusion zone will be installed or demarcated.

(14) Silt fence and geo-textile filter fabric/hay bales/erosion control measures installed to support demolition activities.

(15) Break trailers and Sealand equipment and material storage containers will be removed from the fenced area to allow space for demolition and waste loading.

(16) Perimeter air monitoring equipment will be located and ready for use.

(17) Water supplies for dust suppression will be available.

(18) Adequate supply of waste containers (i.e., covered rail cars, etc.) will be available.

Building Demolition:

The demolition of the C-340 Complex will encompass a number of activities. The following delineates the primary activities associated with the demolition program. Each activity will be performed in accordance with an approved work package.

Site Activities:

Site Boundary—Site boundary fences will be installed to ensure that no unauthorized personnel enter the work zone during the demolition activity. Existing fences will be utilized where possible. Login sheets will be developed to verify that all site visitors have been recorded. All personnel entering the site will be checked to determine that they have proper training and identification.

Environmental Control—Environmental control structures such as silt fences, diversion ditches, and retention basins will be installed. Wastewater collection, transportation, storage, and treatment systems will be established. Processes for stormwater/wastewater management will be defined. Air monitoring equipment will be installed and calibrated.

Verification of Lock Out/Tag Out—All unnecessary energy sources (steam, electrical, pressurized water, etc.) should have been air gapped and/or "locked out/tagged out" during the deactivation. These systems will be checked and verified to have been rendered safe prior to commencing work.

Gross Decontamination—During the deactivation activities all surfaces inside building will have been vacuumed and swept to remove any gross contamination. The demolition activities will generate additional dust and minor debris that is not removed with the structural components. Vacuuming and other physical methods will be utilized to remove this material. Potentially contaminated materials will be physically segregated from "clean" material where practicable.

Stabilizing Airborne Contamination—Following the deactivation activities, all accessible interior surfaces will have been covered with a chemical fixative to prevent airborne contaminant migration. During demolition, potentially contaminated equipment and structural surfaces may be exposed. Chemical fixative

will be reapplied to all interior surfaces that have been exposed during the demolition activities to prevent the generation of airborne contamination.

Demolition—These activities define the process of dismantlement, demolition, size reduction, segregation, packaging, and load out of equipment, structural components, work platforms, mezzanines, and pit covers from building interior, as well as, the removal of corrugated asbestos transite paneling. These activities will be accomplished with standard equipment and approved construction techniques. The activities provide the necessary steps to remove the structures of the C-340 Building to slab and to decontaminate/stabilize the slabs, sumps, and other subgrade structural features for subsequent actions under the post-gaseous diffusion plant Soils and Slabs Operable Unit activities.

Figures A.3 through A.10 are photographs of demolition activities that have been conducted on structures similar to the C-340 Complex. These photographs are for illustration only; they do not necessarily depict activities within PGDP. Figures A.11 through A.14 are a series of photographs that show the demolition of the conveyor structure that connected the C-340 Complex to the C-340-D Structure. Figure A.15 is of recently performed demolition activities at the PGDP C-746-A East End Smelter.

Figure A.3. Building Structure and Roof Demolition (Shear and Fugitive Dust Control)

Figure A.4. Interior Building Mezzanine and Equipment Removal Prior to Demolishing the Structure

Figure A.5. Transite Siding Removal and Packaging

Figure A.6. Building Demolition Using "Long Reach" Excavator with Shear Attachment

Figure A.7. High Bay Roof Truss Removal (Crane Assisted Disassembly)

Figure A.8. High Bay Roof Trusses and Columns Removed

Figure A.9. Concrete Demolition (Pulverizer)

Figure A.10. Stack Demolition (Crane Assisted and OSHA Basket)

Figure A.11. C-340 Complex Conveyer Prior to Demolition
(Personnel are accessing the conveyor structure from the man-lift to disconnect the conveyor from the building.)

Figure A.12. C-340 Complex Conveyer Being Pulled Over by Excavator
(The conveyor was cut away from the building prior to being pulled over. The plastic on the ground collects dust from the structure when it contacts the ground.)

Figure A.13 C-340 Complex Conveyer Structure on the Ground

Figure A.14. C-340 Complex Area Following Cleanup and Packaging of Debris from the Conveyer Demolition

Figure A.15. Demolition of the C-746-A East End Smelter Showing Use of a Dust Boss to Reduce Dust Generation

The expected demolition sequence for the C-340 Complex is to demolish the single story south end block structure and north end block structures first. The south end structure is used as a Boundary Control station and dress out area during deactivation. The north end structure is the old shipping and receiving area, used as a waste load out area during deactivation. The primary method of demolition will be using excavator-mounted shears and grapples, with material handling using excavator mounted grapples. Some manual cutting of beams or components and removal from upper floors using a crane may be required, depending upon the size and height. Specific work packages will identify those items.

The sequence and detailed activities associated with the demolition of C-340 A, B, and C are shown below. Work packages and Activity Hazard Assessments (AHAs) will be developed for each of the demolition activities as well as subactivities, as appropriate.

C-340-B Metals Building

(1) Perform gross decontamination
(2) Apply fixative as required
(3) Remove remaining equipment/platforms
(4) Clean pits
(5) Radcon/Environmental survey and release pits for backfill
(6) Backfill pits with flowable fill
(7) Remove doors, louvers, and corrugated asbestos transite siding
(8) Air gap/sever roof and roof sheathing

(9) Demolish structure and roof simultaneously, primarily using excavator-mounted shears
(10) Demolish structure from north to south, east to west
(11) Sort, size, and package debris

C-340-C Slag Building

(1) Perform gross decontamination
(2) Apply fixative as required
(3) Remove remaining equipment/platforms
(4) Remove doors, louvers and corrugated asbestos transite siding
(5) Sever roof and roof sheathing along Powder Building
(6) Demolish structure and roof simultaneously, primarily using excavator-mounted shears
(7) Demolish from the top down north to south
(8) Sort, size, and package debris

C-340-A Powder Building

(1) Perform gross decontamination

(2) Apply fixative as required

(3) Remove remaining equipment/platforms

(4) Clean pits

(5) Radcon/Environmental survey and release pits for backfill

(6) Backfill pits with flowable fill

(7) Remove doors, louvers, and corrugated asbestos transite siding

(8) Demolish structure and roof simultaneously, primarily using excavator-mounted shears; manual cutting and removal of beams or components from upper floors via crane may be required due to height

(9) Demolish from the top down, east to west

(10) Sort, size and package debris

Stabilization of Slabs and Subsurface Structures—During deactivation, existing debris will have been removed from the pits, basements, and trenches in C-340 and fixative will have been applied to the walls and floors. Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent the U.S. Department of Energy deems practicable using available equipment and techniques. These structures will be filled with flowable fill to create safe work areas for personnel and equipment and a fixative will be applied to the surface.

Any PCB spills that cannot be cleaned to levels prescribed by the applicable or relevant and appropriate requirements (ARARs) will be sealed and/or covered and left for subsequent action under the Soils and Slabs Operable Unit. Small areas of PCB-contaminated concrete may be scabbled if DOE determines that method is the most efficient way to address them.

Demobilization—The following activities will be performed during the demobilization from the C-340 Complex decommissioning project.

(1) Backfill truck wells with crushed stone
(2) Sort, size, and package debris
(3) Repair flowable fill surface
(4) Apply final fixative coating to exposed surfaces
(5) Install safety fencing
(6) Post warning signage
(7) Decontaminate rental equipment
(8) Perform Verification Sampling as applicable
(9) Repair or remove access roads
(10) Grade and seed, as needed
(11) Remove personnel and equipment from site
(12) Prepare Removal Completion Report
(13) Dust suppression during any demobilization activities that have potential to generate dust

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APPENDIX B

C-340 COMPLEX DEMOLITION REMOVAL ACTION VERIFICATION PLAN

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C-340 COMPLEX DEMOLITION
REMOVAL ACTION VERIFICATION PLAN

This Demolition Removal Action Verification Plan identifies sampling and/or monitoring that may be necessary to confirm that the ground level slabs of the C-340 Complex have been placed in a protective state that will prevent migration of contaminants from the slab after the buildings have been demolished. This will ensure that the removal action objectives have been met.

The criteria for determining success of the removal action include the following:

- Removal of the physical structures to the slabs; and

- Removal of the associated residual contaminants, which are expected to include
  - Radionuclides,
  - Polychlorinated biphenyls (PCBs),
  - Asbestos-containing materials, and
  - Residual metals contamination.

During structural demolition, specifically transite removal, the surfaces around the perimeter of the C-340 Complex will be protected from cross-contamination by lead-headed bolts that fasten transite to the structure, paint chips, and other debris through the use of physical barriers, such as plastic sheeting.

The slabs that remain after structural demolition will be inspected, visually surveyed, decontaminated, as appropriate, and sealed to minimize the possibility of spreading contamination. Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent practicable using available equipment and techniques. Successful removal of paint chips will be verified by visual inspection of the slab and soils immediately adjacent to the slab.

Fixatives may be applied to prevent scaling paint and fugitive dust from being released to the environment. Loose material, such as paint chips, will be segregated from the primary waste streams to the extent possible by vacuuming or other physical means.

Any PCB spills that cannot be cleaned to levels prescribed by the applicable or relevant and appropriate requirements (ARARs) will be sealed and/or covered and left for subsequent action under the Soils and Slabs Operable Unit. Small areas of PCB-contaminated concrete may be scabbled if DOE determines that method is the most efficient way to address them.

Radionuclides

Radionuclides may be present on the slab due to the operations that took place when the facility was active. Following demolition, the slab will be surveyed to determine fixed and removable levels of radiological contamination. The postdemolition and postdemobilization radiological control surveys will include all disturbed areas around the slab for posting or controls in accordance with 10 *CFR* § 835. Swipe samples will be collected and analyzed in a fixed-base laboratory. If the survey indicates that only fixed contamination is present, the slab will be posted according to the requirements of 10 *CFR* § 835. Conversely, if the survey indicates that removable radiological contamination exists at levels exceeding those in Table B.1, the slab surface will be decontaminated by physical means, such as vacuuming or washing. Based on the results of a subsequent survey, the slab will be posted according to the requirements of 10 *CFR* § 835, Appendix D.

Table B.1. Removable Surface Contamination Limits

Radionuclide	Removable (disintegrations per minute)
Alpha emitters	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission)	1,000

Table B.2 lists the analytical parameters and test methods for radiological samples.

Table B.2. Radiological Sampling Parameters and Test Methods

Analytical Parameter	Test Method
Total U, U-234, U-238, Th-228, Th-230, Th-232, Pu-238, Pu-239, Pu-240, Np-237, Am-241, Mass of U-235, Activity of U-235, Weight Percent of U-235	Alpha Spectroscopy/Inductively Coupled Plasma Mass Spectrometry
Cs-134, Cs-137, Co-60, Th-234, K-40	Gamma Spectroscopy
Tc-99, Sr-90	Liquid Scintillation

Polychlorinated biphenyls

PCBs may be present at the slab of the demolished building either as paint chips that flaked off of equipment and/or structural elements or as PCB-contaminated concrete from spills onto the slab from overhead piping and equipment. Loose paint chips will be collected and characterized for PCBs as well as other contamination. Successful removal of paint chips will be verified by visual inspection of the slab and soils immediately adjacent to the slab.

Concrete that is suspected of being PCB-contaminated will be sampled with hexane wipes to determine the initial PCB concentration, decontaminated according to applicable requirements, and then posted, if necessary, in accordance with ARARs. The sampling locations will be determined based on process knowledge and/or visual inspection and evidence of staining.

Table B.3 lists the U.S. Environmental Protection Agency test methods for PCBs that may be used during the decommissioning activities.

Table B.3. PCB Analytical Test Methods

Analytical Parameter	Test Method
PCBs in paint	EPA SW-846-8082
PCB hexane wipe analysis	EPA SW-846-8082

Asbestos-containing materials

Asbestos may be present on the concrete slab from removal of the transite siding. Prior to structural demolition, the slab will be vacuumed using a vacuum with a HEPA filter to ensure that no loose asbestos fibers remain on the slab and are not dispersed during removal. The resulting waste will be sampled and characterized for appropriate disposal according to ARARs.

Table B.4 lists the analytical test methods for asbestos samples that may be obtained during the decommissioning activities.

Table B.4. Asbestos Test Method

Analytical Parameter	Test Method
Asbestos	NIOSH-9002

Residual metals contamination

Residual metals contamination may remain on the slab as contaminants in dust from demolition. The slab will be vacuumed, and the resulting waste will be characterized for metals contamination to determine its regulatory status and appropriate disposition.

Table B.5 lists the analytical parameters and U.S. Environmental Protection Agency test methods for samples requiring metal analysis that may be obtained during the decommissioning activities.

Table B.5. Metals Analytical Test Methods

Analytical Parameter	Test Method
TCLP Metals (except Mercury) plus Zn	EPA SW-846-6010
TCLP Metals—Mercury	EPA SW-846-7470
Total Metals (RCRA 8 plus Zn, Tl)	EPA SW-846-6020 EPA SW-846-6010
Total Metals—Mercury	EPA SW-846-7470/7471

TCLP = toxicity characteristic leaching procedure
Total metals include arsenic, barium, cadmium, chromium, lead, selenium, silver, beryllium, antimony, nickel, and zinc.
RCRA = Resource Conservation and Recovery Act

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APPENDIX C

HEALTH AND SAFETY PLAN FOR THE C-340 COMPLEX AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

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CONTENTS

ACRONYMS

ACGIH	American Conference of Government Industrial Hygienists
AHA	Activity Hazard Assessment
AIHA	American Industrial Hygiene Association
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
CAAS	Critically Accident Alarm System
CFR	*Code of Federal Regulation*
CRZ	contamination reduction zone
DOE	U.S. Department of Energy
EMS	Environmental Management System
ES&H	Environment, Safety, and Health
EZ	exclusion zone
FS	field superintendent
H&S	health and safety
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSR	health and safety representative
ISMS	Integrated Safety Management System
NIOSH	National Institute for Occupational Safety and Health
OSHA	U.S. Occupational Safety and Health Administration
PEL	permissible exposure limit
PGDP	Paducah Gaseous Diffusion Plant
PM	project manager
PPE	personal protective equipment
PSS	plant shift superintendent
RADCON	radiological control
RCT	radiological control technician
RWP	radiological work permit
SZ	support zone
TLV	threshold limit value

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C.1 PURPOSE

This Health and Safety Plan (HASP) has been developed to delineate the general health and safety requirements associated with C-340 Complex Removal Action Work Plan and discuss the process of identifying potential hazards. Site-specific hazards and controls will be established for each activity and location prior to performing work. These hazards and controls will be documented in the form of Activity Hazard Assessments (AHAs), work packages, and procedures. Personnel assigned to this project will be familiar with the details of these work control documents prior to performing work in the affected areas.

C.2 INTEGRATED SAFETY MANAGEMENT

The C-340 Complex removal action will utilize the LATA Environmental Services of Kentucky, LLC, Integrated Safety Management System (ISMS), which integrates the Safety Management System, the Environmental Management System (EMS), and Quality Management System to ensure personnel and environmental safety and quality are integrated into management and work practices at all levels so that missions are accomplished while protecting the public, the workers, and the environment. The concepts of the ISMS/EMS will be utilized to provide a formal, organized process to ensure the safe performance of work. The ISMS/EMS Plan identifies the methodologies that will be used to address previously recognized hazards and how the hazards are mitigated using contractor-accepted Environment, Safety, and Health (ES&H) practices.

The core functions and guiding principles of ISMS/EMS will be implemented by incorporating the requirements of programs, policies, technical specifications, and procedures from the U.S. Department of Energy (DOE), U.S. Occupational Safety and Health Administration (OSHA), and the U.S. Environmental Protection Agency, as appropriate. Brief descriptions of the five ISMS/EMS core functions are defined in subsequent sections.

C.2.1 DEFINE SCOPE OF WORK

Defining and understanding the scope of work is the first critical step in successfully performing any specific activity in a safe and compliant manner. In accordance with ISMS protocols, at a minimum, key personnel from the project team will participate in the development of the approach to each activity. The managers will ensure that each team member understands the scope of work and the technical and safety issues involved and that all parties are in agreement on the scope and approach to complete the work.

C.2.2 ANALYZE HAZARDS

In the course of planning the work, key personnel from the project team will identify hazards including personnel safety and environmental risks associated with the performance of the work. Hazards may be identified and assessed by performing a site visit, reviewing lessons learned, and reviewing project plans or historical data. The hazard assessment process will be prescribed by the DOE prime contractor's procedures and policies.

Once the hazards have been identified and assessed, measures will be identified to minimize risks to workers, the public, and the environment. These measures will be described in the project-specific AHAs, which serve to provide a control mechanism for all work activities. AHAs are detailed, activity-specific

evaluations that address each step of the task and/or activity that will be performed. The AHA development process entails a detailed evaluation of each activity to identify specific activities or operations required to successfully complete the scope of work and define the potential chemical, environmental, physical, radiological, and/or biological hazards that may be encountered; the media and manner in which they may occur; and how they are to be recognized, mitigated, and controlled. Appropriate hazard controls may include engineering controls, administrative controls, and the use of personal protective equipment (PPE). The project health and safety personnel are responsible for the preparation, revision, and implementation of AHAs.

Applicable AHAs will be reviewed with the personnel who will perform the work. Participants in this review will sign and date the AHA to signify that they understand all hazards, controls, and requirements in the AHAs. Copies of the AHAs with appropriate signatures shall be maintained at the work location.

C.2.3 DEVELOP/IMPLEMENT CONTROLS

The primary mechanisms used to flowdown ISMS/EMS controls to the project team are project-specific plans and technical procedures. Other mechanisms include program/project management systems, employee training, communication, work site inspections, independent assessments, and audits. These mechanisms are communicated in the following:

- Pre-job meetings
- Orientations
- Training
- Plan-of-the-day/pre-job briefings
- AHAs
- Radiological work permits (RWP)

The plan of the day/pre-job briefing incorporates the principles of ISMS/EMS. The specific steps within ISMS/EMS are emphasized to each employee. It is stressed that no employee will be directed or forced to perform any activity that he/she believes is unsafe, puts his/her health at risk, or that could endanger the public or the environment. One of the key elements of ISMS/EMS is that all personnel are permitted to stop work or decline to perform an assigned activity because of a reasonable belief that the activity poses an imminent risk of death, serious physical harm, or other serious hazard to workers or the environment.

Employee involvement is emphasized in all training sessions, beginning with initial orientation training, and is periodically reinforced in refresher training, as applicable, and in ES&H briefings/meetings. Employees are encouraged to participate in the selection, development, and presentation of training/meeting topics and their full and constructive input is encouraged in all communication sessions.

C.2.4 PERFORM WORK

Upon approval to proceed, the project-specific plans will be implemented. The field superintendent will verify that all applicable plans, forms, and records are contained in the project files and accessible by approved personnel. Actions that will be taken during the performance of the work to incorporate ISMS/EMS principles include the following:

- Plan of the day/pre-job briefings
- Monthly project safety meetings

- ES&H oversight/inspections
- Safety inspections
- Equipment inspection
- Stop work authority

C.2.5 FEEDBACK/IMPROVEMENT

Feedback and improvement are accomplished through several channels, including ISMS/EMS audits, self-assessments, employee suggestions, lessons learned, and post-job briefings.

Project managers will encourage employees to submit any suggestions and constructive criticism that offer opportunities for improvement on the program. Project management will conduct periodic inspections and meetings with project personnel at the work site to discuss safety issues, environmental issues, and/or concerns, as well as other relevant topics.

During field activities, meetings and briefings will provide opportunities for project personnel to communicate the following:

- Lessons learned and any other topics relevant to the work performed
- How work steps/procedures could be modified to promote a safer working environment
- How communications could be improved within the project team
- Overall issues or concerns they may have regarding how the work was performed

C.3 FLOWDOWN TO SUBCONTRACTORS

The ISMS/EMS approach to ES&H ensures that project team members, including subcontractors, are aware of their roles, responsibilities, and authorities for worker/public safety and protection of the environment. All organizations will be responsible for compliance with the prime contractor's Worker Safety and Health Program, ISMS/EMS Program, Radiation Protection Program, and Quality Assurance Program. In addition, subcontract requirements will flow down to lower-tier subcontractors, as applicable. Project personnel will have the appropriate health and safety (H&S) training required in accordance with 29 *CFR* § 1910 and DOE standards, but they also will undergo site-specific pre-job training, including safety and environmental, to ensure that ES&H issues related to the activities to be performed or specific to the work site are clearly understood. Documentation of training will be reviewed prior to starting work.

C.4 SUSPENDING/STOPPING WORK

In accordance with 10 *CFR* § 851.20 and the DOE prime contractor's Worker Safety and Health Program and procedures, employees and subcontractors have suspend/stop-work authority. Individuals involved in any aspect of the project have the authority and responsibility to suspend or stop work if they believe that an activity poses an imminent risk to the H&S of the workers, the public, or to the environment. Concerns shall be brought to the attention of the field superintendent (FS) and health and safety representative (HSR), they will be evaluated by project management personnel, and actions will be taken to rectify or control the situation. In the case of imminent danger or emergency situations, team members should halt activities immediately and instruct other affected workers to pull back from the hazardous area. The FS

and/or HSR should be notified immediately; at that time, Management and/or emergency responders will be notified.

C.5 ISMS/EMS BRIEFINGS AND ORIENTATIONS

Plan of the day/pre-job briefings detailing the specific hazards of the work to be performed and safety precautions and procedures specific for the job shall be conducted by the FS and/or HSR at the beginning of each shift. During these briefings, work activities and the associated hazards (personnel safety and environmental risks) and mitigating controls will be discussed using activity-specific AHAs, project documents, and/or lessons learned.

Prior to performing work on the site, personnel shall be required to read, or be briefed, on the DOE prime contractor's Worker Safety and Health Program, applicable AHAs, the work package, and other applicable documents. This shall be documented as required reading, using acknowledgement forms or briefing sheets. Visitors also will be oriented to the applicable plans and potential hazards that they may encounter.

C.6 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

One of the primary underlying principles of a successful project organization is the establishment of clearly defined roles and responsibilities and effective lines of communication among employees and the Prime Contractor, subcontractors, and other organizations involved in the project. Ensuring that personnel fully understand their roles and responsibilities and that they have a thorough understanding of the scope of work and other project requirements will provide the foundation for successful and safe completion of the project.

The roles and responsibilities of key field team members are briefly described as follows:

- The project manager (PM) oversees the implementation of the project plans and provides the resources for the project. The PM oversees the project plans and work activities while ensuring that operations are conducted in accordance with the DOE prime contractor's procedures, regulatory requirements, and Worker Safety and Health Program. He/she is responsible for coordinating and assigning resources needed for the project. The PM also performs management audits and inspections.

- The FS coordinates field activities and logistics and provides communication between the project team and other support groups. The FS also ensures that on-site personnel comply with the Worker Safety and Health Program, work packages, and applicable procedures.

- The quality assurance specialist provides support and oversight to the project to ensure that work is performed in accordance with the work package and other applicable plans and procedures. The quality assurance specialist performs audits, surveillance, and assessments. He/she participates or takes the lead in accident/incident prevention investigations.

- The HSR provides H&S support and oversight to the project to ensure that work is being performed safely and in accordance with the AHAs, Worker Safety and Health Program, applicable regulations, 10 *CFR* § 851, DOE directives, and applicable plans and procedures. The HSR participates in the development of AHAs.

- The radiological control (RADCON) group provides support and guidance to the project and assists the FS and HSR with implementation of RADCONs and as low as reasonably achievable (ALARA) principles. The RADCON technician (RCT) observes the work area before/during activities for radiological hazard and authorizes entry into and exit from the radiological work area.

- Environmental compliance organization provides environmental support and oversight to the project to ensure that the planning and fieldwork is being performed properly and in accordance with all applicable regulations, DOE directives, and relevant plans and procedures.

- The waste management coordinator provides waste management support to the project to coordinate waste containers and removal of waste from the worksite, while complying with the Worker Safety and Health Program, as well as ES&H and work control requirements.

- Field Technical Staff/Subcontractors (heavy equipment operators, maintenance mechanics, waste operators, and electricians) perform work as specified in work packages, adhering to the Worker Safety and Health Program, HASP, RWPs, project procedures, and AHAs. Key field personnel also participate in the identification of the hazards and development of the work controls to be utilized during the work.

C.7 SITE CONTROL

C.7.1 WORK SITE CONTROL ZONES

Work zones will be utilized to control access. These areas will be controlled by the FS, HSR, and/or RCT to minimize the number of individuals potentially exposed to site hazards and to ensure that individuals who enter follow the required procedures. The following is a description of the different types of zones that may be established at the site.

C.7.2 EXCLUSION ZONE

The exclusion zone (EZ) is the immediate area around the removal action activity where there is potential for personal exposure to hazardous materials. The exclusion zone will be marked and entry and exit points will be established to regulate movement of personnel and equipment to reduce the potential of the spread of contamination. This is the zone that encompasses the areas where demolition activities occur. It also includes the areas where the demolition debris is segregated, size reduced, and packaged for transport to disposal.

C.7.3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) is the transition area between the EZ and construction zone or support zone. This area will provide a buffer area to reduce the probability that contamination will leave the EZ. The CRZ is designed for the following activities:

- Decontamination of equipment and workers;
- Staging of emergency response equipment and supplies (e.g., first-aid, fire equipment);
- Waste characterization, segregation, packaging and preparation; and
- Worker rest area.

The CRZ is designed to reduce the possibility of the clean area becoming contaminated by site hazards. The degree of contamination in the CRZ decreases as the distance from the contaminants increases.

C.7.4 CONSTRUCTION ZONE

The construction zone is the area outside of potential contamination, but still encompasses work activities and possible hazards associated with fieldwork activities. Entry into this area is controlled and the area clearly marked with barrier tape, rope, or flagging.

C.7.5 SUPPORT ZONE

The support zone (SZ) is the outermost area of the site. This area is uncontaminated where workers provide operational and administrative support. The SZ is clean and will not be entered by contaminated equipment or personnel, unless properly controlled, or except under emergency or evacuation conditions.

C.7.6 SITE COMMUNICATIONS

Paducah Gaseous Diffusion Plant (PGDP) plant radios, plant phones, and cell phones will be used for on-site and off-site communication. Project personnel will be trained in the use of plant radios and emergency numbers. Hand signals also may be utilized; these will be covered with project personnel if necessary.

C.7.7 AUTHORIZATION TO ENTER

Personnel shall adhere to site entry and control procedures identified in the RWP, AHAs, and this HASP; personnel must wear the appropriate PPE and enter the work area only after receiving permission of the FS, HSR, and/or RCT. The FS (or designee) will verify that the appropriate training and briefing requirements are met prior to entry.

As a requirement for work on this project, workers entering the EZ or CRZ will be required to take the appropriate level of Hazardous Waste Operations and Emergency Response (HAZWOPER) training. This training must cover the requirements in 29 *CFR* § 1910.120, HAZWOPER. As applicable, workers must receive annual 8-hour refresher training and 1- or 3-day on-site supervision under a trained, experienced supervisor. The FS shall receive additional 8-hour training in hazardous waste operations supervision. Workers and visitors entering the EZ or CRZ will be briefed on the provisions of this HASP and will be required to sign the HASP Acknowledgment Form. Workers entering radiological posted work areas also will be required to complete Radworker II training.

C.7.8 VISITORS

Site visitors (persons not involved in routine site work activities) shall abide by the following:

- Visitors shall be instructed to stay outside of the EZ and CRZ and remain within the SZ during the extent of their stay.

- Visitors requesting to observe work conducted in the EZ must wear appropriate PPE prior to entry into that zone.

- Visitors who request to enter the EZ must produce evidence that they have medical clearance and appropriate HAZWOPER training that is up-to-date.

- Visitors also must have received the required training for the activities being performed and entry must be approved by the FS, HSR and/or RCT.

C.8 PERSONAL PROTECTIVE EQUIPMENT

When engineering controls are not feasible, when the administrative controls in place are not adequate, or when otherwise indicated (such as for ALARA), PPE will be specified by the AHA and/or RWP. At a minimum, personnel performing work in work zones may be required to wear the following standard safety apparel:

- Hard hats meeting the requirements of American National Standards Institute (ANSI) Z89.1, as prescribed in 29 *CFR* § 1910.135, *Head Protection*. Hard hats will be worn with the suspension properly installed. Hard hats will not be damaged, painted, or deformed.

- Safety glasses with firm side shields will meet the requirements of ANSI Z87.1, as prescribed in 29 *CFR* § 1910.133, *Eye and Face Protection*. Prescription glasses also will meet the ANSI standard and be provided with fixed or firm clip-on side shields. Cover glasses used over prescription glasses will be permitted. Safety glasses will be worn in any area where construction activities are taking place. Face shields will not be worn in lieu of safety glasses.

- Sturdy safety toed work shoes or boots meeting the requirements of ANSI Z41, as prescribed in 29 *CFR* § 1910.136, *Foot Protection*, shall be worn.

C.8.1 ACTIVITY-SPECIFIC LEVELS OF PROTECTION

The levels of personal PPE will be determined by an assessment of the potential hazards posed by the activity to be performed and will be identified in the activity-specific AHAs and RWPs. Typically, the highest hazard levels are to be expected in the EZ; therefore, the level of PPE designated for work in the EZ would be expected to be the highest level designated for an activity. Work conducted in the CRZ may vary. Generally the level of PPE used in the CRZ is one level below that designated for the EZ.

C.8.2 RESPIRATORY PROTECTION

Respiratory protection requirements will be determined by air monitoring and survey results. Personnel required to wear respiratory protection will be trained and quantitatively fit-tested prior to use of the respirator, as prescribed in accordance with DOE prime contractor procedure. Personnel required to wear respirators will inspect their respirators before and after each use and any deficiencies will be reported to the FS or HSR immediately. Respirators will be properly stored in a bag in a clean, dry environment and routinely cleaned. Damaged respirators shall not be used.

C.9 MEDICAL SURVEILLANCE

The medical surveillance program provides for baseline, annual, and termination medical examinations for employees in accordance with 29 *CFR* § 1910.120, HAZWOPER. Employees who may be exposed to hazardous conditions may be required to be trained and fitted for respiratory protection in accordance with 29 *CFR* § 1910.134. Each employee who is or may be exposed to hazardous substances or health hazards at or above the permissible exposure limit (PEL) for 30 days or more per year and each employee who wears a respirator for 30 days or more per year will receive a medical examination before assignment, approximately 12 months later, and at termination of employment or at reassignment. Employees who develop signs or symptoms indicating overexposure or are injured or exposed above the PEL in an emergency situation will be examined medically as soon as possible following the incident.

Personnel performing HAZWOPER activities on this project must complete an annual HAZWOPER physical. The examining physician will document each worker's fitness for work. In addition, the physician will ensure personnel are capable of wearing a respirator through medical examination and conducting a pulmonary function test.

Radiation workers, working under an RWP, may be required to submit a baseline bioassay, periodic bioassay during the project, and exit bioassay at the end of the project.

C.9.1 EXPOSURE MONITORING

Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

C.9.2 ROUTINE AIR MONITORING REQUIREMENTS

Air monitoring will be performed during the following activities:

- Intrusive activities such as building demolition and utility removal;
- Activities where there is a potential for exposure to heavy metals, asbestos-containing materials, silica dust; and
- Personnel filling, handling, and transporting waste containers that contain potentially contaminated material.

C.9.3 INDUSTRIAL HYGIENE MONITORING

Industrial hygiene monitoring and sampling will be performed by assigned project H&S support personnel. Monitoring will use direct-reading instruments, air-sampling equipment, environmental-monitoring equipment, and assessment techniques, as determined appropriate by the H&S group based on professional judgment and in accordance with OSHA, National Institute for Occupational Safety and Health (NIOSH), and American Conference of Government Industrial Hygienists (ACGIH).

Personnel sampling will be conducted to assess the potential exposure to individual employees and to ensure that the proper level of PPE has been selected for the assigned activity. Samples will be collected

in the employee's breathing zone using personnel sampling pumps and the appropriate collection media. For activities with the potential for exposure to significantly elevated chemical concentration, it is expected that the sampling frequency will increase.

If direct reading instruments indicate levels of vapors or particulates that exceed the action level for over 15 minutes in the work area, then personnel sampling will be initiated immediately. Sampling will be conducted, at a minimum, on the worker with the highest expected exposure. Monitoring will continue until levels recorded by direct reading instruments return below the action level.

Once initiated, sampling will always continue for a period long enough to collect a volume of air sufficient to allow the laboratory to achieve an analytical detection limit no greater than one-half the OSHA PEL or ACGIH threshold limit value (TLV), whichever is the more stringent of the two. The samples will be collected in accordance with the approved NIOSH or OSHA methodology and analyzed for the appropriate contaminant(s) of concern. All personnel exposure samples shall be analyzed by a laboratory accredited by American Industrial Hygiene Association (AIHA) in accordance with the appropriate NIOSH or OSHA methodology.

C.9.4 RADIOLOGICAL MONITORING

RADCON will perform personnel air monitoring during work in contamination areas and potentially at the boundary. Scanning of equipment and personnel will also be performed to minimize the possibility of the spread of contamination. Personnel working on the project also will be monitored through Dosimetry and required to wear a dosimeter when working in radiological zones and submit bioassays as required.

C.10 EMERGENCY RESPONSE

C.10.1 RESPONSIBILITIES

The PM, FS, and HSR are responsible for the project emergency management program and ensuring that the appropriate emergency response equipment is readily available at the work site and in proper working order.

In the event of an emergency, all site personnel shall follow the requirements and provisions of the PGDP Emergency Management Plan. Emergency response shall be provided by the PGDP emergency response organization. The HSR will be in charge of personnel accountability during emergency activities. All personnel working on-site will be trained to recognize and report emergencies to the HSR or the FS. The HSR or FS will be responsible for notifying the PGDP emergency response organization.

The PGDP emergency response organization will be contacted for emergency response to all medical emergencies, fires, spills, or other emergencies. The plant shift superintendent (PSS) will coordinate 24-hour emergency response coverage. The requirements of this section will be communicated to site workers. Any new hazards or changes in the plan also will be communicated to site workers.

The DOE on-scene coordinator will provide oversight on an ongoing basis for emergency management/recovery activities.

C.10.2 REPORTING AN EMERGENCY

C.10.2.1 Discovery

The person who discovers an emergency shall immediately report it to the FS & HSR. If properly trained, he/she may attempt to establish control. Designated project personnel shall maintain a radio, telephone, or other reliable means of notifying emergency response personnel and the PSS.

C.10.2.2 Emergency Contacts

- **Fire:** Fire alarm pull box, plant telephone Bell System 333, or plant radio channel 16
- **Medical:** Plant telephone Bell System 333 or plant radio channel 16
- **Security:** Plant telephone Bell System 6246 or plant radio channel 16
- **PSS:** Plant telephone Bell System 6211 or plant radio channel 16

If using a cell phone: 270-441-6333 for emergency, for NON-emergency use 270-441-6211.

C.10.3 INITIAL EMERGENCY RESPONSE

When an emergency occurs, the HSR or FS will assume responsibility for the management of the scene and the protection of the personnel. Personnel are to be evacuated from the immediate danger area, as appropriate. Depending on the degree of emergency, RADCON controls may need to be adhered to during the emergency. For personnel injury or illness, there will be at least one person with current training in first aid and cardiopulmonary resuscitation present on-site during all field activities. This individual will provide minor first aid until other emergency personnel arrive and assume emergency response duties or it is determined to transport the injured to the hospital or medical provider.

C.10.4 PADUCAH GASEOUS DIFFUSION PLANT ALARMS

The alarms can be heard by calling 6161 on a Bell phone. These include the following:

Radiation Emergency/Criticality Accident Alarm System (CAAS):	Continuous blast on a high-pitched air whistle or electronic horn **ACTION**: Evacuate area immediately and stay away from affected building. Report to an assigned plant assembly point.
Attack Warning/Tornado Warning:	Intermittent 2-second blast on plant horns **ACTION:** Take cover.
Evacuate Signal:	Continuous blast on plant horns **ACTION:** Evacuate building.
Plant Emergency:	Hi-Lo Tones **ACTION:** Listen to plant public address system/radio for instructions.

Cascade Buildings:	Three blasts on building horns or howlers **ACTION:** Call area control room.
Other Buildings:	One 10-second blast on building horns or sirens **ACTION:** Follow local emergency procedures.

During field activities all personnel must participate in all PGDP accountability/assembly drills. For accountability, all on-site project personnel must report to the appropriate assembly station, as directed within the AHAs. The FS, HSR, or designee will be responsible for accounting for all field personnel (including sub-tier subcontractor personnel) and reporting any unaccounted-for personnel to the emergency coordinator.

C.10.5 REPORTING A SPILL

When a spill is discovered, personnel will the report the occurrence to the FS or HSR, who will immediately contact the PSS, environmental compliance, and the PM and convey as much information as possible (e.g., material involved, estimated quantity spilled/affected, location, affected personnel, other hazardous conditions).

C.10.6 PROTECTIVE ACTIONS FOR SPILL

An effort will be made to stop the release and contain the spill using materials in the on-site spill response kit, only if it is safe to do so and if no unprotected exposures occur. A telephone contact list containing emergency notification phone numbers will be located at the job site.

In the event that personnel are exposed to hazardous chemicals or radioactive materials, appropriate emergency response action will be taken to remove the contaminated clothing. An emergency shower and eyewash station will be used to flush exposed skin and eyes, respectively. This emergency equipment will be maintained in a readily accessible location adjacent to the active work area.

If an acute exposure to airborne chemicals occurs or is suspected and the affected personnel are unable to escape the work zone, the FS or HSR immediately will contact the PSS for assistance. Rescue operations will not be performed unless the rescuers are dressed in the appropriate protective equipment.

Project managers will be responsible for ensuring all spills of hazardous materials are cleaned up properly and disposed of, including any material generated from the spill unless the spill or release is major and requires response by the PGDP Emergency Response team.

The FS or HSR has the following responsibilities:

- Ensure that spill containment is performed safely;
- Provide all known information to the PSS to ensure proper response;
- Ensure that decontamination measures for exposed personnel are conducted safely and promptly;

- Ensure that, if personnel are exposed to airborne chemicals and are unable to escape the work zone, rescue is not attempted unless rescue personnel are dressed in the appropriate protective equipment; and

- Notify environmental compliance for spill reporting and cleanup requirements.

C.11. TEMPERATURE EXTREMES

Ambient temperatures may pose a threat to project personnel; however, the combination of PPE worn in the work zone and ventilation conditions may indicate the need to monitor personnel for heat or cold tolerance and signs of heat or cold stress. Workers will be evaluated prior to beginning operations and assessed as conditions warrant during and after work in PPE. Personnel who are not required to wear PPE are not immune to the potential hazards of heat- or cold-related disorders or conditions and, therefore, may be included in the monitoring program.

C.12. DECONTAMINATION

Contamination of personnel, equipment, and/or material can occur from contact with radiological and/or hazardous material. When decontamination is required, appropriate procedures shall be followed to ensure effective decontamination is achieved and to minimize generation of mixed waste.

The overall objectives of decontamination are as follows:

- Determine and implement the decontamination methods for personnel and equipment that are effective for the specific hazardous/radioactive substance(s) present;

- Ensure the decontamination procedure itself does not pose any additional safety or health hazard;

- Provide pertinent information on the locations and layouts of decontamination stations and equipment; and

- Establish procedures for the collection, storage, and disposal of clothing and equipment that have not been decontaminated completely.

It is assumed that the majority of contamination concerns from the C-340 Complex will be radiological. Disposable PPE and one-time-use items may undergo radiological surveys prior to release for disposal as nonradioactive waste. Reusable equipment may be required to undergo a radiological survey prior to release from a radiological area. If hazardous waste is encountered, industrial safety and RADCON will assist project management in determining additional methods of decontamination. If clothing or equipment is contaminated with both radiological and hazardous material, mixed waste may be generated. All wastes generated during decontamination will be characterized, stored, and disposed of according to applicable or relevant and appropriate requirements. In an effort to reduce waste, consideration shall be given during the planning process on effective ways or methods to minimize the production of trash, PPE waste, etc.

C.13. TRAINING MATRIX

Employees assigned to the C-340 Complex must be trained according to contract and HASP requirements. The minimum training requirements listed in Table C.1 apply to all personnel who perform work in the C-340 Complex.

Table C.1. Training Matrix for the C-340 Complex D&D Project

REQUIRED TRAINING FOR ENTRY INTO C-340 COMPLEX
GET
RAD Worker II
C-340 Complex Health and Safety Plan Required Reading
Asbestos Awareness, for workers not performing abatement
Asbestos Worker with current 8 hour refresher for workers performing abatement
Asbestos Contractor/Supervisor and current 8 hour refresher for abatement supervisors
PCB Awareness
Temperature Extremes
Lead Awareness
Baseline Bioassay
Hearing Conservation
HAZWOPER 40 hour
HAZWOPER 8 hour Supervisor, for Supervisors and Managers
Current HAZWOPER 8 hour refresher
Current HAZWOPER medical physical examination
Respirator Training/Medical Certification

During the progression of work planning, training needs may be identified that are over and above the minimum requirements. If this is the case, the appropriate training will be provided prior to initiating the work activity.

The front line supervisor shall verify employee training status prior to the start of work.

Subcontractors must submit documentation of training to the training manager prior to entering the work site. If an individual is delinquent in any of the required training, entry into C-340 will not be permitted.

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APPENDIX D

LIST OF PROCEDURES

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This appendix includes a non-exhaustive list of DOE contractor procedures used in the decommissioning process. Development of these procedures included input from various functional groups (e.g., Safety and Health, Engineering, Quality Assurance, Project Management, Facility Management, Radiological Control, Work Controls, Training, Environmental Compliance, Waste Certification Officials, Transportation Compliance, Nuclear Safety, Waste Disposition and members of the craft). These procedures may be revised or deleted without update to this Appendix.

- PAD-ENM-0015 *Asbestos Waste Sampling*
- PAD-ENM-0017 *Paint Chip Sampling*
- PAD-ENM-0018 *Sampling Containerized Waste*
- PAD-ENM-2002 *Sampling of Structural Elements and Miscellaneous Surfaces*
- PAD-IH-1008 *Facility Hazard Assessment*
- PAD-SH-2010 *Hazard Assessment*
- PAD-SH-2020 *Hot Work*
- PAD-IH-5138 *Confined Space Program*
- PAD-IH-5201 *Asbestos and Other Fibrous Materials*
- PAD-DD-1010 *Equipment Decontamination and Fixative Application*
- PAD-DD-2701 *Large Equipment Decontamination*
- PAD-RAD-0301 *Radiological Characterization Data*
- PAD-RAD-1108 *Posting and Labeling*
- PAD-RAD-1101 *Radiation Exposure Limits*
- PAD-RAD-1107 *Workplace Air Monitoring for Radioactivity*
- PAD-RAD-1109 *Radioactive Contamination Control and Monitoring*
- PAD-RAD-1110 *Radiation Surveys*
- PAD-RAD-1112 *Air Sample Collection, Analysis, and Documentation*
- PAD-RAD-1113 *Handling of Samples Potentially Contaminated with Hazardous Material*
- PAD-RAD-1118 *Use and Maintenance of Non-Fissile HEPA Filter-Equipped Vacuum Cleaners*
- PAD-RAD-1119 R1 *Operation and Maintenance of Negative Air Machines*

- PAD-ENG-0012 *Hoisting and Rigging Operations*
- PAD-WC-0020 R0AC1 *Work Planning*
- PAD-WC-0021 *Work Execution*
- PAD-WD-0019 *On-Site Transfer and Movement of Waste Containers and Other Support Equipment*
- PAD-WD-0022 *Waste Water Accumulation, Storage, Treatment, and Disposal*
- PAD-WD-0437 *Waste Characterization and Profiling*
- PAD-WD-3015 *Waste Packaging*
- PAD-WD-3028 *Off-Site Shipping*
- PAD-WD-9503 *Off-Site Shipments by Air Transport*

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Removal Action Work Plan for the C-340 Complex Decommissioning at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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Date Issued—October 2010

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U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

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Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-10CC40020

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CONTENTS

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TABLES

FIGURES

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ACRONYMS

ACM	asbestos-containing material
AHA	Activity Hazard Assessment
AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ES&H	Environment, Safety, and Health
FFA	Federal Facility Agreement
FIMS	Facilities Information System
HASP	Health and Safety Plan
HF	hydrogen fluoride
ISMS	Integrated Safety Management System
KDEP	Kentucky Department for Environmental Protection
LLW	low-level waste
NTCRA	non-time-critical removal action
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act
RAWP	Removal Action Work Plan
SWMU	solid waste management unit
TBC	to be considered
WAC	Waste Acceptance Criteria
WMP	Waste Management Plan

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EXECUTIVE SUMMARY

This Removal Action Work Plan (RAWP) describes the decommissioning (structural demolition) of several buildings within the C-340 Complex at the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky. The primary emphasis of this RAWP is to provide details regarding project management, execution, and regulatory compliance measures related to the removal action.

The work will be performed as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) non-time-critical removal action (NTCRA) as part of the decontamination and decommissioning of the C-340 Complex. This particular removal action will include demolition of the C-340-A, C-340-B, and C-340-C Buildings to the slab, as well as the removal of nonprocess systems in these buildings. The following documents have been prepared and approved for the removal action covered in this RAWP:

- *Engineering Evaluation/Cost Analysis for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0131&D2 (EE/CA) (DOE 2010a); and

- *Action Memorandum for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter Non-Time-Critical Removal Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0290&D1 (AM) (DOE 2010b).

The C-340 Complex is undergoing deactivation under the U.S. Department of Energy (DOE) Atomic Energy Act authority, using accelerated funding from the American Recovery and Reinvestment Act. The project is being conducted in accordance with applicable DOE, state, and federal regulations. The deactivation will be followed by the decommissioning outlined in this document.

During the deactivation activities, all accessible interior asbestos-containing materials will be removed and chemical- and/or radionuclide-containing systems (e.g., process piping, equipment) will be emptied of residual material in accordance with applicable requirements. Additionally, certain wastes such as polychlorinated biphenyl (PCB) capacitors, mercury switches, or manometers, etc., will have been removed. The building surfaces and remaining infrastructure that are designated to be removed during structural demolition (i.e., floors, walls, residual piping, and equipment) will be vacuumed and sealed to the extent practicable to contain and minimize airborne releases during the demolition process.

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The CERCLA NTCRA decommissioning activities included in this RAWP will involve the structural demolition of the C-340 Complex, specifically C-340-A, C-340-B, and C-340-C and the removal of nonprocess systems within these buildings. C-340-D, C-340-E, and the south annex of C-340-B will be decommissioned as non-CERCLA removal actions and are not addressed in this Plan. Unless otherwise noted, "C-340 Complex" refers only to buildings addressed in this removal action.

Activities addressed by this RAWP include the structural demolition of the C-340 Complex and removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping), and residual waste material. This removal action meets the following removal action objectives agreed to by DOE, the U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection, as defined in the AM:

- Reduce the potential exposure to on-site personnel from hazardous substances due to the structural deterioration of these facilities; and

- Reduce risks of releases to the environment and exposure to future industrial workers that may result from uncontrolled releases of hazardous substances, including radiological contamination, from these facilities.

This removal action supports the long-term remediation of the PGDP. Demolishing the structures will remove a source of a potential release to the environment thereby reducing the risk that would be posed if the structures were left standing. Demolition also will satisfy the substantive Resource Conservation and Recovery Act closure requirements for any areas where hazardous waste is discovered during deactivation, as summarized in DOE's letter "American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste," of October 6, 2009 (DOE 2009), which was approved by Kentucky on October 20, 2009 (KDEP 2009a).

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The major radiological contaminants of concern, as documented in the EE/CA and AM, are uranium and the associated daughter products. Other materials that may be present at the C-340 Complex include asbestos-containing materials; PCBs; selenium; and heavy metals, such as lead, chromium, mercury, and cadmium.

Specific activities that will be performed during the decommissioning activities include characterization; demolition; segregation; packaging; transportation and disposition of demolition debris, piping, and small quantities of hazardous materials. The project also will entail leaving the groundlevel slabs, pits, and foundations in a protective state. The slabs and underlying soil will be addressed as described in the AM.

Demolition debris generated from this removal action will be treated, if necessary, and disposed of at an approved on-site or off-site facility with possible reuse/recycle of equipment from the C-340 Complex in accordance with applicable state laws, EPA, DOE policies, and applicable or relevant and appropriate requirements.

The DOE's prime remediation services contractor will perform the work described in this RAWP, using subcontractors as necessary. The project will be implemented in accordance with Integrated Safety Management System practices and principles, including worker involvement. The Demolition Plan, the Removal Action Verification Plan, the Health and Safety Plan, and a list of procedures are included as appendices to the RAWP.

1. INTRODUCTION AND PURPOSE

This Removal Action Work Plan (RAWP) addresses the structural demolition of specific buildings (defined previously) of the C-340 Complex as a non-time-critical removal action (NTCRA). The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection (KDEP) have agreed to address decommissioning activities under the existing Federal Facility Agreement (FFA) (EPA 1998) and in accordance with the joint EPA and DOE policy statement with respect to decommissioning of DOE facilities (DOE and EPA 1995). The regulatory approach for this project was approved by EPA by letter dated July 1, 2009 (EPA 2009), and by KDEP by letter dated September 25, 2009 (KDEP 2009b).

Deactivation activities including removal of the hazardous materials located within the facility, as well as the infrastructure that may contain such material, was initiated under DOE's Atomic Energy Act authority and is presently ongoing.

The approach in this removal action anticipates that some infrastructure will be left in place following deactivation to be decommissioned with the facility structures. After the deactivation is completed, it is anticipated that all accessible interior asbestos-containing materials (ACM) will have been removed in accordance with applicable regulations and DOE policy. Chemical and/or radionuclide containing systems (e.g., process piping) will have been emptied of residual material to the extent practicable. Certain wastes, such as polychlorinated biphenyl (PCB) capacitors, mercury switches, manometers, etc., will have been removed. The building surfaces and remaining infrastructure that will be removed during structural demolition (i.e., floors, walls, residual piping, and equipment) will have been vacuumed and sealed to the extent practicable to contain and minimize airborne releases during the demolition process.

The structures and nonhazardous process systems that remain following the deactivation of the C-340 Complex are expected to contain low-level waste (LLW), PCB bulk product waste, and/or ACM. Small quantities of hazardous substances, such as paint chips or vacuum dust, also may be generated during building demolition. These small quantities are not expected to make the demolition debris waste stream Resource Conservation and Recovery Act (RCRA)-hazardous waste.

Demolishing the C-340 structures will remove a source of a potential release to the environment, thereby reducing the risk that would be posed by the structures were they left standing. This removal action meets the removal action objectives defined in Section 2.2 and supports the long-term remediation of the Paducah Gaseous Diffusion Plant (PGDP).

This RAWP defines the demolition of the building structures to the slab and removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping, etc.) and residual waste material. The activities addressed by this RAWP include the characterization; structural demolition; segregation; on-site or off-site treatment (if necessary); packaging; disposal; transportation; disposition of demolition debris, piping, and small quantities of hazardous materials; and possible reuse/recycle of reusable equipment from the C-340 buildings.

1.1 PURPOSE OF THE REMOVAL ACTION WORK PLAN

The purpose of this RAWP is to provide details on how the NTCRA will be executed in accordance with the Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum (AM). The EE/CA describes the evaluation of alternatives that could be used to address the potential threats posed to human health and the environment from the release or potential release of hazardous substances from the C-340 Complex. The AM documents the decision to proceed with structural demolition of the C-340 Complex as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) NTCRA.

1.2 SCOPE OF THE REMOVAL ACTION WORK PLAN

This RAWP was prepared in accordance with requirements of CERCLA and the Paducah FFA.

This RAWP includes the following:

- Planning schedule for the decommissioning of the C-340 structures and for subsequent documents;
- Description of plans and objectives for the structural demolition removal action; and
- Strategy for waste characterization during demolition of the C-340 structures.

The primary emphasis of the RAWP is to supplement the AM information and to provide greater detail regarding project management, project execution, and applicable or relevant and appropriate requirement (ARAR) compliance measures.

The distinct structures in these complexes that are part of the NTCRA are listed in Table 1, and the associated solid waste management units (SWMUs) are listed in Table 2.

Table 1. C-340 Complex

C-340 Complex	
Facility Number	**Facility Name[1]**
C-340-A	Powder Building*
C-340-B	Metals Plant*
C-340-C	Slag Building*

*except for the south end annex

[1] The Facilities Information Management System (FIMS) for the Paducah GDP lists the five facilities for the C-340 Complex: C-340 (as a separate facility), C-340-A, C-340-B, C-340-C, and C-340-D. FIMS does not include C-340-E. C-340 is included in the C-340-A, C-340-B, and C-340-C (main facility) listing for American Recovery and Reinvestment Act work. C-340-E is an approximately 100 ft^2 building that housed the emergency propane generator external to the C-340 main facility.

Table 2. C-340 Complex SWMUs

C-340 Complex SWMU No.	SWMU Name
101	C-340 Hydraulic System
378	G-340-01 Generator Staging Area
379	G-340-03 Generator Staging Area
380	G-340-04 Generator Staging Area
381	G-340-05 Generator Staging Area
382	G-340-06 Generator Staging Area[2]
434	S-340-01 Satellite Accumulation Area
477	C-340 Metals Plant
514	C-340-D Reject Magnesium Fluoride Storage Silo
515	C-340 "Dirty" Dust Collection System
516	C-340 Derby Preparation Area Sludge Collection System
521	C-340 Saw System Degreaser
522	C-340 Work Pit Located at Ground Floor Level at B-7-B-9
523	C-340 Metals Plant Pit Ground Floor at F-6 to F-11
524	C-340 Pickling Sump B-10 and B-11
529	C-340 Power Plant Sump at Ground Floor Level

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[2] SWMU 382 has been determined to be a "No Further Action" site in the PGDP Site Management Plan (DOE 2010c).

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2. PROJECT DESCRIPTION

2.1 FACILITY DESCRIPTION

The C-340 Complex is located on the eastern side of the PGDP site as shown in Figure 1. Figure 2 is a photograph of the exterior of the facility. As it pertains to this CERCLA NTCRA, the C-340 Complex consists of three inactive buildings as depicted in Figure 1:

- C-340-A Powder Building,
- C-340-B Metals Building, and
- C-340-C Slag Building.

The areas of the C-340 Complex that are addressed in this RAWP include the C-340-A Powder Building (42,000 ft^2); C-340-B Metals Building (17,920 ft^2); and C-340-C Slag Building (4,400 ft^2). C-340-A, B, and C are physically adjoining structures (See Figure 2). C-340-A is a seven-level structure; C-340-B consists of a single level with operating platforms; and C-340-C includes four floors. These are metal frame structures with corrugated asbestos transite exterior walls, built-up roofs with concrete slab foundations, and steel plate upper floors. These facilities are located within a fence that, for all practical purposes, represents the boundary of the facility.

The C-340 Complex produced uranium tetrafluoride (UF_4) and uranium metal from 1956 into the 1980s. The powder unit, which produced UF_4 in the C-340 Complex, operated from 1956 until 1977. These operations generated high levels of airborne UF_4, magnesium powders, uranium metal oxides, and magnesium fluoride (MgF_2) dust. Just before the hydrogen fluoride (HF) production operations ceased, the equipment (conveyors, towers, etc.) was "run until empty." Operations continued until bulk quantities of uranium hexafluoride (UF_6) and UF_4 no longer were present in the facility.

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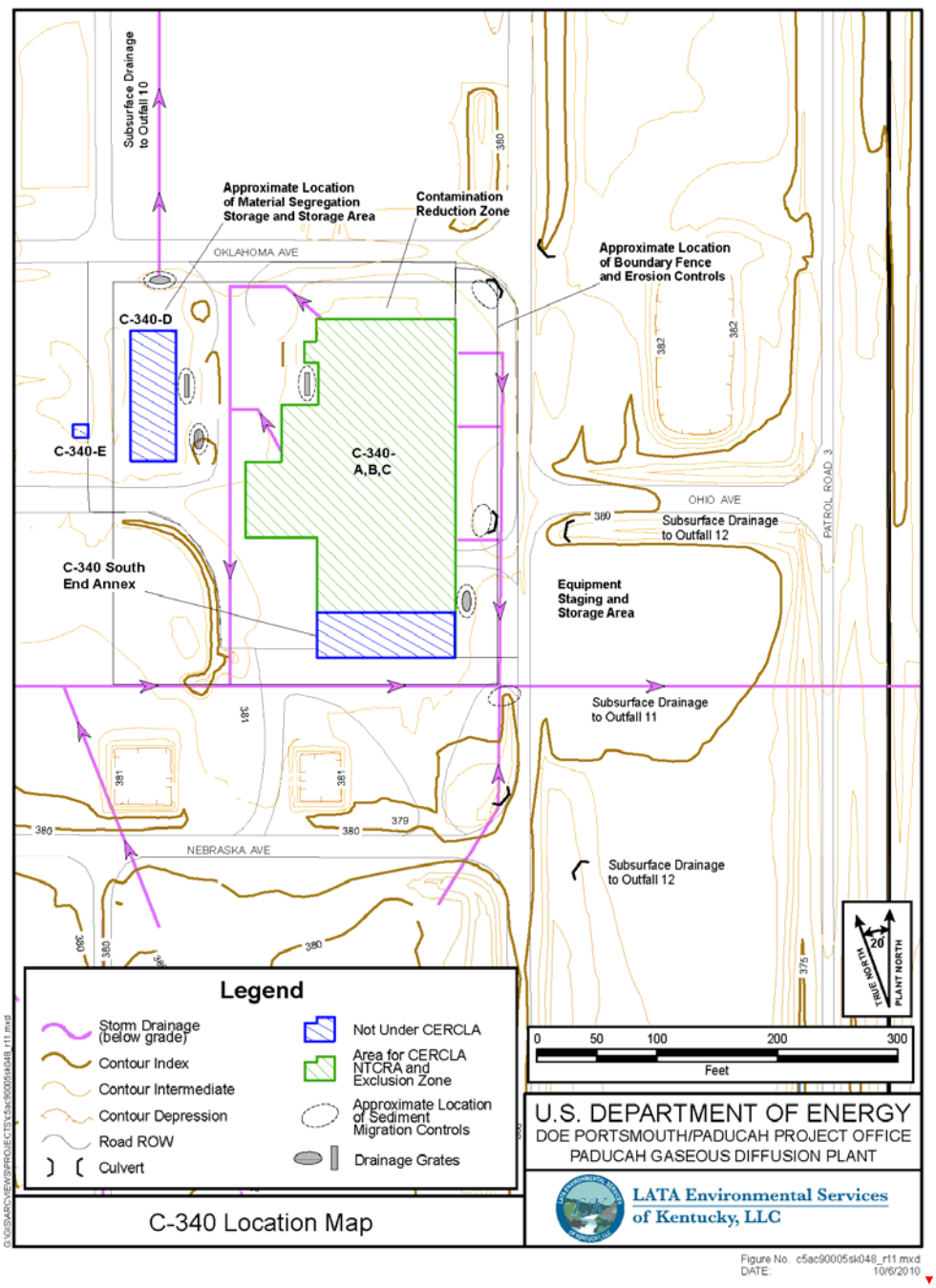
After 1977, the facility also served as an electrical shop, training school, and valve-testing facility, which are not expected to have introduced additional contamination to the structures. From 1978 to 1982, the facility served as a shipping point for UF_4 product. In 1985 and 1986, special melting operations were conducted in C-340-B. The last two operations involved the same chemicals and radiological contamination as materials used during normal operations; therefore, the nature and distribution of contamination were not altered.

In December 1991, utilities were shut off with the exception of power for building lighting. In 1994, the facility was fenced and locked. Until 2009, ongoing activities were limited to routine surveillance and maintenance. In 2009, facility deactivation activities began. The facility has not been the subject of any previous CERCLA response actions.

The C-340 Complex is considered a radiological contamination area, and access is restricted. The C-340-A Powder Building contains heated reactor towers used for the UF_6 to UF_4 reduction process. In this process, UF_6 gas reacted with hydrogen gas in the reactor towers at high temperatures to form UF_4 and HF. The resulting solid UF_4 was dropped into a product/storage hopper and was transferred into drums for further storage. The off-gases, consisting primarily of HF, nitrogen, and hydrogen, passed through a cyclone separator, activated carbon chemical traps, condensers, and a potassium hydroxide scrubbing system. The HF condensed in this process was converted to an anhydrous liquid form, which was stored in tanks.



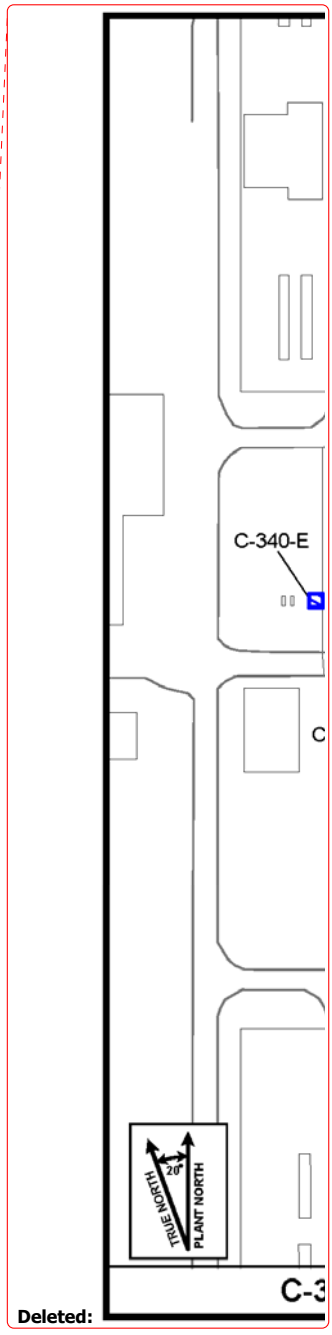


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Figure 1. Location of the C-340 Complex Removal Areas

Figure 2. Exterior of the C-340 Complex

The C-340-B Metals Building houses reduction furnaces that converted some of the UF_4, to uranium metal through the firing of UF_4 and a powdered magnesium mixture at high temperatures. The UF_4 was mixed with magnesium and fed into MgF_2-lined firing reduction vessels, which then were placed in furnaces and heated until the magnesium ignited, precipitating the reaction between the magnesium and UF_4 resulting in molten uranium metal and MgF_2. The molten uranium then was formed into a metal ingot. The metal ingots were removed from the reduction vessel, cleaned and cut, processed further (as needed), staged for shipment, and finally shipped to customers. Hard MgF_2 slag was formed during the reaction.

The C-340-C Slag Building processed the hard MgF_2 slag from C-340-B to powder for reuse as liner material in the firing process. The slag was crushed and then sent through a vibrating feeder to screens that removed larger particles.

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The radiological contamination in the C-340 Metals Reduction Plant Complex is comprised of surface contamination from the historical processes performed in the facility. Uranium currently present in the C-340 Metals Reduction Plant Complex exists as residual UF_4 powder, present in the facility as residual/leftover material in process equipment and uranium metal. The chemical hazards that are known to exist in the C-340 Metals Reduction Plant Complex include lead and/or other heavy metals and PCBs in paint; asbestos-containing materials in the transite siding; mercury; and metals-contaminated dust (potentially containing lead, arsenic or other heavy metals). The presence of contamination is known based on process knowledge and data from sample analyses. Small volumes of hazardous waste, such as paint chips or vacuum dust, may be generated during building demolition, and to the extent practicable, these waste streams will be segregated from the building debris and managed in accordance with applicable regulations.

2.2 REMOVAL ACTION SCOPE AND OBJECTIVES

Decommissioning of C-340 will entail demolishing and packaging the building structures, including any remaining piping and equipment. It also includes removing the corrugated asbestos transite siding on the structures and packaging it for disposition. The demolition will not involve removal of the groundlevel slabs and/or foundations. Sumps and pits, including four SWMUs, 522, 523, 524, and 529, will be backfilled with flowable fill or similar material and the slabs will be decontaminated and a fixative will be applied. The exact

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location of SWMUs 522, 523, 524, and 529 will be noted and delineated, and the backfill activities will be recorded so that the information will be available to the Soils and Slabs Operable Unit, associated with activities post-gaseous diffusion plant shutdown. Wastes generated will be packaged and dispositioned in accordance with ARARs.

The following are the removal action objectives for this project:

- Reduce the potential exposure to on-site personnel from hazardous substances due to the structural deterioration of these facilities; and

- Reduce risks of releases to the environment and exposure to future industrial workers that may result from uncontrolled releases of hazardous substances, including radiological contamination, from these facilities.

2.3 REMOVAL ACTION APPROACH

The decontamination and decommissioning (D&D) of the C-340 Complex will be compliant with ARARs and environment, safety, and health requirements. The DOE Integrated Safety Management System (ISMS) process will be utilized during the entire project. Decommissioning activities will be performed using work control documents, proper waste characterization, and appropriate management and disposition of waste to meet ARARs and Waste Acceptance Criteria (WAC) of the disposition facility.

The ongoing deactivation activities at the C-340 Complex have removed the contaminated loose materials. The process infrastructure and asbestos insulation inside the buildings, but not the exterior transite siding, will be removed prior to the initiation of the decommissioning activity described in this RAWP.

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Chemical- and/or radionuclide-containing systems (e.g., process piping) will have been emptied of residual material. Additionally, certain wastes, such as PCB capacitors, mercury switches, manometers, etc., will have been removed. The structural support systems and remaining infrastructure designated for structural demolition (i.e., floors, walls, residual piping, and equipment) will have been vacuumed and sealed to contain and minimize airborne releases during the demolition process.

Small volumes of hazardous waste, such as paint chips or vacuum dust, may be generated during building demolition, and to the extent practicable, these waste streams will be segregated from the building debris and managed in accordance with applicable regulations. The small amount of contaminants that may remain after deactivation is expected to include radiological contamination from uranium, PCBs in paint, small amounts of hazardous substances, and dust potentially containing lead. Any hazardous materials that may be present in nonprocess systems and become commingled with the demolition debris are expected to be in sufficiently low quantities that they would not require the building debris to be regulated as RCRA hazardous waste. The demolition debris will be characterized and is expected to consist of various types of waste such as LLW, PCB bulk product waste, and solid waste.

The decommissioning phase of this project, including the demolition of the building and remaining equipment and piping, will be accomplished in a manner consistent with ARARs. Sumps and pits will be backfilled with flowable fill or similar material, and slabs will be decontaminated or a fixative will be applied. Wastes generated during the decommissioning activities will be packaged and dispositioned.

To accomplish the project safely and on schedule, the following activities will be performed:

- Planning
- Hazard Analysis
- Hazard Mitigation/Controls
- Characterization
- Demolition
- Waste Material Disposition
- Demobilization

2.3.1 Planning

The decommissioning of the C-340 Complex will require a highly integrated approach to ensure compliance with all technical, environmental, and safety requirements. Planning for decommissioning the C-340 Complex will incorporate the ISMS process.

2.3.2 Hazard Analysis

Every D&D activity is subjected to an Activity Hazard Assessment (AHA) to ensure the safety of the operating personnel, the public, and the environment. Activity-specific AHAs and work packages are prepared for each activity. These work packages and AHAs are reviewed and approved by the appropriate technical managers, industrial hygiene professionals, Health Physics professionals, Environment, Safety, and Health (ES&H) professionals, subject matter experts, and work force peers before any work is performed. These procedures have been, and continue to be, modified as new and improved methods of assessment and response are identified and new situations arise during the D&D activities.

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Prior to initiating each activity, the field team will walk down the area to define and assess the hazards involved in performing the specific activity. The field team may include support from Health Physics professionals, ES&H technicians, technical team members, subject matter experts, field engineers and work force personnel.

Structural components will be evaluated to assess hazards related to the demolition process. Prior to initiating the decommissioning process, material and equipment will be inspected to identify physical hazards. Information relating to the physical condition of the equipment and structure will be obtained from available personnel who worked in the C-340 Complex. The hazard analysis will include identification of each potential hazard related to securing, dismantling, and removing each component. Hazardous energy sources, such as power connections and associated supply sources, will be de-energized and verified as such prior to dismantlement of the facility.

If hazards are identified, they will be assessed and included in the AHAs and work packages for the activity. These documents definitively establish the procedures that must be used for each activity, the hazards involved, and detailed methods to accomplish these activities. Each of the parties involved in the walk down and subsequent assessment will review the work package prior to initiation of the work.

If additional characterization data is required to complete the hazard assessment, support from the field sampling and/or waste management groups will be requested. Activity-specific procedures and protocols have been developed and approved for collection, management, and analysis of samples during the D&D activities. The results of this additional characterization will be integrated into the development of AHAs/work packages.

2.3.3 Hazard Mitigation and Controls

DOE has implemented ISMS that incorporates five core functions and is based on eight guiding principles. The objective of ISMS is to integrate safety and environmental protection into the planning and execution of all work activities. The term safety encompasses nuclear safety, industrial safety, industrial hygiene, occupational health, health physics, and environmental compliance. ISMS requirements flow down to DOE's prime contractor and their subcontractors and are included in the Health and Safety Plan (HASP) (Appendix C).

The five core functions of ISMS are as follows:

(1) Define scope of work
(2) Analyze hazards
(3) Develop and implement hazard controls
(4) Perform work within those controls
(5) Provide feedback for continuous improvement

Following are the eight guiding principles of ISMS:

(1) Line management responsibility for safety
(2) Clear roles and responsibilities
(3) Competence commensurate with responsibility
(4) Balanced priorities
(5) Identification of safety standards and requirements
(6) Hazard control tailored to work being performed
(7) Operations authorization
(8) Worker involvement

During implementation of this removal action, environmental impacts and worker safety will be controlled through various mechanisms including, but not limited to, work sequencing and work practices (such as proper personal protective equipment). Fugitive dust emissions will be mitigated by misting surfaces with water prior to dismantlement and applying fixative to surfaces prior to demolition. Use of water will be controlled in an effort to eliminate an additional waste stream.

Air monitoring in the areas around the structures will allow for identification and mitigation of airborne contamination. Asbestos-control procedures will be instituted during the removal of the ACMs. These procedures will be implemented in compliance with ARARs. ACMs will be managed in accordance with the ARARs from time of removal until they are appropriately disposed of in C-746-U Landfill or an approved off-site landfill.

Contaminants that may be monitored during C-340 D&D activities are the following:

- Lead dust from paint;
- Additional metals, such as cadmium, silver, and beryllium, as needed;
- Asbestos; and
- Uranium.

These constituents will be monitored in the work area using the appropriate type of sampling pumps. Asbestos fibers will be monitored by conducting visual inspections of personal protective equipment and the work environment. In the event that any of these constituents is detected above threshold levels, work will be

paused or stopped and the source of the excursion investigated. An appropriate response will be initiated according to the conditions that warranted the excursion. Detection of asbestos fibers could result in examining and possibly changing the wetting practices used in the demolition and/or changing respiratory filters.

Decontamination is required for large field equipment or equipment components that come in contact with contaminated material. Except for instances where field decontamination is appropriate, cleaning and decontamination of all equipment shall occur at a designated area (decontamination pad) on the site. Disassembly of equipment may be required for areas that are inaccessible (i.e., tracks, pumps, etc.). Decontamination shall be accomplished using brushes or pressure washers with appropriate solvents, and/or tap water and soap, if necessary, to remove particulate matter and surface films. All equipment will be surveyed for radiation contamination prior to release from the plant.

Erosion control structures will be erected to control surface drainage around the facility to minimize sediments in receiving streams. Stormwater containment structures will be constructed, where necessary, to prevent off-site migration of potentially contaminated stormwater. The stormwater inlets will be protected by the installation of silt fences. Other sediment barriers and/or temporary stormwater control structures such as ditches or retention basins will be installed, as needed, to minimize excessive erosion and resulting sediment entering the receiving stream. These controls are similar to existing structures installed during the ongoing deactivation activities.

Hazardous Energy. Hazardous energy sources, such as steam and electrical power, will be identified and de-energized, air gapped, and marked during the deactivation process. Removal activities that could be affected by these sources will be initiated only after verifying that the energy sources have been isolated (i.e. Lock out/Tag out). All hazardous energy sources will be considered active until proven otherwise. Temporary energy sources installed to support decommissioning activities will be managed in the same manner as permanent sources.

Water. The decommissioning activities are not expected to generate significant wastewater volumes. The nature of the materials identified within the C-340 Complex would preclude the use of water to decontaminate the wastes generated. Water used to decontaminate personnel will be containerized, transported, and treated, if necessary, prior to discharge through an existing Kentucky Pollution Discharge Elimination System-permitted outfall. All identified floor drains in the C-340 Complex will be plugged to eliminate the uncontrolled discharge of water from the building. Shower water for personnel will be treated in the PGDP Sanitary Wastewater Collection Treatment System. Water used for dust control will be minimized.

Water used for wetting ACM and dust suppression will be used inside the erosion/runoff control structures around the C-340 structure and collected in basins or sumps and treated, if necessary, prior to discharge. The locations of the erosion control structures are shown on Figure 1. Water usage will be minimized by using low flow "fogging" nozzles to create effective dust control spray and/or through use of specialty demolition equipment such as a "dust boss." A dust boss uses a high volume fan and high pressure water misting system to create an ultrafine water mist that can be focused on the demolition area, suppressing dust generation.

Air. The C-340 decommissioning activities may generate airborne particulates that may be radiologically and/or chemically contaminated. The migration pathways for airborne emissions during deactivation include vents, broken windows, wall penetrations, and open doorways. If the seals on these migration pathways are broken during deactivation, they will be resealed. During the structural demolition, if the seal on a vent, penetration, or window that is located away from the active demolition area is determined to be broken, and resealing the opening is feasible and would reduce potential for contaminant migration, then the seal will be

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repaired. Mitigation measures will include, but are not limited to, water spray, vacuuming, and fixative application techniques for fugitive dust emissions.

Hazardous Materials. The systems left in place, following deactivation, may contain small quantities of hazardous substances. The levels are not expected to result in the building debris being characterized as a RCRA hazardous waste. Small volumes of hazardous waste such as paint chips or vacuum dust may be generated during building demolition. These waste streams will be segregated from the building debris and managed in accordance with ARARs. Most of the resulting waste from building demolition is expected to be LLW and/or PCB bulk product waste. ACM will be managed in accordance with ARARs.

Transite Removal. The only ACM expected to remain after the deactivation activites will be the transite siding on the exterior of the buildings. The hazards associated with the removal of transite include the fugitive ACM emissions from possible breakage of the transite panels and the lead in the "lead heads" of the screw fasteners that attach the panels to the buildings. All transite panels shall be removed intact or in large sections and shall be carefully lowered to the ground using a crane or a specially equipped manlift.

The panels will be removed by detaching the screws from the building. The lead-headed screws will be collected as they are removed and packaged for disposal in appropriately labeled containers. Plastic sheeting placed on the ground beneath the work area will prevent the loss of any lead-headed screws into the soils.

Transite siding will be placed on two 4-inch x 4-inch x 12-ft long wood posts and stacked approximately 2-ft high and double wrapped with 6-mil thick plastic sheeting and one layer of absorbent material for disposition. Misting with water will be utilized during the transite removal process to minimize airborne contamination. Care will be taken not to break or crush the transite panels during removal.

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2.3.4 Characterization

Characterization is necessary to ensure a safe working environment, as well as to determine the proper disposition of materials from the project. The waste materials that will be generated during the decommissioning process will be sampled/analyzed to (1) determine the potential exposures to the workers and environment, (2) establish the levels of personal protection required, (3) establish disposal requirements, and (4) develop appropriate documentation for shipment of the material.

Characterization activities include physical sampling, evaluation of analytical results developed during the deactivation activities, development and application of process knowledge, and historic data research. The need to collect samples will be determined on a case-by-case basis based on the process knowledge of the facility components. Where necessary, sampling will be utilized to verify historical data and/or process knowledge.

Depending upon the characteristics of the waste material, it may be treated, as required, and dispositioned in compliance with ARARs, in addition to the WAC of the designated disposal facility. Characterization will be necessary to segregate the waste material in accordance with the compliance criteria of the disposition facilities. The activities will involve the application of process knowledge and/or sampling and analysis of the waste materials in accordance with sampling and analysis plans.

2.3.5 Demolition

Demolition of C-340 will be performed in accordance with the approach described in the Demolition Plan (Appendix A). Standard construction equipment will be used during demolition. A listing of typical equipment that may be used on the project is included in Table 3. Select contractor-developed procedures for

Table 3. Demolition Equipment

Technology	Description	Applicability	Limitations	Comments
Conventional disassembly	Hand-held tools and saws; used for hand removal of nuts and bolts.	May be applied to any area.	Labor intensive and slow; recommended for limited application. Vacuuming with high efficiency particulate air filtration will be used for activities creating large amounts of airborne particulate.	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 1/4-inch (0.6-cm) thick steel (large-diameter pipe, structural steel, tanks); up to 1-inch (2.5-cm) 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 1.25 inch (3.175 cm) 20 ft (6 m) diameter; wall thickness up to (6 inch) (15 cm), depending on type of circular cutter used.	4 inch (10-cm) to 21 inch (53 cm) clearance required, depending on type of circular cutter used; requires multiple passes for thickness greater than 0.75 inch (1.9 cm).	There are safety concerns, but these can be managed.
Plasma arc cutting devices	High voltage low current electricity combines with pressurized gas (air or nitrogen) to create a focused stream of high temperature ionized gas, melting away the metal.	Provides high speed cutting and gouging for most metals up to 2 inches (5.8 cm) in thickness. Metal thickness may restrict widespread applicability.	May ignite uranium; alloys uranium with the metal, however, generally does not affect cutting operation. Existing worker protection for uranium is adequate for alloying and subsequent segregation that would take place after using a torch.	Additional worker protection may be required if torch is used to cut metals that have PCB or lead-based coatings.
Oxy-fuel torch	Oxygen and a fuel gas mixed and ignited at the tip of a torch; the metal is heated and burned away.	Very effective in cutting carbon steel; depth of cut up to 4 to 6 inches (10 to 15 cm); cutting speed up to 30 inches/min (76 cm/min); common technique for structural carbon steel member disassembly.	May ignite uranium; alloys uranium with the metal, however, generally does not affect cutting operation. Existing worker protection for uranium is adequate for alloying and subsequent waste segregation that would take place after using a torch.	Gasoline will be the primary fuel source for most applications. 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 or lead-based coatings.

PCB = polychlorinated biphenyl

work controls and implementation of decommissioning are listed in Appendix D. These procedures will be used during decommissioning activities. Specific task instructions addressing the hands-on demolition, waste packaging, and other support activities will be developed, reviewed, and approved by subject matter experts and experienced demolition personnel. These work instructions will be developed in accordance with the work control procedures listed in Appendix D.

The C-340 demolition will not involve removal of the groundlevel slabs, subslab penetrations, and/or foundations. After demolition of the C-340 structure, the slab will be inspected, and the presence and characteristics of the cracks or breakage in the slab will be noted and placed in project files for future investigations. The slabs that will remain after structural demolition will be inspected visually, surveyed, decontaminated, as appropriate, and sealed to minimize the possibility of spreading contamination. It is anticipated that after decontamination, a fixative/stabilizer coating, such as InstaCote Epoxy Surface Protector or an equivalent will be applied. Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent that the substrate forms a surface that will bond well with the fixative/stabilizer. Subslab penetrations, such as basements, pits, and sumps will be backfilled to prevent accumulation of water and eliminate hazards to on-site personnel. Figure 3 depicts the slab floors of the C-340 Complex following demolition, and the locations of SWMUs that have been filled with flowable fill.

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2.3.6 Waste Material Disposition

Demolition of C-340 will generate different types of waste streams. The primary waste stream will be construction/demolition debris, which is expected to be categorized as LLW. This waste likely will be disposed of at an off-site commercial disposal facility or the Nevada Test Site. Solid waste will be disposed of on-site in C-746-U Landfill in accordance with the ARARs and the WAC.

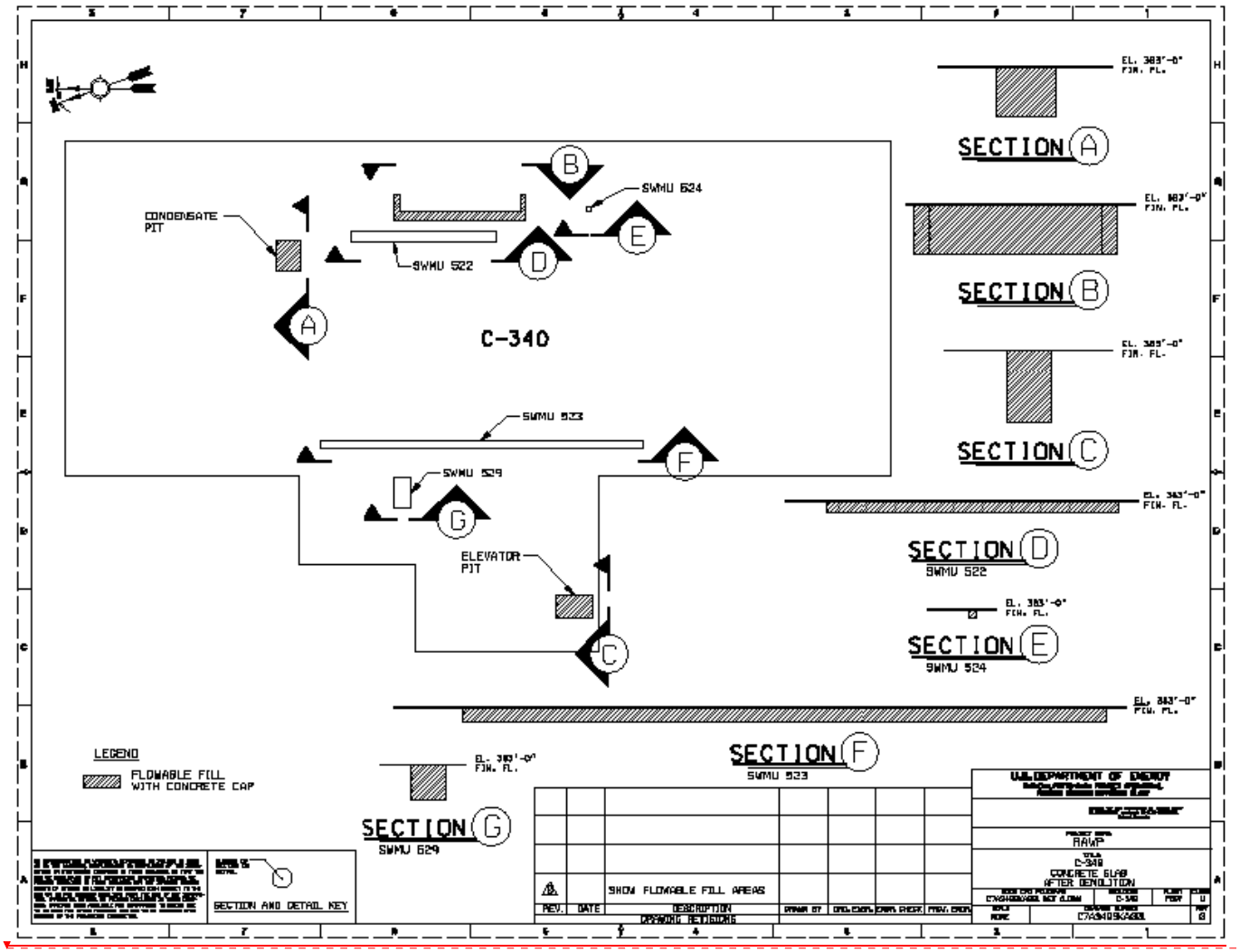
Most waste generated during this action will be loaded directly into shipping containers in areas adjacent to the C-340 Complex. Staging areas, such as the C-759 Scrap Metal Staging Area or the C-760 North-South Diversion Ditch Laydown Gravel Pad, will be used for storage of loaded containers prior to loading containers onto conveyances (railcars or trucks) for shipment. Existing waste storage facilities may be used, as appropriate, for staging and storage of waste (e.g., hazardous or PCB waste) prior to shipment for disposal. Wastewater will be transferred to temporary storage pending characterization and treatment. All waste storage locations will be located inside the DOE controlled area. All waste storage will adhere to the substantive waste storage requirements established in the ARARs.

Waste materials will be sorted and segregated on-site, size reduced, packaged, and/or staged for disposal in accordance with ARARs. Any required on-site treatment such as stabilization or dewatering will be conducted in accordance with ARARs. Waste material shipped off-site will be shipped in accordance with U.S. Department of Transportation (DOT) requirements. ACM will be managed as a separate waste stream in accordance with ARARs and disposed of in C-746-U Landfill or an approved off-site landfill in accordance with applicable regulations and WAC.

Dust suppression techniques used at container storage areas will consist of using reasonable precaution to prevent particulate matter from becoming airborne. These reasonable precautions may include, but not be limited to, using water sprays and mists or chemicals to control dust and covering open bodied trucks when they are in motion and transporting materials that likely could become airborne.

2.3.6.1 Waste material segregation and treatment

Waste materials will be separated into waste streams that conform to the WAC of the proposed disposal facility. The majority of this waste is expected to be LLW and ACM (from corrugated asbestos transite



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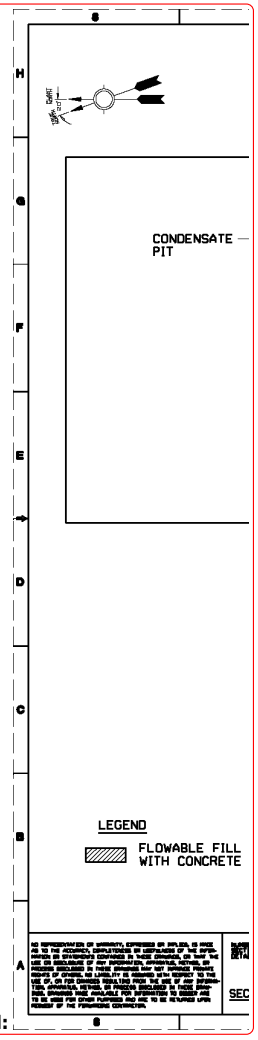

Figure 3. Configuration of the Slabs of the C-340 Complex

panels); however, small volumes of contaminated material, such as paint chips or vacuum dust potentially containing lead, and/or PCB bulk product waste, may be generated during building demolition. Where possible, these materials will be segregated from the building debris by vacuuming or other physical means and managed in accordance with ARARs.

Demolition debris will be staged at CERCLA storage areas in preparation for disposal. Where appropriate, some components may be size reduced to meet transportation or disposal criteria.

Materials removed from the C-340 Complex may require on-site or off-site treatment in order to comply with environmental regulatory requirements prior to disposal. If needed, on-site treatment activities may include dewatering, heavy metals stabilization, encapsulation of paint chips, or other methods. On-site treatment will be performed in accordance with ARARs. Off-site treatment activities will be in accordance with applicable regulations.

Standard industry control measures will be used for dust control at segregation, packaging, and treatment areas. During segregation, sizing, and packaging of demolition debris (steel, concrete from walls or upper floors, etc.), dust suppression methods (amended water sprays or mists and "dust bosses") will be utilized to prevent generation of fugitive dusts. Use of enclosures and dust collection systems during segregation, treatment, and packaging is not anticipated.

2.3.6.2 Waste packaging

The waste generated during D&D will be packaged for transportation and disposal. The waste packaging methods will be dictated by the waste sizes and configurations and selected transportation and disposal options. Waste volumes will be minimized by utilizing methods for component disassembly and size reduction. A variety of containers are available that would be appropriate for the various waste streams generated. Some examples of appropriate transportation packages include Sealand containers, intermodal containers, ST-90 boxes (B-25), steel drums, polyethylene drums, and railcar gondolas. All wastes generated during this project will be packaged in accordance with ARARs.

The waste streams may be described with one of the following DOT proper shipping names:

- Low Specific Activity
- Surface Contaminated Objects
- Hazardous Waste
- Solid/Liquid PCBs
- Solid/Liquid Asbestos
- Solid Waste

Wastes not meeting the above classifications will be evaluated on a case-by-case basis for proper classification and packaging.

2.3.6.3 Waste shipping

Wastes generated from this decommissioning activity may be transported by a variety of methods depending upon the characteristics of the waste and the disposal facility. Typically, the wastes designated for off-site disposal will be shipped in one of these:

- Intermodal containers on over-the-road trucks
- Intermodal containers on flatbed railcars

- Gondola railcars
- Semi dump trailers

Materials designated for disposal in the on-site landfill will be transported in roll-off bins, in tandem dump trucks, or similar conveyances.

Processed material destined for off-site shipment will be packaged in accordance with applicable DOT regulations and placed in a staging area pending transportation to the final treatment/disposal site. Transportation of waste material to the on-site landfill will be conducted in accordance with PGDP and DOE procedures.

Samples collected during the course of this project that must be shipped off-site will be shipped in accordance with applicable DOT regulations if transported by ground. Samples shipped by air are governed by applicable International Air Transport Association/International Civil Aviation Organization and DOT regulations. On-site transportation of samples will be conducted in accordance with PGDP and DOE procedures.

2.3.6.4 Waste disposal

Disposal options that will be considered for the wastes generated during D&D of the C-340 Complex are limited by the presence of radioisotopes at levels that exceed most industrial/sanitary landfills radioisotope limits. Three disposal alternatives are being evaluated as primary disposal options for the waste generated from the D&D activities. These include Nevada Test Site, an off-site commercial disposal facility, and on-site disposal of nonhazardous solid waste at the on-site C-746-U Landfill. Disposal at the on-site landfill will be consistent with WAC developed through an authorized limits evaluation and performance evaluation for the landfill. In the event that these facilities cannot accept certain wastes, other facilities may be evaluated.

2.3.7 Demobilization

Project demobilization includes completing assessments and documentation verifying that the activities described in this RAWP have been performed in a satisfactory manner, dismantlement of all site support equipment and materials, removal of all support equipment, and site restoration. The Removal Action Verification Plan, Appendix B, provides additional details regarding the verification and completion of the removal action objectives.

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3. PLANS AND WORK CONTROL DOCUMENTS

The following project-specific plans either have been or will be developed to ensure the proper execution of decommissioning the C-340 Complex and to ensure compliance with the AM and ARARs.

3.1 DEMOLITION PLAN

The Demolition Plan (Appendix A) includes the details of demolishing the C-340 Complex and is intended to serve as the design report.

3.2 DEMOLITION REMOVAL ACTION VERIFICATION PLAN

The Demolition Removal Action Verification Plan (Appendix B) identifies sampling and/or monitoring necessary to confirm that the groundlevel slabs and foundations have been left in a protective state that will prevent the migration of contaminants from the facility slabs after the facility structures have been demolished.

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3.3 SAMPLING AND ANALYSIS PLANS

Sampling and Analysis Plans for the C-340 Complex will be developed for sampling and analyses of waste streams generated by this removal action. The plans will enable contaminants of concern to be identified, sampled, and analyzed. The plans will define the process for establishing sampling requirements for each activity and subactivity, selection of the proper sampling protocols, and communication of sampling for use in future activities.

3.4 PROJECT HEALTH AND SAFETY PLAN

A HASP outlining the necessary controls and requirements to protect worker health and safety has been prepared and is included in Appendix C. The HASP is consistent with the requirements of 29 *CFR* § 1910.120 and addresses the safety and health concerns for decommissioning the C-340 Complex. During implementation of the removal action, specific work instruction and hazard controls will be developed at the activity level for use by the personnel performing the work. The ISMS process will be used in preparation of these work instructions.

3.5 WASTE MANAGEMENT PLAN

Waste Management activities will be performed in accordance with the approved ARARs. The Paducah FFA does not have a specific requirement for the inclusion of the Waste Management Plan (WMP) in a RAWP, although it is not precluded. This Plan does not include a WMP due to the prescriptive nature of the ARARs relative to the waste management activities expected and the well-defined waste stream volume and characteristics expected to be generated for this removal action. Work instructions and procedures that incorporate and flow down the requirements of ARARs either are in place or will be developed for the field personnel to utilize when performing day to day operations.

3.6 QUALITY ASSURANCE PROJECT PLAN

The programmatic *Quality Assurance Program and Implementation Plan for the Paducah Environmental Remediation Project*, PAD-PLA-QM-001, (LATA Kentucky 2010) documents the processes and procedures that will be used to ensure that the analytical data of acceptable quality are used to make waste disposition decisions. It also explains other aspects of the Quality Assurance Program that are applicable to this project.

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3.7 SPECIFIC WORK DOCUMENTS AND PLANS

Additional special condition documents including, but not limited to, work control documents, activity hazard analyses, and work permits also will be developed, as appropriate.

3.8 OTHER PLANS AND DOCUMENTS

It may be necessary to develop other plans and documents in addition to those identified previously. These may include, but are not limited to, the following:

- Security Plan
- Transportation Plan
- Procurement documents

4. PROJECT SCHEDULE

Table 4 provides key schedule elements and projected implementation dates for the decommissioning of the C-340 Complex. This schedule is based on present budget projections and continued funding by the American Recovery and Reinvestment Act.

Project 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. The enforceable milestones for performance of activities included as part of the removal action are set forth in the Site Management Plan (DOE 2010c). Any additional milestones, timetables, or deadlines for activities included as part of the removal action will be identified and established independent of this RAWP, in accordance with existing FFA protocols.

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Table 4. Project Schedule for D&D of the C-340 Complex

Activity	Milestone[3]
Issue D2 AM to KY/EPA	May 2010
Issue D1 RAWP to KY/EPA	July 2010
Removal Action (Demolition) Start	January 2011
Removal Completion Report	December 2012
Complete Demolition	April 2011

[3] These are general planning dates for submittal of the CERCLA decision documents. Any extensions for reviewing documents, submitting comments, or responding to comments will impact the schedule. This schedule is included in this document for information purposes only and is not intended to establish enforceable schedules or milestones. Enforceable milestones, if any, will be established in the FFA or Site Management Plan and will be updated in accordance with Sections XXIX and/or XXXIX of the FFA.

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5. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with 40 *CFR* § 300.415(j), on-site removal actions conducted under CERCLA are required to meet ARARs to the extent practicable considering the urgency of the situation and the scope of the removal. DOE will comply with ARARs and to-be-considered (TBC) guidance as set forth in the EE/CA when conducting this removal action. The ARARs and TBC guidance are included in the AM for the C-340 and C-746-A Facilities and are incorporated in this RAWP by reference.

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6. REFERENCES

DOE and EPA (U. S. Environmental Protection Agency) 1995. *Policy on Decommissioning of Department of Energy Facilities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*, Washington, DC, May.

DOE 2009. "American Recovery and Reinvestment Act Projects—Regulatory Process for Resource Conservation and Recovery Act Reporting and Closure of Areas Containing Newly Discovered Hazardous Waste," correspondence from Reinhard Knerr, U. S. Department of Energy Paducah Site Lead, to Anthony R. Hatton, Director, Division of Waste Management, October 6.

DOE 2010a. *Engineering Evaluation/Cost Analysis for the C-340 Metals Reduction Plant Complex and the C-746-A East End Smelter at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0131&D2.

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EPA 1998. *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant*, DOE/OR/07-1707, U.S. Environmental Protection Agency, Atlanta, GA, February 13.

EPA 2009. "Response to Proposed Regulatory Path for Projects Under the American Recovery and Reinvestment Act at the Paducah Gaseous Diffusion Plant," U. S. Environmental Protection Agency, Atlanta, GA, correspondence from Franklin E. Hill, Director, Superfund Division, to William Murphie, Director, U. S. Department of Energy, Portsmouth/Paducah Project Office, Lexington, KY, July 1.

KDEP (Kentucky Department for Environmental Protection) 2009a. "Approval of the American Recovery and Reinvestment Act Projects – Regulatory Process for RCRA Reporting and Closure Areas Containing Newly Discovered Hazardous Waste," correspondence from April J. Webb, Manager, Hazardous Waste Branch, to Reinhard Knerr, U. S. Department of Energy Paducah Site Lead, October 20.

KDEP 2009b. "Regulatory Framework for ARRA Work for C-340, C-410, and C-746-A EES," correspondence from April J. Webb, Manager of the Division of Waste Management, Kentucky Department for Environmental Protection, Frankfort, KY, to Reinhard Knerr, U. S. Department of Energy Site Lead, Paducah, KY, September 25.

LATA Kentucky (LATA Environmental Services of Kentucky, LLC) 2010. *Quality Assurance Program and Implementation Plan for the Paducah Environmental Remediation Project*, PAD-PLA-QM-001, July.

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APPENDIX A

DEMOLITION PLAN FOR THE C-340 COMPLEX

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DEMOLITION PLAN FOR THE C-340 COMPLEX

The Demolition Plan defines the detailed activities required to remove the structures of C-340-A, C-340-B, and C-340-C to the slabs and to decontaminate/stabilize the slabs and subsurface pits, trenches, and sumps for subsequent actions under the Soils and Slabs Operable Unit activities.

General

The C-340 Reduction and Metals Complex, also known as the metals plant, is a DOE facility consisting of five facility units (C-340-A Powder Building, C-340-B Metals Building, and C-340-C Slag Building.) The facility is inactive and was accepted to the decontamination and decommissioning (D&D) program in 1992. This Demolition Plan excludes concrete foundations, which are being deferred to Soils and Slabs Operable Unit. This plan also excludes the removal of the ground floor concrete slabs.

The C-340 Complex is located in the east portion of Paducah Gaseous Diffusion Plant (PGDP) between Oklahoma and Nebraska Avenues and is approximately 280 ft long, 172 ft wide, and 121 ft tall at the high roof. Hydrogen fluoride (HF) reactors, coreless electrical induction furnaces, and numerous material handling/transfer, dust collection, and support systems exist inside the complex.

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The C-340 Metals Plant Complex consists of the following operations buildings/areas:

- C-340-A Powder Building
- C-340-B Metals Building
- C-340-C Slag Building

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C-340-A, C-340-B, and C-340-C are to be demolished as a CERCLA Non-Time-Critical Removal Action and are included as a part of this Removal Action Work Plan (RAWP).

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Facility Description

The C-340 Complex is made up of five distinct facility units grouped in a general "T" configuration with a total floor area of 68,332 ft^2 (6,348 m^2). The location of the C-340 Complex is shown in Figure A.1, and Figure A.2 shows an exterior view of the C-340 Complex. The three primary facility units are located within a single structure the C-340-A Powder Building (seven stories), the C-340-B Metals Building (single story with operating platforms), and the C-340-C Slag Building (four stories).

Contamination areas are located within C-340-A, -B, and -C. Access to the facility is restricted and requires special entry procedures. Facility Buildings A, B, C, and D are located within a security fence that represents the boundary of the facility. C-340-D, the Magnesium Storage Building, was demolished previously, and was connected to the main building by an enclosed drum conveyor system. The conveyor gallery was demolished during the C-340-D demolition; therefore, these facilities are not addressed in this plan.

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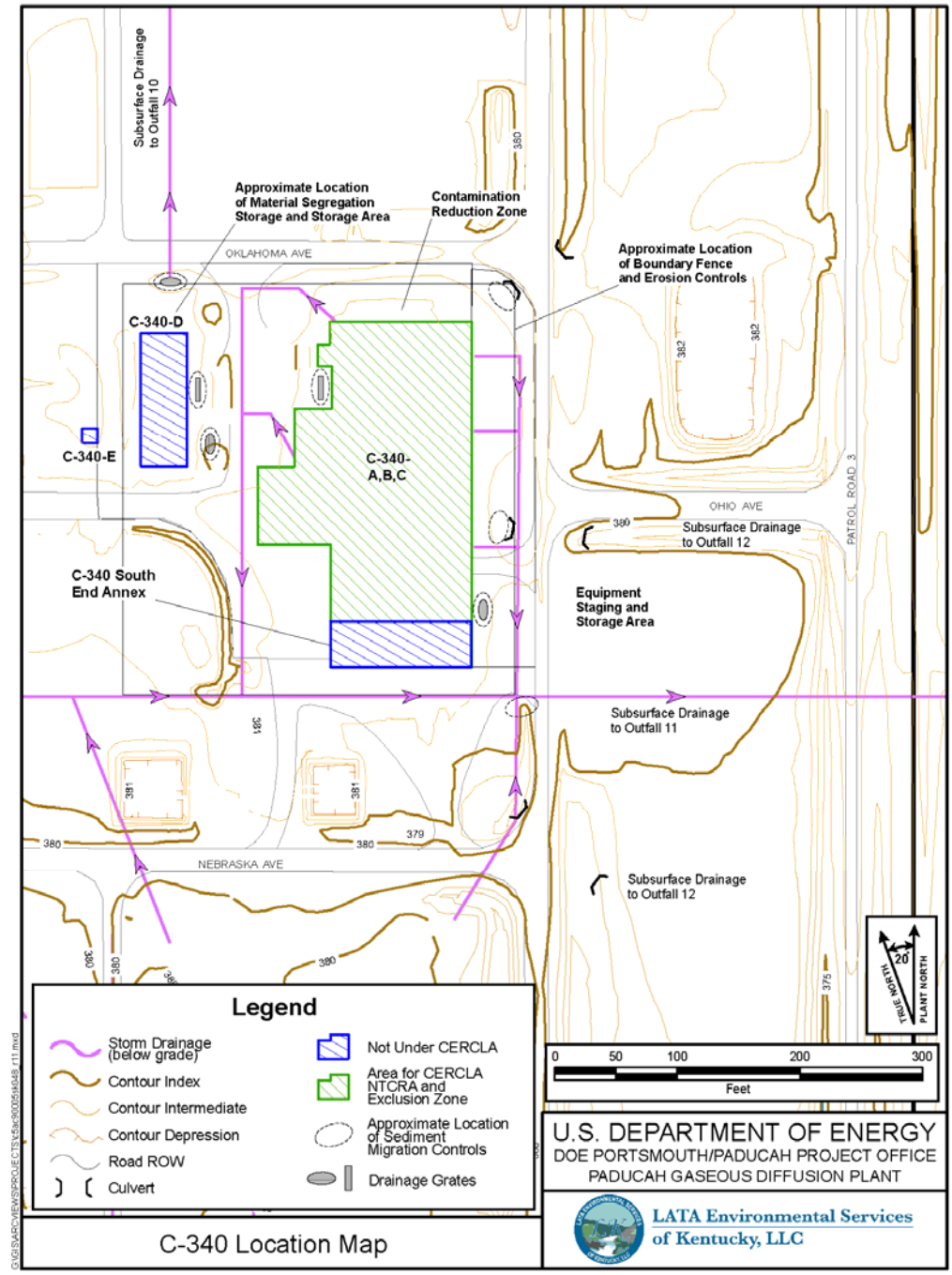
The structure that contains C-340-A, C-340-B, and C-340-C has a steel beam framework with corrugated asbestos exterior wall paneling with some concrete block walls. The built-up roof is made of insulation, felt, and tar and gravel layers. Metal decking supports the roofing material.



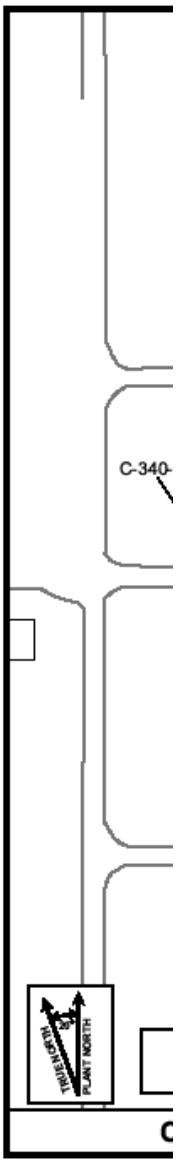


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Figure A-1. Location Map of the C-340 Complex

Figure A-2. Exterior view of the C-340 Metals Reduction Plant Complex

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Auxiliary Systems

The C-340 Complex includes a number of auxiliary systems. The following is a listing of auxiliary systems which will be removed from service (Lock out/Tag out) and air gapped during the deactivation activities.

Water: The C-611 Water Plant and PGDP water system supplied potable water and cooling water.

Electricity: Large transformers provided electricity. The transformers were dismantled and disposed of during a polychlorinated biphenyl (PCB) remedial action.

Heat: Steam-heated air units heated the entire Complex. Exhaust fans vented the air. Outside air entered through wall-mounted intake louvers with automatic dampers. Steam tracing, steam-heated air, as well as electrical resistance heated process piping.

Exhaust air: Air exhausted from the complex discharged through roof ventilation stacks.

Cooling: A chilled water unit cooled the plant control room, change house, and lunchroom. Individual window-mounted air conditioners cooled office areas on the south side of C-340.

Lighting: Explosion-proof incandescent fixtures provided lighting in hazardous areas, with vapor-tight incandescent lighting used in other process areas. Fluorescent lighting lit office and shipping areas.

Refrigeration: Refrigeration systems recovered HF from the process. Condensers cooled by Freon™-22 transformed HF gas to liquid form. Three-stage compression liquefied the Freon™-22 refrigerant.

It is anticipated that all accessible interior asbestos-containing material will have been removed and any systems (e.g., process piping, equipment) containing chemical and/or radionuclides will have been emptied of residual material, in accordance with applicable requirements, during the deactivation activities. Additionally, certain wastes, such as PCB capacitors, mercury switches, or manometers, etc., will have been removed. During the deactivation process the building surfaces and infrastructure (i.e., floors, walls, residual piping, and equipment) will be vacuumed and sealed to contain and minimize airborne releases.

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The decommissioning phase of this project will be accomplished in a manner consistent with applicable or relevant and appropriate requirements. The buildings and remaining infrastructure will be removed, size reduced, packaged, and transported to a designated disposal location. The slab will be cleaned and coated with fixative. The subsurface pits, trenches, and sumps will be backfilled. Any pits or sumps will be cleaned, inspected, and surveyed prior to backfilling, and the condition prior to filling will be noted in the revised solid waste management unit assessment report.

The small amounts of contaminants that may remain after deactivation are expected to include radiological contamination from uranium, PCBs in paint, and small amounts of hazardous substances that cannot be accessed for removal and dust potentially containing lead. Any hazardous material that may be present in non-process systems and become commingled with the demolition debris is expected to be in sufficiently low quantities that they would not require the building debris to be regulated as Resource Conservation and Recovery Act hazardous waste. The demolition debris will be characterized and is expected to consist of various types of waste such as low-level radiologically contaminated waste, PCB bulk product waste, and solid waste. In the event that asbestos is discovered after demolition begins and it cannot be removed safely, the exposed regulated asbestos-containing material and any asbestos-contaminated debris will be treated as asbestos-containing waste material and will be kept adequately wet at all times until it is disposed. Further, if asbestos material is commingled with other types of debris during demolition, the commingled debris will be disposed of as asbestos-contaminated waste.

Other Deactivation and Pre-Demolition Activities:

The following activities will be completed during the deactivation of the facility.

(1) All utilities will be isolated and air gapped.

(2) Grout plugs will be installed in all floor drains and sanitary sewer drains.

(3) C-340-D and C-340-E Structures have been demolished, and the conveyer that connects the C-340-D Building to the C-340-A, -B, and -C Buildings has been demolished.

(4) All process systems, ventilation, and electrical equipment will be removed or stabilized.

(5) Exhaust stacks, exterior ventilation fans, ductwork, and structures will be removed or properly stabilized for removal during demolition.

(6) The overhead pipe chase that exited C-340-A on the West Side and connected to other PGDP facilities has been isolated and air gapped.

(7) Temporary power system and generators have been removed or are reconfigured to provided power needed for structural demolition.

(8) All process systems and electrical equipment will be stabilized and/or removed from buildings prior to demolition.

(9) All basements, pits, trenches, and sumps in zones scheduled for immediate demolition will be vacuumed. Structures that contain free liquids will be pumped to remove any free liquids. All sludge, debris, or foreign material will be removed, analyzed, and appropriately packaged for disposal.

(10) All surfaces will be sprayed with fixative to ensure the containment of transferrable materials.

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(11) The slab surface will be decontaminated by washing, scabbling, or other physical means to reduce the removable contamination levels on the slab surface.

(12) Dust suppression will be practiced during any mobilization activities that have the potential to generate dusts.

(13) Fencing delineating the demolition exclusion zone will be installed or demarcated.

Deleted: Additionally, the following predemolition activities will be completed prior to beginning structural demolition:¶

(14) Silt fence and geo-textile filter fabric/hay bales/erosion control measures installed to support demolition activities.

(15) Break trailers and Sealand equipment and material storage containers will be removed from the fenced area to allow space for demolition and waste loading.

(16) Perimeter air monitoring equipment will be located and ready for use.

(17) Water supplies for dust suppression will be available.

(18) Adequate supply of waste containers (i.e., covered rail cars, etc.) will be available.

Building Demolition:

The demolition of the C-340 Complex will encompass a number of activities. The following delineates the primary activities associated with the demolition program. Each activity will be performed in accordance with an approved work package.

Site Activities:

Site Boundary—Site boundary fences will be installed to ensure that no unauthorized personnel enter the work zone during the demolition activity. Existing fences will be utilized where possible. Login sheets will be developed to verify that all site visitors have been recorded. All personnel entering the site will be checked to determine that they have proper training and identification.

Environmental Control—Environmental control structures such as silt fences, diversion ditches, and retention basins will be installed. Wastewater collection, transportation, storage, and treatment systems will be established. Processes for stormwater/wastewater management will be defined. Air monitoring equipment will be installed and calibrated.

Verification of Lock Out/Tag Out—All unnecessary energy sources (steam, electrical, pressurized water, etc.) should have been air gapped and/or "locked out/tagged out" during the deactivation. These systems will be checked and verified to have been rendered safe prior to commencing work.

Gross Decontamination—During the deactivation activities all surfaces inside building will have been vacuumed and swept to remove any gross contamination. The demolition activities will generate additional dust and minor debris that is not removed with the structural components. Vacuuming and other physical methods will be utilized to remove this material. Potentially contaminated materials will be physically segregated from "clean" material where practicable.

Stabilizing Airborne Contamination—Following the deactivation activities, all accessible interior surfaces will have been covered with a chemical fixative to prevent airborne contaminant migration. During demolition, potentially contaminated equipment and structural surfaces may be exposed. Chemical fixative

will be reapplied to all interior surfaces that have been exposed during the demolition activities to prevent the generation of airborne contamination.

Demolition—These activities define the process of dismantlement, demolition, size reduction, segregation, packaging, and load out of equipment, structural components, work platforms, mezzanines, and pit covers from building interior, as well as, the removal of corrugated asbestos transite paneling. These activities will be accomplished with standard equipment and approved construction techniques. The activities provide the necessary steps to remove the structures of the C-340 Building to slab and to decontaminate/stabilize the slabs, sumps, and other subgrade structural features for subsequent actions under the post-gaseous diffusion plant Soils and Slabs Operable Unit activities.

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Figures A.3 through A.10 are photographs of demolition activities that have been conducted on structures similar to the C-340 Complex. These photographs are for illustration only; they do not necessarily depict activities within PGDP. Figures A.11 through A.14 are a series of photographs that show the demolition of the conveyor structure that connected the C-340 Complex to the C-340-D Structure. Figure A.15 is of recently performed demolition activities at the PGDP C-746-A East End Smelter.

Figure A.3. Building Structure and Roof Demolition (Shear and Fugitive Dust Control)

Figure A.4. Interior Building Mezzanine and Equipment Removal Prior to Demolishing the Structure

Figure A.5. Transite Siding Removal and Packaging

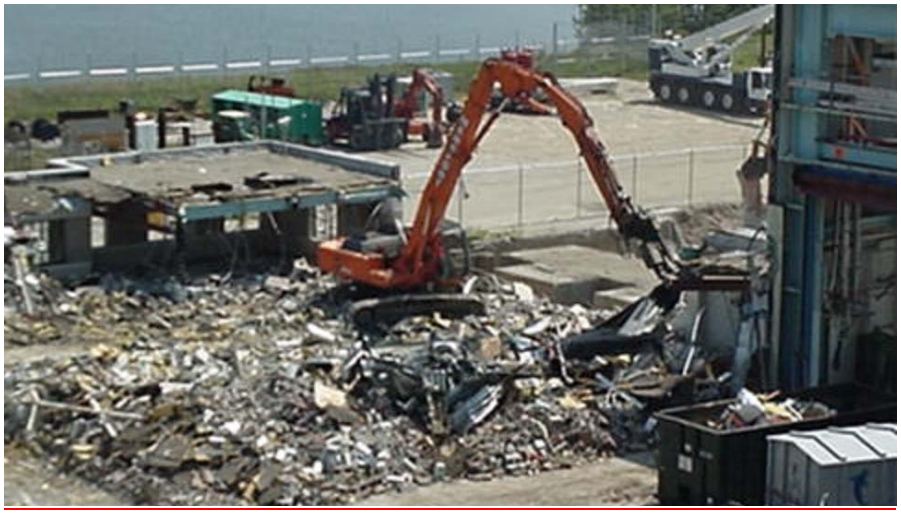

Figure A.6. Building Demolition Using "Long Reach" Excavator with Shear Attachment

Figure A.7. High Bay Roof Truss Removal (Crane Assisted Disassembly)

Figure A.8. High Bay Roof Trusses and Columns Removed

Figure A.9. Concrete Demolition (Pulverizer)

Figure A.10. Stack Demolition (Crane Assisted and OSHA Basket)

Figure A.11. C-340 Complex Conveyer Prior to Demolition
(Personnel are accessing the conveyor structure from the man-lift to disconnect the conveyor from the building.)

Figure A.12. C-340 Complex Conveyer Being Pulled Over by Excavator
(The conveyor was cut away from the building prior to being pulled over. The plastic on the ground collects dust from the structure when it contacts the ground.)

Figure A.13 C-340 Complex Conveyer Structure on the Ground

Figure A.14. C-340 Complex Area Following Cleanup and Packaging of Debris from the Conveyer Demolition

Figure A.15. Demolition of the C-746-A East End Smelter Showing Use of a Dust Boss to Reduce Dust Generation

The expected demolition sequence for the C-340 Complex is to demolish the single story south end block structure and north end block structures first. The south end structure is used as a Boundary Control station and dress out area during deactivation. The north end structure is the old shipping and receiving area, used as a waste load out area during deactivation. The primary method of demolition will be using excavator-mounted shears and grapples, with material handling using excavator mounted grapples. Some manual cutting of beams or components and removal from upper floors using a crane may be required, depending upon the size and height. Specific work packages will identify those items.

The sequence and detailed activities associated with the demolition of C-340 A, B, and C are shown below. Work packages and Activity Hazard Assessments (AHAs) will be developed for each of the demolition activities as well as subactivities, as appropriate.

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C-340-B Metals Building

(1) Perform gross decontamination
(2) Apply fixative as required
(3) Remove remaining equipment/platforms
(4) Clean pits
(5) Radcon/Environmental survey and release pits for backfill
(6) Backfill pits with flowable fill
(7) Remove doors, louvers, and corrugated asbestos transite siding
(8) Air gap/sever roof and roof sheathing

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(9) Demolish structure and roof simultaneously, primarily using excavator-mounted shears
(10) Demolish structure from north to south, east to west
(11) Sort, size, and package debris

C-340-C Slag Building

(1) Perform gross decontamination
(2) Apply fixative as required
(3) Remove remaining equipment/platforms
(4) Remove doors, louvers and corrugated asbestos transite siding
(5) Sever roof and roof sheathing along Powder Building
(6) Demolish structure and roof simultaneously, primarily using excavator-mounted shears
(7) Demolish from the top down north to south
(8) Sort, size, and package debris

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C-340-A Powder Building

(1) Perform gross decontamination

(2) Apply fixative as required

(3) Remove remaining equipment/platforms

(4) Clean pits

(5) Radcon/Environmental survey and release pits for backfill

(6) Backfill pits with flowable fill

(7) Remove doors, louvers, and corrugated asbestos transite siding

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(8) Demolish structure and roof simultaneously, primarily using excavator-mounted shears; manual cutting and removal of beams or components from upper floors via crane may be required due to height

(9) Demolish from the top down, east to west

(10) Sort, size and package debris

Stabilization of Slabs and Subsurface Structures—During deactivation, existing debris will have been removed from the pits, basements, and trenches in C-340 and fixative will have been applied to the walls and floors. Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent the U.S. Department of Energy deems practicable using available equipment and techniques. These structures will be filled with flowable fill to create safe work areas for personnel and equipment and a fixative will be applied to the surface.

Any PCB spills that cannot be cleaned to levels prescribed by the applicable or relevant and appropriate requirements (ARARs) will be sealed and/or covered and left for subsequent action under the Soils and Slabs Operable Unit. Small areas of PCB-contaminated concrete may be scabbled if DOE determines that method is the most efficient way to address them.

Demobilization—The following activities will be performed during the demobilization from the C-340 Complex decommissioning project.

(1) Backfill truck wells with crushed stone
(2) Sort, size, and package debris
(3) Repair flowable fill surface
(4) Apply final fixative coating to exposed surfaces
(5) Install safety fencing
(6) Post warning signage
(7) Decontaminate rental equipment
(8) Perform Verification Sampling as applicable
(9) Repair or remove access roads
(10) Grade and seed, as needed
(11) Remove personnel and equipment from site
(12) Prepare Removal Completion Report
(13) Dust suppression during any demobilization activities that have potential to generate dust

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APPENDIX B

C-340 COMPLEX DEMOLITION REMOVAL ACTION VERIFICATION PLAN

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C-340 COMPLEX DEMOLITION
REMOVAL ACTION VERIFICATION PLAN

This Demolition Removal Action Verification Plan identifies sampling and/or monitoring that may be necessary to confirm that the ground level slabs of the C-340 Complex have been placed in a protective state that will prevent migration of contaminants from the slab after the buildings have been demolished. This will ensure that the removal action objectives have been met.

The criteria for determining success of the removal action include the following:

- Removal of the physical structures to the slabs; and

- Removal of the associated residual contaminants, which are expected to include
  - Radionuclides,
  - Polychlorinated biphenyls (PCBs),
  - Asbestos-containing materials, and
  - Residual metals contamination.

During structural demolition, specifically transite removal, the surfaces around the perimeter of the C-340 Complex will be protected from cross-contamination by lead-headed bolts that fasten transite to the structure, paint chips, and other debris through the use of physical barriers, such as plastic sheeting.

The slabs that remain after structural demolition will be inspected, visually surveyed, decontaminated, as appropriate, and sealed to minimize the possibility of spreading contamination. Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent practicable using available equipment and techniques. Successful removal of paint chips will be verified by visual inspection of the slab and soils immediately adjacent to the slab.

Fixatives may be applied to prevent scaling paint and fugitive dust from being released to the environment. Loose material, such as paint chips, will be segregated from the primary waste streams to the extent possible by vacuuming or other physical means.

Any PCB spills that cannot be cleaned to levels prescribed by the applicable or relevant and appropriate requirements (ARARs) will be sealed and/or covered and left for subsequent action under the Soils and Slabs Operable Unit. Small areas of PCB-contaminated concrete may be scabbled if DOE determines that method is the most efficient way to address them.

Radionuclides

Radionuclides may be present on the slab due to the operations that took place when the facility was active. Following demolition, the slab will be surveyed to determine fixed and removable levels of radiological contamination. The postdemolition and postdemobilization radiological control surveys will include all disturbed areas around the slab for posting or controls in accordance with 10 *CFR* § 835. Swipe samples will be collected and analyzed in a fixed-base laboratory. If the survey indicates that only fixed contamination is present, the slab will be posted according to the requirements of 10 *CFR* § 835. Conversely, if the survey indicates that removable radiological contamination exists at levels exceeding those in Table B.1, the slab surface will be decontaminated by physical means, such as vacuuming or washing. Based on the results of a subsequent survey, the slab will be posted according to the requirements of 10 *CFR* § 835, Appendix D.

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Table B.1. Removable Surface Contamination Limits

Radionuclide	Removable (disintegrations per minute)
Alpha emitters	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission)	1,000

Table B.2 lists the analytical parameters and test methods for radiological samples.

Table B.2. Radiological Sampling Parameters and Test Methods

Analytical Parameter	Test Method
Total U, U-234, U-238, Th-228, Th-230, Th-232, Pu-238, Pu-239, Pu-240, Np-237, Am-241, Mass of U-235, Activity of U-235, Weight Percent of U-235	Alpha Spectroscopy/Inductively Coupled Plasma Mass Spectrometry
Cs-134, Cs-137, Co-60, Th-234, K-40	Gamma Spectroscopy
Tc-99, Sr-90	Liquid Scintillation

Polychlorinated biphenyls

PCBs may be present at the slab of the demolished building either as paint chips that flaked off of equipment and/or structural elements or as PCB-contaminated concrete from spills onto the slab from overhead piping and equipment. Loose paint chips will be collected and characterized for PCBs as well as other contamination. Successful removal of paint chips will be verified by visual inspection of the slab and soils immediately adjacent to the slab.

Concrete that is suspected of being PCB-contaminated will be sampled with hexane wipes to determine the initial PCB concentration, decontaminated according to applicable requirements, and then posted, if necessary, in accordance with ARARs. The sampling locations will be determined based on process knowledge and/or visual inspection and evidence of staining.

Table B.3 lists the U.S. Environmental Protection Agency test methods for PCBs that may be used during the decommissioning activities.

Table B.3. PCB Analytical Test Methods

Analytical Parameter	Test Method
PCBs in paint	EPA SW-846-8082
PCB hexane wipe analysis	EPA SW-846-8082

Asbestos-containing materials

Asbestos may be present on the concrete slab from removal of the transite siding. Prior to structural demolition, the slab will be vacuumed using a vacuum with a HEPA filter to ensure that no loose asbestos fibers remain on the slab and are not dispersed during removal. The resulting waste will be sampled and characterized for appropriate disposal according to ARARs.

Table B.4 lists the analytical test methods for asbestos samples that may be obtained during the decommissioning activities.

Table B.4. Asbestos Test Method

Analytical Parameter	Test Method
Asbestos	NIOSH-9002

Residual metals contamination

Residual metals contamination may remain on the slab as contaminants in dust from demolition. The slab will be vacuumed, and the resulting waste will be characterized for metals contamination to determine its regulatory status and appropriate disposition.

Table B.5 lists the analytical parameters and U.S. Environmental Protection Agency test methods for samples requiring metal analysis that may be obtained during the decommissioning activities.

Table B.5. Metals Analytical Test Methods

Analytical Parameter	Test Method
TCLP Metals (except Mercury) plus Zn	EPA SW-846-6010
TCLP Metals—Mercury	EPA SW-846-7470
Total Metals (RCRA 8 plus Zn, Tl)	EPA SW-846-6020 EPA SW-846-6010
Total Metals—Mercury	EPA SW-846-7470/7471

TCLP = toxicity characteristic leaching procedure
Total metals include arsenic, barium, cadmium, chromium, lead, selenium, silver, beryllium, antimony, nickel, and zinc.
RCRA = Resource Conservation and Recovery Act

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APPENDIX C

HEALTH AND SAFETY PLAN FOR THE C-340 COMPLEX AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

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CONTENTS

ACRONYMS

ACGIH	American Conference of Government Industrial Hygienists
AHA	Activity Hazard Assessment
AIHA	American Industrial Hygiene Association
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
CAAS	Critically Accident Alarm System
CFR	*Code of Federal Regulation*
CRZ	contamination reduction zone
DOE	U.S. Department of Energy
EMS	Environmental Management System
ES&H	Environment, Safety, and Health
EZ	exclusion zone
FS	field superintendent
H&S	health and safety
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSR	health and safety representative
ISMS	Integrated Safety Management System
NIOSH	National Institute for Occupational Safety and Health
OSHA	U.S. Occupational Safety and Health Administration
PEL	permissible exposure limit
PGDP	Paducah Gaseous Diffusion Plant
PM	project manager
PPE	personal protective equipment
PSS	plant shift superintendent
RADCON	radiological control
RCT	radiological control technician
RWP	radiological work permit
SZ	support zone
TLV	threshold limit value

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C.1 PURPOSE

This Health and Safety Plan (HASP) has been developed to delineate the general health and safety requirements associated with C-340 Complex Removal Action Work Plan and discuss the process of identifying potential hazards. Site-specific hazards and controls will be established for each activity and location prior to performing work. These hazards and controls will be documented in the form of Activity Hazard Assessments (AHAs), work packages, and procedures. Personnel assigned to this project will be familiar with the details of these work control documents prior to performing work in the affected areas.

C.2 INTEGRATED SAFETY MANAGEMENT

The C-340 Complex removal action will utilize the LATA Environmental Services of Kentucky, LLC, Integrated Safety Management System (ISMS), which integrates the Safety Management System, the Environmental Management System (EMS), and Quality Management System to ensure personnel and environmental safety and quality are integrated into management and work practices at all levels so that missions are accomplished while protecting the public, the workers, and the environment. The concepts of the ISMS/EMS will be utilized to provide a formal, organized process to ensure the safe performance of work. The ISMS/EMS Plan identifies the methodologies that will be used to address previously recognized hazards and how the hazards are mitigated using contractor-accepted Environment, Safety, and Health (ES&H) practices.

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The core functions and guiding principles of ISMS/EMS will be implemented by incorporating the requirements of programs, policies, technical specifications, and procedures from the U.S. Department of Energy (DOE), U.S. Occupational Safety and Health Administration (OSHA), and the U.S. Environmental Protection Agency, as appropriate. Brief descriptions of the five ISMS/EMS core functions are defined in subsequent sections.

C.2.1 DEFINE SCOPE OF WORK

Defining and understanding the scope of work is the first critical step in successfully performing any specific activity in a safe and compliant manner. In accordance with ISMS protocols, at a minimum, key personnel from the project team will participate in the development of the approach to each activity. The managers will ensure that each team member understands the scope of work and the technical and safety issues involved and that all parties are in agreement on the scope and approach to complete the work.

C.2.2 ANALYZE HAZARDS

In the course of planning the work, key personnel from the project team will identify hazards including personnel safety and environmental risks associated with the performance of the work. Hazards may be identified and assessed by performing a site visit, reviewing lessons learned, and reviewing project plans or historical data. The hazard assessment process will be prescribed by the DOE prime contractor's procedures and policies.

Once the hazards have been identified and assessed, measures will be identified to minimize risks to workers, the public, and the environment. These measures will be described in the project-specific AHAs, which serve to provide a control mechanism for all work activities. AHAs are detailed, activity-specific

evaluations that address each step of the task and/or activity that will be performed. The AHA development process entails a detailed evaluation of each activity to identify specific activities or operations required to successfully complete the scope of work and define the potential chemical, environmental, physical, radiological, and/or biological hazards that may be encountered; the media and manner in which they may occur; and how they are to be recognized, mitigated, and controlled. Appropriate hazard controls may include engineering controls, administrative controls, and the use of personal protective equipment (PPE). The project health and safety personnel are responsible for the preparation, revision, and implementation of AHAs.

Applicable AHAs will be reviewed with the personnel who will perform the work. Participants in this review will sign and date the AHA to signify that they understand all hazards, controls, and requirements in the AHAs. Copies of the AHAs with appropriate signatures shall be maintained at the work location.

C.2.3 DEVELOP/IMPLEMENT CONTROLS

The primary mechanisms used to flowdown ISMS/EMS controls to the project team are project-specific plans and technical procedures. Other mechanisms include program/project management systems, employee training, communication, work site inspections, independent assessments, and audits. These mechanisms are communicated in the following:

- Pre-job meetings
- Orientations
- Training
- Plan-of-the-day/pre-job briefings
- AHAs
- Radiological work permits (RWP)

The plan of the day/pre-job briefing incorporates the principles of ISMS/EMS. The specific steps within ISMS/EMS are emphasized to each employee. It is stressed that no employee will be directed or forced to perform any activity that he/she believes is unsafe, puts his/her health at risk, or that could endanger the public or the environment. One of the key elements of ISMS/EMS is that all personnel are permitted to stop work or decline to perform an assigned activity because of a reasonable belief that the activity poses an imminent risk of death, serious physical harm, or other serious hazard to workers or the environment.

Employee involvement is emphasized in all training sessions, beginning with initial orientation training, and is periodically reinforced in refresher training, as applicable, and in ES&H briefings/meetings. Employees are encouraged to participate in the selection, development, and presentation of training/meeting topics and their full and constructive input is encouraged in all communication sessions.

C.2.4 PERFORM WORK

Upon approval to proceed, the project-specific plans will be implemented. The field superintendent will verify that all applicable plans, forms, and records are contained in the project files and accessible by approved personnel. Actions that will be taken during the performance of the work to incorporate ISMS/EMS principles include the following:

- Plan of the day/pre-job briefings
- Monthly project safety meetings

- ES&H oversight/inspections
- Safety inspections
- Equipment inspection
- Stop work authority

C.2.5 FEEDBACK/IMPROVEMENT

Feedback and improvement are accomplished through several channels, including ISMS/EMS audits, self-assessments, employee suggestions, lessons learned, and post-job briefings.

Project managers will encourage employees to submit any suggestions and constructive criticism that offer opportunities for improvement on the program. Project management will conduct periodic inspections and meetings with project personnel at the work site to discuss safety issues, environmental issues, and/or concerns, as well as other relevant topics.

During field activities, meetings and briefings will provide opportunities for project personnel to communicate the following:

- Lessons learned and any other topics relevant to the work performed
- How work steps/procedures could be modified to promote a safer working environment
- How communications could be improved within the project team
- Overall issues or concerns they may have regarding how the work was performed

C.3 FLOWDOWN TO SUBCONTRACTORS

The ISMS/EMS approach to ES&H ensures that project team members, including subcontractors, are aware of their roles, responsibilities, and authorities for worker/public safety and protection of the environment. All organizations will be responsible for compliance with the prime contractor's Worker Safety and Health Program, ISMS/EMS Program, Radiation Protection Program, and Quality Assurance Program. In addition, subcontract requirements will flow down to lower-tier subcontractors, as applicable. Project personnel will have the appropriate health and safety (H&S) training required in accordance with 29 *CFR* § 1910 and DOE standards, but they also will undergo site-specific pre-job training, including safety and environmental, to ensure that ES&H issues related to the activities to be performed or specific to the work site are clearly understood. Documentation of training will be reviewed prior to starting work.

C.4 SUSPENDING/STOPPING WORK

In accordance with 10 *CFR* § 851.20 and the DOE prime contractor's Worker Safety and Health Program and procedures, employees and subcontractors have suspend/stop-work authority. Individuals involved in any aspect of the project have the authority and responsibility to suspend or stop work if they believe that an activity poses an imminent risk to the H&S of the workers, the public, or to the environment. Concerns shall be brought to the attention of the field superintendent (FS) and health and safety representative (HSR), they will be evaluated by project management personnel, and actions will be taken to rectify or control the situation. In the case of imminent danger or emergency situations, team members should halt activities immediately and instruct other affected workers to pull back from the hazardous area. The FS

and/or HSR should be notified immediately; at that time, Management and/or emergency responders will be notified.

C.5 ISMS/EMS BRIEFINGS AND ORIENTATIONS

Plan of the day/pre-job briefings detailing the specific hazards of the work to be performed and safety precautions and procedures specific for the job shall be conducted by the FS and/or HSR at the beginning of each shift. During these briefings, work activities and the associated hazards (personnel safety and environmental risks) and mitigating controls will be discussed using activity-specific AHAs, project documents, and/or lessons learned.

Prior to performing work on the site, personnel shall be required to read, or be briefed, on the DOE prime contractor's Worker Safety and Health Program, applicable AHAs, the work package, and other applicable documents. This shall be documented as required reading, using acknowledgement forms or briefing sheets. Visitors also will be oriented to the applicable plans and potential hazards that they may encounter.

C.6 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

One of the primary underlying principles of a successful project organization is the establishment of clearly defined roles and responsibilities and effective lines of communication among employees and the Prime Contractor, subcontractors, and other organizations involved in the project. Ensuring that personnel fully understand their roles and responsibilities and that they have a thorough understanding of the scope of work and other project requirements will provide the foundation for successful and safe completion of the project.

The roles and responsibilities of key field team members are briefly described as follows:

- The project manager (PM) oversees the implementation of the project plans and provides the resources for the project. The PM oversees the project plans and work activities while ensuring that operations are conducted in accordance with the DOE prime contractor's procedures, regulatory requirements, and Worker Safety and Health Program. He/she is responsible for coordinating and assigning resources needed for the project. The PM also performs management audits and inspections.

- The FS coordinates field activities and logistics and provides communication between the project team and other support groups. The FS also ensures that on-site personnel comply with the Worker Safety and Health Program, work packages, and applicable procedures.

- The quality assurance specialist provides support and oversight to the project to ensure that work is performed in accordance with the work package and other applicable plans and procedures. The quality assurance specialist performs audits, surveillance, and assessments. He/she participates or takes the lead in accident/incident prevention investigations.

- The HSR provides H&S support and oversight to the project to ensure that work is being performed safely and in accordance with the AHAs, Worker Safety and Health Program, applicable regulations, 10 *CFR* § 851, DOE directives, and applicable plans and procedures. The HSR participates in the development of AHAs.

- The radiological control (RADCON) group provides support and guidance to the project and assists the FS and HSR with implementation of RADCONs and as low as reasonably achievable (ALARA) principles. The RADCON technician (RCT) observes the work area before/during activities for radiological hazard and authorizes entry into and exit from the radiological work area.

- Environmental compliance organization provides environmental support and oversight to the project to ensure that the planning and fieldwork is being performed properly and in accordance with all applicable regulations, DOE directives, and relevant plans and procedures.

- The waste management coordinator provides waste management support to the project to coordinate waste containers and removal of waste from the worksite, while complying with the Worker Safety and Health Program, as well as ES&H and work control requirements.

- Field Technical Staff/Subcontractors (heavy equipment operators, maintenance mechanics, waste operators, and electricians) perform work as specified in work packages, adhering to the Worker Safety and Health Program, HASP, RWPs, project procedures, and AHAs. Key field personnel also participate in the identification of the hazards and development of the work controls to be utilized during the work.

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C.7 SITE CONTROL

C.7.1 WORK SITE CONTROL ZONES

Work zones will be utilized to control access. These areas will be controlled by the FS, HSR, and/or RCT to minimize the number of individuals potentially exposed to site hazards and to ensure that individuals who enter follow the required procedures. The following is a description of the different types of zones that may be established at the site.

C.7.2 EXCLUSION ZONE

The exclusion zone (EZ) is the immediate area around the removal action activity where there is potential for personal exposure to hazardous materials. The exclusion zone will be marked and entry and exit points will be established to regulate movement of personnel and equipment to reduce the potential of the spread of contamination. This is the zone that encompasses the areas where demolition activities occur. It also includes the areas where the demolition debris is segregated, size reduced, and packaged for transport to disposal.

C.7.3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) is the transition area between the EZ and construction zone or support zone. This area will provide a buffer area to reduce the probability that contamination will leave the EZ. The CRZ is designed for the following activities:

- Decontamination of equipment and workers;
- Staging of emergency response equipment and supplies (e.g., first-aid, fire equipment);
- Waste characterization, segregation, packaging and preparation; and
- Worker rest area.

The CRZ is designed to reduce the possibility of the clean area becoming contaminated by site hazards. The degree of contamination in the CRZ decreases as the distance from the contaminants increases.

C.7.4 CONSTRUCTION ZONE

The construction zone is the area outside of potential contamination, but still encompasses work activities and possible hazards associated with fieldwork activities. Entry into this area is controlled and the area clearly marked with barrier tape, rope, or flagging.

C.7.5 SUPPORT ZONE

The support zone (SZ) is the outermost area of the site. This area is uncontaminated where workers provide operational and administrative support. The SZ is clean and will not be entered by contaminated equipment or personnel, unless properly controlled, or except under emergency or evacuation conditions.

C.7.6 SITE COMMUNICATIONS

Paducah Gaseous Diffusion Plant (PGDP) plant radios, plant phones, and cell phones will be used for on-site and off-site communication. Project personnel will be trained in the use of plant radios and emergency numbers. Hand signals also may be utilized; these will be covered with project personnel if necessary.

C.7.7 AUTHORIZATION TO ENTER

Personnel shall adhere to site entry and control procedures identified in the RWP, AHAs, and this HASP; personnel must wear the appropriate PPE and enter the work area only after receiving permission of the FS, HSR, and/or RCT. The FS (or designee) will verify that the appropriate training and briefing requirements are met prior to entry.

As a requirement for work on this project, workers entering the EZ or CRZ will be required to take the appropriate level of Hazardous Waste Operations and Emergency Response (HAZWOPER) training. This training must cover the requirements in 29 *CFR* § 1910.120, HAZWOPER. As applicable, workers must receive annual 8-hour refresher training and 1- or 3-day on-site supervision under a trained, experienced supervisor. The FS shall receive additional 8-hour training in hazardous waste operations supervision. Workers and visitors entering the EZ or CRZ will be briefed on the provisions of this HASP and will be required to sign the HASP Acknowledgment Form. Workers entering radiological posted work areas also will be required to complete Radworker II training.

C.7.8 VISITORS

Site visitors (persons not involved in routine site work activities) shall abide by the following:

- Visitors shall be instructed to stay outside of the EZ and CRZ and remain within the SZ during the extent of their stay.

- Visitors requesting to observe work conducted in the EZ must wear appropriate PPE prior to entry into that zone.

- Visitors who request to enter the EZ must produce evidence that they have medical clearance and appropriate HAZWOPER training that is up-to-date.

- Visitors also must have received the required training for the activities being performed and entry must be approved by the FS, HSR and/or RCT.

C.8 PERSONAL PROTECTIVE EQUIPMENT

When engineering controls are not feasible, when the administrative controls in place are not adequate, or when otherwise indicated (such as for ALARA), PPE will be specified by the AHA and/or RWP. At a minimum, personnel performing work in work zones may be required to wear the following standard safety apparel:

- Hard hats meeting the requirements of American National Standards Institute (ANSI) Z89.1, as prescribed in 29 *CFR* § 1910.135, *Head Protection*. Hard hats will be worn with the suspension properly installed. Hard hats will not be damaged, painted, or deformed.

- Safety glasses with firm side shields will meet the requirements of ANSI Z87.1, as prescribed in 29 *CFR* § 1910.133, *Eye and Face Protection*. Prescription glasses also will meet the ANSI standard and be provided with fixed or firm clip-on side shields. Cover glasses used over prescription glasses will be permitted. Safety glasses will be worn in any area where construction activities are taking place. Face shields will not be worn in lieu of safety glasses.

- Sturdy safety toed work shoes or boots meeting the requirements of ANSI Z41, as prescribed in 29 *CFR* § 1910.136, *Foot Protection*, shall be worn.

C.8.1 ACTIVITY-SPECIFIC LEVELS OF PROTECTION

The levels of personal PPE will be determined by an assessment of the potential hazards posed by the activity to be performed and will be identified in the activity-specific AHAs and RWPs. Typically, the highest hazard levels are to be expected in the EZ; therefore, the level of PPE designated for work in the EZ would be expected to be the highest level designated for an activity. Work conducted in the CRZ may vary. Generally the level of PPE used in the CRZ is one level below that designated for the EZ.

C.8.2 RESPIRATORY PROTECTION

Respiratory protection requirements will be determined by air monitoring and survey results. Personnel required to wear respiratory protection will be trained and quantitatively fit-tested prior to use of the respirator, as prescribed in accordance with DOE prime contractor procedure. Personnel required to wear respirators will inspect their respirators before and after each use and any deficiencies will be reported to the FS or HSR immediately. Respirators will be properly stored in a bag in a clean, dry environment and routinely cleaned. Damaged respirators shall not be used.

C.9 MEDICAL SURVEILLANCE

The medical surveillance program provides for baseline, annual, and termination medical examinations for employees in accordance with 29 *CFR* § 1910.120, HAZWOPER. Employees who may be exposed to hazardous conditions may be required to be trained and fitted for respiratory protection in accordance with 29 *CFR* § 1910.134. Each employee who is or may be exposed to hazardous substances or health hazards at or above the permissible exposure limit (PEL) for 30 days or more per year and each employee who wears a respirator for 30 days or more per year will receive a medical examination before assignment, approximately 12 months later, and at termination of employment or at reassignment. Employees who develop signs or symptoms indicating overexposure or are injured or exposed above the PEL in an emergency situation will be examined medically as soon as possible following the incident.

Personnel performing HAZWOPER activities on this project must complete an annual HAZWOPER physical. The examining physician will document each worker's fitness for work. In addition, the physician will ensure personnel are capable of wearing a respirator through medical examination and conducting a pulmonary function test.

Radiation workers, working under an RWP, may be required to submit a baseline bioassay, periodic bioassay during the project, and exit bioassay at the end of the project.

C.9.1 EXPOSURE MONITORING

Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

C.9.2 ROUTINE AIR MONITORING REQUIREMENTS

Air monitoring will be performed during the following activities:

- Intrusive activities such as building demolition and utility removal;
- Activities where there is a potential for exposure to heavy metals, asbestos-containing materials, silica dust; and
- Personnel filling, handling, and transporting waste containers that contain potentially contaminated material.

C.9.3 INDUSTRIAL HYGIENE MONITORING

Industrial hygiene monitoring and sampling will be performed by assigned project H&S support personnel. Monitoring will use direct-reading instruments, air-sampling equipment, environmental-monitoring equipment, and assessment techniques, as determined appropriate by the H&S group based on professional judgment and in accordance with OSHA, National Institute for Occupational Safety and Health (NIOSH), and American Conference of Government Industrial Hygienists (ACGIH).

Personnel sampling will be conducted to assess the potential exposure to individual employees and to ensure that the proper level of PPE has been selected for the assigned activity. Samples will be collected

in the employee's breathing zone using personnel sampling pumps and the appropriate collection media. For activities with the potential for exposure to significantly elevated chemical concentration, it is expected that the sampling frequency will increase.

If direct reading instruments indicate levels of vapors or particulates that exceed the action level for over 15 minutes in the work area, then personnel sampling will be initiated immediately. Sampling will be conducted, at a minimum, on the worker with the highest expected exposure. Monitoring will continue until levels recorded by direct reading instruments return below the action level.

Once initiated, sampling will always continue for a period long enough to collect a volume of air sufficient to allow the laboratory to achieve an analytical detection limit no greater than one-half the OSHA PEL or ACGIH threshold limit value (TLV), whichever is the more stringent of the two. The samples will be collected in accordance with the approved NIOSH or OSHA methodology and analyzed for the appropriate contaminant(s) of concern. All personnel exposure samples shall be analyzed by a laboratory accredited by American Industrial Hygiene Association (AIHA) in accordance with the appropriate NIOSH or OSHA methodology.

C.9.4 RADIOLOGICAL MONITORING

RADCON will perform personnel air monitoring during work in contamination areas and potentially at the boundary. Scanning of equipment and personnel will also be performed to minimize the possibility of the spread of contamination. Personnel working on the project also will be monitored through Dosimetry and required to wear a dosimeter when working in radiological zones and submit bioassays as required.

C.10 EMERGENCY RESPONSE

C.10.1 RESPONSIBILITIES

The PM, FS, and HSR are responsible for the project emergency management program and ensuring that the appropriate emergency response equipment is readily available at the work site and in proper working order.

In the event of an emergency, all site personnel shall follow the requirements and provisions of the PGDP Emergency Management Plan. Emergency response shall be provided by the PGDP emergency response organization. The HSR will be in charge of personnel accountability during emergency activities. All personnel working on-site will be trained to recognize and report emergencies to the HSR or the FS. The HSR or FS will be responsible for notifying the PGDP emergency response organization.

The PGDP emergency response organization will be contacted for emergency response to all medical emergencies, fires, spills, or other emergencies. The plant shift superintendent (PSS) will coordinate 24-hour emergency response coverage. The requirements of this section will be communicated to site workers. Any new hazards or changes in the plan also will be communicated to site workers.

The DOE on-scene coordinator will provide oversight on an ongoing basis for emergency management/recovery activities.

C.10.2 REPORTING AN EMERGENCY

C.10.2.1 Discovery

The person who discovers an emergency shall immediately report it to the FS & HSR. If properly trained, he/she may attempt to establish control. Designated project personnel shall maintain a radio, telephone, or other reliable means of notifying emergency response personnel and the PSS.

C.10.2.2 Emergency Contacts

- **Fire:** Fire alarm pull box, plant telephone Bell System 333, or plant radio channel 16
- **Medical:** Plant telephone Bell System 333 or plant radio channel 16
- **Security:** Plant telephone Bell System 6246 or plant radio channel 16
- **PSS:** Plant telephone Bell System 6211 or plant radio channel 16

If using a cell phone: 270-441-6333 for emergency, for NON-emergency use 270-441-6211.

C.10.3 INITIAL EMERGENCY RESPONSE

When an emergency occurs, the HSR or FS will assume responsibility for the management of the scene and the protection of the personnel. Personnel are to be evacuated from the immediate danger area, as appropriate. Depending on the degree of emergency, RADCON controls may need to be adhered to during the emergency. For personnel injury or illness, there will be at least one person with current training in first aid and cardiopulmonary resuscitation present on-site during all field activities. This individual will provide minor first aid until other emergency personnel arrive and assume emergency response duties or it is determined to transport the injured to the hospital or medical provider.

C.10.4 PADUCAH GASEOUS DIFFUSION PLANT ALARMS

The alarms can be heard by calling 6161 on a Bell phone. These include the following:

Radiation Emergency/Criticality Accident Alarm System (CAAS):	Continuous blast on a high-pitched air whistle or electronic horn **ACTION**: Evacuate area immediately and stay away from affected building. Report to an assigned plant assembly point.
Attack Warning/Tornado Warning:	Intermittent 2-second blast on plant horns **ACTION:** Take cover.
Evacuate Signal:	Continuous blast on plant horns **ACTION:** Evacuate building.
Plant Emergency:	Hi-Lo Tones **ACTION:** Listen to plant public address system/radio for instructions.

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Cascade Buildings:	Three blasts on building horns or howlers **ACTION:** Call area control room.
Other Buildings:	One 10-second blast on building horns or sirens **ACTION:** Follow local emergency procedures.

During field activities all personnel must participate in all PGDP accountability/assembly drills. For accountability, all on-site project personnel must report to the appropriate assembly station, as directed within the AHAs. The FS, HSR, or designee will be responsible for accounting for all field personnel (including sub-tier subcontractor personnel) and reporting any unaccounted-for personnel to the emergency coordinator.

C.10.5 REPORTING A SPILL

When a spill is discovered, personnel will the report the occurrence to the FS or HSR, who will immediately contact the PSS, environmental compliance, and the PM and convey as much information as possible (e.g., material involved, estimated quantity spilled/affected, location, affected personnel, other hazardous conditions).

C.10.6 PROTECTIVE ACTIONS FOR SPILL

An effort will be made to stop the release and contain the spill using materials in the on-site spill response kit, only if it is safe to do so and if no unprotected exposures occur. A telephone contact list containing emergency notification phone numbers will be located at the job site.

In the event that personnel are exposed to hazardous chemicals or radioactive materials, appropriate emergency response action will be taken to remove the contaminated clothing. An emergency shower and eyewash station will be used to flush exposed skin and eyes, respectively. This emergency equipment will be maintained in a readily accessible location adjacent to the active work area.

If an acute exposure to airborne chemicals occurs or is suspected and the affected personnel are unable to escape the work zone, the FS or HSR immediately will contact the PSS for assistance. Rescue operations will not be performed unless the rescuers are dressed in the appropriate protective equipment.

Project managers will be responsible for ensuring all spills of hazardous materials are cleaned up properly and disposed of, including any material generated from the spill unless the spill or release is major and requires response by the PGDP Emergency Response team.

The FS or HSR has the following responsibilities:

- Ensure that spill containment is performed safely;
- Provide all known information to the PSS to ensure proper response;
- Ensure that decontamination measures for exposed personnel are conducted safely and promptly;

- Ensure that, if personnel are exposed to airborne chemicals and are unable to escape the work zone, rescue is not attempted unless rescue personnel are dressed in the appropriate protective equipment; and

- Notify environmental compliance for spill reporting and cleanup requirements.

C.11. TEMPERATURE EXTREMES

Ambient temperatures may pose a threat to project personnel; however, the combination of PPE worn in the work zone and ventilation conditions may indicate the need to monitor personnel for heat or cold tolerance and signs of heat or cold stress. Workers will be evaluated prior to beginning operations and assessed as conditions warrant during and after work in PPE. Personnel who are not required to wear PPE are not immune to the potential hazards of heat- or cold-related disorders or conditions and, therefore, may be included in the monitoring program.

C.12. DECONTAMINATION

Contamination of personnel, equipment, and/or material can occur from contact with radiological and/or hazardous material. When decontamination is required, appropriate procedures shall be followed to ensure effective decontamination is achieved and to minimize generation of mixed waste.

The overall objectives of decontamination are as follows:

- Determine and implement the decontamination methods for personnel and equipment that are effective for the specific hazardous/radioactive substance(s) present;

- Ensure the decontamination procedure itself does not pose any additional safety or health hazard;

- Provide pertinent information on the locations and layouts of decontamination stations and equipment; and

- Establish procedures for the collection, storage, and disposal of clothing and equipment that have not been decontaminated completely.

It is assumed that the majority of contamination concerns from the C-340 Complex will be radiological. Disposable PPE and one-time-use items may undergo radiological surveys prior to release for disposal as nonradioactive waste. Reusable equipment may be required to undergo a radiological survey prior to release from a radiological area. If hazardous waste is encountered, industrial safety and RADCON will assist project management in determining additional methods of decontamination. If clothing or equipment is contaminated with both radiological and hazardous material, mixed waste may be generated. All wastes generated during decontamination will be characterized, stored, and disposed of according to applicable or relevant and appropriate requirements. In an effort to reduce waste, consideration shall be given during the planning process on effective ways or methods to minimize the production of trash, PPE waste, etc.

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C.13. TRAINING MATRIX

Employees assigned to the C-340 Complex must be trained according to contract and HASP requirements. The minimum training requirements listed in Table C.1 apply to all personnel who perform work in the C-340 Complex.

Table C.1. Training Matrix for the C-340 Complex D&D Project

REQUIRED TRAINING FOR ENTRY INTO C-340 COMPLEX
GET
RAD Worker II
C-340 Complex Health and Safety Plan Required Reading
Asbestos Awareness, for workers not performing abatement
Asbestos Worker with current 8 hour refresher for workers performing abatement
Asbestos Contractor/Supervisor and current 8 hour refresher for abatement supervisors
PCB Awareness
Temperature Extremes
Lead Awareness
Baseline Bioassay
Hearing Conservation
HAZWOPER 40 hour
HAZWOPER 8 hour Supervisor, for Supervisors and Managers
Current HAZWOPER 8 hour refresher
Current HAZWOPER medical physical examination
Respirator Training/Medical Certification

During the progression of work planning, training needs may be identified that are over and above the minimum requirements. If this is the case, the appropriate training will be provided prior to initiating the work activity.

The front line supervisor shall verify employee training status prior to the start of work.

Subcontractors must submit documentation of training to the training manager prior to entering the work site. If an individual is delinquent in any of the required training, entry into C-340 will not be permitted.

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APPENDIX D

LIST OF PROCEDURES

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This appendix includes a non-exhaustive list of DOE contractor procedures used in the decommissioning process. Development of these procedures included input from various functional groups (e.g., Safety and Health, Engineering, Quality Assurance, Project Management, Facility Management, Radiological Control, Work Controls, Training, Environmental Compliance, Waste Certification Officials, Transportation Compliance, Nuclear Safety, Waste Disposition and members of the craft). These procedures may be revised or deleted without update to this Appendix.

- PAD-ENM-0015 *Asbestos Waste Sampling*
- PAD-ENM-0017 *Paint Chip Sampling*
- PAD-ENM-0018 *Sampling Containerized Waste*
- PAD-ENM-2002 *Sampling of Structural Elements and Miscellaneous Surfaces*
- PAD-IH-1008 *Facility Hazard Assessment*
- PAD-SH-2010 *Hazard Assessment*
- PAD-SH-2020 *Hot Work*
- PAD-IH-5138 *Confined Space Program*
- PAD-IH-5201 *Asbestos and Other Fibrous Materials*
- PAD-DD-1010 *Equipment Decontamination and Fixative Application*
- PAD-DD-2701 *Large Equipment Decontamination*
- PAD-RAD-0301 *Radiological Characterization Data*
- PAD-RAD-1108 *Posting and Labeling*
- PAD-RAD-1101 *Radiation Exposure Limits*
- PAD-RAD-1107 *Workplace Air Monitoring for Radioactivity*
- PAD-RAD-1109 *Radioactive Contamination Control and Monitoring*
- PAD-RAD-1110 *Radiation Surveys*
- PAD-RAD-1112 *Air Sample Collection, Analysis, and Documentation*
- PAD-RAD-1113 *Handling of Samples Potentially Contaminated with Hazardous Material*
- PAD-RAD-1118 *Use and Maintenance of Non-Fissile HEPA Filter-Equipped Vacuum Cleaners*
- PAD-RAD-1119 R1 *Operation and Maintenance of Negative Air Machines*

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- PAD-ENG-0012 *Hoisting and Rigging Operations*
- PAD-WC-0020 R0AC1 *Work Planning*
- PAD-WC-0021 *Work Execution*
- PAD-WD-0019 *On-Site Transfer and Movement of Waste Containers and Other Support Equipment*
- PAD-WD-0022 *Waste Water Accumulation, Storage, Treatment, and Disposal*
- PAD-WD-0437 *Waste Characterization and Profiling*
- PAD-WD-3015 *Waste Packaging*
- PAD-WD-3028 *Off-Site Shipping*
- PAD-WD-9503 *Off-Site Shipments by Air Transport*

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Policy for the Paducah Environmental Remediation Project

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Responses to US Environmental Protection Agency
Comments dated August 31, 2010, on the
Removal Action Work Plan for the C-340 Complex Decommissioning
***Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0344&D1**
Dated July 2010

The comments provided by the USEPA have been considered and responses are presented below for consideration. The individual agency comments are listed followed by the response. Those figures and tables from the July report that have been modified based on these comments are attached.

Specific Comment:

Comment 1: *Section 2 should include a figure similar to that in the C-410 RWP, showing all stormwater drainage features to support installation of stormwater runoff mitigation measures.*

Response: Figure 1 has been revised showing the items requested; Figure 1 is included as an attachment to this CRS. (See KDWM General Comment and KDAQ Comment #5)

Comment 2: *Section 2.3.5, second Paragraph: Please modify as follows: "Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent that the substrate forms a surface that will bond well with the fixative/stabilizer."*

Response: The sentence has been changed as suggested.

Comment 3: *Section 4, Table 4: A removal completion report should be included in this table.*

Response: A Removal Completion Report will be added to the table.

Comment 4: *Appendix A: Include figures in Appendix A similar to those provided in Appendix A of the C-410 RWP, with references to the figures in text at the appropriate locations.*

Response: Pictures of example demolitions, as well as photos of the demolition of C-340 Conveyor structure, have been added to Appendix A.

Comment 5: *Page A-4: "Other Deactivation Activities": Have the C-340 D and E buildings been demolished yet? If so, please add here as deactivation activities. Also, the C-410 RWP had 25 individual pre-demolition activities listed. Clearly some were specific to C-410, but others were of a more general nature. Please include at least those that both facilities share in common.*

Response: Yes, C-340 –D and -E have been demolished, and that has been added to the list of items under "Other Deactivation Activities."

The section has been revised as follows:

"Other Deactivation and Pre-Demolition Activities:

The following activities will be completed during the deactivation of the facility.

(1) All utilities will be isolated and air gapped.

(2) Grout plugs will be installed in all floor drains and sanitary sewer drains.

(3) C-340-D and C-340-E Structures have been demolished, and the conveyer that connects the C-340-D Building to the C-340-A, -B, and -C Buildings has been demolished.

(4) All process systems, ventilation, and electrical equipment will be removed or stabilized.

(5) Exhaust stacks, exterior ventilation fans, ductwork, and structures will be removed or properly stabilized for removal during demolition.

(6) The overhead pipe chase that exited C-340-A on the West Side and connected to other PGDP facilities has been isolated and air gapped.

(7) Temporary power system and generators have been removed or are reconfigured to provide power needed for structural demolition.

(8) All process systems and electrical equipment will be stabilized and/or removed from buildings prior to demolition.

(9) All basements, pits, trenches, and sumps in zones scheduled for immediate demolition will be vacuumed. Structures that contain free liquids will be pumped to remove any free liquids. All sludge, debris, or foreign material will be removed, analyzed, and appropriately packaged for disposal.

(10) All surfaces will be sprayed with fixative to ensure the containment of transferrable materials.

(11) The slab surface will be decontaminated by washing, scabbling, or other physical means to reduce the removable contamination levels on the slab surface.

(12) Dust suppression will be practiced during any mobilization activities that have the potential to generate dusts.

(13) Fencing delineating the demolition exclusion zone will be installed or demarcated.

(14) Silt fence and geo-textile filter fabric/hay bales/erosion control measures installed to support demolition activities.

(15) Break trailers and Sealand equipment and material storage containers will be removed from the fenced area to allow space for demolition and waste loading.

(16) Perimeter air monitoring equipment will be located and ready for use.

(17) Water supplies for dust suppression will be available.

(18) Adequate supply of waste containers (i.e., covered rail cars, etc.) will be available.

Comment 6: *Page A-6, C-340-B and A: Number 5 under these two buildings calls for a Radcon/Environmental survey of pits prior to backfilling. EPA assumes the "environmental" aspect is for potential non-radioactive contaminants, such as metals and PCBs. Appendix B does not include any sampling procedures to collect "environmental" samples. Please note sampling and analytical procedure relevant to these samples.*

Response: Analytical sampling protocols for PCBs and metals are included in Appendix B, Tables B.3 and B.5. Sampling procedures pertinent to this project are included in Appendix D as the first four procedures on the list. Specifically, these procedures are as follows:

- PAD-ENM-0015 *Asbestos Waste Sampling*
- PAD-ENM-0017 *Paint Chip Sampling*
- PAD-ENM-0018 *Sampling Containerized Waste*
- PAD-ENM-2002 *Sampling of Structural Elements and Miscellaneous Surfaces*

Comment 7: *Appendix B does not contain or reference any sample collection procedures. Include or reference existing procedures that apply to the samples to be collected.* ***Also****, EPA recommends, at a minimum, that the post-demolition Radcon survey be extended to the soils surrounding the demolished facilities to ensure that contamination did not get released to the soils at levels that may cause an unacceptable short-term risk.*

Response: Analytical sampling protocols for PCBs and metals are included in Appendix B, Tables B.3 and B.5. Sampling procedures pertinent to this project are included in Appendix D as the first four procedures on the list. Specifically, these procedures are as follows:

- PAD-ENM-0015 *Asbestos Waste Sampling*
- PAD-ENM-0017 *Paint Chip Sampling*
- PAD-ENM-0018 *Sampling Containerized Waste*
- PAD-ENM-2002 *Sampling of Structural Elements and Miscellaneous Surfaces*

The postdemolition and postdemobilization radiological control surveys will include disturbed areas around the slab for posting or controls in accordance with 10 *CFR* 835.

The paragraph under "Radionuclides" in appendix B has been changed as follows:
"Following demolition, the slab will be surveyed to determine fixed and ~~removal~~ removable levels of radiological contamination. The postdemolition and postdemobilization radiological control surveys will include all disturbed areas around the slab for posting or controls in accordance with 10 *CFR* § 835. Swipe samples will be collected and analyzed in a fixed-base laboratory."

Responses to Kentucky Division of Waste Management and
Kentucky Division of Air Quality
Comments dated August 30, 2010, on the
Removal Action Work Plan for the C-340 Complex Decommissioning
***Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0344&D1**
Dated July 2010

Kentucky Division of Waste Management Comments

The comments provided by KDWM have been considered and responses are presented below for consideration. The individual agency comments are listed followed by the response. Those figures and tables from the July report that have been modified based on these comments are attached.

General Comment:

A site figure should be added that delineates the C-340 boundary fence-line, the personnel and/or equipment decontamination area(s), the exclusion zone, the contaminant reduction zone, the support zone(s), demolition material segregation/storage area(s) and heavy equipment storage area(s).

Response: Figure 1 has been revised to show the planned location of the areas requested. It is attached to this CRS; however, the actual perimeter of zones may change during implementation of field activities due to changing site conditions. (See EPA Comment #1 and KDAQ Comment #5)

Specific Comments:

Comment 1: *Section 1.2, Table 2, Page 2*: *If during demolition activities any hazardous materials are discovered or generated at SWMU 382, the SWMU Assessment Report (SAR) for this SWMU must be revised to reflect the appropriate changes. Comment noted is sufficient.*

Response: If hazardous materials are discovered or generated, the SAR will be revised as described.

Comment 2: *Section 2.2, first paragraph, fourth sentence, Page 7*: *The fourth sentence states that "Sumps and pits will be backfilled with flowable fill…." Four C-340 SWMUs (522, 523, 524 & 529) are either pits or sumps. During the decommissioning process, the location of each of these SWMUs should be noted, delineated and backfill activities recorded. This will aid during the SAR revision process and the future transfer of these SWMUs to the Soils and Slabs Operable Unit. DOE should acknowledge that this will occur.*

Response: The filling activities for the four SWMUs identified will be recorded as described to assist in revising the SAR upon project completion. The locations of these four SWMUs have been added to Figure 3, which is attached to this summary.

The following text has been added to page 7:

> "Sumps and pits, including the four SWMUs, 522, 523, 524, and 529, will be backfilled with flowable fill or similar material and the slabs will be decontaminated and a fixative will be applied. The exact location of SWMUs 522, 523, 524, and 529 will be noted and delineated, and the backfill activities will be recorded so that the information will be available to the Soils and Slabs Operable Unit associated with activities post gaseous diffusion plant shutdown."

The following sentence has been added to page 14, Section 2.3.5, last sentence:

"Figure 3 depicts the slab floors of the C-340 Complex following demolition, and the locations of SWMUs that have been filled with flowable fill."

Comment 3: *Section 2.3, Page 8: It is unclear why discussion of ACM removal has been written to anticipate compliance with ARARs. Such removal will be in compliance with ARARs. Please remove references to anticipated ARAR compliance.*

Response: The last sentence of the 2nd paragraph has been deleted and the phrase "and asbestos" added to the 2nd sentence, as follows:

"The process infrastructure and asbestos insulation inside the buildings, but not the exterior transite siding, will be removed prior to the initiation of the decommissioning activity described in this RAWP ~~It is anticipated that all accessible interior ACM will have been removed and dispositioned in accordance with applicable regulations and DOE policy.~~"

Comment 4: *Section 2.3.3, Pages 10-11: The proposed erosion and sediment control measures appear to be robust. Please assure Kentucky that the required inspections (every seven days and after a ½ inch or greater rainfall) will be conducted.*

Response: DOE assures Kentucky that the erosion and sediment control measures will be inspected at least every seven days, and after any rainfall that is ½ inch or greater. Required inspections will be flowed into work control documents and subcontracts.

Comment 5: *Section 2.3.3, Page 11, Transite Removal:. Please describe how the transite will be handled during the removal process to prevent or minimize breakage. Please also provide more discussion of how the transite on higher stories will be lowered to the ground.*

Response: The following has been added to Section 2.3.3, page 12:

"All transite panels shall be removed intact or in large sections and shall be carefully lowered to the ground using a crane or a specially equipped manlift."

Comment 6: *Section 2.3.3, fifth paragraph, third sentence, Page 11: If it is expected that a sufficient quantity of sprayed water will be used to warrant the installation of sediment barriers or control structures, please provide the associated details of the expected location(s), a brief definition of the temporary structure(s) and the expected maintenance procedures.*

Response: The sediment barriers and control structures are needed to control rainfall runoff rather than sprayed water. These are shown in revised Figure 1 of the RAWP. The control structures will consist of hay bale fences and sediment fences, according to the terms and conditions of the PGDP KPDES permit.

Comment 7: *Section 2.3.5, second paragraph, last sentence, Page 12: Four C-340 SWMUs (522, 523, 524 & 529) are either pits or sumps. Please revise Figure 3 to include the location of the four final-grade pit/sump SWMUs slated to be flowable filled.*

Response: Figure 3 has been revised to show the location of the four SWMUs listed in this comment and in response to KDWM Comment # 2. The revised figure is attached to this CRS.

Comment 8: *Section 2.3.5, second paragraph, Page 12: Please discuss post-closure procedures for conducting any routine checks for breaks in the foundation that may have led to subsurface releases & contamination prior to the application of fixative. This is necessary so that postclosure site investigations will know where to focus future investigations.*

Response: The following sentence has been added to the 2nd paragraph of Section 2.3.5: "After demolition of the C-340 structure, the slab will be inspected, and the presence and characteristics of any cracks or breakage in the slab will be noted and placed in project files for future investigations."

Comment 9: *Section 2.3.6, Waste Materials Disposition, Page 12: Please provide additional information regarding the use of process knowledge and field techniques versus laboratory testing to determine what portion of D&D wastes will be classified as LLW.*

Response: Designation of waste from C-340 as LLW will be based primarily on radiological surveys conducted in the field, rather than process knowledge or analytical data. Equipment that contained radiological material (piping, hoppers, etc.) that cannot be easily decontaminated or inspected internally may be deemed LLW based on process knowledge. Concrete, from either concrete masonry unit walls or from elevated slabs, will be characterized using bulk sampling and analysis.

Comment 10: *Section 2.3.6.1, third paragraph, Page 13: If any on- or off-site treatment becomes necessary; the type(s) of treatment, the waste quantities and waste type(s) should be noted. Please provide this information to the Removal Action Completion Report.*

Response: On-site and off-site treatment activities will be summarized in the removal completion report. Off-site and on-site treatment also will be reported in the annual RCRA report.

Comment 11: *Section 3.3, Page 19: Section 3.3 (Sampling and Analysis Plan) states that "Sampling and Analysis Plans for the C-340 Complex will be developed….." The stated SAP(s) should be completed and added to a D2 version of this Report as an Appendix. See the Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project, October 2002.*

Response: DOE disagrees that submittal of a SAP is necessary. Section 3.3 refers to waste characterization sampling and analysis. As the C-340 Removal Action is a structural demolition activity, sampling is not planned for the purpose of determining environmental nature and extent of contamination or to collect data for risk assessment purposes. Waste sampling and analysis activities are performed in accordance with the procedures included in Appendix D of this RAWP. These procedures, which include determination of the number of required samples, collection methods, preservation methodologies, chain-of-custody, provisions for quality assurance and quality control, and data assessment are well developed and robust in approach and implementation for characterization of wastes generated by activities at PGDP.

Comment 12: *Section 6, third document, Page 25: The D2 2010 Site Management Plan, dated April 15, 2010, was approved by the EPA on April 19 and the Division on June 25, 2010. Please reference the approved 2010 SMP instead of the outdated 2009 SMP.*

Response: The references to the SMP have been changed to the one approved in 2010.

Comment 13: *Section 6, sixth document, Page 25: The 1998 version of the Federal Facility Agreement for the PGDP is referenced. The most recent approved version of the FFA is dated 9/2/2008. Please reference the most recent approved version of the FFA.*

Response: The citation for the Federal Facility Agreement has not been changed. In a discussion with Kentucky by phone on October 12, 2010, it was agreed that the citation for the FFA should not be changed at this time.

Comment 14: *Appendix A, Page A-4, first paragraph: The pits need to be cleaned and inspected before they are filled. The goal is to support potential future remedial actions as consistent with 40 CFR 300.415(d). Please commit to note the condition of the pits in the D2 version of this document.*

Response: The text on page A-6 has been revised as follows: "The decommissioning phase of this project will be accomplished in a manner consistent with applicable or relevant and appropriate requirements. The buildings and remaining infrastructure will be removed, size reduced, packaged, and transported to a designated disposal location. The slab will be cleaned and coated with fixative. The subsurface pits, trenches, and sumps will be backfilled. Any pits or sumps will be cleaned, inspected, and surveyed prior to backfilling, and the condition prior to filling will be noted in the revised solid waste management unit assessment report."

Comment 15: *Appendix A, Page A-5: Appendix A does not provide the level of detail expected in the demolition plan of a seven-story building. Please describe the planned method for dismantling the building, possible alternative methods and the reasons alternatives could be employed.*

Response: Appendix A has been revised to include additional detail on the approach that is planned for building demolition.

Comment 16: *Demobilization, point 12, Page A-7: This point states that a "Closure Document will be prepared after the project has been completed. The CERCLA document that follows a RAWP is a Removal Action Completion Report (RACR). Please revise this statement.*

Response: Bullet (12) has been revised to state "Prepare Removal Completion Report."

Kentucky Division of Air Quality Comments

The comments provided by KDAQ have been considered and the provided responses are presented for consideration. The individual agency comments are listed followed by the response. Those figures and tables from the July report that have been modified based on these comments are attached.

Specific Comments:

Comment 1: *Executive Summary, Pages ix and A-4: Committing to remove "all accessible interior" asbestos "to the extent practicable" during deactivation is too vague to meet the requirements of the asbestos NESHAP regulation (40 CFR 61, Subpart M). Please provide an explanation of how NESHAP requirements will or will not be met during planned D&D activities.*

Response: Asbestos-containing material (with exception of transite siding on the building) will have been removed during deactivation prior to the start of the CERCLA portion (building decommissioning) of the C-340 Project. During the deactivation phase of the project, DOE and contractors will comply with all requirements pertaining to asbestos removal. The sentences commented upon have been rephrased to the following:

Page ix -
"During the deactivation activities, all accessible interior asbestos-containing materials will be removed and chemical- and/or radionuclide-containing systems (e.g., process piping, equipment) will be emptied of residual material in accordance with applicable requirements ~~to the extent practicable~~."

Page A-5 –
"It is anticipated that all accessible interior asbestos-containing material will have been removed and any systems (e.g., process piping, equipment) containing chemical and/or radionuclides will have been emptied of residual material, in accordance with applicable requirements ~~to the extent practicable,~~ during the deactivation activities."

Comment 2: *Executive Summary, Page A-4: If "small amounts of hazardous substances that cannot be accessed for removal" remain after deactivation, and if these include asbestos, then the "remove it all before demolition" NESHAP requirement could be violated unless CERCLA trumps NESHAP and allows them to remain after demolition. Please provide an explanation of how NESHAP requirements will or will not be met during planned D&D activities.*

Response: A requirement of CERCLA is to comply with the substantive requirements of all applicable regulations. That is the basis for including both federal and Kentucky requirements for asbestos removal in the ARARs of this project. (See EE/CA pages A-12 through A-15)

Some amounts of asbestos are allowed to remain in a building undergoing demolition under 40 *CFR* § 61.145 (c)(1)(i) – (iv). Kentucky regulation 401 *KAR* 58:025 incorporates by reference the federal NESHAPS regulations, 40 *CFR* § 61.140 through 157, Subpart M. Conditions under which all asbestos is not required to be removed are described in 40 *CFR* § 61.145 (c)(1)(i) – (iv), and quoted below.

> (1) Remove all RACM from a facility being demolished or renovated before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access to the material for subsequent removal. RACM need not be removed before demolition if:
> (i) It is Category I nonfriable ACM that is not in poor condition and is not friable.
> (ii) It is on a facility component that is encased in concrete or other similarly hard material and is adequately wet whenever exposed during demolition; or

(iii) It was not accessible for testing and was, therefore, not discovered until after demolition began and, as a result of the demolition, the material cannot be safely removed. If not removed for safety reasons, the exposed RACM and any asbestos-contaminated debris must be treated as asbestos-containing waste material and adequately wet at all times until disposed of.
(iv) They are Category II nonfriable ACM and the probability is low that the materials will become crumbled, pulverized, or reduced to powder during demolition.

Based on this regulation, the following sentence has been added to page A-6 of the C-340 RAWP to address the comment:

"In the event that asbestos is discovered after demolition begins and it cannot be removed safely, the exposed regulated asbestos-containing material and any asbestos-contaminated debris will be treated as asbestos-containing waste material and will be kept adequately wet at all times until it is disposed."

Comment 3: *Executive Summary, Page A-4: Similarly, if asbestos is "co-mingled with the demolition debris" in any quantity (even "sufficiently low quantities"), the entire debris pile must be disposed as asbestos-contaminated. Please explain the effects of comingling demolition debris and ACM in the context of NESHAP compliance.*

Response: DOE will comply with all ARARs, including the asbestos disposal requirements listed in the EE/CA on page A-32. The following sentence has been added to page A-6 of the C-340 RAWP:

"Further, if asbestos material is commingled with other types of debris during demolition, the commingled debris will be disposed of as asbestos-contaminated waste."

Comment 4: *Section 2.3.3, paragraph 5, Page 10: It is unclear what air monitoring will be conducted to "allow for identification and mitigation of airborne contamination." Other than possibly leading to a change in worker protection precautions, please provide additional detail on what contaminants will be monitored for and how any resulting data on airborne contaminants could affect your mitigation strategies associated with D&D activities at C-340.*

Response:
The following text has been added to page 10 of the RAWP:

"Contaminants that may be monitored during C-340 D&D activities are the following:

- Lead dust from paint;
- Additional metals, such as cadmium, silver, and beryllium, as needed;
- Asbestos; and
- Uranium.

These constituents will be monitored in the work area using the appropriate type of sampling pumps. Asbestos fibers will be monitored by conducting visual inspections of personal protective equipment and the work environment. In the event that any of these constituents is detected above threshold levels, work will be paused or stopped and the source of the excursion investigated. An appropriate response will be initiated according to the conditions that warranted the excursion. Detection of asbestos fibers could result in examining and possibly changing the wetting practices used in the demolition and/or changing respiratory filters."

Comment 5: *Section 2.3.3, Water Paragraph, Page 11: The discussion of dust suppression through water application seems incomplete. The secondary effects from such practices, including the potential for contaminated runoff, are not sufficiently addressed. Please provide additional discussion of dust suppression measures during D&D activities in the context of limiting water-borne effluent from D&D activities.*

Response: The following sentences have been added to the second "water" paragraph on page 11:

"Water used for wetting ACM and dust suppression will be used inside the erosion/runoff control structures around the C-340 structure and collected in basins or sumps and treated, if necessary, prior to discharge. The locations of the erosion control structures are shown on Figure 1. Water usage will be minimized by using low flow "fogging" nozzles to create effective dust control spray and/or through use of specialty demolition equipment such as a "dust boss." A dust boss uses a high volume fan and high pressure water misting system to create an ultrafine water mist that can be focused on the demolition area, suppressing dust generation.

(See KDWM General Comment and EPA Comment #1.)

Comment 6: *Section 2.3.3, Air Paragraph, Page 11. The discussion of possible migration pathways for airborne contaminants includes vents and broken windows. It is unclear why these potential sources would not already be sealed as part of the preparatory actions conducted under Atomic Energy Act. Please explain why ensuring that such sources are sealed prior to demolition would not prevent possible airborne releases of contaminants during demolition activities.*

Response: Vents, broken windows, wall penetrations, and open doorways will have been sealed during the deactivation phase of this project, but the seals could be broken during deactivation. If an inspection reveals that is the case, the openings will be resealed prior to demolition. Seals on such areas will be maintained during the demolition phase, except in areas where active demolition is ongoing. In areas where structural demolition is ongoing, sealing of vents, windows, or openings would not be feasible or beneficial.

The second sentence of the "Air" paragraph on page 11 has been revised to read as follows:
"The migration pathways for airborne emissions during deactivation include vents, broken windows, wall penetrations, and open doorways, ~~and fugitive emissions when the structures are demolished.~~ If the seals on these migration pathways are broken during deactivation, they will be resealed. During the structural demolition, if the seal on a vent, penetration, or window that is located away from the active demolition area is determined to be broken, and resealing the opening is feasible and would reduce potential for contaminant migration, then the seal will be repaired."

Comment 7: *Section 2.3.5, Demolition, page 12: The discussion of slab sealants is insufficient. Please provide more details about which slab sealant will be used.*

Response: The following has been added to Section 2.3.5, Demolition.
"It is anticipated that after ~~the appropriate~~ decontamination, ~~method will include the application of~~ a fixative/stabilizer coating~~(s), (~~such as ~~latex paints, gums, or epoxy~~ InstaCote Epoxy Surface Protector or an equivalent will be applied."

Comment 8: *Section 2.3.5, Demolition, Page 12: The discussion of scaling paint removal appears to minimize the need for ARAR compliance and defers instead to only to what "DOE deems practicable." Please expand and revise this discussion to address planned paint removal activities that comply with ARARs.*

Response: The sentence commented upon in the second paragraph of Section 2.3.5 has been changed according to the direction provided in EPA Comment #2, and now reads "Loose and scaling paint will be removed from the foundation and other hard surfaces to the extent that the substrate forms a surface that will bond well with the fixative/stabilizer."

Comment 9: *Section 2.3.6, Waste Material Disposition, Page 14: It is unclear whether dust suppression techniques will be used at storage container staging areas. Please indicate whether and what type of dust suppression techniques will be used at storage container staging areas.*

Response: The following has been added to Section 2.3.6, Page 14: "Dust suppression techniques used at container storage areas will consist of using reasonable precaution to prevent particulate matter from becoming airborne. These reasonable precautions may include, but not be limited to, using water sprays and mists or chemicals to control dust and covering open bodied trucks when they are in motion and transporting materials that likely could become airborne "

Comment 10: *Section 2.3.6.1, Waste Material Segregation and Treatment, Page 13: Discussion is provide on the collection of general demolition dust being collected through vacuuming and other techniques, but no discussion is provided on the collection of fugitive dust generated associated with waste material segregation and treatment. Please provide further discussion of fugitive dust collection methods at waste material segregation and treatment locations.*

Response: The following sentence has been added to Section 2.3.6.1

"Standard industry control measures will be used for dust control at segregation, packaging, and treatment areas. During segregation, sizing, and packaging of demolition debris (steel, concrete from walls or upper floors, etc.), dust suppression methods (amended water sprays or mists and 'dust bosses') will be utilized to prevent generation of fugitive dusts. Use of enclosures and dust collection systems during segregation, treatment, and packaging is not anticipated."

Comment 11: *Table 3, Page 14: For conventional disassembly activities, it is unclear whether such activities would be conducted within enclosures as a means to control any resulting airborne releases. For the activities described in Table 3, please include, as appropriate, any planned use of enclosures, elephant trunks, HEPA filtration, or containment structures to control possible airborne contaminants.*

Response: The primary demolition technique for the steel structure is disassembly with hydraulically operated shears operated by excavators, which do not generate large quantities of dust. Dust will further be reduced as a result of the extensive vacuuming and fixative application on the structure performed as a part of deactivation activities. The use of enclosures or HEPA filtered ventilation is not anticipated for the structural demolition activities. Concrete walls and/or elevated concrete slabs will be demolished using hydraulically operated concrete processors operated by excavators with mists and amended water sprays to suppress dust generation during the demolition.

Comment 12: *Appendix A, Environmental Control, Page 5: The installation and use of air monitoring equipment is referenced, but not explained. Please provide additional detail concerning the type of air monitoring equipment to be installed and the airborne contaminants for which monitoring will be conducted.*

Response: Section 2.3.3, paragraph 5, on page 10 was revised as follows to discuss environmental monitoring:

"Contaminants that may be monitored during C-340 D&D activities are the following:

- Lead dust from paint;
- Additional metals, such as cadmium, silver, and beryllium, as needed;
- Asbestos; and
- Uranium.

These constituents will be monitored in the work area using the appropriate type of sampling pumps. Asbestos fibers will be monitored by conducting visual inspections of personal protective equipment and the work environment. In the event that any of these constituents is detected above threshold levels, work will be paused or stopped and the source of the excursion investigated. An appropriate response will be initiated according to the conditions that warranted the excursion. Detection of asbestos fibers could result in examining and possibly changing the wetting practices used in the demolition and/or changing respiratory filters."

Comment 13: *Appendix A, Stabilization of Slabs and Subsurface Structures, Page A-6: The possible use of concrete scabbing in areas of known or suspected PCB contamination is not compliant with ARAR requirements without the use of appropriate fugitive dust suppression and collection techniques. If scabbing is to be used, please describe the associated fugitive suppression and/or collection techniques, the use of enclosures, or the use of vacuumed scabbing equipment.*

Response: Scabbling activities will be conducted in compliance with ARARs, including dust controls. The expected dust controls to be applied will be scabbling equipment with dust capture devices.

Comment 14: *Appendix A, Demobilization, Pages A-6 & A-7: Please add a task involving the specific performance of appropriate dust management methods during demobilization activities.*

Response: The following task will be added to the demobilization activities:

"(13) Dust suppression during any demobilization activities that have the potential to generate dust"

Comment 15: *Appendix B, Page B-3: See comment above on concrete scabbing (page A-6).*

Response: Scabbling activities will be conducted in compliance with ARARs, including dust controls. The expected dust controls to be applied will be scabbling equipment with dust capture devices.

Comment 16: *Appendix B, Page B-4: "Asbestos may be present on the concrete slab from removal of the transite siding. Prior to structural demolition, the slab will be vacuumed...." If transite removal generates asbestos debris, NESHAP requires the debris to be collected either during the removal (as it's being generated) or -- if simultaneous collection is infeasible -- immediately afterward. Additionally, consider the likelihood that some of the asbestos debris generated during the removal is likely to be carried off by wind, i.e., not all of the debris can be expected to fall directly to the slab below and stay there until someone collects it. If the debris cannot be collected during removal, and if slab vacuuming does not occur immediately after the dust is generated, then this section of the NESHAP regulations would be violated. Please provide an explanation of transite collection and NESHAP requirements.*

Response: The process for removal of transite is described in Section 2.3.3. Care will be taken during the removal to minimize the breaking or damage of the panels and reduce potential for release of fibers. Any debris generated during the removal will be cleaned up during removal operations and/or immediately thereafter including vacuuming the slab. These activities must occur prior to structural demolition.

Comment 17: *Appendix B, Page B-5: The table specifies test method NIOSH-9002 for analyzing bulk asbestos samples during decommissioning activities; however, NESHAP specifies EPA 600/R-93-116. Please address the reasons for selecting NIOSH-9002 instead of EPA 600/R-93-116.*

Response: Both of the analytical methods, EPA 600/R-93-116 and NIOSH-9002, are polarized light microscopy methods. The NESHAP requirement is to use "Appendix E, Subpart E, 40 *CFR* Part 763, Section 1, Polarized Light Microscopy" rather than a requirement to use either an EPA or a NIOSH analytical method; therefore, either method complies with the requirements of the regulation. Based on this, DOE has determined that the NIOSH method should remain on the table. Also, this is the method that the contracted lab uses.

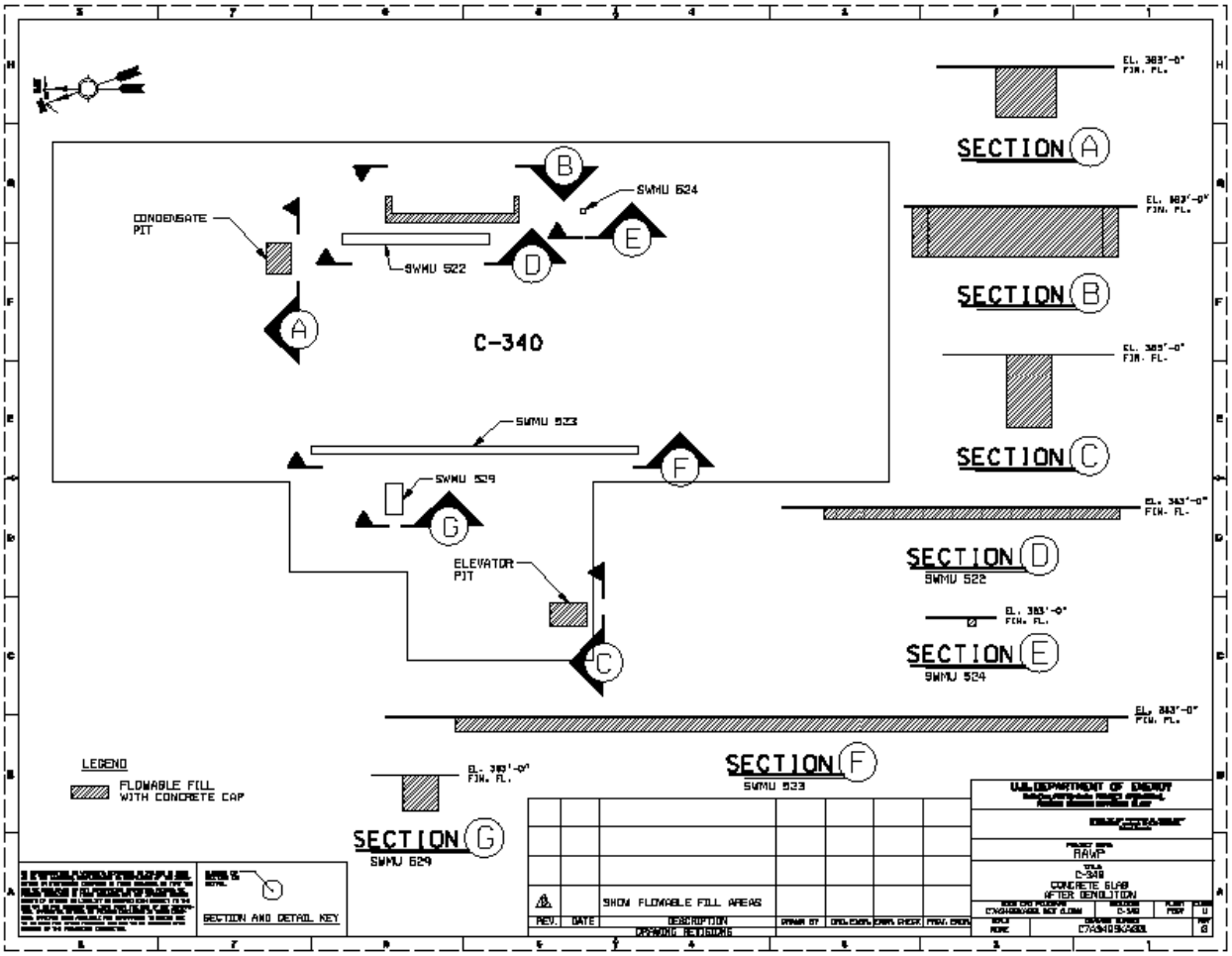

Figure 3. Configuration of the Slabs of the C-340 Complex

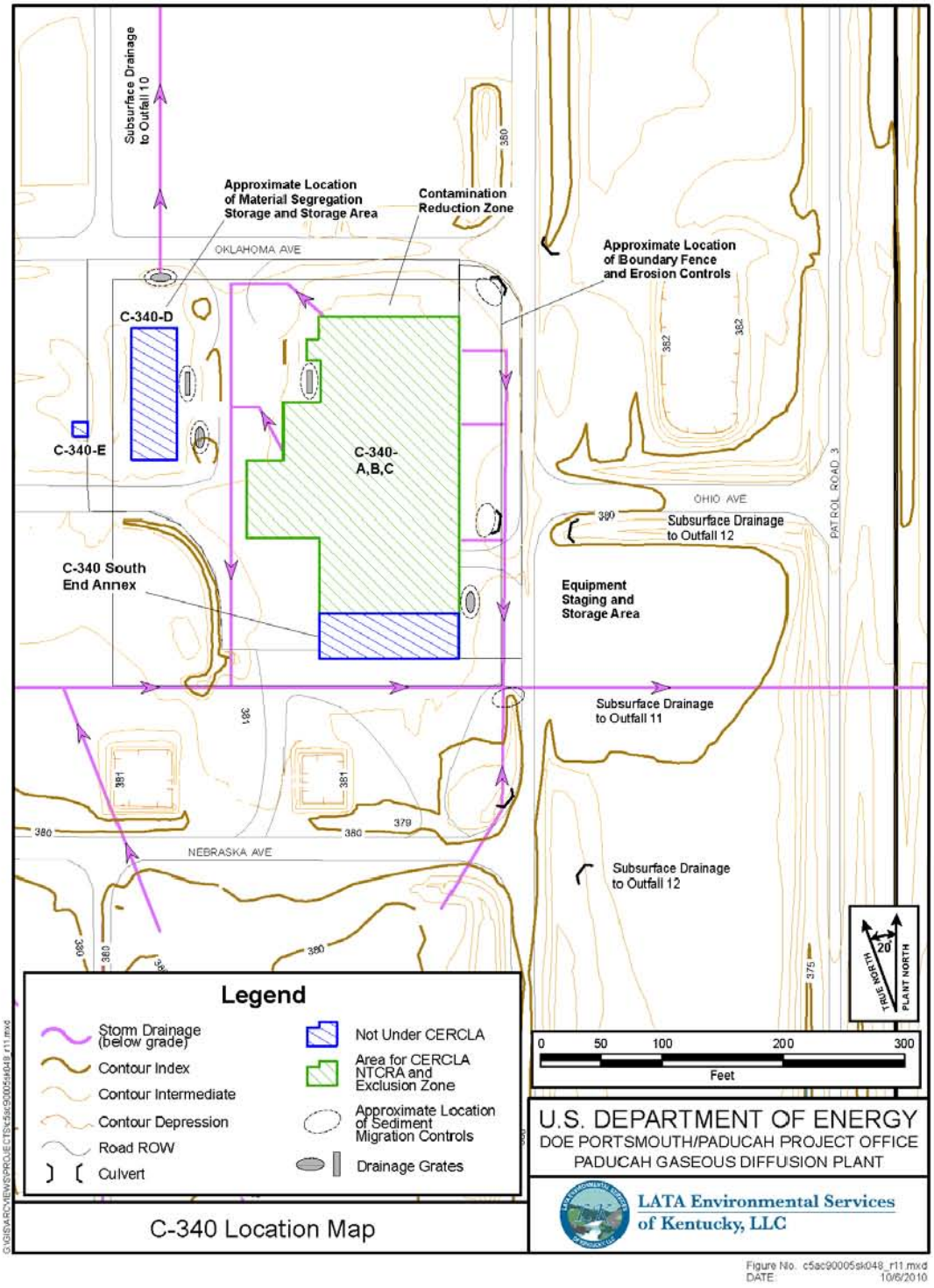

Figure 1. Location of the C-340 Complex Removal Areas