

1. INTRODUCTION

The U.S. Department of Energy (DOE) proposes disposition activities for polychlorinated biphenyl (PCB) wastes, low-level radioactive waste (LLW), mixed low-level radioactive waste (MLLW), and transuranic (TRU) waste from the Paducah Gaseous Diffusion Plant Site (Paducah Site) in Paducah, Kentucky (Table 1.1). All of the wastes would be transported for disposal at various locations in the United States. As a federal agency, DOE must comply with the National Environmental Policy Act of 1969 (NEPA) by considering, in the decision-making process, potential environmental impacts associated with its proposed action. The Council on Environmental Quality (CEQ) promulgated regulations to implement NEPA [40 *Code of Federal Regulations (CFR)* 1500 et seq.] and directed federal agencies to develop their own implementing regulations. DOE regulations (10 *CFR* 1021) provide additional direction for conducting NEPA reviews of proposed DOE activities. This environmental assessment (EA) for the disposition of various DOE wastes stored and/or generated at nonleased portions of the Paducah Site has been prepared in accordance with both CEQ and DOE regulations and with DOE orders and guidance regarding these waste types.

Table 1.1. Paducah EA waste information

Waste type	Approximate total volume (m ³ , unless noted otherwise)	Proposed treatment		Proposed disposal		Approximate volume to be shipped (m ³)
		On-site	Off-site	On-site	Off-site	
PCB	128 metric tons		X		X	200
LLW (T-Hoppers)	22 units					
LLW	5,000	X		✗	X	4,950
MLLW	5,700	X	X	✗	X	5,800
TRU	6	X			X	12

EA = environmental assessment
 LLW = low level radioactive waste
 MLLW = mixed low level waste
 PCB = polychlorinated biphenyl
 TRU = transuranic

1.1 PURPOSE AND NEED FOR AGENCY ACTION

DOE must continue to manage (i.e., treat, store, and dispose) and control its wastes safely, efficiently, and cost effectively in compliance with applicable federal and state laws and protecting public health and the environment.

DOE is under regulatory agreements to treat and dispose several waste types. Regulatory agreements pursuant to the Resource Conservation and Recovery Act of 1976 (RCRA) and the Toxic Substances Control Act of 1976 (TSCA) require that DOE develop waste treatment options to meet required schedules.

DOE developed a site treatment plan (STP) for MLLW, as required by the Federal Facility Compliance Act of 1992. The Commonwealth of Kentucky approved the STP, and the Agreed Order was signed on September 10, 1997. The STP Agreed Order supercedes the Federal Facility Compliance Agreement (FFCA) for land disposal restrictions (LDRs) between DOE and the U.S. Environmental Protection Agency (EPA) (referred to as the LDR FFCA). The STP requires that DOE characterize MLLW and RCRA/TSCA-regulated mixed waste streams and develop and implement a plan for their treatment.

The TSCA FFCA, which DOE entered into with EPA in 1992, establishes requirements for compliance with TSCA. DOE developed a TSCA Implementation Plan for the Paducah Site to ensure compliance

with the TSCA FFCA requirements. Both the TSCA FFCA and the TSCA Implementation Plan for the Paducah Site have requirements for the disposal of TSCA-regulated, TSCA-regulated mixed, and RCRA/TSCA-regulated mixed wastes. The TSCA FFCA requires that disposal of these wastes begin as soon as EPA approves a disposal method. Moreover, it requires that such wastes generated after 1992 be disposed within 10 years of their generation date.

DOE is required by the Atomic Energy Act (42 United States Code 2011 et seq.) and DOE Order 435.1 to manage the radioactive wastes that it generates. DOE has determined that it will dispose LLW and MLLW at the Hanford Site in Washington state and at the Nevada Test Site, as documented in the *Record of Decision (ROD) for the Department of Energy's Waste Management Program: Treatment and Disposal of Low-Level Waste and Mixed Low-Level Waste* (January 1998, 63 Federal Register 3629). Generally, the proposed action would aid implementation of the high tier NEPA documentation and RODs. Pertinent documents are presented in [Tables 1.2 and 1.3](#).

There are 160 DOE Material Storage Areas (DMSAs) at the Paducah Site. DOE needs to characterize the materials in the DMSAs consistent with RCRA/TSCA regulations and Nuclear Criticality Safety requirements. DOE has prepared the Paducah Gaseous Diffusion Plant Department of Energy Material Storage Area Characterization Remediation Plan (BJC 2001). This document outlines activities for the characterization of wastes managed in the 160 DMSAs.

As described above, DOE-Oak Ridge Operations has various waste types located at the Paducah Site that must undergo disposition activities. In this analysis, disposition activities include any activity, primary or supporting, needed to effectively manage Paducah Site wastes. Examples of primary disposition activities include waste storage, on-site and/or off-site treatment, transportation, and disposal. Supporting activities may include vehicle fueling, facility maintenance, staging, packaging, sorting, volume reduction, storage container inspections, etc.

1.2 SCOPE OF THIS ASSESSMENT

In October 1992, Congress passed the Energy Policy Act of 1992, which established the U.S. Enrichment Corporation (USEC). Effective July 1, 1993, DOE leased the plant production operation facilities to USEC. Under the terms of the lease, USEC assumed responsibility for environmental compliance activities that were directly associated with uranium enrichment operations. Generally, DOE retained responsibility for the site environmental restoration program and the legacy waste management program, including waste inventories predating July 1, 1993, and wastes generated by ongoing DOE activities.

This EA provides an evaluation of the potential effects of disposition of accumulated legacy and ongoing operational wastes at the Paducah Site. The potential effects of waste transportation over both highway and rail routes are evaluated. It should also be noted that the 10-year waste disposition assumptions result in a baseline disposal time frame and produce a reasonable “worst-case” scenario for risk analysis. This assumption does not imply that risks are eliminated after the 10-year period. It is anticipated that as long as newly generated waste does not exceed the contaminant concentration assumptions made in the risk impact analysis and volume parameters presented in [Table 1.1](#), this document would apply past the 10-year time frame. This is reasonable, because the impact analysis for any newly generated wastes that match the waste parameters would be very similar to those presented within this document. If ongoing operations produce a waste that differs from the wastes described herein, additional NEPA review may be required. Wastes not considered part of the proposed action and alternative include waste for which treatment and disposal are addressed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). CERCLA wastes are the primary wastes (by volume) at the Paducah Site. NEPA values for these wastes are addressed in project-specific CERCLA documents. Additionally, the cumulative impacts section of this document takes CERCLA wastes into consideration.

Table 1.2. Additional DOE documents addressing Paducah Site wastes

Waste Type	Activity	Proposed action	Documents providing analysis/decisions									
			NEPA					Record of decision				
			This document	WM PEIS	WIPP EIS	TRU EIS	Facility documents	65-FR-10061	63-FR-3629	65-FR-82985	65-FR-48683	
Mixed low-level waste	Storage	On-site	X ¹	X								
	Transport to treatment	NA	-	-	-	-	-	-	-	-	-	-
	Treatment	On-site as consistent with STP	X ²	X					X			
	Transport	Truck transport	X									
	Disposal	Commercial	X ³				X	X				
Low-level waste (solids)	Storage	On-site	X ¹	X								
	Transport to treatment	NA	-	-	-	-	-	-	-	-	-	-
	Treatment	NA	-	-	-	-	-	-	-	-	-	-
	Transport	Truck transport	X									
	Disposal	NTS		X			X	X				
Wastewater	Storage	On-site	X									
	Transport to treatment	NA	-	-	-	-	-	-	-	-	-	-
	Treatment	On-site	X									
	Transport	NA	-	-	-	-	-	-	-	-	-	-
	Disposal	NA	-									
TRU waste	Storage	On-site	X ¹	X						X		
	Transport to treatment	NA	-	-	-	-	-	-	-	-	-	-
	Treatment	On-site	X ²	X						X		X
	Transport to staging	Truck transport to ORNL	X									
	Transport to disposal	Truck transport from ORNL to WIPP				X						
	Disposal	WIPP		X	X		X				X	
PCB waste	Storage	On-site	X									
	Transport to treatment	NA	-	-	-	-	-	-	-	-	-	-
	Treatment	NA	-	-	-	-	-	-	-	-	-	-
	Transport	Truck transport	X									
	Disposal	Deer Park	X ³					X				

Table 1.2. Additional DOE documents addressing Paducah Site wastes (continued)

¹ Current inventory impacts were assessed under the WM-PEIS. Ongoing operations impacts are addressed in the waste EA.

² Although the basic concept of this activity was addressed in the WM-PEIS, the specific process that would be implemented at the site is addressed in the waste EA.

³ Qualitative analysis performed in the waste EA.

– = not applicable

FR = Federal Register

NA = not applicable

NTS = Nevada Test Site

ORNL = Oak Ridge National Laboratory

PCB = polychlorinated biphenyl

STP = Site Treatment Plan

TRU = transuranic

WIPP = Waste Isolation Pilot Plant

WM-PEIS = Waste Management Programmatic Environmental Impact Statement

REFERENCES:

WM-PEIS = Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste. DOE/EIS-0200-F, May 1997.

WIPP EIS = Final Environmental Impact Statement for the Waste Isolation Pilot Plant, DOE/EIS-0026, October 1980.

TRU EIS = Final Environmental Impact Statement for Treating Transuranic (TRU)/Alpha Low Level Waste at the Oak Ridge National Laboratory, Oak Ridge, Tennessee, DOE/EIS-0305-F, June 2000.

Waste EA = This document.

65-FR-10061 = Record of Decision for the Department of Energy's Waste Management Program: Treatment and Disposal of Low-Level Waste and Mixed Low-Level Waste; Amendment of the Record of Decision for the Nevada Test Site, February 2000.

63-FR-3629 = Record of Decision for the Department of Energy's Waste Management Program: Treatment and Storage of Transuranic Waste, January 1998.

65-FR-82985 = Revision to the Record of Decision for the Department of Energy's Waste Management Program: Treatment and Storage of Transuranic Waste, December 2000.

65-FR-48683 = Record of Decision on Treating Transuranic (TRU)/Alpha Low-Level Waste at the Oak Ridge National Laboratory, August 2000.

63-FR-41810 = Record of Decision for the Department of Energy's Waste Management Program: Treatment of Non-wastewater Hazardous Waste, August 1998.

Table 1.3. Summary of Waste Management PEIS Record of Decisions (ROD) Issued to Date for Paducah Site Waste Types

Waste Type	Activity	ROD(s)	Decision	Rationale
Mixed Low Level Waste	Treatment	65 FR 10061	Treat at Hanford, INEEL, ORR and SRS or onsite as consistent with current STP.	Takes advantage of infrastructure capabilities that already exist. Also avoids environmental impacts and costs associated with construction of new facilities.
	Disposal	65 FR 10061	Dispose at Hanford or NTS. Decision does not preclude DOE's use of commercial disposal facilities consistent with current DOE policy.	Based on low impacts to human health, operational flexibility, and relative implementation costs. No foreseeable need for construction of a third facility due to volume of waste anticipated.
Low Level Waste	Treatment	65 FR 10061	Perform minimal treatment at the site.	Volume reduction would not offer sufficient benefits to offset the increase in human health effect and costs it would entail.
	Disposal	65 FR 10061	Offsite disposal at Hanford, NTS, or commercial facility. Potential continued on-site disposal at LANL, SRS, INEEL, and ORR.	Based on low impacts to human health, operational flexibility, and relative implementation costs.
Transuranic Waste	Treatment	63 FR 3629	May decide to ship TRU wastes from sites for preparation and disposal.	It may be impractical for sites with small amounts of TRU wastes to develop capabilities to prepare them for disposal. It would be more cost effective to transfer them to sites where DOE has the existing capability. The sites that could receive such shipments include the ORR.
	Storage	63 FR 3629	Prepare and store its TRU waste on site.	On site storage results in the lowest impacts among the alternatives analyzed in the WM PEIS.
	Treatment (revised)	65 FR 82985	Develop capability at WIPP to prepare TRU waste for disposal.	Revision of earlier ROD to create a centralized capability to dispose of TRU waste at WIPP. This would expedite the removal of waste from sites with smaller inventories of TRU wastes.
	Storage (revised)	65 FR 82985	Increase above ground storage time at WIPP to 1 year and the total above-ground storage capacity increased by 25%.	Allows DOE to accumulate the necessary amount of waste for approval of the program by EPA and NMED. Also allows to store wastes during disposal delays.
Non-wastewater Hazardous Waste	Treatment	63 FR 41810	Continue to use off-site facilities for the treatment of major portions of this waste.	The potential health, environmental, and cost impacts of continued use of off-site commercial facilities are low. The additional costs of expanding existing facilities and/or constructing new ones is not justified in view of commercial facility availability.
	Disposal	63 FR 41810	Continue to use off-site facilities for the disposal of major portions of this waste.	Upon receipt of wastes for treatment, the facility takes title to the wastes and, after treatment, dispose of it.
PCB Waste	Treatment	None	None	None
	Disposal	None	None	None

Current typical disposition activities include actions taken to maintain and/or manage Paducah Site wastes. These include, but are not limited to, the following: storage, drum movement, overpackaging/repackaging, equipment and drum sorting and flushing, physical volume reduction, equipment and waste-container decontamination, marking, relabeling, inspection, drip/spill cleanup, waste tracking, and inventory. Other activities include standard waste characterization (which includes waste sampling), waste analysis and data management, waste treatment and disposal, and miscellaneous supporting activities. Minor facility modifications/upgrades, for example, new alarm systems, would be made as necessary.

This assessment also presents the most current waste volumes for Environmental Management Program wastes at the Paducah Site (Table 1.1). Changes from the previous forecast have resulted from waste-minimization and pollution-prevention efforts on the Paducah Site, coupled with changes in operational plans. Therefore, there has been a decrease in the forecasted volumes of various waste streams that would be generated. If this trend continues, it would result in lower anticipated impacts and risks in the future.

This environmental assessment is tiered under other currently existing NEPA documents. Generally, DOE site-specific NEPA documents are tiered under DOE programmatic NEPA documents. Therefore, analysis performed and decisions made in programmatic documents do not have to be repeated for similar site-specific actions.

This assessment is intended to supplement and update the previous NEPA evaluation of waste disposition activities conducted as part of the final Waste Management Programmatic Environmental Impact Statement (WM-PEIS) for radioactive and hazardous waste (DOE 1997). This assessment expands the scope of previous analyses to include possible transportation to commercial facilities. Tables 1.2 and 1.3 provide a summary of analyses performed for Paducah wastes in other NEPA documents. These tables also provide a summary of decisions made in applicable record-of-decision documents.

A public information meeting was held on October 26, 2000, in which DOE sought input on the contents of this EA. Some comments were in opposition to any new on-site landfills for waste disposal, and some people expressed concern about incineration as a treatment option at any site. No new landfills are proposed for this action. Some MLLW is proposed for off-site treatment at the TSCA Incinerator in Oak Ridge, Tennessee. Residual wastes from incineration will be dispositioned in accordance with TSCA Operating Procedures and the TSCA Incinerator Residual Management Plan. Appendix B presents a distribution list of individuals who received this document.

The wastes considered in this assessment are limited to DOE's ongoing and legacy non-CERCLA waste management operations at the Paducah Site. These wastes include LLW, MLLW, and TRU waste, as well as materials stored in DMSAs. Also included is storage of USEC program wastes, which are characterized as one or more of these waste types.

Wastes not covered in this EA are those associated with CERCLA activities, including decontamination and decommissioning activities, and disposal of wastes associated with USEC uranium enrichment activities.

Environmental impacts from the disposal and/or treatment of waste at DOE facilities have been evaluated as part of the NEPA documents associated with ongoing facility operations. The EA does not include detailed consideration of impacts from treatment and disposal operations at commercial facilities. Per DOE guidance, while analysis of impacts from a vendor's action may be within the scope of DOE's review obligation, "the level of detail should be commensurate with the importance of the impacts or issues related to the impacts. If DOE's proposed waste load would be a small part of the facility's throughput and the facility would operate well within established standards, then the vendor's part of DOE's proposal would be low on the *sliding (sic)* scale, and a statement of this context would adequately characterize the

impacts” (DOE 2000d, *Lessons Learned*). Waste volumes anticipated over a 10-evaluation period comprise, or would comprise, less than 1 percent of the combined capacity of the commercial treatment and/or disposal facilities and less than 4 percent of the capacity of any one individual commercial facility. The commercial treatment and disposal facilities that will be used to treat or dispose the waste are required to operate within the bounds of federal and state requirements such as U.S. Nuclear Regulatory Commission (NRC) or Agreement State licenses, RCRA permits, TSCA authorizations, air and water permits, and Occupational Safety and Health Administration regulations. Also, the waste planned to be transported is typical of waste being treated at the commercial waste treatment facilities.

There are three other environmental and waste management activities associated with the Paducah Site that are not covered by CERCLA or this EA: (1) the depleted uranium hexafluoride conversion project, (2) the disposal of nonradioactive waste containing residual radioactivity at the C-746-U landfill, and (3) DOE’s proposal to implement a long-term management plan for its inventory of potentially reusable low-enriched uranium. DOE is currently in the process of preparing appropriate NEPA reviews for all of these activities.

1.2.1 PCB Waste

Polychlorinated biphenyls (PCBs) are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties, ranging from oily liquids to waxy solids. Due to their nonflammability, chemical stability, high boiling point, and electrical insulating properties, PCBs are used in hundreds of industrial and commercial applications, including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and in many other applications.

1.2.2 Low-Level Waste

LLW is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, TRU waste, byproduct material (as defined in section 11e.(2) of the *Atomic Energy Act of 1954*, as amended), or naturally occurring radioactive material (DOE G 435.1-1).

1.2.3 Mixed Low-Level Waste

MLLW is waste that contains LLW (as defined above) and hazardous waste. Hazardous wastes are a subset of solid wastes that pose substantial or potential threats to public health or the environment and meet any of the following criteria identified by 40 *CFR* 260 and 261:

- they are specifically listed as a hazardous waste by EPA,
- they exhibit one or more of the characteristics of hazardous waste (ignitability, corrosiveness, reactivity, and/or toxicity),
- they are generated by the treatment of hazardous waste, or
- they are contained in a hazardous waste.

1.2.4 TRU Waste

TRU waste contains, for each gram of waste, more than 100 nanocuries of alpha-emitting TRU isotopes, with half-lives greater than 20 years. A waste can meet this definition without being considered TRU waste if it is (1) high-level radioactive waste; (2) waste that DOE has determined, with the concurrence of EPA, does

not need the degree of isolation required by EPA's high-level waste rule (40 *CFR* 191); or (3) waste that has been approved for disposal on a case-by-case basis in accordance with the NRC's radioactive land disposal regulation (10 *CFR* 61). TRU is not generally found outside the DOE complex and is produced mainly from the reprocessing of spent nuclear fuel, nuclear weapons production, and reactor fuel assembly. TRU wastes emit mainly alpha particles as they break down.

1.2.5 DMSA Waste

DMSA wastes are located throughout the Paducah Site. These storage areas (approximately 160 of them) are located within buildings and areas that have been leased to USEC. Detailed descriptions of DMSA waste are not available because the majority of it has not been characterized. However, based upon visual surveillance, the majority of this waste appears to be discarded furniture, equipment, and assorted rubble. After the materials in these areas are characterized, any RCRA/TSCA/solid waste that is identified would be grouped and properly dispositioned as the waste types listed in this section. Other DMSA waste types would remain in storage until they are evaluated during CERCLA-related decommissioning and decontamination (D&D) activities.