



## Department of Energy

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**MAR 08 2018**

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PPPO-02-4685072-18

Ms. Julie Corkran  
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Dear Mr. Begley and Ms. Corkran:

**TRANSMITTAL OF THE REMOVAL NOTIFICATION FOR DEMOLITION OF THE C-400 CLEANING BUILDING IN THE C-400 COMPLEX OPERABLE UNIT AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-2420&D2)**

References:

1. Letter from J. Corkran to T. Duncan, "EPA Comments: Removal Notification for Demolition of the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, (DOE/LX/07-2420&D1), Primary Document, transmittal dated January 10, 2018 (PPPO-02-4594721-18A)," dated February 9, 2018
2. Letter from A. Webb to T. Duncan, "Kentucky Concurrence with the Removal Notification for Demolition of the C-400 Cleaning Building (DOE/LX/07-2420&D1), Paducah Site, Paducah, McCracken County, Kentucky, #KY8-890-008-982," dated February 9, 2018

Please find enclosed for review and approval, the certified *Removal Notification for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-2420&D2. This D2 document incorporates changes as documented in the enclosed comment response summary. The Kentucky Department for Environmental Protection concurred on the D1 version of the document on February 9, 2018.

Redline and clean versions of the D2 document and a comment response summary are included to assist in review and approval of this removal notification. In accordance with Section XX.G.2 of the Federal Facility Agreement, there is a 30-day review period for this D2 primary document.

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

Sincerely,



Tracey Duncan  
Federal Facility Agreement Manager  
Portsmouth/Paducah Project Office

Enclosures:

1. Certification Page
2. Removal Notification for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit, DOE/LX/07-2420&D2—Clean
3. Removal Notification for Demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit, DOE/LX/07-2420&D2—Redline
4. Comment Response Summary

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DOE/LX/07-2420&D2  
Primary Document

**Removal Notification for Demolition of the  
C-400 Cleaning Building in the C-400 Complex  
Operable Unit at the  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**



**CLEARED FOR PUBLIC RELEASE**

**Removal Notification for Demolition of the  
C-400 Cleaning Building in the C-400 Complex  
Operable Unit at the  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky**

Date Issued—March 2018

U.S. DEPARTMENT OF ENERGY  
Office of Environmental Management

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

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## ACRONYMS

AM	action memorandum
AR	Administrative Record
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
<i>CFR</i>	<i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FY	fiscal year
MOA	memorandum of agreement
NTCRA	non-time-critical removal action
OU	operable unit
PGDP	Paducah Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act
RN	removal notification
SMP	Site Management Plan
SWMU	solid waste management unit

## 1. INTRODUCTION

In accordance with Section X.B of the *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant* (FFA) (EPA 1998), the U.S. Department of Energy (DOE) hereby is providing a written removal notification (RN) for demolition of the C-400 Cleaning Building in the C-400 Complex Operable Unit (OU) at the Paducah Gaseous Diffusion Plant (PGDP). The bases for undertaking this non-time-critical removal action (NTCRA) are the following: (1) The DOE and U.S. Environmental Protection Agency (EPA) Policy on Decommissioning Department of Energy Facilities (Policy) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (DOE and EPA 1995), which states decommissioning activities at DOE facilities posing a substantial threat of release shall be conducted as an NTCRA unless the circumstances make an NTCRA inappropriate; (2) evaluation of the factors set forth in 40 *CFR* § 300.415(b)(2), which demonstrate that a removal action is appropriate; and (3) per 40 *CFR* § 300.415(b)(4), a planning period of at least six months is required before on-site removal activities will be initiated. The format of this RN is designed to meet the requirements for DOE RN set forth in Section X.B of the FFA.

Removal action alternatives will be evaluated in an engineering evaluation/cost analysis (EE/CA) for demolition of the C-400 Cleaning Building. Sufficient data exist and will be used in the EE/CA to evaluate removal action alternatives. Process knowledge and information pertaining to the nature and extent of contamination, worker health and safety, and the potential threats of releases from the C-400 Cleaning Building are available currently.

The EE/CA will be made available to the public for review and comment once approved by EPA and Kentucky Department for Environmental Protection. Following consideration of comments from the public, the final Action Memorandum (AM) identifying and documenting the selected removal action alternative will be prepared and submitted for regulatory review and approval. The AM will include a summary of comments received during the public comment period.

Following finalization of the AM, DOE will prepare and submit a Removal Action Work Plan for the C-400 Cleaning Building for regulator review and approval. Once approved, DOE will initiate demolition activities at the C-400 Cleaning Building in accordance with the approved work plan. Following completion of the removal activities, DOE will document completed removal activities in the Removal Action Report. DOE will issue a Removal Action Report for the C-400 NTCRA that will be placed in the Administrative Record for the C-400 Complex OU. In accordance with Paragraph X.E. of the FFA, the Removal Action Work Plan is required to contain a schedule for completion of work to be performed, and, as such, the Removal Action Work Plan will include a planning date for submittal of the Removal Action Report.

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

**Table 1. C-400 Cleaning Building NTCRA Planning Schedule**

<b>Documents</b>	<b>Planning Schedule<sup>1</sup></b>
D1 Engineering Evaluation/Cost Analysis	5/2/2018
D1 Action Memorandum	8/14/2018
D1 Removal Action Work Plan	8/17/2018
Field Start Date	11/27/2018

<sup>1</sup> This schedule is included in this document for information purposes only and is not intended to establish enforceable schedules or milestones. Enforcement milestones will be established in the fiscal year (FY) 2018 Site Management Plan (SMP). The dates are consistent with the C-400 MOA. Per the C-400 MOA, the C-400 dates are based on streamlined assumptions (no extension and no disputes). If extension(s) or dispute(s) occur, then future milestones and planning dates may be adjusted pursuant to the FFA.

## **2. REMOVAL SITE EVALUATION**

Section X.B of the FFA requires that the RN include the removal site evaluation or summary of the Administrative Record (AR) constituting an equivalent removal site evaluation. The C-400 Cleaning Building has been the subject of a number of environmental investigations, treatability studies, feasibility studies, and remedial actions since the discovery of off-site groundwater contamination at PGDP in 1988, which provide an extensive AR file supporting the removal action. Each of the investigations and activities resulted in generation of data that documented presence of contamination associated with the C-400 Building. This contamination includes PCBs, radionuclides, specific VOCs such as trichloroethene and trichloroethane, and specific heavy metals such as uranium and lead. The building also has asbestos-containing materials in its structure. The AR includes reports of environmental contamination that is known to be associated with the building and provides a portion of the basis supporting this removal action to demolish the C-400 Cleaning Building. The AR includes the following reports: MMES 1995; DOE 1996; DOE 1999a; DOE 1999b; DOE 1999c; DOE 2001; DOE 2005; DOE 2008a; DOE 2008b; DOE 2010; DOE 2012; DOE 2013; DOE 2017b; DOE 2017c; DOE 2018.

The C-400 Cleaning Building removal action is being performed consistent with Section X, Removal Actions, of the FFA which provides that, "Removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned." Furthermore, the removal action notification is being made consistent with the Terms and Conditions Section of the *Memorandum of Agreement on the C-400 Complex under the Federal Facility Agreement for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* signed August 8, 2017 which indicates the, "C-400 Building Decommissioning and Demolition will be addressed by a CERCLA Non-Time Critical Removal Action under the PGDP FFA."

Following discontinued use of the C-400 Building, the C-400 Cleaning Building facility is undergoing deactivation.

After deactivation, the remaining portions of the C-400 Building will contain hazardous substances that are present in the construction materials and from use during operation of the facility.

The C-400 Cleaning Building information provided in the remaining portion of this section is presented in the format consistent with Section IX and Appendix D of the FFA, constituting an equivalent removal site evaluation. This NTCRA addresses the above slab structures associated with the C-400 Cleaning Building. The removal action will not address the remaining solid waste management units (SWMUs)



that are located in the building concrete floor slab or those that are located exterior to the building structure.

**Unit name**—C-400 Cleaning Building (C-400 Complex Operable Unit)

**Regulatory status**—C-400 Complex OU—Appendix 4 of the FY 2018 SMP provides a list of SWMUs located within the C-400 Complex OU and their regulatory status (DOE 2018). The SWMUs listed in the C-400 Complex OU require further evaluation as part of the C-400 Complex OU RI/FS. Other SWMUs associated within the C-400 Building have been designated as no further action and will be documented in the ROD for the C-400 Complex OU.

**Location**—The C-400 Cleaning Building is located inside the plant Limited Area, near the center of the industrial section of the Paducah Site. The building is between 10th and 11th Streets to the west and east, respectively, and between Virginia and Tennessee Avenues to the north and south, respectively. An inset depicting the location of the C-400 Cleaning Building in relation to the plant site can be found in Figure 1.

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

**Function**—The primary function of the C-400 Cleaning Building included cleaning, metal etching and plating, radioactive materials stabilization and recovery, metals recovery, uranium hexafluoride (UF<sub>6</sub>) cylinder washing, uranium trioxide production, diffusion process equipment testing, and uranium tetrafluoride (green salt) pulverization. The building and adjacent structures have been used in a wide variety of functions to support operations at the plant, primarily cleaning and maintenance of equipment from the uranium enrichment process buildings, including some from outside contractual work.

**Operational status**—Inactive

**Dates operated**—1952 until 2014

**Brief history and process description**—The history that is provided focuses on long-term processes and operations of the facility. The C-400 Cleaning Building construction was completed in 1953. The building housed secondary maintenance areas that were dedicated to specialized disassembly required prior to decontamination.

The main purpose of the C-400 Cleaning Building was cleaning new components prior to installation and use, chemical treatments and general decontamination of equipment for reuse or discard, material recovery operations, plant laundry, cascade equipment testing, and pulverizing uranium tetrafluoride (UF<sub>4</sub>). Cleaning activities included degreasing (including chemical and vapor), pickling, neutralizing, removing oxidation products, and for gaseous cleaning and passivation processes of components (MMES 1995).

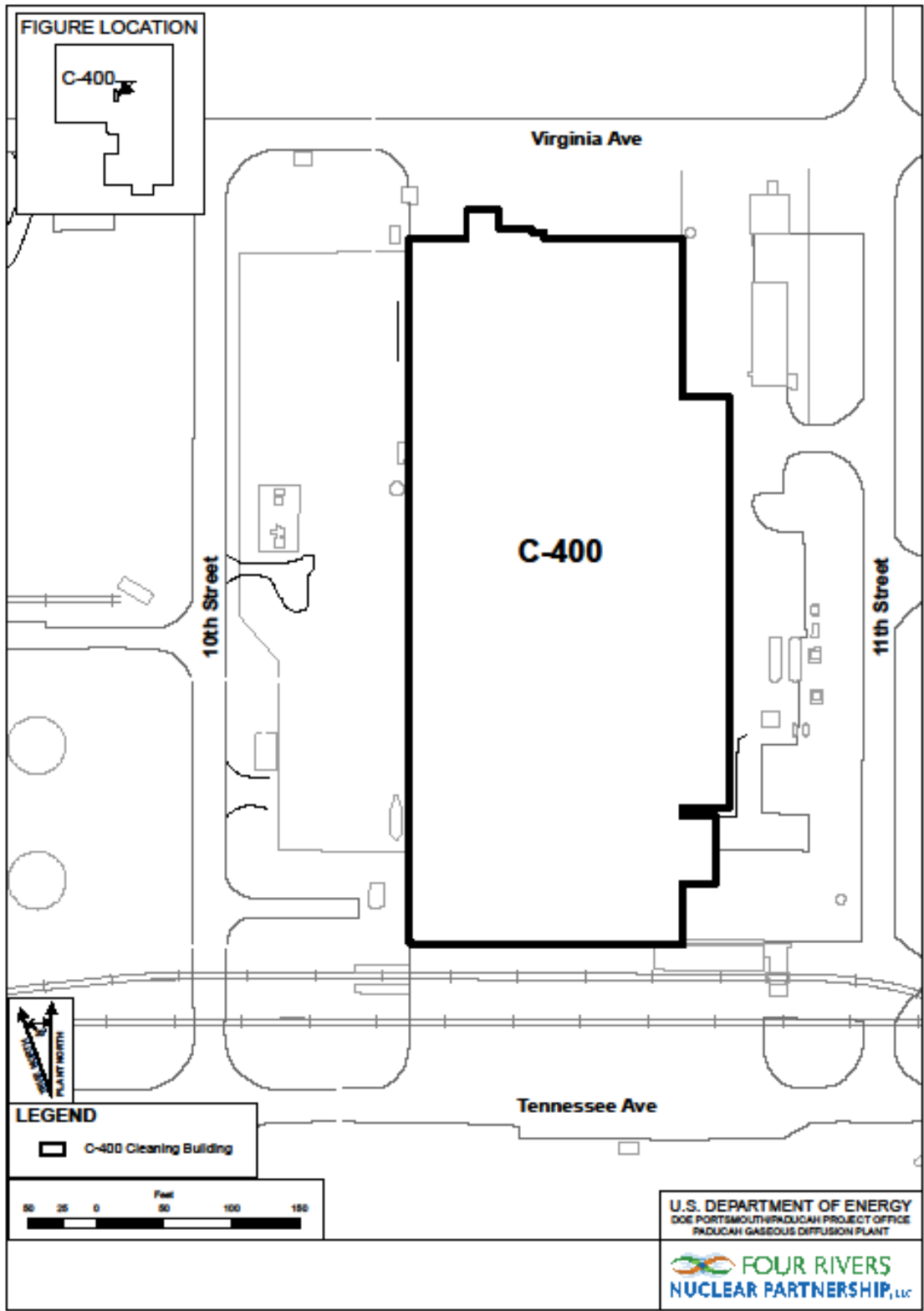


Figure 1. C-400 Cleaning Building

General decontamination was performed on removed equipment to support component disposal or refurbishment activities. Components typically were disassembled by maintenance crews in designated areas prior to beginning decontamination that included mining, steaming, chemical rinsing, or blasting. Liquid waste from decontamination processes allowed the metals to be separated from the liquid, resulting in two different waste streams, solid and liquid.

The building also housed other processes, including the plant laundry, which processed respirators, clothing issued for general use and special clothing such as anti-contamination clothing. The test-loop provided for an area where cascade-type equipment was tested online using gaseous UF<sub>6</sub> to simulate potential cascade conditions, and the pulverizer that transformed existing UF<sub>4</sub> into a finely divided powder (MMES 1995).

The former plant laundry remained stationed in the building until July 2016 before moving to the C-720 complex. The C-400 Deactivation Project began in July 2015 and is forecast to be complete November 2018. Complete deactivation will leave the C-400 Cleaning Building in a demolition-ready state, which includes the following:

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

In addition, during deactivation, the floor drains will have been sealed shut with controlled, low-strength cement material, and the basements and subsurface ducts will have been sealed with controlled, low-strength cement material (i.e., flowable fill cement mix).

**Waste description**—Demolition of the C-400 Cleaning Building structure will generate a waste stream that may include solid waste such as construction/demolition debris, Toxic Substances Control Act waste, radiological waste, Resource Conservation and Recovery Act (RCRA) waste, and mixed waste. It also is expected that asbestos-containing materials will be generated.

**Waste quantity**—Approximately 500,000 ft<sup>3</sup>

**Summary of environmental sampling data**—The scope of this NTCRA is to address the C-400 Cleaning Building and not the underlying slab or adjacent environmental media. The elements of the structure and its contents will be characterized for waste disposal as part of this removal project.

**Description of release and media affected**—This RN is specific to the removal action, which will remove the C-400 Cleaning Building above the concrete slab structure. The scope of the NTCRA does not address environmental media. Environmental media associated with the southern end of the C-400 Cleaning Building has been the subject of an Interim Remedial Action and will be the subject of a future final remedial action as part of the C-400 Complex OU (DOE 2017a).

*Radiological contamination*—Post-deactivation radiological inventory of the C-400 Cleaning Building is comprised of surface contamination from the historical processes performed in the facility. The activity associated with the uranium radionuclides constitutes the majority of the radiological inventory present in the facility. Various radionuclides are present as surface contamination. Some recycled uranium or reactor returns were processed at the Paducah Site in the 1960s and 1970s, resulting in the potential for the presence of fission and activation products. Beta-gamma contamination that may be present consists of uranium daughter products and technetium-99. Alpha contamination that may be present includes uranium and thorium, and transuranic elements, including plutonium, americium, and neptunium.

*Chemical contamination*—The chemical hazards that are known to exist in the C-400 Cleaning Building include lead and/or other heavy metals; asbestos-containing materials in the original building construction; PCBs; and volatile organic compounds.

**Impact on or by other SWMUs**—The NTCRA at the C-400 Cleaning Building will address all of the building structure located above the concrete floor slab. This removal action will occur above ground level and will not impact any SWMU. Appendix 4 of the FY 2018 SMP provides a listing of SWMUs for the C-400 Complex OU (DOE 2018).

### 3. REMOVAL ACTION JUSTIFICATION

Table 2 identifies the eight factors under 40 *CFR* § 300.415(b)(2) that are considered to determine whether a removal action is appropriate and summarizes each factor’s applicability. The presence of hazardous substances in the C-400 Cleaning Building has been determined to pose an actual or potential threat of release to the environment and relates to the factors set forth in 40 *CFR* § 300.415 (b)(2)(i), (ii), (v), and (viii).

**Table 2. Factors for Consideration for a Removal Action**

Factors for Consideration for a Removal Action per 40 <i>CFR</i> § 300.415 (b)(2)	Applicability	
	Yes	No
(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants	✓	
(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems	✓	
(iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release		✓
(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate		✓
(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released	✓	
(vi) Threat of fire or explosion		✓
(vii) The availability of other appropriate federal or state response mechanisms to respond to the release		✓
(viii) Other situations or factors that may pose threats to public health or welfare of the United States or the environment	✓	

Details of applicable factors for consideration, (i), (ii), (v), and (viii), are as follows.

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

Building degradation over time could result in potential structural failure and contaminant migration. This degradation, including roof and wall deterioration, could allow rainwater to infiltrate the building. Infiltration of rainwater could wash transferable or soluble contaminants out of the building through cracks in the floor or walls impacting underlying groundwater. Furthermore, there is an increased potential for site personnel involved with surveillance and maintenance activities to be exposed to hazardous substances, including radiological contamination, associated with structural components. There

is a potential risk from hazardous substances, including radiological contamination and exposure to vapors from historical VOC releases. There is the potential for contamination to be released to the environment if the structural elements of the building that contain the contamination were to fail. Demolition and appropriate disposal of the resulting wastes will reduce the risk of exposure to workers located near this facility.

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

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

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

The controlled demolition of this facility will ensure that risks to human health and the environment from actual or potential exposure to hazardous substances, including radiological contamination, are reduced or eliminated. Controlled demolition using engineered safety measures is safer and reduces the probability of risks posed by releases of hazardous substances, including radiological contamination that would result from an uncontrolled collapse (i.e., building “falling in on itself”). Uncontrolled collapse likely would result in spread of hazardous substances and radiological contamination to site personnel and the environment because contamination in buildings no longer would be contained by structures.

#### **4. ADMINISTRATIVE RECORD FOR THE C-400 CLEANING BUILDING**

A new AR file will be started upon approval of this RN. No CERCLA activities have been initiated for demolition action at the C-400 Cleaning Building prior to this RN. This RN and the ensuing EE/CA and Action Memorandum will be the initial documents in the AR for the C-400 Cleaning Building demolition action; the AR also will include any other documents or information used for response selection.

#### **5. SUMMARY AND PATH FORWARD**

DOE is notifying EPA and Kentucky that DOE intends to proceed with an NTCRA of the C-400 Cleaning Building. Upon EPA and Kentucky approval, DOE will prepare an EE/CA that will evaluate removal action alternatives for the NTCRA for submittal, consistent with the date set forth in Table 1.

## 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*, Washington, DC, May.
- DOE 1996. *Phase I: Paducah Gaseous Diffusion Plant Waste Area Group 6 Industrial Hydrogeologic Study*, DOE/OR/07-1478&D1, U.S. Department of Energy, Paducah, KY, July.
- DOE 1999a. *Remedial Investigation Report for Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1727&D2, U.S. Department of Energy, Paducah, KY, May.
- DOE 1999b. *Surfactant Enhanced Subsurface Remediation Treatability Study Report for the Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1787&D1, Secondary Document, KY8-890-008-982, U.S. Department of Energy.
- DOE 1999c. *Bench Scale In-Situ Chemical Oxidation Studies of Trichloroethene in Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1788&D1, Secondary Document, U.S. Department of Energy, February.
- DOE 2001. *Feasibility Study for the Groundwater Operable Unit at Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1857&D2, U.S. Department of Energy, August.
- DOE 2005. *Record of Decision for Interim Remedial Action for the Groundwater Operable Unit for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* DOE/OR/07-2150&D2/R2, U.S. Department of Energy, July.
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- DOE 2010. *Remedial Action Work Plan for the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0004&D2/R2/A1, U.S. Department of Energy, November.
- DOE 2012. *Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Phase IIa Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, U.S. Department of Energy, August.

- DOE 2013. *Remedial Action Work Plan for Phase IIa of the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/1271&D2/R3, U.S. Department of Energy, October.
- DOE 2017a. *Memorandum of Agreement on the C-400 Complex under the Federal Facility Agreement for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, U.S. Department of Energy, Paducah, KY, August.
- DOE 2017b. PGDP Administrative Record for the Paducah Gaseous Diffusion Plant, [www.paducaheic.com](http://www.paducaheic.com), Index Search: (ARF 6 Phase) and (6PHASE-PD), U.S. Department of Energy, Paducah, KY, December.
- DOE 2017c. *Solid Waste Management Unit Assessment Report for Solid Waste Management Unit 51*, DOE/LX/07-2412&D1, U.S. Department of Energy, March.
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- MMES (Martin Marietta Energy Systems, Inc.) 1995. *C-400 Process and Structure Review*, KY/ERWM-38, Martin Marietta Energy Systems, Inc., Kevil, KY, May.