Department of Energy

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

JUN 08 2010

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

PPPO-02-569-10

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 THE REMOVAL ACTION WORK PLAN ADDENDUM FOR THE C-410 COMPLEX INFRASTRUCTURE DECONTAMINATION AND DECOMMISSIONING PROJECT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, DOE/LX/07-0304&D2

Please find enclosed the certified D2 *Removal Action Work Plan (RAWP) Addendum for the C-410 Complex Infrastructure Decontamination and Decommissioning Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0304&D2 for your approval. This document addresses comments received from the U.S. Environmental Protection Agency (EPA). Also enclosed are the EPA comment response summary and red-lined version of the D2 RAWP Addendum which incorporates minor editing changes. The U.S. Department of Energy received approval of the D1 RAWP Addendum from the Kentucky Department of Environmental Protection on April 9, 2010.

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 Addendum for C-410 Complex
3. Red-lined D2 RAWP Addendum for C-410 Complex
4. EPA CRS

cc w/enclosures:
AR File/Kevil

e-copy w/enclosures:
ballard.turpin@epa.gov, EPA/Atlanta
bert.gawthorp@lex.doe.gov, PPPO/LEX
brad.montgomery@prs-llc.net, PRS/Kevil
daniel.yaeger@lex.doe.gov, PPPO/LEX
dennis.ferrigno@prs-llc.net, PRS/Kevil
donald.ulrich@prs-llc.net, PRS/Kevil
edward.winner@ky.gov, KDEP/Frankfort
elizabeth.wyatt@prs-llc.net, PRS/Kevil
jana.white@prs-llc.net, PRS/Kevil
janet.miller@lex.doe.gov, PRC/PAD
jeffrey.gibson@ky.gov, KDEP/Frankfort
john.morgan@prs-llc.net, PRS/Kevil
keaton.osborne@lprs-llc.net, PRS/Kevil
mike.spry@prs-llc.net, PRS/Kevil
pamela.dawson@lex.doe.gov, PRC/PAD
patricia.goddard@prs-llc.net, PRS/Kevil
rachel.blumenfeld@lex.doe.gov, PPPO/LEX
ray.miskelley@lex.doe.gov, PPPO/LEX
reinhard.knerr@lex.doe.gov, PPPO/PAD
rob.seifert@lex.doe.gov, PPPO/PAD
sidney.dumont@lex.doe.gov, PTC/PAD
tufts.jennifer@epa.gov, EPA/Atlanta

CERTIFICATION

Document Identification: ***Removal Action Work Plan Addendum for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*** **DOE/LX/07-0304&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.

Paducah Remediation Services, LLC
Operator

Dennis Ferrigno, PM, Site Manager
Paducah Remediation Services, LLC

6/8/2010
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

6/8/10
Date Signed

DOE/LX/07-0304&D2
Primary Document

Removal Action Work Plan Addendum for C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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Removal Action Work Plan Addendum for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—June 2010

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

Prepared by
PADUCAH REMEDIATION SERVICES, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-06EW05001

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CONTENTS

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TABLES

FIGURES

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ACRONYMS

ACM	asbestos-containing material
AHA	Activity Hazard Analysis
AM	Action Memorandum
AMA	Action Memorandum Addendum
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
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 of 1976
RAWP	Removal Action Work Plan
SAP	Sampling and Analysis Plan
SME	subject matter expert
SWMU	solid waste management unit
TBC	to be considered
TSCA	Toxic Substances Control Act
WAC	waste acceptance criteria

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EXECUTIVE SUMMARY

This Removal Action Work Plan (RAWP) Addendum describes the demolition of the structures and associated non-process infrastructure of the C-410 Feed Plant Complex (C-410 Complex) at the Paducah Gaseous Diffusion Plant (PGDP) near Paducah, Kentucky. The following Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documents were prepared as a part of the planning, evaluation, and implementation of the original work scope for the decontamination/decommissioning (D&D) of the C-410 Complex:

- *Action Memorandum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2002&D1/R1;

- *Engineering Evaluation/Cost Analysis for the C-410 Complex Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1952&D2/Rl; and

- *Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-2012&D2.

These documents defined the original approach to the D&D of the C-410 Complex. They described the decision to remove the hazardous materials and the infrastructure prior to initiating the structural demolition process.

The non-time-critical removal action (NTCRA) defined in those documents is being performed by the U.S. Department of Energy (DOE) pursuant to DOE's removal authority under Executive Order 12580 and in accordance with the Federal Facility Agreement for the PGDP Section X.E, Non-Time- Critical Removal Actions and the National Contingency Plan regulations.

Subsequent to the development and approval of these documents, safer and more efficient modifications were developed to the method of accomplishment of D&D of the C-410 Complex. These modifications necessitated changes to the scope of the existing NTCRA. The decision process that resulted in the approval of this modified approach is presented in the *Action Memorandum Addendum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0273&D2, November 2009.

That Action Memorandum Addendum (AMA) documented the following decisions:

(1) To expand the scope of the existing NTCRA to include facility structure demolition to the slabs and disposition of demolition debris, and

(2) To allow the non-process systems to remain in place and to remove these systems at the same time the building is demolished.

These decisions would necessitate a change to the overall approach to the C-410 D&D RAWP. These changes included facility structure demolition to the slabs and disposition of demolition debris, as well as allowing the non-process systems to remain in place and removing these systems at the same time the building is demolished. The ongoing deactivation activities involving the removal of loose contaminated material and contaminated infrastructure would continue to be performed as a NTCRA under the CERCLA as part of the D&D of the C-410 Complex.

The *Action Memorandum Addendum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0273&D2, was prepared and approved for the removal action covered in the RAWP Addendum.

This RAWP Addendum defines the approaches necessary to facilitate changes in the original *Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2012&D2. The primary emphasis of this Addendum is to (1) define the approach for implementing the decisions documented in the AMA, (2) provide details regarding project execution, and (3) document the applicable or relevant and appropriate requirements (ARARs) and compliance measures.

Activities addressed by this RAWP Addendum include the structural demolition of the C-410 Feed Plant Complex (C-410 Complex) and removal of certain low-hazard infrastructure (e.g., empty water, air, and nitrogen piping, etc.), and residual waste material.

Demolition debris generated from this removal action will be treated, as necessary, and disposed of at an approved on-site or off-site facility.

The DOE's prime remediation services contractor will perform the work described in this RAWP Addendum, using subcontractors as necessary. The project will be implemented in accordance with the Integrated Safety Management System practices and principles, including worker involvement. Site- and project-specific program plans and procedures have been developed to implement the RAWP Addendum and to ensure compliance with ARARs. The Demolition Plan and the Demolition Removal Action Verification Plan are included as appendices to this RAWP Addendum.

1. INTRODUCTION AND PURPOSE

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). This Removal Action Work Plan (RAWP) Addendum meets the removal action objectives agreed upon among DOE, EPA, and KDEP as defined in Section 2.2. The removal action supports the long-term remediation of Paducah Gaseous Diffusion Plant (PGDP). Demolishing the structure 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 in place.

Under the originally approved Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) non-time-critical removal action (NTCRA), all infrastructure (i.e., piping, equipment, material, platforms, and interior non-load-bearing walls) would be removed from the C-410 Feed Plant Complex, essentially leaving an empty facility shell prior to structural demolition (DOE 2001; DOE 2002a; DOE 2002b). The remaining facility structure (i.e., shell) originally was intended to be decommissioned as part of a subsequent CERCLA response action after all of the infrastructure systems had been removed.

These activities would be conducted as an NTCRA under the CERCLA. The original removal action for the C-410 Complex was defined in the following three documents:

(1) *Action Memorandum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-2002&D1/R1(AM);

(2) *Engineering Evaluation/Cost Analysis for the C-410 Complex Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-1952&D2/R1 (EE/CA); and

(3) *Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-2012&D2.

Deactivation activities including removal of the hazardous materials located within the facility, as well as the removal of infrastructure that might contain such material, was initiated and is presently ongoing, in accordance with these documents.

The *Action Memorandum Addendum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0273&D2 (AMA), was prepared and approved for the removal action covered in the RAWP Addendum.

This RAWP Addendum defines the demolition of the building structure to the slab, including non-process systems. The approach in this addendum anticipates that some infrastructure will be left in place to be decommissioned with the facility structure. Prior to structure demolition, it is anticipated that all accessible interior asbestos-containing materials (ACM) will have been removed, in accordance with applicable or relevant and appropriate requirements (ARARs), and chemical- and/or radionuclide-containing systems (e.g., process piping) will have been emptied of residual material to the extent practicable. 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 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.

This removal action meets the removal action objectives defined in Section 2.2, as agreed upon among DOE, the EPA, and KDEP, and supports the long-term remediation of PGDP. Demolishing the structure will remove a source of a potential release to the environment, thereby reducing the risk that would be posed by the structures were they to be left standing.

Most of the waste from the structures and nonhazardous process systems that remain following the deactivation of the C-410 Complex are expected to be low-level radiologically contaminated waste, 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.

The activities addressed by this RAWP Addendum include the characterization; 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-410 Complex. The activities will be performed in accordance with the applicable DOE and regulatory standards.

1.1 PURPOSE OF THE REMOVAL ACTION WORK PLAN

The purpose of this RAWP Addendum is to provide details on how the NTCRA will be executed in accordance with the AMA (DOE 2009a) and the ARARs. The AMA documents the decision to proceed with structural demolition of the C-410 CERCLA NTCRA.

1.2 SCOPE OF THE REMOVAL ACTION WORK PLAN

This RAWP Addendum was prepared in accordance with requirements of CERCLA and the Paducah FFA. The primary emphasis of the RAWP Addendum is to supplement the AMA information and to provide greater detail regarding project management, project execution, and ARAR compliance measures.

This RAWP Addendum includes the following:

- Planning schedule for the decommissioning of the C-410 Complex facilities and for subsequent documents;
- Description of plans and objectives for the structural demolition removal action; and
- Strategy for the waste characterization during the demolition of the C-410 Complex.

The solid waste management units (SWMUs) that will be addressed by this NTCRA are shown in Table 1. SWMUs 41, 478, 494, 495, and 496 are directly associated with the building structural demolition. The remaining SWMUs are subsurface pits or sumps that must be backfilled following the demolition of the buildings.

Table 1. SWMUs Addressed by the C-410 NTCRA

SWMU NUMBER	DESCRIPTION
SWMU 41	C-410-C Neutralization Tank
SWMU 478	C-410/420 Feed Plant
SWMU 494	C-410 Ash Removal Systems
SWMU 495	C-410-I Ash Receiver Shed
SWMU 496	C-410 Fluorine/Hydrogen Filters
SWMU 497	C-410 Neutralization Room Inverter Vat
SWMU 498	C-410/420 Complex—Sump at Columns D & E-1 & 2
SWMU 499	C-410/420 Complex—Sump at Column H-9 & 10
SWMU 500	C-410/420 Complex—Sump at Column U-10 & 11
SWMU 501	C-410/420 Complex—Scale Pit Sumps A & B
SWMU 502	C-410/420 Complex—Sump at Column U-9
SWMU 503	C-410/420 Complex—Sump at Column G-1
SWMU 504	C-410/420 Complex—Sump at Column L-10
SWMU 505	C-410/420 Complex—Sump at Column A-3N
SWMU 506	C-410/420 Complex—Sump at Column Wa-9
SWMU 507	C-410/420 Complex—Condensate Tank Pit
SWMU 508	C-410/420 Complex—Settling Basin
SWMU 509	C-410/420 Complex—Drain Pit
SWMU 510	C-410/420 Complex—Sump at Column P & Q-2
SWMU 511	C-410/420 Complex—Sump at Column Q & R-2
SWMU 512	C-410/420 Complex—Sump at Column R-2
SWMU 513	C-411 Cell Maintenance Room Sump Pit

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2. PROJECT DESCRIPTION

2.1 FACILITY DESCRIPTION

The C-410 Complex is located in the central part of PGDP, as shown in Figure 1. Figure 2 is a photograph of the exterior of the facility. The C-410 Complex consists of three main process buildings and several auxiliary facilities. The buildings and facilities that are included in the NTCRA are as follows:

C-410	Original Feed Plant with Two East Expansions and One West Expansion
C-410-C	Hydrogen Fluoride (HF) Neutralization Building
C-410-I	Ash Receiver Shelter
C-411	Cell Maintenance Building
C-420	Green Salt Plant

The primary structural system in the C-410 (including expansions), C-411, and C-420 Buildings is steel frame supporting interior floors made of concrete slabs, steel grating, or steel deck plates. Exterior walls are made of corrugated transite siding, masonry, and concrete with steel sash windows. The roofs are comprised of steel sheathing, insulation, asphalt felt, and gravel ballast.

The C-410 Feed Plant is a steel frame, concrete, and concrete masonry units structure with dimensions of 210-ft wide x 230-ft long x 39-ft high. It has corrugated transite siding and a large open high bay area with multiple mezzanine levels, basements, and pits. C-410 has three additions as shown on Table 2.

The contaminants that are expected to remain after deactivation of these facilities will be radiological contamination from uranium, PCBs in paint, and small amounts of hazardous substances that cannot be accessed for removal. These small quantities are not expected to make the demolition debris waste stream a Resource Conservation and Recovery Act (RCRA)-hazardous and/or Toxic Substances Control Act (TSCA)-regulated waste. The decommissioning phase of the project will be accomplished in a manner consistent with ARARs.

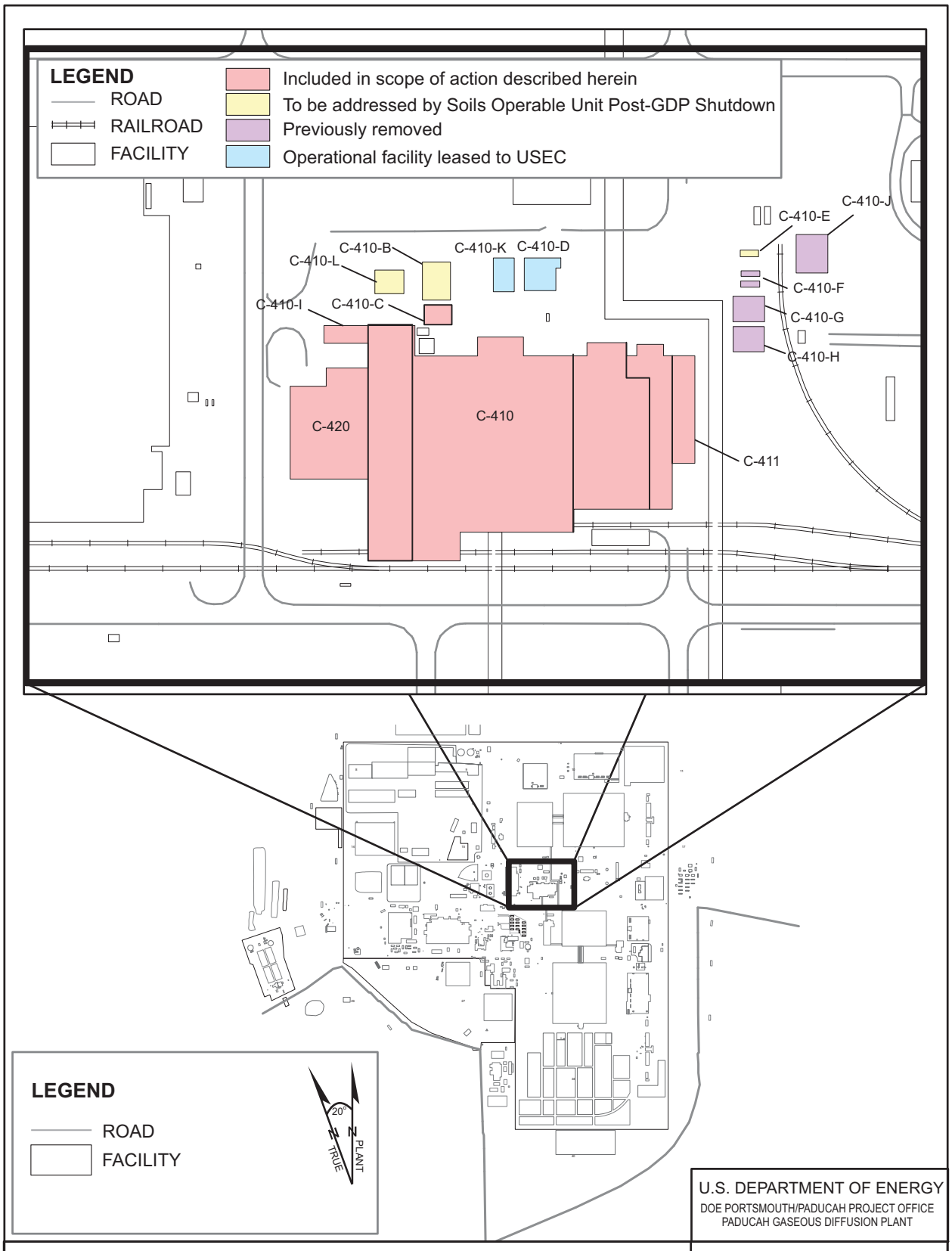

Figure 1. Location of C-410 Complex

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Figure 2. Exterior of the C-410 Complex

Table 2. Additions to C-410 with the Construction Type and Dimensions of Each

Addition Name	Construction Description	Width (ft)	Length (ft)	Height (ft)
C-410 1st East Expansion	Steel frame, concrete masonry unit, high bay building	100	200	16
C-410 2nd East Expansion	Steel frame, concrete masonry unit, high bay building	29	200	16
C-410 West Expansion	Steel frame, concrete, concrete masonry units, and corrugated transite-sided high bay building	60	308	39

C-411—Cell Maintenance Facility is an addition to the C-410 Building that was constructed for maintenance work on the fluorine (F_2) production process equipment. The exterior walls are concrete block and the roof is flat with built-up gravel surface roofing over an insulated metal deck. The building consists of a single-story bay approximately 31-ft wide by 202-ft long. The framing is steel with continuous foundations for exterior walls. The contamination remaining after deactivation will be expected to be similar to that described for C-410.

The C-420—Green Salt Plant is a combined single story and six-story building with two elevator penthouses. It has an approximate floor area of 46,800 ft^2. Building dimensions are shown in Table 3. It is a structural steel building covered with corrugated transite siding. The building houses hoppers, conveyers, reactor towers, and other support equipment. The contamination remaining after deactivation will be expected to be similar to that described for C-410.

Table 3. Dimensions of the Sections of the C-420 Green Salt Plant

Section of Building	Width (ft)	Length (ft)	Height (ft)
Single story	48	24	14
Six story	103	120	73
#1 elevator penthouse	12	24	10
#2 elevator penthouse	24	24	10

In addition to the C-410, C-411, and C-420 Buildings, the following external structures are included in this NTCRA.

C-410-C—HF Neutralization Building is a steel frame building with corrugated transite siding with a footprint of approximately 1,088 ft^2. The neutralization building contained the system required to neutralize low pH water from cleaning fluorine (F_2) production process equipment. C-410-C contains a slurry tank used for mixing the lime or soda ash and water prior to discharging it to the neutralization process. In addition to the neutralization chemicals, the building is expected to contain residual quantities of HF by-products.

C-410-I—Ash Receiver Shelter is a 2,000 ft^2 steel frame building sided with corrugated transite siding used to store ash from the uranium tetrafluoride/fluorination process. The shelter is expected to contain residual quantities of uranium compounds.

The C-410 Complex also includes or included the following facilities that are not part of the NTCRA. Their status is noted below.

C-410-B HF Neutralization Lagoon
C-410-E Emergency HF Holding Pond

These structures will be addressed by the Environmental Restoration Program, Soils Operable Unit

C-410-F HF Storage Building (North)
C-410-G HF Storage Building (Center)
C-410-H HF Storage Building (South)
C-410-J HF Storage Building (East)

These structures were previously removed.

C-410-D Fluorine Storage Building
C-410-K Fluorine Loading Station Building

These are operating facilities leased to United States Enrichment Corporation.

2.2 REMOVAL ACTION SCOPE AND OBJECTIVES

The removal action objectives identified in the AM of 2002 include the following:

- Remove the materials causing the highest potential risks (e.g., transferable radioactive materials, asbestos, and other hazardous materials such as PCBs); thereby, significantly reducing the risk to current employees and potential off-site receptors in the event of building failure or further degradation to levels within the CERCLA risk range and in compliance with ARARs;

- Reduce the potential for public, worker, and environmental exposure to radioactive and hazardous substances caused by uncontrolled release from the buildings; and

- Remove the infrastructure from the Complex buildings in preparation for future final cleanup.

The following Removal Action Objectives were developed as a part of the AMA and are included in this RAWP Addendum:

- To expand the scope of the existing NTCRA to include facility structure demolition, including transite removal; and

- To allow leaving the non-process systems in place and to remove these systems at the same time the building is demolished using heavy equipment such as excavators with shears.

2.3 REMOVAL ACTION APPROACH

The decontamination and decommissioning (D&D) of the C-410 Complex will be in compliance with ARARs and Safety and Health requirements. The Integrated Safety Management System (ISMS) process will be executed for the entire project.

D&D activities will be performed using work control documents, proper waste characterization, and appropriate management and disposition of waste to meet ARARs and the waste acceptance criteria (WAC) of the disposition facility.

The ongoing deactivation activities at the C-410 Complex will have removed the contaminated loose materials and infrastructure prior to the initiation of the decommissioning activity described in this RAWP Addendum. It is anticipated that all accessible interior ACM will have been removed and dispositioned in accordance with ARARs and chemical- and/or radionuclide-containing systems (e.g., process piping) will have been emptied of residual material to the extent practicable. Additionally, certain wastes such as PCB capacitors, mercury switches, or 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 contaminants that are expected to remain after deactivation of these facilities will be radiological contamination from uranium, PCBs in paint, and small amounts of hazardous substances that cannot be accessed for removal. These small quantities are not expected to make the demolition debris waste stream a RCRA-hazardous and/or TSCA-regulated waste.

The decommissioning phase of this project will be accomplished in a manner consistent with ARARs including the demolition of the building and remaining equipment and piping. 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 will be packaged and dispositioned.

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

- Planning
- Hazard Analysis
- Hazard Mitigation/Controls

- Characterization
- Demolition
- Waste Disposition
- Demobilization

2.3.1 Planning

The decommissioning of the C-410 Complex will require a highly integrated approach to ensure compliance with all technical, environmental, and safety requirements. Planning for decommissioning of the C-410 Complex will incorporate the ISMS process.

2.3.2 Hazard Analysis

Every task that is originated during the D&D program is subjected to an Activity Hazard Analysis (AHA) to ensure the safety of the operating personnel, the public, and the environment. Task-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 (SMEs), 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 task, 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, SMEs, 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. Process knowledge relating to the physical condition of the equipment and structure will be obtained from available personnel who worked in the C-410 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 verified de-energized prior to dismantlement of the facility.

If hazards are identified, they will be assessed and included in the AHAs and work packages for the task. These documents definitively establish the procedures that must be used for each task, the hazards involved, and detailed methods for accomplishment. Each of the parties involved in the walkdown 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. Task-specific procedures and protocols have been developed and used in previous and ongoing D&D activities for collection, management, and analysis of samples. The results of this characterization will be integrated into the AHA/work package development.

2.3.3 Hazard Mitigation and Controls

DOE has implemented an 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.

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 wearing proper personnel 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.

Cross-contamination will be controlled through a combination of methods, including, but not limited to, fixing agents, physical barriers, and other contamination control measures. Barriers will be installed as the demolition progresses and may include plastic screens, temporary walls, isolation of areas using existing doors, etc. Spraying fixative on the interior surfaces will minimize airborne contamination.

Decontamination is required for large field equipment or equipment components that touch or enter the ground and parts of the equipment that become splattered with potentially contaminated material. Cleaning and decontamination of all equipment should 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 or tap water and soap, if necessary, to remove particulate matter and surface films. The component shall be rinsed with tap water prior to relocation to an appropriate storage area. All equipment will be surveyed by radiation control personnel prior to free release from the plant.

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 transite siding. These procedures will be implemented in strict compliance with ARARs.

ACMs will be managed in accordance with the ARARs from time of removal until they are disposed of in the C-746-U Landfill or an approved off-site landfill in accordance with applicable regulations.

Erosion control structures will be erected to control surface drainage around the facility to minimize sediments in receiving streams. Storm-water containment structures will be constructed, where necessary, to prevent off-site migration of potentially contaminated storm water. Figure 3 illustrates the general

configuration of the storm-water sewers associated with the C-410 Complex. The storm-water inlets will be protected by the installation of silt fences. Other sediment barriers and/or temporary storm-water 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. Those sources will have been 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. Lock out/tag out procedures will be applied. All hazardous energy sources will be considered active until proven otherwise. Temporary energy source installs to support the decommissioning activities will be managed in the same manner as permanent sources.

Water. The decommissioning activities are not expected to generate significant wastewater discharge volumes. The nature of the materials identified within the C-410 Complex would preclude the use of water to decontaminate the wastes generated. All identified floor drains in the C-410 Complex have been plugged to eliminate the uncontrolled discharge of water from the building. Water used to decontaminate personnel will be containerized, transported, and treated, if necessary, prior to discharge through an existing Kentucky Pollution Discharge Elimination System outfall. Shower water for personnel will be treated in the PGDP Sanitary Wastewater Collection Treatment System. Water used for dust control will be minimized.

Air. The C-410 Complex decommissioning may generate airborne particulates that may be radiologically and/or chemically contaminated. The migration pathways for airborne emissions include vents, broken windows, wall penetrations, open doorways, and fugitive emissions when the structures are demolished. Mitigation measures will include, but are not limited to, water spray, vacuuming, and fixative application techniques for fugitive dust emissions.

Hazardous Materials. Transite siding, containing asbestos, will be removed prior to structural demolition and managed in accordance with ARARs. The systems left in place, following deactivation, may contain small quantities of hazardous substances, but the levels are not expected to result in the building debris being characterized as a RCRA-hazardous or TSCA-regulated 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 low-level radiologically contaminated waste and/or PCB bulk product waste.

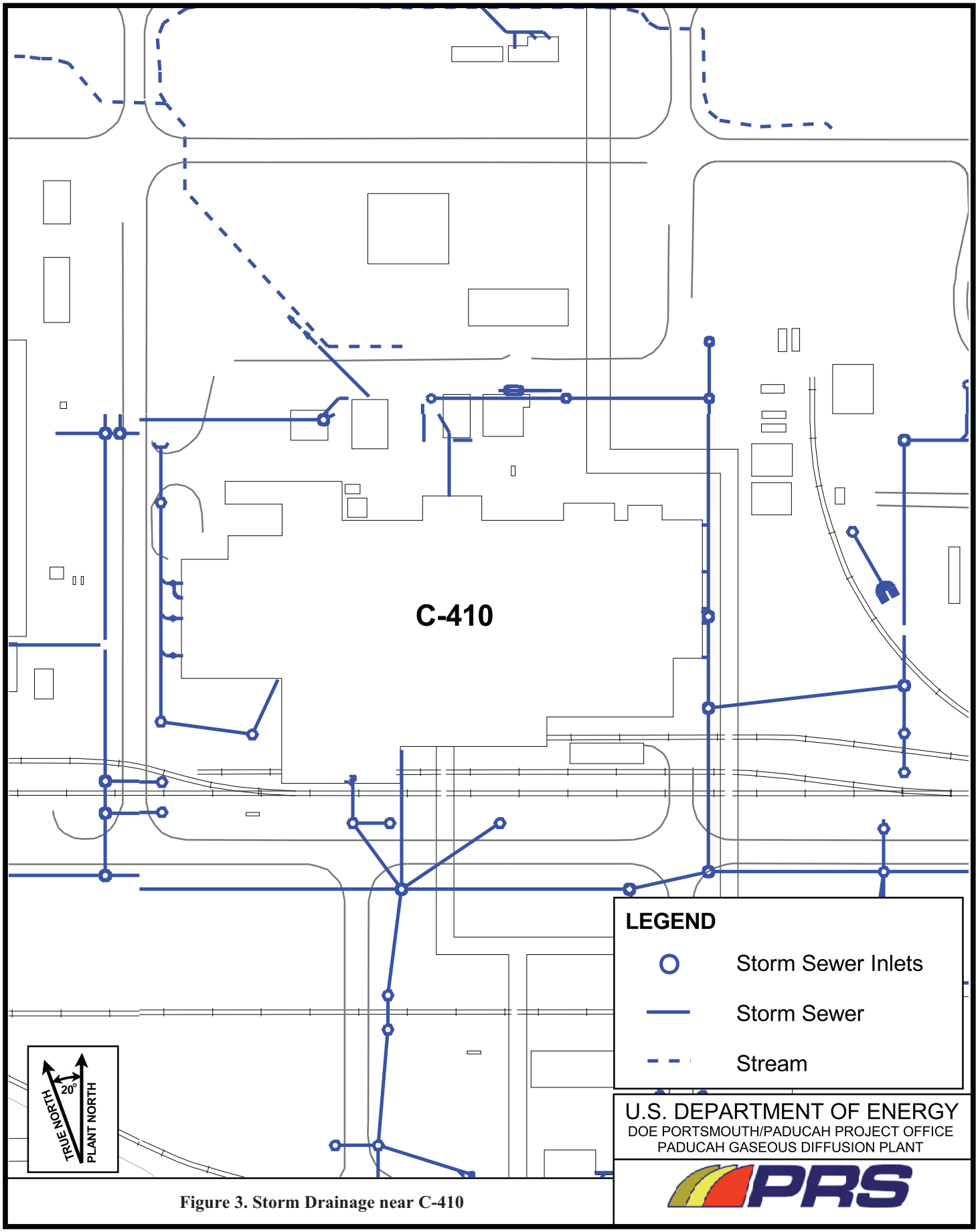

Figure 3. Storm Drainage near C-410

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2.3.4 Characterization

Characterization activities will identify materials and augment the information developed during the deactivation activities through process knowledge and historic data research. The need to collect samples will be determined on a case-by-case basis and will be based on the characteristics, hazards, and process knowledge of the facility components to be dismantled. The waste superintendent is trained and experienced in the characterization of waste materials associated with the C-410 D&D activities. The waste superintendent will determine the need to collect samples with input from SMEs who have direct knowledge of the facility and components that are being assessed. The types and numbers of samples will be determined by the waste superintendent prior to initiating the demolition activities.

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 and the samples analyzed to determine the potential exposures to the workers and environment, establish the levels of personal protection required, establish disposal requirements, and produce necessary documentation for shipment of the material.

Depending upon the characteristics of the material, it may be treated, as required, and dispositioned in compliance with the 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. These activities will involve the application of process knowledge and/or sampling and analysis of the waste materials in accordance with Sampling and Analysis Plans (SAPs).

2.3.5 Demolition

During demolition of the C-410 Complex, typical, standard demolition-type construction equipment will be used. Other specific equipment that also may be utilized is included in Table 4.

The C-410 Complex demolition will not involve removal of the ground-level slabs, sub-slab penetrations, and/or foundations. The slabs that will remain after structural demolition will be visually inspected, surveyed, decontaminated as appropriate, and sealed to minimize the possibility of spreading contamination. It is anticipated that the slab decontamination will include the application of a fixative/stabilizer coating(s) (such as latex paints, gums, or epoxy). Sub-slab penetrations, such as basements, pits, and sumps will be backfilled to prevent accumulation of water and eliminate hazards to on-site personnel.

Figure 4 depicts the slab design/construction of slab floor openings following demolition.

2.3.6 Waste Material Disposition

Waste will be stored in CERCLA waste storage areas prior to disposal. Wastewater will be transferred to temporary storage pending characterization and treatment. All waste storage locations will be located inside the PGDP security fence. The waste storage will adhere to the substantive waste storage requirements established in the ARARs.

Table 4. Description and Evaluation of Building Dismantlement and Size-Reduction Technologies

Technology	Description	Applicability	Limitations	Comments
Conventional disassembly	Hand-held tools and saws; used for hand removal of nuts and bolts.	May be applied to any area.	Labor intensive and slow; recommended for limited application. Vacuuming with high efficiency particulate air filtration will be used for activities 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

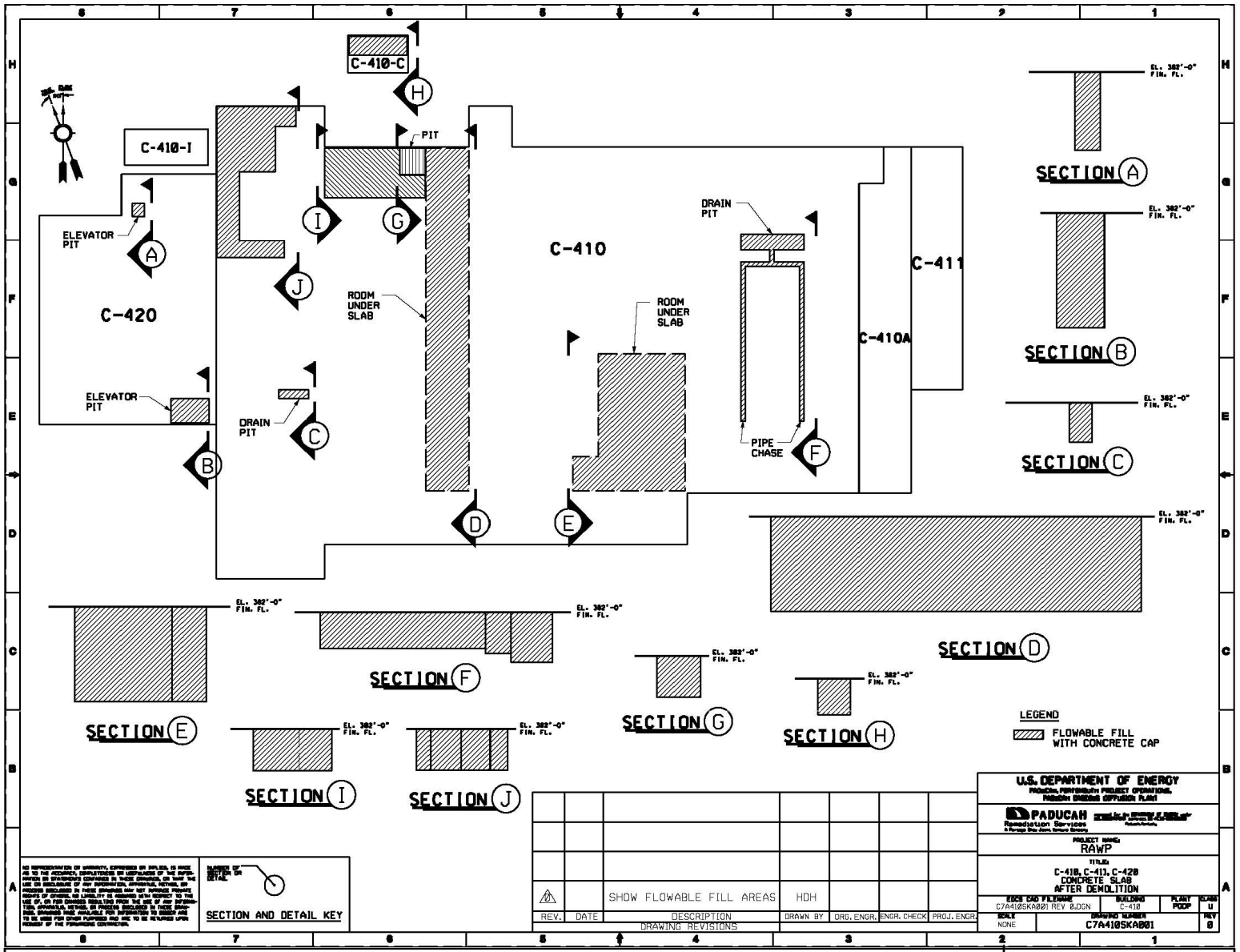

Figure 4. Configuration of the C-410 Complex Slabs after Demolishing the Structures

Waste materials will be sorted and segregated on-site and crushed, dismantled, packaged, and staged for disposal in accordance with ARARs. It is anticipated that waste generated by the decommissioning activities will be segregated, sorted, and size-reduced in close proximity to the C-410 Complex site. Any on-site treatment will be ARAR compliant. Waste material 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 the ARARs and disposed of in the C-746-U Landfill or an approved off-site landfill in accordance with applicable regulations.

Demolition of the C-410 Complex will generate different types of waste streams. The primary waste stream will be construction/demolition debris, which is expected to be categorized as low-level radiologically contaminated waste (LLW). This waste likely will be disposed of at an off-site commercial disposal facility or the Nevada Test Site. Sanitary/solid waste will be disposed of in the C-746-U Landfill on-site, in accordance with ARARs.

2.3.6.1 Waste material segregation and treatment

Waste materials will be separated, to the extent practical, into waste streams that conform to the WAC of the proposed disposal facility. The majority of this waste is expected to be LLW; however, small volumes of contaminated material, such as paint chips or vacuum dust, PCB bulk product waste, and residual quantities of ACMs 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 processing areas in preparation for disposal. Where appropriate, some components will be size reduced to meet transportation or disposal criteria.

Should any of the materials removed from the C-410 Complex require on-site or off-site treatment in order to comply with environmental regulatory requirements prior to disposal. On-site treatment will be performed in accordance with ARARs. Off-site treatment activities will be in accordance with applicable regulations.

2.3.6.2 Waste packaging

The waste generated during D&D will be packaged for transportation and disposal. The volume of waste that requires packaging will utilize methods for component disassembly and selected transportation/disposal options. A variety of containers are available that would be appropriate for the different 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 temporary 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 shipped off-site, will be shipped in accordance with 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-410 Complex are limited by the presence of radioisotopes at levels that exceed most industrial/sanitary landfills radioisotope limits. Three facilities are being evaluated as primary disposal options for the waste generated from the D&D activities: Nevada Test Site, an off-site commercial disposal facility, and potential on-site disposal of nonhazardous solid waste at PGDP 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. Other facilities may be evaluated on an as-needed basis.

2.3.6.5 Equipment recycle/reuse

The recycle and/or reuse of materials from decommissioning the C-410 Complex will be consistent with DOE policy and federal and state requirements. Currently, DOE has suspended the unrestricted release for recycling of scrap metals from radiation areas within DOE facilities. The reuse of equipment from the C-410 Complex will be designated for locations within DOE- and/or Nuclear Regulatory Commission-approved facilities. Should the new location be an off-site facility, the equipment will be packaged and prepared for transport in accordance with the ARARs.

2.3.7 Demobilization

Project demobilization includes completing assessments and documentation verifying that the activities described in this RAWP Addendum have been performed in a satisfactory manner, dismantlement of all site support equipment and materials, removal of all support equipment, and site restoration.

3. PLANS AND WORK CONTROL DOCUMENTS

The following plans either have been or will be developed to ensure the proper execution of decommissioning the C-410 Complex and to ensure compliance with the AMA and ARARs.

3.1 DEMOLITION PLAN

The Demolition Plan (Appendix A) includes the details for demolishing the six structures that are included in this RAWP Addendum.

3.2 DEMOLITION REMOVAL ACTION VERIFICATION PLANS

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

3.3 SAMPLING AND ANALYSIS PLANS

The SAP for the C-410 Complex infrastructure removal was submitted with the original RAWP in 2002. This SAP remains in place for the demolition of the building because the governing principles of characterization for waste disposition will remain the same throughout the course of the added scope. The plan enables contaminants of concern to be identified, sampled, and the samples analyzed according to standing programs and processes developed by DOE's contractor. The plan defines the process for establishing sampling requirements for each task and subtask, selection of the proper sampling protocols, and documentation of sampling for use in future activities.

3.4 PROJECT HEALTH AND SAFETY PLAN

A Health and Safety Plan (HASP) outlining the necessary controls and requirements to protect worker safety during the D&D project for the C-410 Complex was included with the original RAWP in 2002 and approved in April 2003. The HASP complies with the requirements of 29 *CFR* § 1910.120 and addresses the safety and health concerns for D&D of the C-410 Complex. The activities included in this RAWP Addendum will be performed under the currently approved C-410 HASP, as updated. During implementation of the removal action, specific work instruction and hazard controls will be developed at the task 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

The Waste Management Plan documents the processes, procedures, and methods that have been used to ensure safe and compliant execution of waste management work performed during execution of the removal action. The Waste Management Plan was included with the original RAWP in 2002 and will remain in effect throughout the remainder of the project.

3.6 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.

4. PROJECT SCHEDULE

Table 5 provides key schedule elements and projected implementation dates for the decommissioning of the C-410 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 2009b). Any additional milestones, timetables, or deadlines for activities included as part of the removal action will be identified and established independent of this RAWP Addendum, in accordance with existing FFA protocols.

Table 5. Project Schedule for D&D of the C-410 Complex

Activity	Milestone[1]
Issue D1 RAWP Addendum to KY/EPA	February 2010
Complete Demolition	September 2011
Issue D1 Removal Action Completion Report to KY/EPA	December 2011
Complete Waste and/or Recyclable Materials Transportation and Disposal	December 2011

[1] Note that 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 original AM when conducting this removal action. Additional ARARs and TBC guidance were developed for the scope of work included in this RAWP Addendum. Those ARARS were included in the AMA document and are incorporated in this document by reference.

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6. REFERENCES

DOE (U.S. Department of Energy) 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.

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DOE 2002a. *Action Memorandum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2002&D1/R1, U.S. Department of Energy, Paducah, KY, May.

DOE 2002b. *Removal Action Work Plan for the C-410 Complex Infrastructure D&D Project at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-2012&D1, U.S. Department of Energy, Paducah, KY, October.

DOE 2009a. *Action Memorandum Addendum for the C-410 Infrastructure Removal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-0273&D2, U.S. Department of Energy, Paducah, KY, November.

DOE 2009b. *Site Management Plan, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, Annual Revision-Fiscal Year 2009, DOE/LX/07-0185&D2/R1, U.S. Department of Energy, Paducah, KY, March 26.

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

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APPENDIX A

DEMOLITION PLAN FOR THE C-410 COMPLEX

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FIGURES

TABLES

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ACRONYMS

ACM	asbestos-containing material
ARAR	applicable or relevant and appropriate requirement
CMU	concrete masonry unit
HF	hydrogen fluoride
NTCRA	Non-Time-Critical Removal Action
PCAAS	Portable Criticality Accident Alarm System
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
RADCON	radiation control
WGT	waste generator technician

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Facility Description

The C-410 Complex is located in the central part of Paducah Gaseous Diffusion Plant (PGDP) as shown in Figure A.1. Figure A.2 is a photograph of the exterior of the facility. The C-410 Complex consists of three main process buildings and several auxiliary facilities. The buildings and facilities that are included in the Non-Time-Critical Removal Action (NTCRA) are as follows:

C-410	Original Feed Plant with Two East Expansions and One West Expansion
C-410-C	Hydrogen Fluoride (HF) Neutralization Building
C-410-I	Ash Receiver Shelter
C-411	Cell Maintenance Building
C-420	Green Salt Plant

The primary structural system in the C-410 (including expansions), C-411, and C-420 Buildings is made of a steel frame with supporting interior floors made of concrete slabs, steel grating, or steel deck plates. Exterior walls are made of corrugated transite siding, masonry, and concrete with steel sash windows. The roofs are comprised of steel sheathing, insulation, asphalt felt, and gravel ballast.

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

Prior to structure demolition, it is anticipated that all accessible interior asbestos-containing materials will have been removed and chemical- and/or radionuclide-containing systems (e.g., process piping) will have been emptied of residual material to the extent practicable. 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 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 contaminants that are expected to remain after deactivation of these facilities will be radiological contamination from uranium, PCBs in paint, and small amounts of hazardous substances that cannot be accessed for removal. These small quantities are not expected to make the demolition debris waste stream a Resource Conservation and Recovery Act-hazardous and/or Toxic Substances Control Act-regulated waste. The decommissioning phase of this project will be accomplished in a manner consistent with applicable or relevant and appropriate requirements (ARARs).

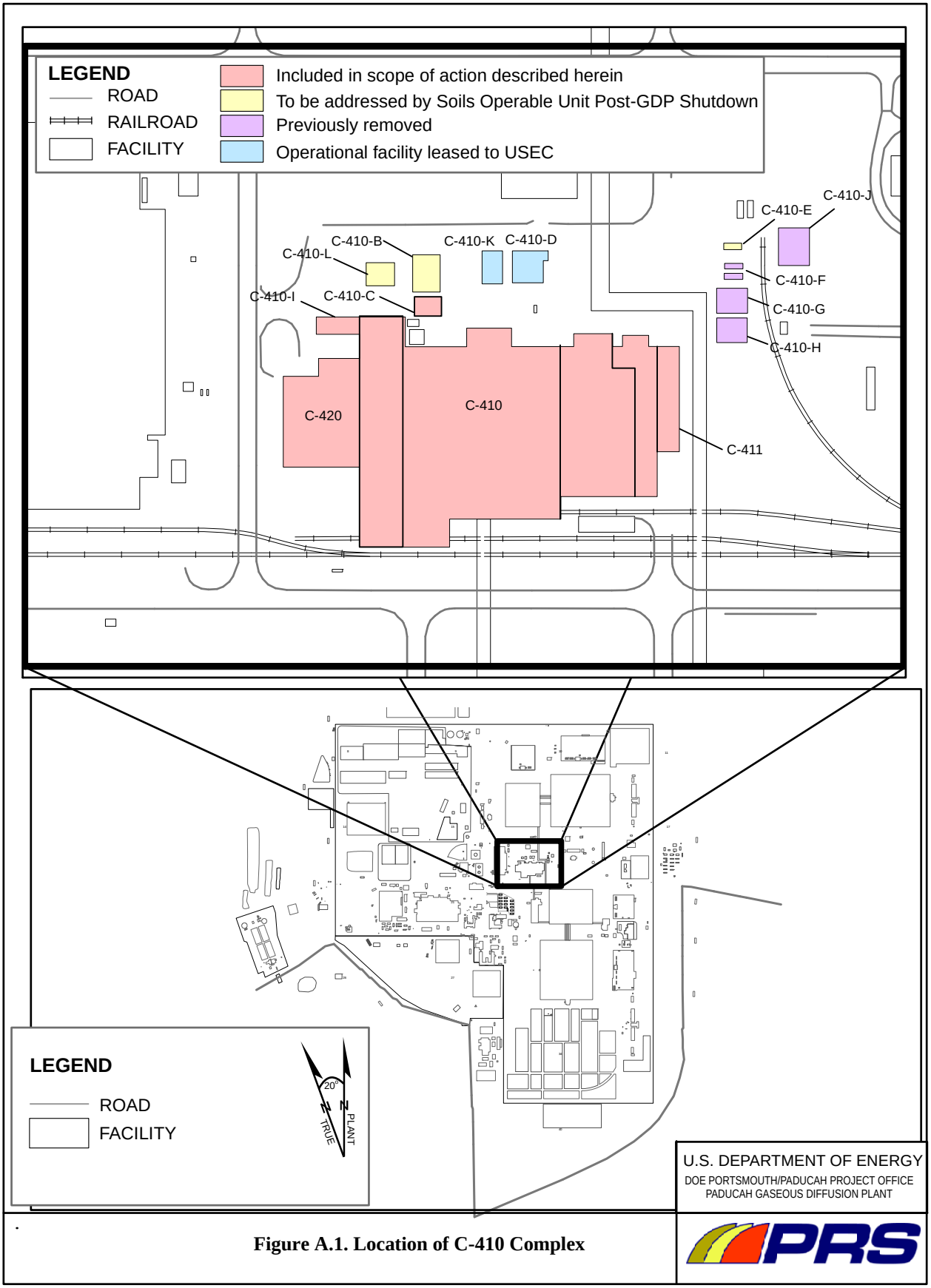

Figure A.1. Location of C-410 Complex

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Figure A.2. Exterior of the C-410 Complex

The C-410 Feed Plant is a steel frame, concrete, and concrete masonry unit structure with dimensions of 210-ft wide x 230-ft long x 39-ft high. It has corrugated transite siding and a large, open, high bay area with multiple mezzanine levels, basements, and pits.

C-410 has three additions as shown on Table A.1.

Table A.1. Additions to C-410 with the Construction Type and Dimensions of Each

Addition Name	Construction Description	Width (ft)	Length (ft)	Height (ft)
C-410 1st East Expansion	Steel framed, concrete masonry unit, high bay building	100	200	16
C-410 2nd East Expansion	Steel framed, concrete masonry unit, high bay building	29	200	16
C-410 West Expansion	Steel framed, concrete, concrete masonry units, and corrugated transite-sided high bay building	60	308	39

The C-411 Cell Maintenance Building is an addition to the C-410 Building that was constructed for maintenance work on the fluorine (F_2) production process equipment. The exterior walls are concrete block and the roof is flat with built-up gravel surface roofing over an insulated metal deck. The building consists of a single-story bay about 31-ft wide by 202-ft long. The framing is steel with continuous foundations for exterior walls. The contamination remaining after deactivation will be expected to be similar to that described for C-410.

The C-420 Green Salt Plant is a combined single story and six-story building with two elevator penthouses. It has an approximate floor area of 46,800 ft^2. Dimensions are shown in Table A.2. It is a structural steel

building covered with corrugated transite siding. The building houses hoppers, conveyers, reactor towers, and other support equipment.

Table A.2. Dimensions of the Sections of the C-420 Green Salt Plant

Section of building	Width, ft	Length, ft	Height, ft
Single story	48	24	14
Six story	103	120	73
#1 elevator penthouse	12	24	10
#2 elevator penthouse	24	24	10

In addition to the C-410, C-411, and C-420 Buildings, the following external structures are included in this NTCRA.

C-410-C—HF Neutralization Building is a steel framed building with corrugated transite siding with a footprint of approximately 1,088 ft^2. The neutralization building contained the system required to neutralize low pH water from cleaning F_2 production process equipment. C-410-C contains a slurry tank used for mixing the lime or soda ash and water prior to discharging it to the neutralization process. In addition to the neutralization chemicals, the building is expected to contain residual quantities of HF by-products.

C-410-I—Ash Receiver Shelter is a 2,000 ft^2 steel frame building sided with corrugated transite used to store ash from the uranium tetrafluoride/fluorination process. The shelter is expected to contain residual quantities of uranium compounds.

The C-410 Complex also includes or included the following facilities that are not part of the NTCRA. Their status is noted below.

C-410-B HF Neutralization Lagoon
C-410-E Emergency HF Holding Pond

These structures will be addressed by the Environmental Restoration Program, Soils Operable Unit

C-410-F HF Storage Building (North)
C-410-G HF Storage Building (Center)
C-410-H HF Storage Building (South)
C-410-J HF Storage Building (East)

These structures were previously removed.

C-410-D Fluorine Storage Building
C-410-K Fluorine Loading Station Building

These are operating facilities leased to United States Enrichment Corporation.

Auxiliary Systems

The C-410 Complex included a number of auxiliary systems. The following auxiliary systems will be removed from service (Lock out/Tag out) and air gapped during deactivation.

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

- **Electricity**. Two 2,000-kVA, 13.8-kV transformers powering a 400-A, 4-kV direct current bus provided electrical power. Two double-ended substations provided power at 13.8-kV primary and 480-V secondary voltages. Each of the four transformers was rated at 1,500/2,000 kVA.

- **Heat**. Steam heated air units heated the entire Complex. Roof-mounted exhaust fans vented the building. Outside air entered through wall-mounted intake louvers with automatic dampers. Heat was supplied by steam tracing, steam-heated air, as well as electrical resistance heated process piping.

- **Exhaust Air**. Air exhausted from the F_2 cell rooms and HF vaporizer room was discharged through stacks north of the fluorine plant.

- **Cooling**. A chilled water unit cooled the feed plant control room, change house, lunchroom, and laboratory. Individual window-mounted air conditioners cooled office areas on the west side of C-420.

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

- **Refrigeration**. Refrigeration systems condensed UF_6 product, HF, and F_2 in off-gases from the reaction systems. Cold traps cooled by Freon™-12 removed HF and F_2 from off-gases. A two-stage ammonia refrigeration system provided cooling to the Freon™-12 system. The ammonia system also cooled the glycol used in the cold traps to condense UF_6.

Pre-Demolition Conditions

The following activities will be completed prior to initiating the physical demolition of the C-410 structures.

(1) All utilities isolated and air gapped.

(2) C-420 south steam and condensate overhead pipe chase isolated and air gapped or removed.

(3) C-310-410 overhead tie line isolated and air gapped or removed.

(4) Portable Criticality Accident Alarm System (PCAAS) relocated away from the east side of C-411 and alternate method of worker notification approved and available for use.

(5) Ventilation fans, electrical conduit, piping, and platforms removed from C-410 Building to the vent stack towers and from the north pipe chase.

(6) Shed roof structure removed on the north side of C-410 original feed plant.

(7) Bag house, ventilation fans, and structure housing removed.

(8) Air compressor, air compressor electrical power, “breathing air station,” and structures removed.

(9) Neutralization lagoon support structure C-410-C removed.

(10) Quonset hut building C-410-L remains.

(11) C-410 railroad tracks inspected and refurbished as required to support demolition activities.

(12) Construction fence delineating the exclusion zone is installed.

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

(14) Temporary utilities installed to support demolition activities.

(15) Overhead C-331/335 tie line located on east side of the C-410 Complex remains in service to support plant operations during and after the C-410 Complex demolition activities.

(16) The underground utilities and communications equipment in the vicinity of C-410 will remain active to support plant operations during the C-410 Complex demolition activities.

(17) All process systems and electrical equipment removed from buildings prior to demolition.

(18) 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.

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

(20) The dust from the cleaning activities will be analyzed and appropriately packaged for disposal.

(21) Wastewater, including free liquids from the pits, will be characterized, treated, if necessary, and dispositioned.

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

(23) All transite panels, windows, and door assemblies will be disposed of in the C-746-U Solid Waste Contained Landfill.

(24) Barriers will be installed to minimize cross-contamination.

(25) Ample supply of covered railcars is available for waste shipments.

Main Tasks

A. Develop the following work packages as a minimum:

(1) Gross Decontamination and Fixative application
(2) Flowable Backfill
(3) Building C-411 and C-410 2nd East expansion demolition
(4) Building C-410 1st East expansion demolition
(5) Building C-410 Feed Plant demolition
(6) C-410-C demolition
(7) C-410 West Expansion (including C-410-I) demolition
(8) Building C-420 demolition
(9) Vent Stacks and Towers demolition

B. Obtain approvals from internal support groups such as the following:

   (1) Engineering
   (2) Radiological control (RADCON)/as low as reasonably achievable
   (3) Safety
   (4) Environmental Compliance
   (5) Quality Assurance

C. Construct work zone fence.

D. Construct silt fence, install water retention barriers as required.

E. Ensure all unnecessary utilities (permanent and/or temporary) are "locked out/tagged out" and/or air gapped prior to commencing work.

   - Remove/relocate new transformer prior to building C-420 demolition.

F. Perform gross decontamination—Vacuum all surfaces inside building. Use hydraulic man lifts and scissors lifts to reach elevated surfaces.

G. Perform asbestos abatement verification surveys following the asbestos-containing material (ACM) abatement activity.

H. Apply fixative to all decontaminated interior surfaces as directed by RADCON.

I. Package and load equipment, work platforms, mezzanines, pit, and basement covers.

J. Remove debris from basements and pits.

K. Vacuum basements and pits.

L. Flowable fill material will be placed in basements and pits to create safe work areas for personnel and equipment as directed.

M. Demolish buildings to slab.

N. Radcon surveys will be performed on remaining slab in accordance with Appendix B.

O. Oil stained areas or areas of known PCB spills will be sampled in accordance with Appendix B.

P. Fixative paint will be applied to the slab.

BUILDING DEMOLITION

The Demolition Plan defines the detailed activities required to remove the structures of the C-410 Complex 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.11 are photographs of demolition activities that have been conducted on structures

similar to the C-410 Complex. These photos are for illustration only and do not necessarily depict activities within PGDP.

The suggested demolition sequence for the C-410 Complex is from east to west. The following is the detailed order in which the buildings will be demolished.

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. Excavator and Long Reach Boom with Demo Hammer Attachment

Figure A.8. High Bay Roof Truss Removal (Crane Assisted Disassembly)

Figure A.9. High Bay Roof Trusses and Columns Removed

Figure A.10. Concrete Demolition (Pulverizer)

Figure A.11. Stack Demolition (Crane Assisted and OSHA Basket)

C-411 (Cell Maintenance Building) and C-410 (2nd East Expansion)

(1) Perform gross decontamination.
(2) Spray all surfaces with fixative following deactivation.
(3) Remove remaining equipment.
(4) Sever roof and roof sheathing.
(5) Demolish structure and roof simultaneously.
(6) Demolish north, south, and east concrete masonry unit (CMU) walls from the building exterior.
(7) Sort, size, and package debris, as directed by WGTs.

C-410 (1st East Expansion)

(1) Perform gross decontamination.
(2) Spray all surfaces with fixative following deactivation.
(3) Remove remaining equipment/mezzanines/platforms.
(4) Clean pits/basements.
(5) RADCON/environmental survey and release pits/basements for backfill.
(6) Backfill pits/basements.
(7) Remove windows and transite corrugated siding. Concrete wall remains in place at this time.
(8) Sever roof and roof sheathing.
(9) Demolish structure and roof simultaneously.
(10) Sort, size, and package debris, as directed by WGTs.

C-410 Feed Plant

(1) Perform gross decontamination.
(2) Spray all surfaces with fixative following deactivation
(3) Remove remaining equipment/mezzanines/platforms.
(4) Clean pits/basements.
(5) RADCON/environmental survey and release pits/basements for backfill.
(6) Backfill pits/basements.
(7) Remove windows and transite corrugated siding. Concrete wall remains in place at this time.
(8) Air gap/sever roof and roof sheathing.
(9) Demolish structure and roof simultaneously.
(10) Sort, size, and package debris, as directed by WGTs.

C-410 West expansion (includes C-410-I)

(1) Perform gross decontamination.
(2) Spray all surfaces with fixative following deactivation
(3) Remove remaining equipment/mezzanines/platforms.
(4) Clean pits/basements.
(5) RADCON/environmental survey and release pits/basements for backfill.
(6) Backfill pits/basements.
(7) Remove windows and transite corrugated siding. Concrete wall remains in place at this time.
(8) Sever roof and roof sheathing.
(9) Demolish structure and roof simultaneously.
(10) Sort, size, and package debris, as directed by WGTs.

C-410-C

(1) Perform gross decontamination.
(2) Spray all surfaces with fixative following deactivation.
(3) Remove remaining equipment/mezzanines/platforms.
(4) Clean pits/basements.
(5) RADCON/environmental survey and release pits/basements for backfill.
(6) Backfill pits/basements.
(7) Remove windows and transite corrugated siding. Concrete wall remains in place at this time.
(8) Sever roof and roof sheathing.
(9) Demolish structure and roof simultaneously.
(10) Sort, size, and package debris, as directed by WGTs.

C-420 (Green Salt Plant)

(1) Remove electrical transformer located at the southwest corner of building C-420.
(2) Perform gross decontamination.
(3) Spray all surfaces with fixative following deactivation.
(4) Remove remaining equipment/mezzanines/platforms.
(5) Clean pits.
(6) RADCON/environmental survey and release pits for backfill.
(7) Backfill pits.
(8) Remove windows and transite corrugated siding. CMU wall remains in place at this time.
(9) Demolish C-420.
(10) Sort, size, and package debris, as directed by WGTs.

Finish Work

(1) Demolish all remaining exterior walls.
(2) Cut all anchor bolts and steel flush with concrete surface.
(3) Demolish vent stacks and towers.
(4) Sort, size, and package debris as directed by WGTs.
(5) Repair flowable fill surface and apply final fixative coating to surface.
(6) Install personnel safety fencing.
(7) Post warning signs.
(8) Decontaminate rental equipment.
(9) Repair or remove access roads.
(10) Grade and seed, as needed.

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APPENDIX B

DEMOLITION REMOVAL ACTION VERIFICATION PLAN FOR THE C-410 COMPLEX

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C-410 Complex Demolition Removal Action Verification Plan

This Demolition Removal Action Verification Plan identifies sampling and/or monitoring necessary to confirm that the ground-level slabs of the C-410 Complex have been placed in a protective state that will prevent migration of contaminants from them after the buildings have been demolished. During removal action implementation, fugitive emissions and cross contamination will be controlled through a combination of methods, including, but not limited to fixing agents, physical barriers, and other contamination control measures.

The criteria for determining success of the removal action include the removal of the physical structures to slab and removal of the associated residual contaminants, which may include radionuclides, polychlorinated biphenyls, asbestos-containing materials, and components containing residual heavy metals contamination. Tables B.1-B.4 illustrate the analytical parameters and U.S. Environmental Protection Agency (EPA) test method for each of the types of samples that may be obtained during the decommissioning activities.

Table B.1. Paint Sampling Parameters and Test Methods

Analytical Parameter	Test Method
PCBs	EPA SW-846-8082

Table B.2. Hexane Wipe Sampling Parameters and Test Methods

Analytical Parameter	Test Method
PCB Wipe analysis	EPA SW-846-8082

Table B.3. Oil and Lubricant or Water Sampling Parameters and Test Methods

Analytical Parameter	Test Method
pH	EPA SW-846-9045
Total Metals (RCRA 8 plus Zn, Tl)	EPA SW-846-6020 EPA SW-846-6010
Total Metals – Mercury	EPA SW-846-7470/7471
PCBs	EPA SW-846-8082
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

Total metals include arsenic, barium, cadmium, chromium, lead, selenium, silver, beryllium, antimony, nickel, and zinc.
pH = hydrogen-ion concentration
PCB = polychlorinated biphenyl
RCRA = Resource Conservation and Recovery Act

Table B.4. Asbestos Sampling Parameters and Test Methods

Analytical Parameter	Test Method
TCLP Metals (except Mercury) plus Zn	EPA SW-846-6010
TCLP Metals—Mercury	EPA SW-846-7470
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	Liquid Scintillation
Sr-90	Gas Proportional
Asbestos	NIOSH-9002

TCLP = toxicity characteristic leaching procedure

Surfaces around the perimeter of the removal action will be protected from cross contamination by paint chips and other debris through the use of physical barriers. Barriers will be installed as the demolition progresses and may include plastic screens, temporary walls, and isolation of areas using existing doors, etc. Spraying fixative on the interior surfaces will minimize airborne contamination. Misting surfaces with water prior to and during the demolition will reduce dust emissions. The slabs that will remain after structural demolition will be visually inspected, 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 the U.S. Department of Energy deems practicable using available equipment and techniques. Successful removal of paint chips will be verified by visual inspection of the foundation. Fixatives may be applied to prevent scaling paint and fugitive dusts, which may contain contaminated materials, from being released to the environment. Loose material such as paint chips will be segregated from the primary waste streams to the extent possible via vacuuming and other physical means.

There are no known unremediated PCB spills that will remain in the C-410 Complex following deactivation.

Following demolition, the slab will be surveyed in accordance with the criteria of 10 *CFR* § 835, Appendix D, and posted accordingly. The slab surface will be decontaminated by washing, scabbling, or other physical means prior to applying a fixative when the removable contamination levels on the slab surface exceed the levels specified in 10 *CFR* § 835, Appendix D.