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FINAL
Environmental Impact Statement
for Department of Energy Activities in Support of Commercial Production of High-Assay Low-Enriched Uranium (HALEU)

VOLUME 2
Appendices A, B, C, and D

U.S. Department of Energy
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APPENDIX A – ENVIRONMENTAL CONSEQUENCES SUPPORTING INFORMATION

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Acronyms and Abbreviations

<	less than
>	greater than
AADT	annual average daily traffic
ACP	American Centrifuge Plant
ANR	advanced nuclear reactor
ATSDR	Agency for Toxic Substances and Disease Registry
BMPs	best management practices
BWXT	BWX Technologies, Inc.
C.F.R.	Code of Federal Regulations
CISF	Consolidated Interim Storage Facility
CWA	Clean Water Act
dBA	A-weighted sound level
DOE	U.S. Department of Energy
DTS	dry transfer system
DU	depleted uranium
DUF_6	depleted uranium hexafluoride
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFF	fuel fabrication facility
GEIS	Generic Environmental Impact Statement
GHG	greenhouse gas
GLE	Global Laser Enrichment
GNF-A	Global Nuclear Fuel – Americas
HALEU	high-assay low-enriched uranium
HF	hydrogen fluoride
IIFP	International Isotopes Fluorine Products, Inc.
IPaC	Information for Planning and Consultation
ISFSI	independent spent fuel storage installation
ISR	in-situ recovery
lbs	pounds
LEU	low-enriched uranium
LWR	light water reactor
MT	metric tons
MT/yr	metric ton per year
MWt	megawatts thermal
NEF	National Enrichment Facility
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
PPE	Plant Parameter Envelope
Pub. L.	Public Law
rem	roentgen equivalent man
ROI	region of influence
RWP	Regional Water Plan
SC-GHG	social cost of GHG emissions
SME	subject matter expert
SNF	spent nuclear fuel
SNM	special nuclear material
SPE	Site Parameter Envelope
SWU	separative work unit
TRISO	tri-structural isotropic
U-235	uranium-235
U_3O_8	triuranium oxide
UF_6	uranium hexafluoride
ULP	Uranium Leasing Program
UO_2	uranium dioxide
US-	U.S. Highway
U.S.C.	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
UUSA	Urenco USA
X-energy	X-energy, LLC

Appendix A Environmental Consequences Supporting Information

There are numerous existing National Environmental Policy Act (NEPA) evaluations for currently operating and planned uranium fuel cycle facilities. These existing evaluations identified and evaluated potential environmental consequences associated with the construction and operation of uranium fuel cycle facilities. The facilities and their associated construction and operation characteristics are very similar to the Proposed Action and post-Proposed Action activities addressed in this Environmental Impact Statement (EIS). Therefore, the potential environmental consequences are expected to be very similar. A list of the specific NEPA documents that were relevant to each of the activities is provided in this appendix in the respective activity sections. (Appendix B, *Facility NEPA Documentation*, provides a comprehensive list of the existing NEPA evaluations used to extrapolate the potential environmental consequences for the Proposed Action and post-Proposed Action activities.)

The author subject matter experts (SMEs) reviewed the applicable NEPA evaluations.[1] Using the potential environmental consequences in those documents, they developed the potential environmental consequences for the Proposed Action and post-Proposed Action activities. The U.S. Department of Energy (DOE) used the same impact assessment categories (SMALL, MODERATE, and LARGE) from the majority of the source documents. In all cases, the Proposed Action and post-Proposed Action activities' potential environmental consequences for facilities located at existing uranium fuel cycle sites were assessed to be the same or less than those associated with the currently operating and planned uranium fuel cycle facilities' potential environmental consequences.

SMEs also considered legacy contamination issues, and how the practices, regulations, oversight, and reporting have evolved since the existing NEPA documents were prepared. Ongoing activities at existing facilities (also see Figure 1-3 of the Technical Report) and construction and operation of new facilities are, and would be conducted, under the cognizant regulatory agencies NEPA evaluations and associated license and permitting conditions.

Since there are no specific locations currently known for the Proposed Action or post-Proposed Action activities, those uncertainties are discussed where that uncertainty would be important to the potential environmental consequences. DOE determined potential environmental consequences for the following activities in support of the Proposed Action and post-Proposed Action activities:

Proposed Action Activities

- Uranium Mining and Milling
- Uranium Conversion
- Uranium Enrichment
- Uranium Deconversion
- Uranium Storage
- Radioactive Materials Transportation

This EIS adopts the NRC impact assessment categories* from most of the NEPA documents that were used as the basis for the impact analysis:

- **SMALL –** The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- **MODERATE** – The environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource.
- **LARGE** – The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

*The assignment of NRC impact assessment categories does not indicate coordination between DOE and NRC on the HALEU EIS.

[1] In certain instances, only a draft of the NEPA evaluation was available which DOE considered as preliminary findings which have not undergone public review. These draft sources were only used when there was not a corresponding final NEPA document.

Post-Proposed Action Activities

- Reactor Fuel Fabrication
- Construction and Operation of Reactors
- Spent Fuel Storage and Disposition

As discussed above, the potential environmental consequences associated with construction and operation of uranium fuel cycle facilities in the existing NEPA evaluations were evaluated by the authors of this EIS. The authors, who are SMEs in their respective fields, used their education, working knowledge, experience, and professional judgement to extrapolate the potential environmental consequences associated with the Proposed Action and post-Proposed Action activities that are discussed in this appendix.

For additional discussions of the potential environmental consequences, please also see the *Technical Report in Support of the HALEU EIS* (Leidos, 2023). The Technical Report, and other project citations, are available to review through the project website. The Technical Report (Leidos, 2023) is a 500+-page report that documents the review of existing NEPA documentation for constructing and operating uranium fuel cycle facilities. It contains summary information from NEPA documentation addressing construction and operation of existing and proposed fuel cycle (mainly LEU fuel cycle) facilities used to develop the information regarding the impacts of the Proposed Action provided in the appendices, Volume 1 chapters, and Summary of this EIS. This technical report summarizes relevant environmental impact information from these documents and provides the assessment of how these impacts could be used to assess impacts associated with DOE's Proposed Action. Information is provided for the Proposed Action and related post-Proposed Action activities (mining and milling, conversion, enrichment, deconversion, storage, transportation, fuel fabrication, and construction and operation of advanced reactors). Impact assessments for all resource areas are provided in the **Technical Report (Leidos, 2023)**.

See Technical Report for a detailed, 500+-page description of the activity-specific analysis methodology and each of the activity-specific NEPA evaluations that helped inform the activity-specific analysis.

The HALEU EIS presents the potential environmental consequences of the Proposed Action[2] (i.e., the impacts from HALEU production, storage, and transportation activities) and discusses the potential impacts of HALEU fuel fabrication, construction and operation of advanced reactors, and the resulting spent nuclear fuel (SNF) management.

To determine what the potential environmental consequences of the Proposed Action might be, DOE analyzed the best available information (i.e., existing environmental analysis documentation) prepared in accordance with NEPA, for the construction and operation of facilities that currently conduct or are capable of conducting activities that would be similar to those expected to occur under the Proposed Action. Those existing and planned facilities are approved to operate under existing U.S. Nuclear Regulatory Commission (NRC) licenses; Agreement State licenses; U.S. Department of Interior permits; and/or applicable Federal, state, and local permits and approvals. NEPA evaluations for those facilities were previously performed and considered under their licensing, permitting, and approval action decisions.

For each of the major activities, of the Proposed Action and post-Proposed Action activities, DOE's SMEs provided the following:

[2] The Proposed Action is to acquire, through procurement from commercial sources, HALEU enriched to at least 19.75 and less than 20 weight percent U-235 over a 10-year period of performance, and to facilitate the establishment of commercial HALEU fuel production. The Proposed Action implements Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects.

- A description of the activity, including a general description, a description of the processes, potential facilities, and existing NEPA documentation.
- The approach to NEPA analyses.
- The affected environment and environmental consequences, evaluated by SMEs across 15 different impact areas.

The results of these evaluations are presented in the 500 plus-page Technical Report (Leidos, 2023) and summarized in this appendix of the Final EIS.

Decisions on the specific location of facilities are not being made pursuant to this EIS. The Proposed Action will only address the acquisition of HALEU and related services. The locations where companies choose to site their facilities would be subject to further environmental analysis under the relevant regulatory authority.

Therefore, SMEs carefully reviewed the existing NEPA documentation, from the perspective of the Proposed Action activities, and documented that review and analytical results in the Technical Report. The Technical Report contains sections for each of the major areas presented in Appendix A.

DOE's approach to the impact analyses in the HALEU EIS was to summarize information from existing NEPA documents as an indication of the potential impacts from future HALEU activities. Although impacts information from uranium fuel cycle facility NEPA documents was used, it was used because it represents the best available predictive information that could provide an indication of potential impacts from HALEU fuel cycle facilities. It was not used to indicate the impacts at or preference for any specific facility or location.

To accomplish this, DOE reviewed applicable NEPA documents for each type of uranium fuel cycle facility. As an example of how this information was used, if all the NEPA documents said the impacts would be SMALL for a particular type of impact except for one document that reported the potential for MODERATE impacts, DOE would characterize the potential impacts for a similar HALEU fuel cycle facility to be SMALL to MODERATE with the circumstances for the MODERATE impacts explained.

Use of the available NEPA documentation for licensed fuel cycle facilities in no way is intended to indicate a preference for the use of these facilities in commercializing the HALEU fuel cycle. They provide information on the kind and significance of impacts that could be incurred through the use of any existing or new facility.

Using this extracted information and associated potential impact category classifications, the resource area SMEs used their knowledge and experience based professional judgements to estimate the potential environmental consequences relative to the HALEU EIS Proposed Action in general should they occur at existing facilities or involve the use and/or construction of new facilities at brownfield or greenfield locations. In most cases, the estimated potential environmental consequences associated with Proposed Action located at existing fuel cycle facilities were the same; however, in a few cases, the lower level of effort for the specific HALEU activities resulted in a slightly lower impact category classification. Locating Proposed Action activities at brownfield or greenfield sites introduces additional uncertainty in the parameters used to assess the impact category. In some cases, this resulted in the SMEs determining that the impact characterization at these sites could be larger than that for an existing brownfield or greenfield site. This was done to inform the decision maker that if DOE moves forward with the Proposed Action, these types of impacts are likely at the various location options identified previously. It was not intended to be an absolute statement of impact since the impacts cannot be further estimated at this time—sites have not been selected and facility designs have not been completed.

DOE generally did not use historic (legacy) information as an indication of future impacts. DOE recognizes that the use of this historic information would affect the characterization of existing environments and could impact the characterization of the impacts. Because the Proposed Action and any decisions based on this EIS would not select specific sites for any of the HALEU fuel cycle activities, the impact on existing environments is best left to the expected site-specific environmental analysis for each facility. In addressing potential impacts, past activities were conducted under a different regulatory regime that is not representative of current and future facility construction, operation, and decommissioning. Current requirements for licensing, permitting, and monitoring are generally much more stringent than historic practices.

This Final EIS appendix provides a discussion of the potential environmental consequences for the resource areas potentially affected by the implementation of the Proposed Action and post-Proposed Action activities. Environmental consequences are discussed for Proposed Action and related post-Proposed Action activities if conducted at existing (or proposed new) facilities and for which existing NEPA documentation exists. Extrapolation of impacts, including those for existing brownfield and greenfield sites, are addressed in Chapter 3, *Affected Environment and Environmental Consequences,* of the EIS.

A.1 Uranium Mining and Milling

Mining and milling services to support HALEU reactors (producing 2,100 MT of uranium in the form of 2,500 MT of U_3O_8, or "yellowcake") would be a very small fraction of the uranium mining and milling occurring in the United States in the foreseeable future.[3]

The 89-page Section 1 of the **Technical Report - Section 1 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

A.1.1 Introduction

This EIS considers two main uranium extraction methods: in-situ recovery (ISR) mining (i.e., the predominant extraction method used in the United States for uranium recovery) and conventional mining, which includes open-pit, strip mining, and underground mining. Conventional mining would include transportation of the mined material to a uranium mill for extraction of uranium from the ore.

ISR facilities recover uranium from low-grade ores where other mining and milling methods may be too expensive or environmentally disruptive. In the ISR uranium extraction process, wells are drilled into rock formations. Water containing various compounds is injected into the uranium ore body, oxidizing the insoluble tetravalent uranium to highly soluble hexavalent uranium underground before being pumped to the surface for further processing.

Either of these methods might be utilized by commercial entities and therefore both are addressed.

A.1.2 Analysis Methodology

A.1.2.1 Approach to NEPA Analyses

This EIS incorporates by reference resource conditions and impact considerations of the primary existing NEPA documentation sources discussed in Section A.1.2.2, Existing NEPA Documentation, below, as well as other available information such as new census data. The analysis also considers comments provided

3 There has been an increase in uranium producer interest in opening and operating US uranium mines primarily due to the increase in uranium prices. As a result, in late 2023, Energy Fuels Resources (USA) Inc. commenced operations at the Pinyon Plain Mine in Arizona and the La Sal and Pandora Mines in Utah. The company has also taken steps toward opening in 2025 the Whirlwind Mine (in Colorado) and reopening the Nichols Ranch mine (in Wyoming) this year or in 2025. The company also has plans to pursue permitting at three additional sites. All of these actions and plans have been and are being implemented and are not associated with the Proposed Action.

by interested parties during the scoping period. Details regarding the impacts of construction, operation, and closure of uranium mining and recovery facilities to support high-assay low-enriched uranium (HALEU) production were developed from the range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.1.2.2.

Existing permitted ISR mining occurs primarily in the following locations:

- Northwest Nebraska (Dawes County)
- Northwest New Mexico (McKinley County)
- Southwest South Dakota (Fall River and Custer Counties)
- South Texas (Karnes, Bee, Goliad, Brooks, and Duval Counties)
- Eastern Wyoming (Campbell, Crook, and Johnson Counties)
- Southwestern Wyoming (Sweetwater County)

Existing permitted conventional mining occurs primarily in the following locations:

- Northwest Arizona (Mohave and Coconino Counties)
- Northwest New Mexico (McKinley and Cibola Counties)
- Southwest Colorado (Montrose and San Miguel Counties)
- Southeast Utah (San Juan and Garfield Counties)

Milling facilities used to process conventionally mined uranium are located in South-Central Utah (Garfield and San Juan Counties) and Southwestern Wyoming (Sweetwater County). White Mesa in San Juan County, Utah, is the only mill currently in operation.

The intent of this HALEU EIS is to provide a summary of potential impacts that could occur at new or existing permitted mines and mills, using existing NEPA documentation for existing operations and other available sources, incorporated by reference. Private industry, along with U.S. Nuclear Regulatory Commission (NRC) approvals, would determine the actual mining techniques employed and site-specific NEPA evaluation would be required for changes to existing permitted mining operations.

NEPA documentation for both ISR and conventional mining and milling is available as the mines and mills have been utilized for uranium recovery as part of the low-enriched uranium (LEU) fuel cycle. The function and operation of these facilities is identical in both the LEU and proposed HALEU fuel cycle. Ore is extracted and processed to produce the same yellowcake needed as feed material for the conversion facility. The only difference is the quantity of ore and yellowcake required to produce equivalent quantities of LEU and HALEU (roughly four times more for HALEU than LEU enriched to about 5%). In this analysis, that difference is addressed by the number of mines necessary to supply the uranium ore.

A.1.2.2 Existing NEPA Documentation

DOE prepared this HALEU EIS and determined the scope for ISR mining and milling activities by reviewing the *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (NUREG-1910) (NRC, 2009a) (referred to as the "ISR GEIS"). The NRC prepared the ISR GEIS to access the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of ISR uranium recovery facilities. The NRC developed the ISR GEIS using (1) knowledge gained during the past 30 years licensing and regulating ISR facilities, (2) the active participation of the State of Wyoming Department of Environmental Quality as a cooperating agency, and (3) public comments received during the preparation of the ISR GEIS. The NRC's licensing experience indicates that the technology used for ISR uranium recovery is relatively standardized throughout the industry and therefore appropriate for a programmatic evaluation in a Generic Environmental Impact Statement

(GEIS). The ISR GEIS determined which impacts would be essentially the same for all ISR facilities and which impacts would result in varying levels of impacts for different facilities, thus requiring further site-specific information to determine the potential impacts. As such, the ISR GEIS provides DOE with a starting point for determining the region of influence (ROI) and scope for resources under consideration for detailed analysis within this HALEU EIS. This HALEU EIS incorporates by reference information and analysis contained in the 2009 ISR GEIS and focuses on new information related to regulatory changes or changes to environmental conditions since publication of the 2009 ISR GEIS. The ISR process includes on-site processing to yellowcake.

DOE also reviewed the Final Uranium Leasing Program Programmatic Environmental Impact Statement (DOE/EIS-0472) (referred to as the "ULP PEIS") to determine the scope for conventional mining activities, which considers environmental impacts from conventional (underground) mine development in western Colorado (Mesa, Montrose, and San Miguel Counties) (DOE, 2014). DOE prepared the ULP PEIS to support the implementation of the Atomic Energy Act, which authorized and directed DOE, among other things, to the extent that DOE deems it necessary to implement the provisions of the Atomic Energy Act, Public Law (Pub. L.) 83-703, 68 Stat. 919, codified at 42 U.S. Code (U.S.C.) §2097. The Uranium Leasing Program (ULP) contributes to the development of a supply of domestic uranium consistent with the provisions of the Atomic Energy Act and Energy Policy Act of 2005, Pub. L. 109-58, 199 Stat. 594, codified at 42 U.S.C. §15801, which has commitments to decrease the United States' dependence on foreign energy supplies. DOE is using the ULP PEIS as a reference to gauge the type and magnitude of impacts and mitigations that could be expected if the Proposed Action and post-Proposed Action activities were to be supported through conventional mining on private lands.

Regarding milling of conventionally mined uranium, DOE reviewed the Environmental Assessment for Renewal of Source Material License No. SUA-1358 for the White Mesa Uranium Mill in San Juan County, Utah, and the *Radioactive Material License No. UT 1900479 and Utah Ground Water Discharge Permit No. UGW370004 Technical Evaluation and Environmental Assessment: White Mesa Uranium Mill Energy Fuels Resources* (UDWMRC, 2017) because that facility is currently used for milling conventionally mined uranium from Colorado (NRC, 1997a). In response to concerns received during the public comment period on the draft EIS related to health effects from operation of the mill, DOE has added the following more recent information. In June 2023, the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), Office of Community Health and Hazard Assessment conducted an evaluation of potential community exposure and issued a report (ATSDR, 2023). The Ute Mountain Ute Tribe had asked the Agency to evaluate how radiation and other chemicals related to uranium milling activities at the White Mesa Uranium Mill might affect the health of tribal members. The mill is located next to Ute Mountain Ute Tribe lands. For the scenarios that ATSDR were able to evaluate, ATSDR concluded the following:

- Children and adults living in White Mesa are unlikely to be harmed from breathing radiological contaminants in the air. Residential air exposures do not result in elevated risks of adverse cancer or non-cancer health effects from radiological material. Annual doses from airborne radionuclides ranged from 9 to 23 mrem per year.
- Children and adults who drink the water from the Ute Mountain Ute Tribe public water system are unlikely to be harmed from radiological contaminants. Residential drinking water quality reports are within EPA regulatory limits. For radiological water quality standards, these limits have been shown to be protective of human health and are below the ATSDR minimal risk level and were not evaluated further.

The ATSDR recommended that the Ute Mountain Ute Tribe continue to monitor drinking water and collect air, water and soil samples.

That evaluation supports that the air emissions, groundwater contamination, and radiological impacts were well within those initially identified in the NRC NEPA documents and well within the State of Utah standards imposed on the White Mesa Mill. The White Mesa Mill is regulated by the Utah Department of Environmental Quality and operates under the following DEQ permits:

- Air Quality Approval Order DAQE-AN0112050018-11[4]
- Groundwater Discharge Permit No. UGW370004 (Current)[5]
- Radioactive Materials License No. UT1900479 (Current)[6]
- 2022 Ground Water Permit Renewal Tailings Cells 5A/5B License Amendment Request[7]

Additionally, DOE also reviewed the following site-specific NEPA analyses for conventional mines and ISR facilities for resource conditions and impact considerations:

- *Draft Environmental Impact Statement for the La Jara Mesa Mine Project* (USDA, 2012)
- *Draft Environmental Impact Statement for Roca Honda Mine Sections 9, 10 and 16, Township 13 North, Range 8 West, New Mexico Principal Meridian, Cibola National Forest, McKinley and Cibola Counties, New Mexico* (USDA, 2013)
- *Environmental Impact Statement for the Moore Ranch ISR Project In Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 1* (NRC, 2010)
- *Environmental Impact Statement for the Nichols Ranch ISR Project in Campbell and Johnson Counties, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 2* (NRC, 2011a)
- *Environmental Impact Statement for the Lost Creek ISR Project in Sweetwater County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 3* (NRC, 2011b)
- *Environmental Impact Statement for the Dewey-Burdock Project in Custer and Fall River Counties, South Dakota: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 4* (NRC, 2014a)
- *Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 5* (NRC, 2014b)
- *Environmental Impact Statement for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report NUREG-1910 Supplement 6* (NRC, 2016)

4 https://daqpermitting.utah.gov/DocViewer?IntDocID=50134&contentType=application/pdf

5 https://deq.utah.gov/waste-management-and-radiation-control/groundwater-discharge-permit-no-ugw370004-white-mesa-uranium-mill-energy-fuels-resources-usa-inc

6 https://deq.utah.gov/waste-management-and-radiation-control/radioactive-materials-license-no-ut1900479-white-mesa-uranium-mill-energy-fuels-resources-usa-inc

7 https://deq.utah.gov/waste-management-and-radiation-control/white-mesa-uranium-mill-tailings-cells-5a-5b-license-amendment-request-energy-fuels-resources-usa-inc

A.1.3 Potential Environmental Consequences

The Proposed Action's impact assessments for ISR, conventional mining, and milling activities are presented in Table A-1 below. After the table, see Section A.1.3.1, *Land Use*, through Section A.1.3.10, *Socioeconomics*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding the construction, operation, and closure of uranium mining and recovery facilities to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.1.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-1 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, important impact assessment differences between ISR and conventional mining are noted. Section 1 of the **Technical Report - Section 1 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL to MODERATE**	Land Disturbed (acres)	120 to 1,860 – ISR 4,600 – Conventional Mining 800 – Milling
		Site Size (acres)	2,500 – ISR 16,000 – Conventional Mining
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL to MODERATE**	Tallest Substantial Structure (other than met/T-line towers)	35 ft – ISR drill rigs
Geology and Soils	**SMALL to MODERATE**	Rock and Soil Excavated	Large quantities (about 15 million MT[(d)]) of soil and rock removed during conventional mining.
		Backfill Needed	Large quantities of backfill needed during conventional mine restoration.
Water Resources	**SMALL to LARGE**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants.
		Average Operational Water Use (gpd)	252,000 gpd (63 million gpy/250 days/yr) – ISR
		Groundwater Quantity/Quality	Increased groundwater discharge ("dewatering effect") of shallow

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment [(a)]***	***Impact Indicator***	***Key Information [(b)]***
			aquifers associated with conventional mining, and potential for degradation of groundwater quality associated with inadvertent leaks/spills of contaminants, introduction of drilling fluids and muds, wastewater management practices and the potential creation of connections between previously disconnected aquifers of differing qualities.
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Attainment for all ISR and conventional mining sites.
		Construction Emissions	Emissions from vehicles, equipment, and fugitive dust. ISR and conventional mining development activities would not contribute to an exceedance of a NAAQS.
		Operations Emissions	Emissions from vehicles, equipment, uranium ore dust, and fugitive dust. Minimal emissions from ISR activities would not contribute to an exceedance of a NAAQS. Conventional mining would not contribute to an exceedance of a NAAQS with the implementation of mitigation measures. Facility licensing conditions for conventional milling would require implementation of control measures and environmental and radiation monitoring

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	***HALEU Activity Impact Assessment [(a)]***	***Impact Indicator***	***Key Information [(b)]***
			that would minimize facility air quality impacts to regulatory levels.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	SMALL to LARGE – all ISR Regions SMALL to LARGE – Conventional Mining SMALL – Milling Mitigations would be utilized to minimize the potential environmental consequences.
Historic and Cultural Resources	**SMALL to MODERATE**	Potential for NRHP property to be disturbed or impacted	Yes Mitigations would be utilized to minimize the potential environmental consequences.
		Potential for impacts on Traditional Cultural Property (TCP)	Yes Mitigations would be utilized to minimize the potential environmental consequences.
Infrastructure	**SMALL (mining) to no impacts (milling)**	Electrical Use	SMALL
		Water Use	SMALL
		Fuel Use	SMALL
Noise	**SMALL to MODERATE**	Noise Levels	80 to 98 dBA at 50 ft from the source. Noise levels attenuate to about 55 dBA L_{dn} at a distance of 1,200 ft.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	Five nonfatal injuries and illnesses predicted.
		Construction Radiological Impacts (mrem/yr)	No quantities of radioactive material sufficient to be of concern to workers or the public.
		Operations Average	675 to 713 – ISR

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
		Worker Dose (mrem/yr)	433 – Conventional Mining 700 to 1,200 – Milling
		Operations MEI Public Dose (mrem/yr)	0.4 to 31.7 – ISR 0.3 to 0.6 – Conventional Mining 10 – Milling
		Operations Population Dose (person-rem/yr)	0.009 to 0.36 – ISR 16 to 93 – Conventional Mining
		Operations Chemical Risk	Exposures would be mitigated.
Public and Occupational Health – Accidents	**SMALL to MODERATE**	Radiological Accidents	Consequences of accidents would be low, except for, a dryer explosion, which could result in 8.8 rem dose to a worker wearing respiratory protection. The 8.8 rem dose is above NRC limits. The dose to off-site individuals at 200 meters would be below 100 mrem. The likelihood of such an accident would be low, and therefore, the risk would also be low.
		Chemical Accidents	Releases of hazardous chemicals of sufficient magnitude to adversely impact workers and the public are possible, but are generally considered unlikely, given commonly applied safety practices and the history of safe use of these chemicals at regulated facilities.
Traffic	**SMALL to MODERATE**	Daily Vehicle Trips – Construction	400 workers/2 trucks – ISR 252 workers/80 trucks – Conventional Mining
		Daily Vehicle Trips – Operations	400 workers/2 trucks – ISR 252 workers/160 trucks – Conventional Mining

Table A-1. Uranium Mining and Milling – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
			300 workers/80 trucks – Milling
Socioeconomics	**SMALL to LARGE**	Peak Construction Employment (direct)	200 personnel – ISR 126 – Conventional Mining
		Operations Employment (direct)	50 to 80 personnel – ISR 7 to 150 personnel – Conventional Mining 50 to 150 personnel – Milling
Environmental Justice	**SMALL to MODERATE** At existing mines no disproportionate and adverse impacts on communities with environmental justice concerns are expected. The SMALL to MODERATE impact rating accommodates the uncertainty of site selection, but to determine disproportionate impacts at new sites would require site-specific analysis.	Minority or low-income population in the ROI and disproportionate and adverse human health and environmental effects	Communities with environmental justice concerns are generally not in the ROI of existing sites, or if present, would not receive disproportionate and adverse impacts. San Juan County, Utah, and Cibola and McKinley Counties, New Mexico, could have disproportionate and adverse impacts. Mitigations could be utilized to minimize potential impacts.

Key: dBA = A-weighted decibels; ft = feet; gpd = gallons per day; gpy = gallons per year; HALEU = high-assay low-enriched uranium; ISR = in-situ recovery; L_{dn} = day-night average sound level; LLW = low-level waste; MEI = maximally exposed individual; MLLW = mixed low-level waste; mrem/yr = millirem per year; NA = not applicable; NAAQS = National Ambient Air Quality Standards; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; ROI = region of influence

Notes:

[a] Impacts denoted as potentially LARGE would be associated with the specific site and the extent of the mining operations.

[b] Details regarding the impacts of construction, operation, and closure of uranium mining and recovery facilities to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.1.2.2, *Existing NEPA Documentation.* Sections 1 and 1.3 and Table 1-4 of the **Technical Report - Section 1 (Leidos, 2023)** provide the technical support for this portion of the Final EIS.

[c] The impacts of greenhouse gases (GHGs) are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

[d] Assuming all uranium is mined via conventional mining with an ore uranium content of 0.1% and none via ISR.

A.1.3.1 Land Use

The majority of existing ISR and conventional mines occur in rural, agriculturally dominated, and undeveloped locations. Modifications to existing mines or construction of new mines (both ISR and conventional) could lead to land use impacts including changes and disturbances in access to restricted areas, delays in the exercise of mineral rights for other ores; restriction of livestock grazing areas; and restriction of recreational activities. Due to the small amount of land disturbance associated with ISR mining, such impacts would remain SMALL. Due to the rural nature of most conventional mining sites and the abundant opportunities for agricultural and recreational activities in the regions associated with existing, permitted conventional mining conflicts arising from land use are likewise anticipated to remain SMALL. Potential land use conflicts are discussed further in the **Technical Report (Leidos, 2023).**

Potentially SMALL to MODERATE impacts have been identified for land use associated with the decommissioning of ISR mines due to the larger area impacted by decommissioning. The assessment of individual mines in the six Supplements to the ISR GEIS (NRC, 2009a) indicate that this impact is expected to be temporary due to an initial increase in activity intensity due to the increased use of earth- and material-moving equipment and other heavy equipment and would not extend beyond the decommissioning phase of operation.

A.1.3.2 Visual and Scenic Resources

Impacts to visual and scenic resources from a conventional mine would be SMALL to MODERATE. Impacts to visual and scenic resources from mining and milling activities in support of the Proposed Action could primarily occur during construction and well field development, where vertical drilling rig masts contrast with the existing topography. Existing ISR and conventional mines generally occur within Bureau of Land Management Visual Resources Management Classes III and IV areas, where Class III indicates an area of moderate visual value and Class IV indicates the least valuable designated areas, when considering visual and scenic resources. Some existing lease tracts for conventional mining and licensed regions for ISR activities do contain isolated Class II areas. Conventional mining lease tracts analyzed in the *Final Uranium Leasing Program Programmatic Environmental Impact Statement* (DOE/EIS-0472) (referred to as the "ULP PEIS") were found to contain prominent rivers, mountain ranges, and mesas within their viewsheds (DOE, 2014). In many of these areas, rubble piles and other remnants of previous mining activities are present.

Existing ISR facilities analyzed in the *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, NUREG-1910*, in the Wyoming West Region, contain Class II areas such as the Red Lake, Alkali Basin, Alkali Draw, South Pinnacles, Honeycomb Buttes Wilderness Study Areas, and locations within the Granite Mountain range; however, all identified Class II areas are located greater than 20 miles from the closest point of the two uranium districts located in this region (NRC, 2009a). Potentially sensitive visual resources within the Wyoming East Region include the Bozeman, Oregon, and Bridger Historic Trails that cross the southern portion of the region. In the Nebraska-South Dakota-Wyoming region, Class II areas have been identified around Devil's Tower National Monument and Black Hills National Forest along the Wyoming-South Dakota border. The nearest potential facility under consideration at the time the GEIS was written was proposed for siting approximately 28 miles from Devil's Tower National Monument and ten miles from Black Hills National Forest. Within the Northwestern New Mexico Region, many areas have been considerably modified by human activity and structures associated with oil and gas development. Class II areas within or in close proximity to the region include Cabezon Peak, Canon Jarido, Elk Springs, Ignacio Chavez, Jones Canyon, La Lena special management areas, and the Empedrado wilderness study areas. As stated above, all current facilities are located within Class III or IV areas.

Other sources of impact could include the dust generated during clearing for construction and the potential visibility of lighted drill rigs during nighttime operations. These visual impacts are usually temporary and considered SMALL. However, the impacts could be more pronounced in rural, previously undeveloped areas where the baseline visual landscape is less disturbed. Vegetation clearing and introduction of drilling rigs and roads could result in visual contracts with the baseline landscape.

Mine expansion and associated road development could also introduce visual contrasts.

A.1.3.3 Geology and Soils

The general impacts to soils and geology from conventional mine development and operation range from SMALL to MODERATE.

Impacts to soils and geology from mine construction and operation would be highly site dependent largely based on the type, size, and local characteristics of the mine. For example, a shallow shaft mine would have much smaller impacts to geology and soils than a room and pillar or open-pit mine due to the size of the staging area, which is largely dependent on amount of topsoil and overburden to be removed and stockpiled. Nearby sensitive geology can also be a factor in how geological formations are impacted and may require additional best management practices (BMPs) to mitigate.

Generally, no impacts to geology would occur during the construction and staging phase of a mine or of construction of additional support facilities at an existing fully permitted uranium mine since most activities will occur in shallow soils and would not involve removal of rock from the geological formation.

Mine operation would result in removing and stockpiling topsoil and overburden from the mine. Larger amounts of rock removed from the geological formation would be more likely to cause permanent changes to the geological formation and could potentially lead to collapse, surface subsidence, or induce earthquakes. Impacts to soils and geology could be mitigated during construction and operation of the mine by following BMPs such as those listed in Table 4.6-1 of the 2014 *Final Uranium Leasing Program Programmatic Environmental Impact Statement* (DOE, 2014) and following proper mine decommissioning and reclamation procedures.

A.1.3.4 Water Resources

Construction activities associated with ISR mining and conventional mining may result in temporary water quality degradation associated with wastewater effluents and short-term increases in stormwater runoff during ground-disturbing activities. Wastewater and stormwater discharges would be subject to Federal and state permit conditions, as applicable, including the National Pollutant Discharge Elimination System (NPDES) program under Section 402 of the Clean Water Act, Pub. L. 92-500, 86 Stat. 816, Title I, codified at 33 U.S.C. §1342. Adherence to applicable permit conditions and the implementation of appropriate BMPs (e.g., berms, drainage swales, detention basins, etc.) would be expected to minimize impacts. For example, excavated surface soil material resulting from conventional mining exploration and development activities would be stockpiled in a secure location designed to prevent runoff. Temporary access roads may not be removed immediately if it is anticipated that further exploration will be needed at a specific site; however, when reclamation does occur, exposed soil surfaces would be appropriately revegetated to prevent continued erosion. Additionally, conventional mining operations would be conducted in accordance with a pre-approved, mine-specific plan that dictates the use of BMPs to minimize impacts on the surrounding environment, including nearby water resources. Certain existing mines, such as those located in close proximity to the Dolores River and the San Miguel River, may require the implementation of larger stormwater control systems to account for the increased potential for erosion and runoff. Such site-specific conditions would be specified in the pre-approved, mine-specific plan as well as in required permits.

During ISR mining operations, the primary contaminant of concern would be lixiviant, in the event of a leak from pipelines, wells, or header houses. During aquifer restoration, disposal of wastewater via land application (i.e., spraying on the land surface) of treated wastewater, discharge to solar evaporation ponds, or discharge to surface waters has the potential to affect nearby surface waters and water quality of shallow groundwater aquifers. Although the release of wastewater to land requires treatment of wastewater, it is possible that some contaminants would remain after treatment, which have the potential to wash off the land into nearby surface waters. Failure of an evaporation pond embankment could likewise result in contamination of nearby waters. Direct discharge to surface water would require permitting, which would likely include monitoring requirements (NRC, 2009a, pp. 4.2-18 to 4.2-20). Brine slurries resulting from reverse osmosis during aquifer restoration have the potential to impact groundwater when disposed of by deep well injection. As underground injection requires a permit from

EPA, it is anticipated that adherence to permit conditions would mitigate potential impacts from deep well injection (NRC, 2009a, pp. 4.2-19). Prior to the beginning of operations, NRC requires licensees to take measures to prevent the potential migration of contaminants between aquifers, including installation of monitoring wells to permit early detection of leaks, development of monitoring programs and operating programs to identify, analyze, and resolve any leaks that may occur, completion of well mechanical integrity tests to ensure lixiviant would remain in the well, and completion of aquifer pump tests to determine aquifer parameters. Monitoring specifications for each mine would typically be included in the associated NRC license (NRC, 2009a, pp. 4.2-23). When uranium recovery is complete, NRC requires that the production aquifer be restored to preoperational conditions, if possible. If preoperational conditions are not achievable, NRC requires that the production aquifer be returned to maximum contaminant levels provided in 10 Code of Federal Regulations (C.F.R.) §40, Appendix A, Table 5C, or to alternate concentration limits approved by NRC (NRC, 2009a, pp. 4.2-22).

During conventional mining operations, contaminants of concern include those that may be found in surface runoff, such as sediment, chemical dust control compounds (e.g., magnesium chloride), fuels, and mineral leachates. In the Uravan Mineral Belt region, runoff from historical mining areas has contained elevated concentrations of metals such as arsenic, molybdenum, and selenium; however, runoff quantities were found to be limited, affecting local water quality only (DOE, 2014, pp. 4-84 to 4-85). Groundwater in the shallow alluvial aquifer located beneath historical tailing sites near mining lease tracts in San Miguel County, Colorado was found to contain elevated concentrations of manganese, molybdenum, nitrate, selenium, and uranium. Experiments conducted on the leaching of metals from uranium-containing sandstones in areas where mining has historically occurred have likewise found that leachates contain elevated concentrations of arsenic, molybdenum, selenium, and vanadium. As stated above, mining operations are conducted in accordance with a pre-approved, mine-specific plan that dictates the use of BMPs to minimize impacts on the surrounding environment, including nearby water resources.

An additional concern related to conventional mining is the potential for disruption of shallow aquifers through the creation of an open cavity, which results in increased groundwater discharge. This in turn has the potential to lower groundwater surface elevations, alter groundwater flow paths, and impact water quality. This "dewatering" effect may affect nearby, groundwater-dependent resources such as vegetation, springs, and groundwater users. Additional detail regarding potential impacts to water resources resulting from ISR and conventional mining (overall classified as SMALL), as well as associated impact minimization measures, may be found in the Technical Report (Leidos, 2023).

Although generally ISR mining impacts to groundwater and surface water are SMALL, site-specific characteristics can result in the potential for MODERATE to LARGE impacts for some aspects of water resources.

ISR mining involves drilling wells into rock formations known to contain uranium ore, and injecting lixiviant into the wells to dissolve the uranium into groundwater, which is then pumped out of the formation so the uranium can be extracted. Potential impacts to groundwater may result from consumptive groundwater use (used during construction for dust suppression, mixing cements, and drilling support), the introduction of drilling fluids and muds during well drilling, the risk of fuel, lubricant, or similar contaminant leaks or spills, and management of wastewater. Typically, sites with deep groundwater with little hydrological connections to surface waters would see SMALL impacts from the construction, operation, aquifer restoration, and decommissioning of an ISR facility.

A leak or spill of lixiviant could result in MODERATE to LARGE impacts if the affected groundwater table is located close to the ground surface, is an important source of water for local domestic or agricultural uses, or is hydraulically connected to other important aquifers. To minimize the potential for such an impact, pipelines would be monitored frequently to quickly detect and prevent leaks or spills. Additionally, spill response and cleanup procedures would be in place to mitigate an impact in the event a leak or spill does occur.

A.1.3.5 Ecological Resources

ISR Mining

ISR facility activities at any location would have to take into consideration current ecological conditions present at the site and to comply with the applicable regulatory requirements at that location. The level of impact would be dependent on site-specific characteristics and the presence of the resource (including threatened and endangered species) in proximity to activities.

Construction and/or land disturbance occurring within undeveloped lands associated with permitted ISR mines and mine operation could have SMALL, MODERATE, or LARGE impacts on ecological resources.[8] The degree of impact could be limited due to the implementation of BMPs and mitigation measures. The magnitude of impact would depend on the size of a new facility or extension to an existing facility and the amount of land disturbance. An inventory of threatened or endangered species would be developed during site-specific reviews to identify unique or special habitats, and Endangered Species Act consultations conducted with the U.S. Fish and Wildlife Service (USFWS) would assist in reducing/avoiding adverse impacts. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

Land-clearing activities as part of construction within undeveloped lands would likely result in increased erosion, stormwater runoff, and loss of vegetation. Additionally, impacts on wildlife could include habitat fragmentation, disturbance, and injury or mortality—as habitats within the footprint disturbed by construction and/or land disturbance could be reduced or altered. Loss of habitat could result in a long-term reduction in wildlife abundance and diversity. Habitat disturbance could facilitate the spread and introduction of invasive plant species. Wildlife habitat could be adversely affected if invasive vegetation became established in the disturbed areas and adjacent off-site habitats. Construction activities could cause wildlife disturbance, including interference with behavioral activities. Wildlife could respond in various ways, including attraction, habituation, and avoidance. Principal sources of noise would include vehicle traffic and operation of machinery. Regular or periodic noise could cause adjacent areas to be less attractive to wildlife and result in a reduction in use. Construction activities could result in the direct injury or death of certain wildlife species.

Wildlife could also be exposed to accidental fuel spills or releases of other hazardous materials. Temporary contamination or alteration of soils would be likely from operational leaks and spills and possible from transportation or land application of treated wastewater. However, detection and response to leaks and spills (e.g., soil cleanup) and eventual survey and decommissioning of all potentially impacted soil limit the magnitude of overall impacts to terrestrial ecology. Migratory birds could be affected by exposure to constituents in evaporation ponds. To avoid impacts to migratory birds, tree clearing within undeveloped lands would need to occur outside of the nesting season (late February through early August). Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities. A permit would be required for the purposeful take of an active migratory bird nest. Mitigation measures such as perimeter fencing, netting, alternative sites, and periodic wildlife surveys would reduce overall impacts.

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[8] Similar impacts could occur during decommissioning; although of potentially similar magnitude, these impacts would be associated with more temporary disturbances.

For Federally listed species present at a specific location, additional analysis would be required by the licensee to determine the severity and nature of impacts as part of the final design and description of the Proposed Action. Removal of native habitats could impact vegetation, wildlife, and possibly special status species.

Wetlands and/or water features (such as streams, lakes, ponds, or other waters) subject to protection under Section 404 of the Clean Water Act (CWA), 33 U.S.C. §1344, could occur within the Proposed Action area. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, formal wetland delineation surveys would be required to determine presence or absence of jurisdictional wetlands. Impacts to Federally protected wetlands would require licensee consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent NEPA analysis performed by the NRC or other Federal agency under these actions may also be required.

Conventional Mining

Impacts from conventional mining (including exploration, mine development and operations, and reclamation) at existing or new sites could have SMALL, MODERATE, or LARGE impacts on ecological resources. The degree of impact could be limited due to the implementation of BMPs and mitigation measures. The magnitude of impact would depend on the size of a new facility or extension to an existing facility and the amount of land disturbance. An inventory of threatened or endangered species would be developed during site-specific reviews to identify unique or special habitats, and Endangered Species Act consultations conducted with the USFWS would assist in reducing/avoiding adverse impacts. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

Impacts from exploration could result from disturbance of vegetation and soils, the removal of trees or shrubs, compaction of soils, destruction of plants, burial of vegetation under waste material, or erosion and sedimentation. The localized destruction of ecological soil crusts, where present, would be considered a longer-term impact, particularly where soil erosion has occurred. Direct impacts could include the destruction of habitats during site clearing and excavation, as well as the loss of habitat in additional use areas. Indirect impacts from mining could be associated with fugitive dust, invasive species, erosion, sedimentation, and impacts due to changes in surface water or groundwater hydrology or water quality. The deposition of fugitive dust and the establishment of invasive species, including the potential alteration of fire regimes, could result in long-term impacts. Additional habitats could be affected by any access roads or utility lines required for the mines. Impacts on wildlife could occur from habitat disturbance, wildlife disturbance, and wildlife injury or mortality and habitat loss.

Impacts on aquatic resources could result from increases in sedimentation and turbidity from soil erosion and runoff during mine development and operations. There would be a very low likelihood of an accidental ore spill into a perennial stream or river.

Potential impacts on threatened, endangered, and sensitive species could occur, depending on the location of the mines and amount of surface disturbance. Direct impacts could result from the destruction of habitats during site clearing, excavation, and operations. Indirect impacts could result from fugitive dust, erosion, sedimentation, and impacts related to altered surface water and groundwater hydrology.

A.1.3.6 Historic and Cultural Resources

ISR and Conventional Mining

New or expansion of existing mines would need to be evaluated by the licensee for impacts on historic and cultural resources and conformance with Section 106 of the National Historic Preservation Act, Pub. L. 89-665, 80 Stat. 915, codified at 54 U.S.C. §306102, in future NEPA site-specific documentation[9] with respect to the mining technique and location of the site to assess site-specific impacts on cultural resources.

Construction-related impacts to cultural resources can be direct or indirect and can occur at any stage of a uranium recovery project (i.e., during construction, operation, aquifer restoration, and decommissioning). Construction involving land-disturbing activities, such as grading roads, installing wells, and constructing surface facilities and well fields, are expected to be the most likely to affect historic and cultural resources. These land-disturbing activities would occur for both ISR mining and conventional mining and are generally discussed below.

As needed, the NRC license applicant would be required, under conditions in its NRC license, to adhere to procedures regarding the discovery of previously undocumented cultural resources during initial construction, operation, aquifer restoration, and decommissioning. These procedures typically require the licensee to stop work and to notify the appropriate Federal and state agencies. Licensees and applicants typically consult with the responsible state and Tribal agencies to determine the appropriate measures to take (e.g., avoidance or mitigation) should new resources be discovered during land-disturbing activities at a specific facility. The NRC and licensees/applicants may enter into a memorandum of agreement with the responsible state and Tribal agencies to ensure protection of historic and cultural resources, if encountered.

Most of the potential for significant adverse effects to National Register of Historic Places (NRHP)-eligible or potentially NRHP-eligible historic properties and traditional cultural properties, both direct and indirect, would likely occur during land-disturbing activities related to conventional uranium mine development and/or expansion or building an ISR facility. Buried cultural features and deposits that are not visible on the surface during initial cultural resources inventories could be discovered during earth-moving activities. Indirect impacts may also occur outside the uranium mining project site and related facilities and components. Increased access to formerly remote or inaccessible resources, traditional cultural properties and culturally significant landscapes, as well as other ethnographically significant cultural landscapes may adversely affect these resources. Significant cultural landscapes should be identified during literature and records searches and may require additional archival, ethnographic, or ethnohistorical research that encompasses areas well outside the area of direct impacts. Indirect impacts to some of these cultural resources may be unavoidable and exist throughout the lifecycle of a conventional uranium mine or an ISR uranium recovery project.

Because of the localized nature of land-disturbing activities related to construction, impacts to historic and cultural resources are anticipated to be SMALL, but could be MODERATE for facilities located near known highly significant resources, such as Devils Tower (NRC, 2009a, p. § 4.4.8.1) or Chaco Canyon (NRC, 1997b) National Monuments. Proposed facilities or expansions adjacent to these types of properties are likely to have the greatest potential impacts. Mitigation measures (e.g., avoidance, implementation of a cultural resources management plan for all mineral operating lease areas, recording, and archiving samples) and additional consultations with the appropriate State Historic Preservation Officer and affected Native American Tribes would be needed to assist in reducing the impacts. From the standpoint of cultural resources, the most significant impacts to any sites that are present would occur during the initial mine development and/or construction within the Area of Potential Effects (NRC, 2009a, p. § 4.4.8.1).

[9] Site-specific NEPA (or state equivalent) documentation is the responsibility of the cognizant regulatory authority, either the NRC, another Federal agency, or a state agency.

A.1.3.7 Noise

Locations considered within this HALEU EIS are existing permitted mines on private lands; expansion of these mines within their permitted boundaries would be evaluated for impacts to noise in future NEPA documentation with respect to the mining technique and site-specific conditions. In general, mining locations are located within relatively rural and undeveloped areas, where ambient noise levels would be expected to be low. Limited sensitive noise receptors occur in these regions. HALEU activities would have to follow applicable Federal, state, or local guidelines and regulations on noise at these sites.

ISR Mining Construction

It is anticipated that because of the use of heavy equipment (e.g., bulldozers, graders, drill rigs, compressors), potential noise impacts would be greatest during expansion of existing ISR facilities. Standard construction techniques using appropriate heavy equipment would be used to build well fields and buildings and to grade access roads as required. Depending on the type of construction and equipment used, noise levels (other than occasional instantaneous levels) resulting from construction activities might reach or occasionally exceed 85 decibels A-weighted (dBA) at 50 feet from the source. Personal hearing protection would be required for workers in these areas.

Noise resulting from construction activities could impact residents within 1,000 feet of the noise sources, particularly during the night. Traffic associated with construction activities would include workers commuting to and from the jobsite, as well as relocation of construction equipment to different parts of the project. This might affect small communities located along existing roads. Because well field and facility construction activities would generally occur during daytime hours (see ISR GEIS Section 2.7), related noise would not be expected to exceed the 24-hour average sound-energy guideline of 70 dBA that the U.S. Environmental Protection Agency (EPA) (1978) determined to protect hearing with a margin of safety (NRC, 2009a, pp. 4.2-39). As a result, construction-related noise impacts would be expected to be SMALL to MODERATE (NRC, 2009a, pp. 4.2-40).

Conventional Mining Operations

During mine operations, over-the-road heavy haul trucks would transport uranium ores from conventional mines to the proposed mills and represent the potential for MODERATE noise impacts. These shipments could produce noise along the haul routes. A peak pass-by noise level of 84 dBA from a heavy truck operating at 55 miles per hour (88 kilometers per hour) was estimated in the ULP PEIS (DOE, 2014) based on the Federal Highway Administration's *FHWA Traffic Noise Model (FHWA TNM®) Technical Manual* (Menge et al., 1998). At a distance of 120 feet and 230 feet from the route, noise levels would attenuate to 55 and 50 dBA, respectively. Noise levels above the EPA guideline level of 55 dBA day-night average sound level for residential areas would be reached up to the distance of 60 feet from the route. Accordingly, EPA guideline levels would be exceeded within 230 feet of the haul route, and any residences within this distance might be affected.

Additionally, depending on local geological conditions, explosive blasting during mine development and operations might be needed. Rock blasting would be expected to last approximately 6 months and would be heard within a 1,250-foot radius. Blasting techniques are designed and controlled by blasting and vibration control specialists to prevent damage to structures or equipment. Noise controls may be implemented at the noise source (e.g., substitution of materials or equipment or changing work methods) or by attenuating noise propagation (e.g., use of barriers, enclosures, linings, or mufflers). These controls attenuate blasting noise as well. However, given the impulsive nature of blasting noise, it is critical that blasting activities be avoided at night and on weekends and that affected neighborhoods be notified in advance of scheduled blasts.

Best Management Practices

To reduce noise-related impacts, BMPs would be implemented during all phases of mine operations. Some of these practices include:

- Maintaining equipment in good working order in accordance with manufacturer's specifications.
- Limiting noisy activities to the least noise-sensitive times of the day (daytime between 7:00 a.m. and 7:00 p.m.) and weekdays and limit idle time for vehicles and motorized equipment.
- Notifying area residents of high-noise and/or high-vibration-generating activities (e.g., above-ground and below-ground blasting) in advance.
- Employing noise-reduction devices (e.g., mufflers) as appropriate.
- Providing a noise complaint process for surrounding communities.
- Siting noise sources to take advantage of topography and distance; construct engineered sound barriers and/or berms as necessary.

A.1.3.8 Public and Occupational Health – Facility Accidents

ISR Mining

Accidents associated with mining and milling of uranium are addressed, with accidents associated with ISR facility operation being the predominant contributor to worker impacts from accidents. (Impacts to the public were assessed to be SMALL for all types of mining facility accidents.) ISR mining and milling is the predominant extraction method used in the United States for uranium recovery.

The accident scenarios for conventional milling and ISR are quite similar. The differences in accident consequences would primarily be due to differences in assumed worker exposure times and in site-specific parameters such as distances to receptors and population distribution.

Accident Consequences

Radiological and nonradiological accidents could involve processing equipment failures such as yellowcake slurry spills, or radon gas or uranium particulate releases. Consequences of accidents to workers and the public would be generally low, except for a dryer explosion, which could result in worker dose above NRC limits. The likelihood of such an accident would be low, and therefore, the risk would also be low. Potential nonradiological accidents impacts include high-consequence chemical release events (e.g., ammonia) for both workers and nearby populations. As a result of operators following commonly applied chemical safety and handling protocols, the likelihood of such release events would be low. Consequently, the impacts are considered to be SMALL to MODERATE.

Radiological Impacts from ISR Process Accidents

A radiological hazards assessment considered the various stages within the ISR process. To prevent or mitigate accidents, ISR facilities are designed to contain releases and with controls, reduce the exposure to individuals in the event of an accident. As required by regulations, emergency response procedures would be in place to direct employee actions in the event of an accident. As part of worker protection, respiratory protection programs would be in place. In addition to the mitigation items discussed after each accident, additional measures would be in place to protect workers and members of the public. Employee personnel dosimetry programs are required. As part of worker protection, respiratory protection programs are in place as well as bioassay programs that detect uranium intake in employees.

Contamination control programs involve surveying personnel, clothing, and equipment prior to their removal to an unrestricted area.

Thickeners are used to concentrate the yellowcake slurry before it is transferred to the dryer. Radionuclides could be inadvertently released to the atmosphere through a thickener failure and spill. A tank failure or pipe break could cause the tank contents to spill inside and outside the building. There could be external doses from the spill to workers, but off-site individuals would be too far away to observe any effects. Doses to the unprotected worker could exceed the 5-roentgen equivalent man (rem) annual dose limit specified in 10 C.F.R. §20 if workers did not evacuate the area soon enough after the accident. Spills or leaks would normally be detected by loss of system pressure, observation, or flow imbalance. Operating procedures are developed for spill response.

Dryers used to turn wet yellowcake into dry powder present another potential hazard at an ISR facility. The two main types of dryers used are multihearth dryers for older facilities and rotary vacuum dryers for newer facilities. The multihearth dryers are assumed to be more hazardous than the rotary vacuum dryers because they operate at higher temperatures and may be direct gas fired. An explosion in the dryer could disperse yellowcake into the central processing facility. Assuming a conservative release of 2.2 pounds (lbs) of yellowcake and a respirable fraction of 1, a worker in a full-face-piece powered air-purifying respirator would obtain a dose of 8.8 rem, which would exceed the annual worker dose limit of 5 rem by 76%.

In the unlikely event of an unmitigated accident, radiation doses to the workers could have a MODERATE impact depending on the type of accident.

A.1.3.9 Traffic

For a proposed ISR mining facility, impacts could range from SMALL to MODERATE. Table 2.8-1 of the ISR GEIS (NRC, 2009a) presents vehicle trip estimates for the construction, operation, and decommissioning phases of ISR facilities. The majority of daily vehicle traffic would be generated by commuting personnel, with a small number of truck shipments per day (up to five). The ISR GEIS (NRC, 2009a) estimated that staff levels at ISR facilities range from about 20 to 200, depending on the scheduling of construction, drilling, and operational activities. For this HALEU EIS, the traffic analysis conservatively assumes that 400 daily vehicle trips from commuters would serve as an upper bound for potential daily traffic volumes (i.e., assuming 200 employees would result in one round trip or two vehicle trips per day).

For a proposed conventional mining facility, traffic impacts were assessed to range from SMALL to MODERATE, depending on the number and size of mining facilities that could be operating in a mining location. The following estimates on the number of workers and truck shipments from Alternative 3 of the ULP PEIS (DOE, 2014) were assumed for analysis of potential traffic impacts:

- An estimate of 126 workers during peak mining activities. This would result in approximately 126 daily round trips (or 252 vehicle trips) from commuting workers.
- An estimated 40 daily truck shipments (or 80 vehicle trips per day) from the mines to a mill. It was estimated that this would result in 2 to 3 additional truck shipments per hour, assuming a 16-hour workday for truck transport.
- Therefore, an estimated combined vehicle trips from conventional mining activities of up to 332 vehicle trips per day.

The additional vehicle trips from an ISR facility or conventional mine would result in increased congestion, delays, traffic hazards, and maintenance on the highways. Increases in the rate of required road maintenance could also occur from high traffic demands. The magnitude of estimated project-related transportation is expected to vary depending on whether or not expansion of an ISR or mining facility would be required or how many conventional mines would be operating at a given time. When considered with the regional annual average daily traffic (AADT) volumes, nearby public roadways would have sufficient capacity to handle the increases in daily traffic for an ISR facility or conventional mine, as long as baseline AADT volumes do not substantially increase from current volumes. Due to the potentially high increase in traffic volumes during commuting hours, traffic impacts from mining activities at ISR or conventional mining facilities would range from SMALL to MODERATE, depending on the number of personnel required.

A.1.3.10 Socioeconomics

Locations considered within this HALEU EIS are existing permitted mines on private lands; expansion of these mines within their permitted boundaries would be evaluated for socioeconomic impacts in future NEPA documentation with respect to the mining technique, site-specific conditions, and regional socioeconomic conditions. In general, existing permitted mining locations are located within relatively rural and undeveloped areas.

Major industrial projects have the potential to affect the socioeconomic dynamics of the communities in or around which they are situated. Capital expenditures and the migration of workers and their families into a community may influence factors such as regional income; employment levels; local tax revenue; housing availability; and area community services such as healthcare, schools, and public safety. Some existing permitted sites have been evaluated in previous NEPA documents that characterize and evaluate socioeconomic impacts on a site's ROI. The ROI for socioeconomic impacts is defined as a multi-county region encompassing the area in which the majority of proposed workers for HALEU mining or milling would be expected to reside and spend most of their salary, and in which a significant portion of site purchase and non-payroll expenditures from the construction, operation, and decommissioning phases of mining activities are expected to take place. With respect to the Proposed Action, the ROIs focus mainly on the host counties with existing permitted facilities and select surrounding counties with larger population centers and/or within potential commuting distance and where greatest impacts would be expected to occur.

For activities at a milling facility, Alternative 3 of the 2014 ULP PEIS (DOE, 2014) conservatively analyzed impacts for a peak year of mining activities and estimated 40 daily truck shipments (or 80 vehicle trips per day) of ore to the White Mesa Mill would occur under Alternative 3. The 2014 ULP PEIS noted that 150 employees worked at the White Mesa Mill under full operating conditions. As such, it is assumed that 150 workers would generate 300 daily vehicle trips. Therefore, a combined traffic volume of 380 daily vehicle trips from activities at the White Mesa Mill provides an upper-bound for traffic impacts and impacts would be considered SMALL as a result of the Proposed Action.

ISR Mining

The implementation of the Proposed Action could result in expansion of ISR mining occurring within existing permitted mining sites requiring construction of additional facilities. Potential impacts to socioeconomics would result predominantly from construction and operations employment at an ISR facility and demands on the existing public and social services, housing, infrastructure (schools, utilities), and the local workforce. The impact assumptions regarding workforce requirements used in the ISR GEIS are considered applicable to the Proposed Action and are carried forward in this analysis. The evaluation of employment impacts typically includes estimating the level of direct and indirect employment created by a proposed action. Direct employment refers to jobs created by the proposed construction activities and facility operations. Indirect employment refers to jobs created in the ROI to support the needs of the workers directly employed by a proposed action and jobs created to support site purchase and non-payroll expenditures.

The direct impact to population, employment, and social services from ISR mining activities would be dependent upon how many of the construction and operations workers would be obtained from within the ROI. If all workers were obtained from within an ROI, then there would be no change in the ROI total population; however, if any workers were introduced from outside the ROI, there would be potential impacts to regional demography in conjunction with the in-migration of the supporting workforce and their families. Where the impacts occur would also depend on where incoming workers chose to live, and whether there is good distribution across an ROI or workers concentrate in one area.

Construction

The general findings for construction impacts from ISR construction activities, as described in the ISR GEIS, are applicable to the Proposed Action and its associated regions of influence, as summarized below.

The NRC's ISR GEIS (NRC, 2009a) assumed that total peak construction employment would be about 200 people, including company employees and local contractors, depending on timing of construction with other stages of the ISR lifecycle. The construction period would be short term (12 to 18 months). The general practice would be to use local contractors as available; however, the ISR GEIS identified a potential influx population if the majority of construction requirements were filled by a skilled workforce from outside of the region—ranging from 480 to 560 persons, depending on location (uranium mining region)—if all workers brought their families, based on an average household size per family (the average household size was updated to reflect current averages for household size by state in 2021).

A total of about 140 ancillary (indirect) jobs could be created for the proposed HALEU ISR mining activities as a bounding analysis. However, in reality, construction workers are less likely to relocate their entire family to the region for short-term work thus minimizing impacts from an outside workforce. If the majority of the construction workforce is filled from within the region, impacts to population and demographics would be SMALL for the ROI, but the potential impact on smaller counties and communities could be MODERATE, especially if workers choose to live close to the mining site and concentrate in a small populated nearby community. In general, potential impacts would be greatest on local communities with small populations.

An influx of 200 workers would be expected to have a SMALL to MODERATE impact to the employment structure, depending on where the workers settle. The use of outside workers would be expected to have a MODERATE (beneficial) impact to communities with high unemployment rates due to the potential increase in job opportunities. But if the majority of construction workers are pulled from the local workforce, the impacts would be SMALL. In addition, relocated workers to the project area would contribute to the local economy through purchasing goods and services and taxes. Because of the small relative size of the ISR workforce, net impacts would be SMALL within the ROI and beneficial to the local economy. But the potential economic benefits upon smaller communities and counties could be MODERATE.

Local building materials and building supplies would be used to the extent practical. Most employees would live in larger communities with access to more services. Some construction employees, however, would commute from outside the county or the ROI to the ISR facility, and skilled employees (e.g., engineers, accountants, managers) would come from outside the local workforce. For purposes of this analysis, it is assumed that the majority of construction requirements would likely be filled by a skilled workforce from outside of the region. Assuming a peak workforce of 200, this influx of workers and their families could result in a SMALL to MODERATE impact in the region.

Local finance would be affected by ISR construction through additional taxation and the purchase of goods and services. Not all states have an income tax (e.g., Wyoming), but every state has other taxes (e.g., sales, lodging, use) that construction workers would be expected to contribute toward while working at the ISR facility. In addition, Wyoming imposes an "ad valorem tax" on mineral extraction. It is anticipated that ISR facility development could have MODERATE impacts on local finances within each of the ROIs; such impacts would be considered beneficial.

Operation

Employment levels for HALEU ISR facility operations would be less than those for construction, with total peak employment (50 to 80 personnel) depending on timing and overlap with other stages of the ISR lifecycle. Assuming the 70% of these workers would in-migrate to the area and bring their families, the potential impact to the local population and public services resulting from an influx of workers (maximum range of 50 to 60) and their families (total of 160 persons) would range from SMALL to MODERATE, depending on the location (proximity to a population center) of an ISR facility with the ROI.

Potential impacts on housing could be MODERATE at some locations, due to a limited number of available units (assumes one unit per worker family), if workers are not distributed throughout the ROI or there are no other large population centers within commuting distance.

The increase in job, income, and revenues generated from Federal, state, and local taxes on the facility and the uranium produced would result in a SMALL to MODERATE beneficial impact to the local and regional economy, similar to construction impacts, depending on the extent to which a local workforce is used. If the entire labor force came from outside the affected community, the economic impacts could be MODERATE in one of the smaller counties.

A.1.3.11 Environmental Justice

Although locations for mining and milling have not been determined, this section provides information on communities with environmental justice concerns obtained by determining select locations of current facilities, reviewing past NEPA documents, and updating U.S. Census data for cities, counties, and states. Although DOE acknowledges that not using block groups may mischaracterize the presence of communities with environmental justice concerns, due to the number of existing and historic mines that would need to be analyzed and considering overall costs and timeframe of obtaining data and conducting the analysis at the block group level, such an approach was not reasonable. The methodology for assessing minority and low-income populations for mining and milling only looked at a comparison of the city or county to the state and assessed if the city or county was greater than the state. A meaningfully greater analysis was not conducted since the analysis did not present the comparison of block group to county. Once locations have been determined, further analysis using current methodologies of comparing block groups to the reference community (e.g., county) and analyzing if these numbers are meaningfully greater, may be undertaken in future NEPA reviews by the relevant regulatory authority (e.g., NRC). Determination of impacts for these communities, however, was based on the findings of previous NEPA documents.

DOE's analysis focused on mining sites that were located predominantly in certain regions within the United States (i.e., Nebraska, Texas, New Mexico, Wyoming, Arizona, Colorado, Utah, and South Dakota) and narrowed further to certain counties and cities within those states. Table A-2 presents the minority and low-income demographics for select mining and milling locations.

Table A-2. Minority and Low-Income Demographics for Potential Mining and Milling Locations

Area Name	*Total Population*	*Minority*	*% Minority*	*Population for Whom Poverty is Calculated*	*Low-Income Population*	*% Low Income*
United States	333,036,755	136,997,971	41.1%	325,180,754	42,062,633	12.9%
Nebraska	1,951,480	435,835	22.3%	1,899,516	195,455	10.3%
Dawes	8,383	1,303	15.5%	7,422	1,033	13.9%
New Mexico	2,109,366	1,349,449	64.0%	2,067,620	378,896	18.3%
McKinley	72,946	67,130	92.0%	72,252	24,593	34.0%
South Dakota	881,785	169,050	19.2%	853,175	106,291	12.5%
Fall River	6,979	1,120	16.0%	6,777	1,201	17.7%
Custer	8,360	967	11.6%	8,186	936	11.4%
Texas	28,862,581	17,117,549	59.3%	28,260,264	3,965,117	14.0%
Goliad	7,085	3,035	42.8%	7,001	754	10.8%
Brooks	7,100	6,597	92.9%	6,493	2,437	37.5%
Duval	10,001	9,039	90.4%	9,433	2,225	23.6%
Wyoming	576,641	98,133	17.0%	563,382	60,482	10.7%
Campbell	46,758	6,216	13.3%	45,982	5,070	11.0%
Crook	7,185	496	6.9%	7,085	538	7.6%
Johnson	8,457	829	9.8%	8,370	1,382	16.5%
Converse	13,702	1,598	11.7%	13,557	1,068	7.9%
Sweetwater	42,459	9,216	21.7%	41,941	4,396	10.5%
Arizona	7,079,203	3,297,538	46.6%	6,926,281	934,911	13.5%
Mohave	211,274	50,870	24.1%	207,762	33,239	16.0%
Colorado	5,723,176	1,901,348	33.2%	5,605,422	535,976	9.6%
Mesa	154,685	30,556	19.8%	151,047	17,937	11.9%
Montrose	42,328	10,517	24.8%	41,904	4,844	11.6%
San Miguel	8,084	1,207	14.9%	8,046	754	9.4%
Utah	3,231,370	733,907	22.7%	3,182,692	278,486	8.8%
San Juan	14,610	8,266	56.6%	14,287	3,033	21.2%
Garfield	5,061	603	11.9%	4,870	761	15.6%

Key: % = percent
Note: Green shading indicates a minority population and yellow shading indicates a low-income population compared to the state.

To determine cumulative burdens, DOE's Energy Justice Mapping Tool – Disadvantaged Communities Reporter was used to identify areas as disadvantaged including among other factors, areas with high housing costs. Multiple sources of data that estimate cost of living by state and city were reviewed to determine if the potential locations would be considered high-cost housing when considering poverty levels for environmental justice analysis. Cities with high costs of housing tended to be major urban areas such as Seattle, Washington; San Fransisco, Los Angeles, and San Diego, California; Washington, DC; and New York City area. One city in western Arizona was listed (Lake Havasu City) as one of the 25 locations with the most expensive housing (Kiplinger, 2024).

Below are mining and milling locations analyzed in existing NEPA documentation, and some of which were analyzed by DOE as described above. Please reference Section 1.3.15, *Environmental Justice*, of the **Technical Report - Section 1.3.15 (Leidos, 2023)** for the complete analysis of these mining and milling locations.

La Jara Mesa – Cibola County, New Mexico

The environmental impacts from construction of the Proposed Action that have been discussed in this EIS would not disproportionately impact communities with environmental justice concerns because there are no communities within 10 miles of the site. The population of the census tract containing the project (34.5% minority) does not have a meaningfully greater minority status than other populations in the county or state as a whole or a disproportionately lower income (16.8% below the poverty level).

Roca Honda Mine – McKinley and Cibola Counties, New Mexico

The total population of McKinley County, New Mexico, is 72,902, of which 91.7% would be considered members of a minority population. The total population of Cibola County, New Mexico, is 17,172, of which 78.7% would be considered members of a minority population. Both counties' minority populations exceed 50% of their total populations. Both counties' minority population percentage is meaningfully greater than the percentage of minorities in New Mexico as a whole. Therefore, both counties are considered to be communities with environmental justice concerns. The total population of McKinley County, New Mexico, is 72,902, of which 33.5% would be considered a low-income population (USCB, 2023a). The total population of Cibola County, New Mexico, is 17,172, of which 27.3% would be considered a low-income population (USCB, 2023b). McKinley County's low-income population is 15.9% higher than New Mexico state's low-income population (17.6%) (USCB, 2023c) and is therefore considered to be a community with environmental justice concerns. The proposed Roca Honda mine would be likely to result in disproportionate and adverse impacts to these communities with environmental justice concerns.

These impacts could potentially create beneficial impacts due to the provision of jobs and economic opportunities in communities with environmental justice concerns; however, they are expected to cause adverse impacts of SMALL magnitude due to potential health risks for minors and nearby residents of San Mateo. Additionally, adverse mental health impacts of MODERATE magnitude would occur to Tribal nations due to mine development within the spiritually significant Mt. Taylor, which is designated as a traditional cultural property. This site is not expected to cause significant traffic or produce time delays. Therefore, impacts associated with access to recreation, hospitals and public health facilities, and places of worship would be minimal. Occupational health impacts to miners from exposures to unsafe levels of radon and other hazards would be SMALL. Public health impacts would be limited to fugitive dust, diesel and heavy vehicle emissions from activities of drilling, blasting, use of heavy equipment, and the transportation of materials; however, there are legacy health issues of concern as the proposed site is located in areas with unresolved legacy contamination. This site is not expected to expose children to toxic substances or radionuclides, though it would potentially create impacts of negligible to SMALL magnitude due to increased risk of inhaling fugitive dust and exhaust emissions from vehicles and mining equipment.

Both beneficial and adverse effects on communities with environmental justice concerns would likely be significant and cause disproportionate and adverse effects ranging from SMALL to MODERATE. The beneficial effects could occur by improving economic prospects for approximately two decades of the mine life in an area with high unemployment, high poverty rates, and high minority populations. The adverse effects would stem from factors such as health and environmental risks as well as spiritual and psychological harm inflicted on American Indian populations. Mitigations could be utilized to minimize the potential impacts.

Moore Ranch ISR Project – Campbell County, Wyoming

The proposed construction, operation, and decommissioning of the proposed ISR facility and aquifer restoration would not have disproportionate and adverse effects on communities with environmental justice concerns residing in the vicinity of the proposed Moore Ranch ISR Project.

Nichols Ranch ISR Project – Campbell, Johnson, and Natrona Counties, Wyoming

No disproportionate and adverse impacts would occur because no significant concentrations of communities with environmental justice concerns live within the project's ROI, which consists of Campbell, Johnson, and Natrona Counties.

Lost Creek ISR Project – Sweetwater County, Wyoming

No communities with environmental justice concerns were identified in the vicinity of the proposed Lost Creek ISR Project. Therefore, there would be no disproportionate and adverse impacts on communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the proposed ISR facility at Lost Creek.

Dewey-Burdock Project – Custer and Fall River Counties, South Dakota, and Weston County, Wyoming

The percentage of minority populations living in affected block groups in the vicinity of the proposed Dewey-Burdock ISR Project site in Custer and Fall River Counties in South Dakota and Weston County in Wyoming is not meaningfully greater than the percentage of minority populations recorded at the state and county levels and is well below the national level. Furthermore, the percentage of low-income populations living in affected census tracts in the vicinity of the proposed project site in Custer, Fall River, and Weston Counties is not meaningfully greater than the percentage of low-income populations recorded at the state or county level. Therefore, there would be no disproportionate and adverse impacts on communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the proposed Dewey-Burdock ISR facility.

Ross ISR Project – Crook County, Wyoming

No communities with environmental justice concerns were identified in the vicinity of the proposed Ross ISR Project. Therefore, there would be no disproportionate and adverse impacts on communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the Ross ISR Project.

Reno Creek ISR Project – Campbell County, Wyoming

The percentage of minority populations living in affected block groups in the vicinity of the proposed Reno Creek ISR Project area in Campbell County, Wyoming, is not meaningfully greater than the percentage of minority populations recorded at the state and county level and is well below the national level. Furthermore, the percentage of low-income populations living in affected census tracts in the vicinity of the proposed project area is not meaningfully greater than the percentage of low-income populations recorded at the state or county level. Therefore, there would be no disproportionate and adverse impacts to communities with environmental justice concerns from the construction, operation, aquifer restoration, and decommissioning of the proposed Reno Creek ISR Project.

Based on public comments on the Draft HALEU EIS, it is noted that the environmental justice analysis included comparing demographics for San Juan County to the state of Utah, the location of White Mesa Mill, La Sal Mines Complex, and the Ute Mountain Ute Tribe. San Juan County was identified as having both minority and low-income populations. The Roca Honda Mine (in the Cibola National Forest, McKinley County, New Mexico) is described based on previous NEPA and DOE's analysis presented in Table A-2, *Minority and Low-Income Demographics for Potential Mining and Milling Locations*, and indicates that

McKinley County and Cibola County would be considered minority populations. Therefore, San Juan County, McKinley County, and Cibola County include communities with environmental justice concerns. The HALEU EIS concludes that both beneficial and adverse effects on communities with environmental justice concerns would likely be significant and cause disproportionate and adverse effects ranging from SMALL to MODERATE. The beneficial effects could occur by improving economic prospects for approximately two decades of the mine life in an area with high unemployment, high poverty rates, and high minority populations. The adverse effects would stem from factors such as health and environmental risks as well as spiritual and psychological harm inflicted on Tribal populations. Mitigations could be utilized to minimize the potential impacts. Table A-2 also contains data on Mohave County in Arizona as a surrogate potential location of a mining facility. Pinyon Plain Mine is located in adjacent Coconino County, Arizona. Specific impacts may be assessed in future NEPA review by the relevant regulatory authority (e.g., NRC).

A.1.3.12 Legacy Health Issues

The NEPA documents used as source information for the health and safety assessment all indicated that going forward impacts to the public and workers were expected to be SMALL. However, mining in particular has legacy issues[10] associated with past operating practices and mine reclamation and restoration activities. The differences in projected and past impacts can be attributed to improvements in mining techniques and regulatory oversight. However, the legacy of past operations has left many in the public concerned, particularly those impacted by past operations including minority and indigenous peoples. Given the lack of site-specific information and the range of potential locations for all of the fuel cycle facilities, collection and analysis of affected environment information (e.g., legacy impacts, monitoring data, etc.) at existing sites would not be a reasonable undertaking. Additionally, much of the information would also ultimately not be relevant to any future environmental review of specific sites. Thus, a full discussion of the existing environments and the impact on those existing environments, including legacy impacts, is best left to site-specific environmental analysis under the relevant regulatory authority. However, the following discussion has been added to discuss, generally, issues of legacy impacts.

Mining

Historical conventional mining and to an extent milling have resulted in legacy issues, some of which impact the health of the local communities, including Native American communities. By some measures, this legacy has had a significant health effect for some residents in the past and continues to affect health in the present. These issues may remain deeply embedded within the social history and collective psyche of these communities and continue to affect perceptions of communities toward new proposed projects (USDA, 2013).

The following discussion is from a Draft EIS for the Roca Honda Mine (USDA, 2013), but the sentiments regarding legacy issues are not isolated to this one mining region. By some studies, a direct result of previous mining activity is increased instances of diseases experienced by miners, their families, and other community members. As many of the miners were members of Native American communities, the health impacts were particularly felt by them and their families. There is a perception that the full extent of health impacts from uranium mining and milling remains uncertain (USDA, 2013).

In addition, in many areas where uranium mining may occur in the future there are unreclaimed mining sites, including on Native American lands that may continue to affect health. While assessment programs

10 Legacy issues pertain to the historical impacts of uranium mining and milling, including peoples' biophysical, social, and political experiences.

and plans have been initiated to reclaim the land and rectify some of the environmental and health legacy, there is a feeling from some residents that the cleanup effort has not gone quickly enough. This has led to a lack of trust in government and in mining companies (USDA, 2013).

While actual impacts on human health from mines operated adhering to modern health and safety requirements (e.g., improved mine ventilation, more extensive dust control requirement for personnel and vehicles) and ore handling protocols are expected to be SMALL (see Section 1.3.11 of The Technical Report supporting this EIS (Leidos, 2023)), concerns about health impacts from operations on the part of Native Americans and others, along with actual changes to water and land from the project in the vicinity of sacred lands, may have real effects on the mental and physical health of some community members. This may include stress and anxiety levels, which in turn, impact the mental, physical, and social health effects of these local populations (USDA, 2013). In addition to the legacy human health impacts Tribes also have expressed concerns with the impact of mining on natural resources. The same contamination that could result in health impacts could also affect the native environment. Both waters and land from prior mining operation and the unreclaimed lands from abandoned mines are a concern. Mine waste piled near unclaimed mines could be a source of both offsite land (radionuclides transported offsite by wind) and water (radionuclides transported by seepage and erosion into surface water) contamination. Groundwater contamination has also been observed due to the migration of waters through mines. Contamination spreading offsite (away from the mine) has the potential to affect ecological and historic and cultural properties. At a minimum, the wastes and byproducts remaining at mine sites could, and often do, result in lack of access to some lands and waters.

Milling

The Utah Division of Waste Management and Radiation Control evaluated the dose to various public receptors for operation of the White Mesa Mill during the years 2007 to 2014. During this period, the mill did not operate full time; the highest usage occurred in 2011 when the plant operated at 68% capacity. Annual doses to three public receptors were evaluated in the assessment: a residential individual, a worker at a facility other than the White Mesa Mill, and a recreational camper using the Federal lands near the White Mesa Mill for no more than 14 days (the limit for camping on Federal lands). The State of Utah and EPA regulations provide limits for public exposure to radiation from fuel cycle facilities. State Rule R313-15-301 specifies that a member of the public cannot be exposed to a dose that exceeds 100 mrem in a calendar year from the licensee's operations, including from radon emissions. Utah R313-15-101(4) states that the individual dose from air emissions of radioactive material to the environment, excluding radon and its decay products, is limited to 100 mrem in a calendar year. EPA's requirement found in 40 C.F.R. §190.10(a) limits an individual member of the public to a dose of less than 25 mrem to the whole body. Based on the assessment of operating data, considering the three receptors identified above, the Utah Division of Waste Management and Radiation Control estimated the maximum for these three doses during the period considered to be 6.17 mrem, 2.95 mrem, and 16.2 mrem: all below the regulatory limits (UDWMRC, 2017).

In response to a request from the Ute Mountain Ute Tribe, ATSDR provided assistance in evaluating radiological and chemical data collected by the Tribe for the area around the White Mesa Uranium Mill (UDWMRC, 2017). The request asked for assistance in evaluating "(1) if exposures could occur from inhalation of suspended radiological waste products and if on-site settling ponds could impact aquifers used for drinking water; (2) if radon from the mill and settling ponds is impacting people at the mill fenceline and at residences nearby; (3) if soil and vegetation in the public lands surrounding the mill poses a health hazard to people; and (4) if springs and seeps pose a health hazard to people." With the data provided, the ATSDR was able to reach the following conclusions:

- Children and adults living in White Mesa are unlikely to be harmed from breathing radiological contaminants in the air. Residential air exposures do not result in elevated risks of adverse cancer or non-cancer health effects from radiological material. Annual doses from airborne radionuclides ranged from 9 to 23 mrem per year.
- Children and adults who drink the water from the Ute Mountain Ute Tribe public water system are unlikely to be harmed from radiological contaminants. Residential drinking water quality reports are within EPA regulatory limits. For radiological water quality standards, these limits have been shown to be protective of human health and are below the ATSDR minimal risk level and were not evaluated further.

The ATSDR recommended that the Ute Mountain Ute Tribe continue to monitor drinking water and collect air, water, and soil samples.

However, the local community is concerned with the impacts from past operations, including releases of contaminants to the air and water supplies that could still be causing health effects in the local community. Much like the legacy impacts of mining, these impacts potentially have direct (radiation induced illness) and indirect (mental and physical stress induced illness) among the local population. However, due to a lack of information, the ATSDR was not able to address the potential impacts from radon nor the potential impacts from radionuclides in the environment (soil, vegetation, non-public water supplies) (ATSDR, 2023).

A.2 Uranium Conversion

The 34-page Section 2 of the **Technical Report - Section 2 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

A.2.1 Introduction

In support of the Proposed Action, HALEU conversion facilities would be needed to convert natural uranium yellowcake (the product of uranium extraction from uranium ore-bearing material) to uranium hexafluoride (UF_6) that would be used as feed material for a HALEU enrichment facility.

Only one domestic conversion facility currently exists in the United States, the Honeywell International Metropolis Works Uranium Conversion Facility (the Metropolis Works Plant, or "the Metropolis facility") near Metropolis, Illinois.[11] This NRC-licensed facility restarted operations in April 2023 after over 5 years in a ready-idle mode. The Metropolis facility has the licensed capacity to produce up to 15,000 metric tons per year (MT/yr) of UF_6. To meet the amount of HALEU required under the Proposed Action, about 20% of the plant's capacity would be utilized. The prior NEPA analysis for that site is used in this HALEU EIS to develop the assessment of the potential impacts of converting about 2,500 MT/yr of yellowcake annually into the 3,100 MT/yr of UF_6, annually, for subsequent use in a HALEU enrichment facility.

Existing NEPA documentation regarding construction of a new conversion facility is unavailable.[12] Thus, NEPA documentation for construction and operation of a deconversion facility, *Environmental Impact*

11 ConverDyn, a general partnership between Honeywell and General Atomics, acts as the sole marketing entity for UF_6 produced at the Metropolis facility.

12 The Metropolis EA (NRC, 2019) was prepared to support relicensing of the facility and therefore only evaluates continued operations.

Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico – Final Report (referred to as the "Fluorine/DU EIS") (NRC, 2012a), was used as the basis for the analysis of the construction of a new conversion facility. The construction of any new conversion facility would require separate site-specific environmental analysis prepared by the relevant regulatory authority (e.g., NRC).

A.2.2 Analysis Methodology

A.2.2.1 Approach to NEPA Analyses

The conversion activity for the Proposed Action includes operation of a conversion facility for about 6 years. This could be at either a new facility or the Metropolis facility, which would require no modifications to meet the project conversion demands. Although the Metropolis facility is referenced specifically, the use of the available NEPA documentation for this facility provides information on the kind and significance of impacts that could be incurred through the use of any existing or new facility. In no way is the application of previous NEPA analysis intended to indicate a preference for the use of any particular facility in the HALEU fuel cycle.

No conversion facility has been constructed in the United States since the construction of the Metropolis facility, built in 1958. As this is well before NEPA was enacted, little to no environmental information is available for the construction of a conversion facility. However, a new conversion facility would be a new chemical processing facility. The effort, materials, and impacts of its construction would not be significantly different from a comparably sized facility that performs a different but similar chemical processing function. This HALEU EIS assesses impacts associated with the construction of several types of facilities: enrichment, deconversion, and storage. For the assessment of the impacts of constructing a conversion facility, the construction of the deconversion facility could be used as a surrogate. The proposed fluorine extraction process and depleted uranium (DU) deconversion plant in Lea County, New Mexico, is sized to process 3,400 metric tons (MT) of DU per year (NRC, 2012a). A conversion facility producing enough UF_6 to support the production of 290 MT of HALEU would operate with an annual production capacity of approximately 2,520 MT/yr of yellowcake (assuming 6 years of operation). As a first approximation, the new conversion facility would be slightly smaller than the proposed deconversion facility and the impacts of constructing the conversion facility should be bound by those of constructing the deconversion facility.

The NRC completed the *Environmental Assessment for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois)* (referred to as the "Metropolis EA") that evaluated the impacts of renewing the operating license of the Metropolis facility for 40 years (NRC, 2019). The affected environment discussions and environmental impact analyses for the operation of a HALEU conversion facility are adopted by reference from the Metropolis Environmental Assessment (EA) (NRC, 2019) for the Metropolis facility, with additions to update the discussions to current conditions where needed. The impact analyses take into consideration that the annual conversion demand for the Proposed Action would be about 20% of the annual conversion production and resulting impacts evaluated in the Metropolis EA. In other words, annual impacts identified in the Metropolis EA would substantially bound annual impacts expected from the Proposed Action. However, short-term impacts, such as a daily period, could be similar between the HALEU activities and the activities evaluated in the Metropolis EA (although most of the impacts identified in the Metropolis EA are expressed as annual impacts). The analyses consider project and environmental controls, and if needed, mitigations that would minimize project impacts.

The impact analyses for conversion in the HALEU EIS include the same impact conclusion statements as those stated in the Metropolis EA, such as the project impact "would not be significant" or "would have no significant impacts."

Environmental Justice

For environmental justice, DOE presented conclusions from existing NEPA documents since site locations are not being determined pursuant to this EIS. The Metropolis EA (NRC, 2019a) concluded that the continued operations would not cause noticeable impacts on populations living near the Metropolis facility and therefore would not cause disproportionately high and adverse human health and environmental effects on minority or low-income populations. Metropolis is the only facility in the United States that performs commercial-scale uranium conversion; therefore, additional block group analysis was conducted for this facility (**Technical Report - Section 2.3.2.15 (Leidos, 2023)**). The new analysis determined that there are potential communities with environmental justice concerns; however, impacts from the HALEU conversion activities to minority or low-income populations would be SMALL and not be disproportionate or adverse.

A.2.2.2 Existing NEPA Documentation

As discussed previously, the Metropolis facility has sufficient conversion capacity to support the needs of the Proposed Action. The Metropolis EA (NRC, 2019) covers all the activities associated with uranium conversion and was used to determine potential impacts associated with facility operations. Potential impacts for construction of a new facility were extracted from the Fluorine/DU EIS as a surrogate. These documents and other NEPA resource documents include:

- *Final Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico, NUREG-2113* (NRC, 2012a)
- Metropolis EA (NRC, 2019)

A.2.3 Potential Environmental Consequences

The environmental consequences associated with the operation of a HALEU conversion facility to produce the quantities of UF_6 needed to support the Proposed Action are expected to be bounded by the consequences of operation of the Metropolis facility at full capacity as analyzed in the EA produced during the license renewal for that facility.[13] Therefore, DOE has summarized the environmental consequences information from the Metropolis EA (NRC, 2019) and used this information to inform the assessment of the impacts associated with operation of a HALEU conversion facility in support of the Proposed Action. Potential impacts for construction of a new facility were developed using information from the Fluorine/DU EIS (the International Isotopes Fluorine Products, Inc. [IIFP] facility).

The Proposed Action's impact assessments for uranium conversion are presented in Table A-3 below. After the table, see Section A.2.3.1, *Ecological Resources*, through Section A.2.3.3, *Socioeconomics*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding a conversion facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.2.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-3 provides key information that was used

[13] The NRC renewed the license for the Metropolis facility in March 2020, which expires on March 24, 2060.

in the determination of the Proposed Action impact assessments. Where applicable, differences between the Metropolis and IIFP facilities are noted. Section 2 of the Technical Report (Leidos, 2023) provides the technical backup for this portion of the Final EIS. **Technical Report - Section 2 (Leidos, 2023)**

Table A-3. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**No significant impact or SMALL**	Land Disturbed (acres)	NA – Metropolis 40 – IIFP
		Total Site Size (acres)	1,000 – Metropolis 640 – IIFP
Visual and Scenic Resources	**No significant impact or SMALL**	Tallest Substantial Structure (other than met/T-line towers) (feet)	100 – IIFP
		Distance to Nearest Receptor (miles)	1.6 – IIFP
		BLM VRM Rating	Class IV – Metropolis
Geology and Soils	**No significant impact or SMALL**	Backfill Needed (cubic yards)	NA – Metropolis 200 – IIFP
Water Resources	**No significant impact or SMALL**	Effluent Discharge	Stormwater runoff and treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	3,024 to 4,464 – IIFP
		Floodplains	While portions of the property are located within a floodplain, the Metropolis facility restricted area (i.e., where facilities are built/utilized) is not.
Air Quality [(c)]	**No significant impact or SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust.
		Operations emissions	Emissions from (1) vehicles; (2) uranium compounds, hydrogen fluoride, and other gaseous and particulate effluents released from rooftop vents; and (3) process equipment. Emission controls and regulatory compliance required by a state permit and the NRC would limit emissions to acceptable levels and less than the NAAQS.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	None – Metropolis SMALL – IIFP
Historic and Cultural Resources	**No impacts or SMALL to MODERATE**	NRHP property potentially disturbed or impacted	No – Metropolis No – IIFP
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for Metropolis or IIFP
Infrastructure	**No impacts or SMALL**	Electrical Use	No increase in utility usage for Metropolis
		Water Use	See Water Resources
		Fuel Use	No increase in utility usage for Metropolis

Table A-3. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Noise	**No significant impacts or SMALL**	Distance to Off-Site Receptor (miles)	0.3 – Metropolis 1.6 – IIFP
		Noise Levels	Noise levels would remain at baseline levels for Metropolis. Below EPA guideline of 55 dBA as L_{dn} for residential zones for IIFP.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**No significant impacts or SMALL**	Occupational Risk	The Metropolis facility has had no occupational fatalities and the reportable work injury rate was 2.5/yr for the period of 2010 to 2014. Fewer than 100 accidents and no fatalities for construction at IIFP.
		Construction Radiological Impacts (mrem/yr)	NA – Metropolis Worker: 5 to 89 – IIFP No impacts to the public – IIFP
		Operations Average Worker Dose (mrem/yr)	127 – Metropolis 75 – IIFP
		Operations MEI Public Dose (mrem/yr)	2.17 – Metropolis 0.002 – IIFP
		Operations Population Dose (person-rem/yr)	4.52 – Metropolis 0.04 – IIFP
		Operations Chemical Risk	Uranium and fluorine are the primary chemical hazards.
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	The most significant accident consequences could result in a worker dose of 122 rem and an off-site population dose of 72 person-rem. All the accident scenarios predict less than one lifetime cancer fatality in the off-site population.
		Chemical Accidents	The most significant accident consequences could result in workers exposed to hydrogen fluoride at 58,500 mg/m^3 with 26.4 mg/m^3 at the controlled area boundary. Consequences to the maximally exposed member of the public are high on the basis of uranium exposure (> 13 mg/m^3) and intermediate for hydrogen fluoride exposure (between 0.8 and 28 mg/m^3).
Traffic	**SMALL**	Construction – Daily Vehicle Trips: Workers/Trucks	NA – Metropolis 280/40 –IIFP

Table A-3. Uranium Conversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	HALEU Activity Impact Assessment [(a)]	Impact Indicator	Key Information [(b)]
		Operations – Daily Vehicle Trips: Workers/Trucks	422/20 – Metropolis 280/20 – IIFP
Socioeconomics	**SMALL to MODERATE**	Peak Construction Employment (direct)	NA – Metropolis 140 – IIFP
		Operations Employment (direct)	298 – Metropolis 140 – IIFP
		ROI Labor Force	36,679 – Metropolis
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected**	Minority or low-income population in ROI	1 minority and 7 low-income block groups near Metropolis. Nearest community with environmental justice concerns is 14 miles from IIFP.

Key: > = greater than; BLM VRM = Bureau of Land Management Visual Resources Management; dBA = A-weighted decibels; EPA = U.S. Environmental Protection Agency; ft = feet; gpd = gallons per day; HALEU = high-assay low-enriched uranium; IIFP = International Isotopes Fluorine Products; L_{dn} = day-night average sound level; LLW = low-level waste; MEI = maximally exposed individual; mg/m^3 = milligram per cubic meters; MLLW = mixed low-level waste; mrem/yr = millirem per year; NAAQS = National Ambient Air Quality Standards; NEPA: National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; ROI = region of influence

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site of new construction.

[b] Details regarding the impacts of operating an existing uranium conversion facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.2.2.2, *Existing NEPA Documentation*. Sections 2 and 2.3 and Table 2-6 of the **Technical Report - Section 2 (Leidos, 2023)** provide the technical support for this portion of the Final EIS.

[c] The impacts of GHGs are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.2.3.1 Ecological Resources

Impacts on ecological resources from the construction of a new conversion facility could occur from removal or degradation of vegetation, wildlife habitats, wetlands, and Federal- and state-listed species, as well as by contamination by radioactive or hazardous materials via an airborne or waterborne pathway. Construction of a new conversion facility at an existing industrial site would likely occur on previously disturbed areas and have the potential to impact up to 40 acres. Impacts to ecological resources would be SMALL if new construction were to occur entirely within previously developed and disturbed lands. Construction of a new conversion facility at a new location has the potential to impact terrestrial and aquatic resources, wetlands, and threatened and endangered species. The degree of impact, while limited due to the relatively small size of the facility and the implementation of BMPs, would be dependent upon the ecological characteristics of the selected site. While the Fluorine/DU EIS (NRC, 2012a) identified impacts as SMALL for construction, any new construction occurring within undeveloped lands could have SMALL or MODERATE impacts on ecological resources depending on the resources disturbed, mitigation, and the minimization measures employed. An inventory of threatened or endangered species would be developed during site-specific reviews to identify unique or special habitats, and Endangered Species Act consultations conducted with the USFWS would assist in reducing/avoiding adverse impacts. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

A.2.3.2 Historic and Cultural Resources

The impacts on historic and cultural resources of construction of a new conversion facility at an existing uranium fuel cycle facility or industrial site on previously disturbed land, would likely be SMALL. Construction of a new conversion facility at an undeveloped location has the potential to impact historic and cultural resources. The degree of impact, while limited due to the relatively small size of the facility and the implementation of BMPs, would be dependent upon the historic and cultural characteristics of the selected site. Because of this, the impacts of construction at a previously undeveloped site are expected to be SMALL to MODERATE.

A.2.3.3 Socioeconomics

Given the small in-migrating population expected to move into the area and the fact that all the potential sites are well established industrial sites, the socioeconomic impacts associated with a new conversion facility would be expected to be SMALL in the ROI. In addition, the economic impacts (e.g., increased jobs, income, and tax revenues) would be considered beneficial to the local and regional economy. In the event a larger (than analyzed) workforce moved into the ROI and a majority of workers chose to reside in the host county, particularly at one of the sites where the host county is more rural in nature and has lower population numbers (and a low population density), the potential impacts could be SMALL to MODERATE, as the higher numbers could adversely affect housing availability and community services such as education, fire protection, law enforcement, and medical resources. At the same time, however, the corresponding increases in income, spending, and tax revenues that would result from a larger workforce would help benefit the local economy, and the increased revenues could be used to enhance existing public services that might be deficient.

A.3 Uranium Enrichment

A.3.1 Introduction

As part of the Proposed Action and related activities, a HALEU enrichment facility would enrich natural uranium to at least 19.75 and less than 20 weight percent uranium-235 (U-235). Current domestic enrichment facilities are licensed to enrich uranium to LEU levels of about 5% and a demonstration project for enrichment to HALEU is also underway Enrichment of uranium less than 10% can be done in an NRC Category III facility (the lowest security category for fuel cycle facilities). Enrichment levels between 10% and 20% requires greater security (NRC Category II). Using the excess capacity of existing facilities to enrich uranium up to less than 10% may be more economical, in that it could result in the construction of smaller NRC Category II enrichment facilities for the HALEU program. Using existing facilities is only one option for creating a HALEU enrichment capability. Several options are available to support the domestic, commercial production of HALEU enriched to at least 19.75 and less than 20 weight percent U-235:

- Construction of a new enrichment facility capable of using natural uranium as feed and producing HALEU enriched to at least 19.75 and less than 20 weight percent U-235
- Modification of existing enrichment facilities that currently produce LEU
- Use of existing enrichment facilities to produce LEU and augmentation of the existing facilities with new facilities to enrich the LEU to HALEU

This EIS considers three uranium enrichment sites as the basis for the assessment of impacts from the construction and operation of a HALEU enrichment facility; the Urenco USA (UUSA) National Enrichment

Facility (NEF) in Lea County, New Mexico, the Centrus American Centrifuge Plant in Piketon, Ohio, and a proposed Global Laser Enrichment (GLE) facility in Wilmington, North Carolina.[14]

Section 3 of the **Technical Report - Section 3 (Leidos, 2023)** provides the technical support for this portion of the Final HALEU EIS.

A.3.2 Analysis Methodology

A.3.2.1 Approach to NEPA Analyses

In this section, DOE analyzed the potential impacts of constructing and operating a HALEU enrichment facility using gaseous centrifuge enrichment at the UUSA site in Eunice, New Mexico; gaseous centrifuge enrichment at the Centrus Energy site in Piketon, Ohio; and SILEX (laser) enrichment at the GLE site in Wilmington, North Carolina.

While enrichment facilities at one or more of these locations could supply enriched uranium to support the HALEU commercialization effort, DOE has considered the construction and operation of a facility that could produce up to 38 MT of HALEU in the form of UF_6 enriched to 19.75% U-235 per year at each location. This approach provides the upper bound of impacts that could occur at each site. To meet the required production of 50 MT/yr of HALEU metal, multiple enrichment facilities would be needed.

This HALEU EIS extracts from and incorporates, by reference, prior NEPA documentation and analysis conducted at each site (i.e., UUSA, Centrus, and GLE). These facilities were designed to produce LEU enriched from less than 5% to less than 10% U-235. This HALEU EIS considers new facilities that would be required at each site to support approximately 1.1 million separative work units (SWUs) per year to produce 38 MT of HALEU in the form of UF_6. Construction of a new HALEU facility at the Centrus or GLE site would be expected to take place in areas previously designated for commercial enrichment facilities that were licensed but never constructed. If new construction occurs outside of previously planned areas, it is still expected that the new facilities would remain within existing site boundaries, thereby avoiding sensitive resources in the surrounding environment. For example, the expansion of the UUSA NEF to a 10 million SWU capacity (see Figure A-1) would result in additional buildings being constructed within the existing plant site boundaries.

14 The GLE facility had applied for an NRC license and submitted environmental documentation in support of the license application. The application was terminated by the applicant before the facility was constructed.

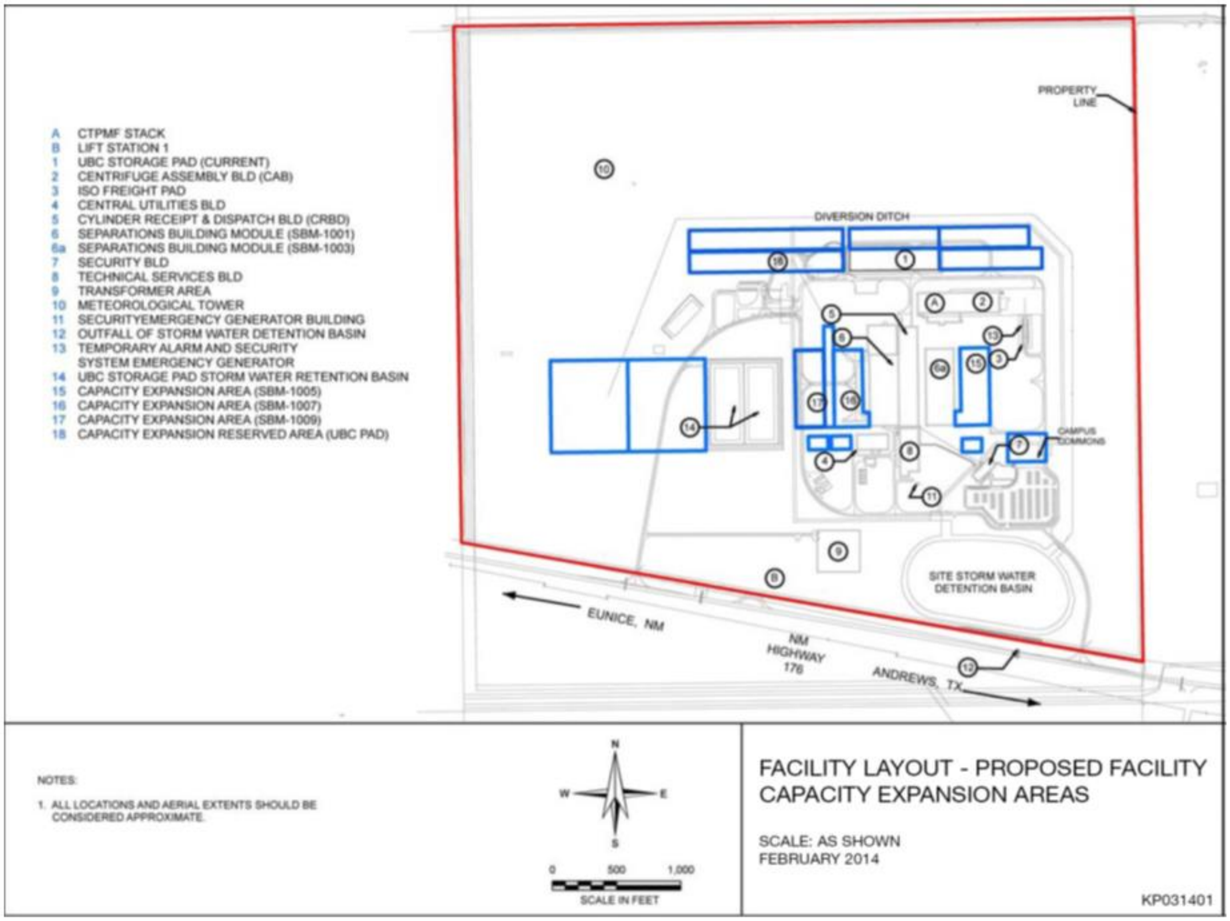

Figure A-1. 2014 Proposed Expansion to 10 Million SWUs (NRC, 2015)

A commercial enrichment facility for LEU has been constructed and is currently operating at the UUSA site. This HALEU EIS assumes that a HALEU facility at this location would be in addition to the facilities that are currently enriching uranium at that site.

When extracting from prior analyses in existing NEPA documents, DOE reviewed potential changes in baseline data or circumstances, as well as any unique differences related to HALEU enrichment compared to LEU enrichment. HALEU collection, storage, and transport would require some modifications compared to the same actions in an LEU enrichment facility. Preventing an accidental criticality would require administrative controls (potentially more stringent than for LEU) and could require equipment modifications for feed withdrawal from the centrifuges. These changes would be a minimal part of the enrichment process (relatively small quantity of HALEU material compared to feed material and DU) and thus, should not greatly change the assessment of impacts between an LEU enrichment facility and a HALEU enrichment facility. This HALEU EIS focuses on these changes and differences when presenting affected environment and analyzing potential impacts. It is important to note that a HALEU facility at one of these locations will require either a license amendment or new license for special nuclear material (SNM). The respective applications would include facility details that are not known at this time that would be reviewed by the NRC under NEPA.

A.3.2.2 Existing NEPA Documentation

The NRC prepared EISs for all three commercial enrichment facilities. In addition, the NRC prepared an EA for the UUSA site (NRC, 2015) for the expansion of the facility from 3 million SWUs per year to

10 million SWUs per year. The NRC also prepared EAs for the Centrus site for a centrifuge demonstration project (at the Lead Cascade Facility) in 2004 and for an amendment to the facility license to demonstrate HALEU production in 2021 (NRC, 2021a). These documents and other NEPA resource documents include:

- **UUSA** – *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico, Final Report, NUREG-1790* (NRC, 2005a)

  Environmental Assessment for the Proposed Louisiana Energy Services, URENCO USA Uranium Enrichment Facility Expansion, Lea County, New Mexico (NRC, 2015)
- **Centrus** – *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio, NUREG-1834* (NRC, 2006)

  Finding of No Significant Impact for the United States Enrichment Corporation Incorporated, American Centrifuge Lead Cascade Facility at Piketon, Ohio (DOE, 2004a)

  Environmental Assessment for the Proposed Amendment of the US Nuclear Regulatory Commission License Number SNM-2011 for the American Centrifuge Plant in Piketon, Ohio (NRC, 2021a)
- **GLE** – *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina, NUREG-1938* (NRC, 2012b)

  Note: The 2008 Environmental Report (ML090890503) submitted to the NRC in support of the license application may also contain relevant information.

Additional NEPA documents related to DU management that may be useful are:

- *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269)* (DOE, 1999)
- *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site (DOE/EIS-0359)* (DOE, 2004b)
- *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site (DOE/EIS-0360)* (DOE, 2004a)
- *Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride (DOE/EIS-0359-S1 and DOE/EIS-0360-S1)* (DOE, 2020)

A.3.3 Potential Environmental Consequences

The environmental consequences from construction and operation of a facility that enriches natural uranium to 19.75% HALEU are expected to be comparable to those from a facility that enriches to 5% LEU. Therefore, DOE reviewed the environmental consequences information from existing NEPA documents for the three enrichment facilities identified above and used this information to inform the assessment of the impacts associated with construction and operation of a HALEU enrichment facility.

The Proposed Action's impact assessments for enrichment are presented in Table A-4 below. After the table, see Section A.3.3.1, *Water Resources*, through Section A.3.3.7, *Environmental Justice*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding an enrichment facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.3.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-4 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences between UUSA, Centrus, and GLE are noted. Section 3 of the **Technical Report - Section 3 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

Table A-4. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	394 – UUSA 51 – Centrus 226 – GLE
		Total Site Size (acres)	543 – UUSA 3,700 – Centrus 1,621 – GLE
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers) (ft)	131 – UUSA 160 – GLE
		BLM VRM Rating	Class III or IV
Geology and Soils	**SMALL**	Rock and Soil Excavated	Minimal
		Backfill Needed	Minimal
Water Resources	**SMALL to MODERATE**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	44,500 – UUSA 650,000 – Centrus 86,000 – GLE
		Floodplains	While portions of the GLE site are located within the floodplain, the North-Central Site Sector in which facilities are located is not.
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust. Activities would not contribute to an exceedance of a NAAQS with the implementation of mitigation measures.
		Operations emissions	Emissions from (1) vehicles; (2) uranium compounds, and hydrogen fluoride; and (3) process equipment and backup diesel generators. Facility air emissions would be below applicable regulatory levels and would not contribute to an exceedance of a NAAQS.

Table A-4. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	None – UUSA MODERATE – Centrus SMALL to MODERATE – GLE
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP Property Potentially Disturbed or Impacted	No – UUSA Yes – Centrus Mitigations would be utilized to minimize the potential environmental consequences identified.
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for UUSA, Centrus, and GLE
Infrastructure	**SMALL to MODERATE**	Electrical Use	13 MW – UUSA 16% of analyzed capacity for Centrus 18% of analyzed capacity for GLE
		Water Use	See Water Resources
		Fuel Use	48 million cubic ft/yr natural gas – UUSA 16% of analyzed capacity for Centrus 18% of analyzed capacity for GLE
Noise	**SMALL to MODERATE**	Distance to Off-Site Receptor (miles)	2.6 – UUSA 0.6 – Centrus 0.8 – GLE
		Noise Levels	Construction noise 53 L_{dn} Operations noise primarily inside buildings.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	Fewer than 100 accidents and no fatalities for construction 4 injuries per year and no fatalities for operations
		Construction Radiological Impacts (mrem/yr)	Worker: 5 – UUSA 89 – Centrus 10.5 – GLE No impacts to the public.
		Operations Average Worker Dose (mrem/yr)	97 – UUSA 29 – Centrus 50 to 75 – GLE

Table A-4. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
		Operations MEI Public Dose (mrem/yr)	0.002 – UUSA 0.03 – Centrus $5x10^{-5}$ – GLE
		Individual facilities – Operations Population Dose (person-rem/yr)	0.0047 – UUSA 0.45 – Centrus 0.1 – GLE
		Operations Chemical Risk	Any potential exposures would be mitigated to minimize the impacts.
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	The most significant accident consequences could result in a worker fatality on-site from a criticality, a worker dose of 13 rem, 0.97 rem to the MEI, and a population dose of 12,000-person rem with 7 LCFs. Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
		Chemical Accidents	The most significant accident consequences could result in workers exposed to 18,000 mg/m^3 uranium and 6,250 mg/m^3 hydrogen fluoride, with 9.12 mg/m^3 uranium and 3.45 mg/m^3 hydrogen fluoride at controlled area boundary. Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
Traffic	**SMALL to MODERATE**	Construction – Daily Vehicle Trips: Workers/Trucks	1,600/28 – UUSA 2,612/20 – Centrus 1,428/70 – GLE
		Operations – Daily Vehicle Trips: Workers/Trucks	500/51 – UUSA 1,100/24 – Centrus 735/6 – GLE
Socioeconomics	**SMALL to LARGE**	Peak Construction Employment (direct)	800 – UUSA 300 – Centrus 280 – GLE
		Operations Employment (direct)	42 – UUSA 120 – Centrus 70 – GLE
		ROI Labor Force	50,358 – UUSA 87,076 – Centrus 204,800 – GLE
Environmental Justice	**No disproportionate and adverse impacts on communities with**	Minority or low-income population in ROI	1 minority block group near UUSA. 6 low-income block groups near Centrus.

Table A-4. Uranium Enrichment – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
	environmental justice concerns are expected		2 minority and 3 low-income block groups near GLE.

Key: % = percent; BLM VRM = Bureau of Land Management Visual Resources Management; ft = feet; GLE = Global Laser Enrichment; gpd = gallons per day; HALEU = high-assay low-enriched uranium; IROFS = items relied on for safety; LCF = latent cancer fatality; L_{dn} = day-night average sound level; LLW = low-level waste; MEI = maximally exposed individual; mg/m^3 = milligram per cubic meters; MLLW = mixed low-level waste; mrem/yr = millirem per year; MW = megawatt; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; ROI = region of influence; UUSA = Urenco USA

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding the impacts of operating an existing uranium enrichment facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.3.2.2, *Existing NEPA Documentation*. Sections 3.3.3 and Table 3-22 of the **Technical Report - Section 3.3.3 (Leidos, 2023)** provide the technical support for this portion of the Final EIS.

[c] The impacts of GHGs are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.3.3.1 Water Resources

Water quality impacts associated with the construction and operation of an enrichment facility at the three sites used to inform this assessment were all SMALL impacts. Ground-disturbing activities associated with land clearing, excavation, and grading could result in temporary increases in soil erosion and sedimentation, which increase turbidity and affect the quality of downstream waters. Generally, low levels of contaminants and the use of BMPs for capturing and treating effluent on-site such as detention or retention basins would be included to prevent process waters from leaving the site. As necessary, NPDES permits would be required for authorized discharges during construction or operation to the surface waters near any proposed facility. Stormwater NPDESs permits for construction and operations would be required. DOE expects that BMPs would be employed to limit the impact of stormwater discharges. Construction of the HALEU enrichment facility (based on needed capacity, assumed to be a smaller facility than evaluated in the source documents) would be expected to result in impacts no larger than and most likely smaller than the impacts presented in these documents.

Water use by the HALEU enrichment facility would impact the region water consumption rates that could impact existing water levels, particularly at sites using groundwater as the source of industrial and sanitary water. For instance, at the UUSA site in New Mexico, water levels in the High Plains aquifer have been in decline, and future demand for water in the region is anticipated to exceed the recharge rate. The Lea County Regional Water Plan (RWP), which addresses conservation of regional water supplies for future use, was most recently updated in 2016. The RWP reported that groundwater levels in Lea County are declining at a rate of up to 4 feet per year, with wells in Lea County declining approximately 0.59 feet per year (OSE ISC, 2016). Compliance with the RWP would mitigate the strain that a new facility at this site may place on the groundwater supply and would assist with water conservation in the future decades in which this facility would be operational. As a result of these mitigations, impacts to the municipal water supply system resulting from the addition of a HALEU enrichment facility at this location would be expected to be SMALL to MODERATE. The site-specific environmental impact assessment of construction and operation of a HALEU enrichment facility would address the impact of water consumption on the local water aquifer/water supply.

A.3.3.2 Ecological Resources

The severity of impacts would be dependent on the current ecological conditions of the selected site, in comparison to the disturbance footprint associated with the facility designs.

Wetlands, Federal and state rare, threatened, and endangered species are known to occur at or near the sites used in the assessment of impacts for proposed HALEU enrichment facilities. (The extent of wetlands and the types and number of rare, threatened, and endangered species at a new HALEU enrichment facility would be site specific.) Results of the analyses in the reviewed NEPA documents determined that impacts to ecological resources from the action would be SMALL due to the relatively small area impacted and through implementation of several BMPs on-site. For the Proposed Action, a new analysis—complete with interagency consultations—would be expected, as part of the site-specific NEPA (or state equivalent) documentation prepared by the relevant regulatory authority, to update the inventory of ecological resources on-site and provide a determination of effects.

Construction of a HALEU enrichment facility would likely result in increased erosion, stormwater runoff, and loss of vegetation. Potential impacts on vegetation include decline or mortality of trees near the construction boundary, effects related to hydrologic changes, deposition of dust and other particulate matter, introduction of invasive plant species, and accidental releases of hazardous materials (e.g., fuel spills). Impacts on wildlife from construction on-site would include habitat disturbance, wildlife disturbance, and injury or mortality of wildlife. Habitats within the footprint disturbed by construction would be reduced or altered, and construction activities would result in habitat fragmentation. Although habitats adjacent to the proposed facility site would mostly remain unaffected, wildlife might make less use of these areas due to disturbance (indirect habitat loss). Reduced impacts would result from locating new structures (buildings, cylinder storage areas) in previously developed areas.

Depending upon the site chosen, an official USFWS Information for Planning and Consultation (IPaC) data request would need to be submitted for the project under Section 7 of the Endangered Species Act, Pub. L. 93-205, 87 Stat. 884, codified at 16 U.S.C. §1531–1544, to generate an *Official Species List,* and identified if federally designated critical habitats are present. Additional analysis would be required to determine the severity and nature of impacts to federally protected species. Removal of forested habitats would impact vegetation, wildlife, and possibly special status species (defined as those protected under the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and state-listed species). As such, targeted species surveys may be required and interagency coordination could be warranted, including but not limited to: Section 7 consultation with the USFWS's field offices and coordination with the state department of natural resources for state-listed species.

Additionally, migratory birds are protected under the Migratory Bird Treaty Act, Pub. L. 86-732, 40 Stat. 755, codified at 16 U.S.C. §703-712. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act, Pub. L. 95-616, 92 Stat. 3114, codified at 16 U.S.C. §668-668d. Again, depending on the site chosen, numerous migratory birds, including some birds of conservation concern and eagles, occur and/or have the potential to occur as transients within the forested areas site. The USFWS recommends conducting tree-clearing activities outside of the bird nesting season to avoid the need for active nest relocation or destruction, when appropriate. To avoid impacts to migratory birds, tree clearing within the land proposed for the new Cylinder Storage Area would need to occur outside of the nesting season (late February through early August). Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities. A permit would be required for the purposeful take of an active migratory bird nest. A permit is not required to destroy migratory bird inactive nests.

The existence of a large number of wetlands at a proposed site, as are present at the Piketon and Wilmington sites, could result in a MODERATE impact to ecological resources. Wetlands and/or water features (such as streams, lakes, ponds, or other waters) are subject to protection under Section 404 of the CWA, 33 U.S.C. §1344. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, formal wetland delineation surveys would be required to determine presence or absence of jurisdictional wetlands. Impacts to Federally protected wetlands could require consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent NRC NEPA documentation under these actions may also be required. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

A.3.3.3 Historic and Cultural Resources

Potential historic, cultural, and paleontological resources impacts from construction and operation were analyzed at all three sites used in the assessment of potential impacts of constructing and operating a HALEU enrichment facility. Impacts were categorized as SMALL for all but the GLE site in Wilmington, North Carolina (NRC, 2012b). For the GLE site, the NRC previously identified one historic property within the area of proposed facility construction, which would be avoided during preconstruction and construction activities (NRC, 2012b). Although no construction activities were proposed in the portion of the Wilmington site where historic and cultural resources are known to exist, the GLE (Wilmington) site is located within a region containing high concentrations of historic and cultural resources. Due to potential impacts on undiscovered historic and cultural resources, the NRC determined potential impacts at the proposed GLE site were expected to be SMALL to MODERATE, with license conditions that would require GLE to consider the potential effects on historic and cultural resources from any ground-disturbing activities in unsurveyed areas of the GLE facility site and development of Common Procedure CP-24-201 to address the unanticipated discovery of human remains or artifacts.

A.3.3.4 Noise

Under the Proposed Action, noise impacts associated with construction activities would be short term and limited to the immediate vicinity of the proposed HALEU facility. The level of impact would depend primarily upon the distance from the construction activity to the public.

During operations, noise would be confined primarily to inside buildings. Building facades and distance to public receptors would further reduce public noise impacts. Noise from truck traffic would be expected. As needed BMPs could be utilized to further reduce noise impacts. BMPs to reduce noise-related impacts include the following:

- Maintain equipment in good working order in accordance with manufacturer's specifications.
- Limit noisy activities to the least noise-sensitive times of the day (daytime between 7:00 a.m. and 7:00 p.m.) on weekdays and limit idle time for vehicles and motorized equipment.
- Employ noise-reduction devices (e.g., mufflers) as appropriate.
- Provide a noise complaint process for surrounding communities.

Based on the above discussed analysis and the implementation of BMPs, operational noise impacts at the HALEU enrichment facility (whether at an existing uranium or industrial site or at an undeveloped site) would be expected to be SMALL.

A.3.3.5 Traffic

The three enrichment sites assessed in the evaluation of potential impacts for a HALEU enrichment facility have seen some minor to high increases in traffic volume since the publication of the reference NEPA documentation. At the UUSA site, the AADT volumes on New Mexico Highway 176 and New Mexico Highway 18 near the project site have experienced moderate to high percentage increases in traffic volumes. At the Centrus Piketon site, AADT volumes on U.S. Highway 23 and Ohio Highway 32 have experienced small increases in traffic volumes. At the GLE Wilmington site, the greatest increases in traffic volumes occurred on I-140 and I-40. Based on the most recent AADT data for each site, excess daily volume capacities still remain for these roadways.

Construction Impacts

Impacts to traffic were considered for the construction of the UUSA NEF, the Centrus American Centrifuge Plant (ACP) in Piketon, Ohio, and the GLE facility in Wilmington, North Carolina. These three facilities all would have higher capacities than the 1.1 million SWUs required for the HALEU enrichment facility. (The NEPA documents addressed construction efforts associated with building/adding capacity of between 3.5 million and 6 million SWUs.) Construction and operation of a new co-located HALEU enrichment facility with an estimated capacity of 1.1 million SWUs at these locations would be within the level of impacts determined in relevant NEPA documentation,[15] the 2005 NEF EIS (NRC, 2005a) and 2015 UUSA EA (NRC, 2015) for the UUSA site, the 2006 ACP EIS (NRC, 2006) for the Centrus site, and 2012 GLE EIS (NRC, 2012b) for the GLE Wilmington site.

It was estimated that during construction/expansion of enrichment capacity at the three sites used in this assessment, approximately:

- For any single year, 3,400 truck round trips could occur, resulting in approximately 28 daily vehicle trips for the UUSA facility (NRC, 2005a).
- Up to 2,286 truck round trips (or 20 daily vehicle trips) could occur for any single year of construction at the Centrus Piketon site (NRC, 2006).
- Approximately 35 truck round trips per day (or 70 vehicle trips per day) would be added to the local traffic on average over the construction period at the GLE Wilmington site (NRC, 2012b). Section 4.2.10 of the 2012 GLE EIS noted that a new entrance, an extension of the existing North Entrance to the site off Castle Hayne Road, would be provided for motor vehicle traffic.

However, the majority of new daily vehicle trips generated would result from commuting workers and would have the greatest traffic impacts. The traffic impacts would be most detected during peak commuting hours, especially on the roads directly serving the sites. For the three sites discussed in the assessment, the increase in worker commuter traffic were estimated to be:

- 1,600 daily vehicle trips (or 800 vehicle trips during the peak commuting hours) at the UUSA site (NRC, 2005a)

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[15] **2005 NEF EIS:** *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*
2015 UUSA EA: *Environmental Assessment for the Proposed Louisiana Energy Services, URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico, Docket No. 70-3103*
2006 ACP EIS: *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*
2012 GLE EIS: *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*

- 2,612 daily vehicle trips (or 1,306 vehicle trips during the peak commuting hours) at the Centrus Piketon site (NRC, 2006)
- 1,428 daily vehicle trips (or 680 vehicle trips during the peak a.m. commute hour) for peak construction activities at the GLE site (NRC, 2012b)

Operational Impacts

Impacts to traffic were considered for operation of the UUSA NEF, the Centrus ACP in Piketon, Ohio, and the GLE facility in Wilmington, North Carolina. Operation of a new co-located HALEU enrichment facility with an estimated capacity of 1.1 million SWUs at one of these locations would be within the level of impacts determined in the 2005 NEF EIS (NRC, 2005a) and 2015 UUSA EA (NRC, 2015) for the UUSA site, the 2006 ACP EIS (NRC, 2006) for the Centrus site, and 2012 GLE EIS (NRC, 2012b) for the GLE Wilmington site.

It was estimated that during operations at the enrichment facilities at the three sites used in this assessment, approximately:

- 2,900 truck round trips for nonradiological materials and up to 3,200 truck round trips of radiological materials (combined for the original operational level and an expanded operation at 7 million SWUs capacity) could occur for any single year, resulting in approximately 24 and 27 daily vehicle trips, respectively, (assuming 250 working days in a year) for the UUSA NEF (NRC, 2005a)
- Up to 3,100 truck round trips (or 24 daily vehicle trips) for radiological and nonradiological material could occur for any single year of construction at the Centrus Piketon site (NRC, 2006)
- Approximately 2,100 truck round trips per year (6 daily trips) would be added to the local traffic on average during operations at the GLE Wilmington site (NRC, 2012b)

However, the majority of new daily vehicle trips generated would result from commuting workers and would have the greatest traffic impacts. The traffic impacts would be most detected during peak commuting hours, especially on the roads directly serving the sites. For the three sites the increase in worker commuter traffic were estimated to be:

- 258 workers with up to 500 daily vehicle trips at the UUSA NEF site (NRC, 2015)
- 795 workers could generate 1,100 daily vehicle trips (with 199 vehicle trips during the peak commuting hours) at the Centrus Piketon site (NRC, 2006)
- 350 workers would generate 735 daily vehicle trips (with 140 vehicle trips during the peak a.m. commute hour) at the GLE site (NRC, 2012b)

A.3.3.6 Socioeconomics

DOE has adopted the NRC socioeconomic impacts documented in their NEPA evaluation. The NRC defines socioeconomic impacts as follows:

- Employment/economic activity: SMALL is less than (<) 0.1% increase in employment; MODERATE is between 0.1% and 1% increase in employment; and LARGE is defined as greater than (>) 1% increase in employment.
- Population/housing impacts: SMALL is < 0.1% increase in population growth or < 20% of vacant housing units required; MODERATE is between 0.1% and 1% increase in population growth and/or between 20% and 50% of vacant housing units required; and LARGE impacts are defined as > 1% increase in population growth and/or > 50% of vacant housing units required (DOE, 1999).

Therefore, the severity of the economic impacts depends greatly on the current socioeconomic conditions of the site selected for a HALEU enrichment facility. At the UUSA site (Lea County, New Mexico):

- Average increase in workforce of 0.9% (peak increase of 1.8%).
- Increase in local population of 0.02%.
- Potential indirect workforce increase of over 1,000 new jobs.
- Incoming workers require about 1% of available (vacant rental and home ownership) housing.
- Other indirect impacts, including tax revenue and social and health services; MODERATE due to the increase in direct and indirect jobs.

At the Centrus site (Piketon, Ohio):

- Average increase in workforce of 1.1%.
- Increase in local population of 0.4%.
- Indirect impacts (from spending or local purchases), resulting in potential over 1,000 new jobs, a MODERATE impact.
- Some public services and tax revenue impacts due to the increase in direct and indirect jobs, SMALL impact.
- Potentially MODERATE impacts on healthcare and school services.
- Potentially LARGE impacts due to limited housing availability for in-migrating workforce.

At the GLE site (Wilmington, North Carolina):

- Given the small number of new employees (92), the economic impact of constructing the proposed facility would be SMALL, but it would be considered a beneficial impact to the economy during the period of construction.

Operation

Based on the existing environmental conditions and the projected number of operational workers (both those residing within the ROI and those moving to the ROI), the estimated socioeconomic impacts of constructing a HALEU enrichment facility at the three sites used to inform the impact analysis would be as follows.

For the UUSA site in Lea County, the increase in workforce would be 0.04%. Even assuming half of workers are new to the ROI, because of the small population increase from proposed operation of the HALEU enrichment facility, all socioeconomic impacts would be SMALL.

For the Centrus site in Piketon, the increase in workforce of 120 plus 190 indirect jobs would be a SMALL increase in the workforce (about 0.3%). However, the number of workers assumed to be new to the area could have a MODERATE to LARGE impact on available housing. The assumed number of workers in-migrating to the area could require about 9% of available (vacant) housing.

For the GLE site in Wilmington, given the small number of new employees, impacts on population, employment, housing, and all other economic indicators would be SMALL. Facility operations would generate additional income in the ROI, along with increases in income and sales taxes; corporate income tax payments also would increase. The economic impact of operating the proposed facility would be SMALL; however, it would be considered a long-term beneficial impact to the economy.

While most socioeconomic indicators show a SMALL impact, each site analyzed has the potential for some of the impacts to be MODERATE.

A.3.3.7 Environmental Justice

The ROI for environmental justice is the area within a 4-mile radius of the enrichment facilities. This ROI was based on NRC guidelines from the Office of Nuclear Material Safety and Safeguards for facilities located outside of city limits or in a rural area.

Minority populations were determined by comparing the percent minority of the block groups to the county using current U.S. Census data. If the percentage of minority individuals in a block group was greater than the percentage of the total minority population within the county, then the block group was identified as having a minority population. Similar analysis was also conducted to determine the presence of low-income populations. In instances where the population was determined to be minority or low-income, a meaningfully greater analysis using 15% was also conducted.

Below are enrichment locations analyzed in existing NEPA documentation and analyzed by DOE, as described above. Please reference Section 3.3.15, *Environmental Justice*, of the **Technical Report - Section 3.3.15 (Leidos, 2023)** for the complete analysis of these enrichment locations.

UUSA Site – Eunice, New Mexico

The total population of New Mexico is 2,109,366, of which 64.0% would be considered members of a minority population. The total population of nearby Texas is 28,862,581, of which 59.3% would be considered members of a minority population. As shown in Table A-5*, Communities Within Four Miles of UUSA – Eunice, New Mexico*, of the four block groups within the ROI, none of the block groups have a percentage that would exceed the county (Lea County 66.7% and Andrews County 61%) for minority populations.

The total population of New Mexico for whom poverty is determined is 2,067,620, of which 18.3% would be considered members of a low-income population. The total population of Texas for whom poverty is determined is 28,260,264, of which 14% would be considered members of a low-income population. One block group, of the four block groups within the ROI, has a percentage that exceeds the county. Block Group 1 in Texas has 13.9% low income compared to Andrews County, Texas, at 12.3% which is not meaningfully greater than the county (more than 15%).

Table A-5. Communities Within Four Miles of UUSA – Eunice, New Mexico

Area Name	***Total Population***	***Minority***	***% Minority***	***Population for Whom Poverty is Determined***	***Low-Income Population***	***% Low Income***
United States	333,036,755	136,997,971	41.1%	325,180,754	42,062,633	12.9%
New Mexico	2,109,366	1,349,449	64.0%	2,067,620	378,896	18.3%
Lea County	72,743	48,525	66.7%	70,064	11,740	16.8%
Census Tract 8	3,516	1,945	55.3%	3,516	315	9.0%
Texas	28,862,581	17,117,549	59.3%	28,260,264	3,965,117	14.0%
Andrews County	18,184	11,100	61.0%	18,110	2,224	12.3%
Census Tract 9501	2,421	1,024	42.3%	2,421	336	13.9%

Block Group by Tract	***Total Population***	***Minority***	***% Minority***	***Population for Whom Poverty is Determined***	***Low-Income Population***	***% Low Income***	***Block Group by Tract***
Census Tract 8 (New Mexico)	Block Group 2	1,223	767	62.7%	1,223	94	7.7%
	Block Group 1	1,022	428	41.9%	1,022	27	2.6%
	Block Group 4	566	182	32.2%	566	67	11.8%
Census Tract 9501 (Texas)	Block Group 1	2,421	1024	42.3%	2,421	336	13.9%
ROI (4-mile radius):		5,232	2,401	45.9%	5,232	524	10.0%

Source: (USCB, 2023d)
Key: % = percent; ROI = region of influence
Note: Yellow shading indicates a low-income population comparing the block group to the county.

To determine cumulative burdens to communities with environmental justice concerns, DOE conducted an analysis to identify disadvantaged communities in the United States, which DOE defines as underserved, overburdened front-line communities (DOE, 2022a). DOE's analysis considers a census tract that ranks in or above the 80th percentile of the cumulative sum of 36 burden indicators for a state and has at least 30 (DOE, 2022a) as a disadvantaged community. DOE's Energy Justice Mapping Tool – Disadvantaged Communities Reporter also identifies areas as disadvantaged including among other factors, areas with high housing costs. The cumulative burden includes fossil fuel dependence, energy burden, environmental and climate hazards, and socioeconomic vulnerabilities. According to DOE's analysis, Eunice in Lea County, New Mexico, and Beaver Village in Pike County, Ohio, are not considered disadvantaged; however, Wrightsboro in New Hanover County, North Carolina, is considered disadvantaged.

Multiple sources of data that estimate cost of living by state and city were reviewed to determine if the potential locations would be considered high-cost housing when considering poverty levels for environmental justice analysis. Cities with high costs of housing tended to be major urban areas such as Seattle, Washington; San Fransisco, Los Angeles, and San Diego, California; Washington, DC; and New York City area. One city in western Arizonia was listed (Lake Havasu City) but no cities in New Mexico were considered to have the most expensive housing (Kiplinger, 2024).

The construction and operation of the enrichment facility would have a SMALL impact on communities with environmental justice concerns. The study further concluded that no disproportionate and adverse impacts from construction, operation, or decommissioning would occur to communities with environmental justice concerns living near the UUSA site or along the transportation routes into and out of the facility.

Centrus Site – Piketon, Ohio

The total population of Ohio is 11,769,923, of which 22.2% would be considered members of a minority population. As shown in Table A-6, *Communities Within Four Miles of Centrus Energy Corp – Piketon, Ohio*, three block groups meet the thresholds for minority populations with two that are meaningful greater than the county (more than 15%).

The total population for whom poverty is determined in Ohio is 11,451,346, of which 13.4% would be considered as low income. Four block groups of the nine block groups within the ROI meet the threshold for low-income populations. One block group is not meaningfully greater than the county (more than 15%).

Table A-6. Communities Within Four Miles of Centrus Energy Corp – Piketon, Ohio

Area Name		***Total Population***	***Minority***	***% Minority***	***Population for Whom Poverty is Determined***	***Low-Income Population***	***% Low Income***
United States		333,036,755	136,997,971	41.1%	325,180,754	42,062,633	12.9%
Ohio		11,769,923	2,617,097	22.2%	11,451,346	1,528,963	13.4%
Pike County		27,271	1431	5.2%	26806	5190	19.4%
Census Tract 9522		5,313	379	7.1%	5,303	1,414	26.7%
Census Tract 9523		5,296	260	4.9%	5,041	885	17.6%
Census Tract 9527		4,119	266	6.5%	4,001	673	16.8%
Scioto County		74,392	5353	7.2%	70905	16891	23.8%
Census Tract 22		4,472	849	19.0%	3,126	486	15.5%
Census Tract 23		4,254	22	0.5%	4,082	849	20.8%
Block Group by Tract		***Total Population***	***Minority***	***% Minority***	***Population for Whom Poverty is Determined***	***Low-Income Population***	***% Low Income***
Census Tract 9522	Block Group 3	1,262	74	5.9%	1,252	246	19.6%
	Block Group 4	1,528	149	9.8%	1,528	573	37.5%
Census Tract 9523	Block Group 1	554	0	0.0%	523	9	1.7%
	Block Group 3	1,748	9	0.5%	1,630	279	17.1%
	Block Group 4	748	9	1.2%	748	142	19.0%
Census Tract 9527	Block Group 1	855	2	0.2%	855	181	21.2%
	Block Group 2	1,502	107	7.1%	1,384	158	11.4%

Table A-6. Communities Within Four Miles of Centrus Energy Corp – Piketon, Ohio

Block Group by Tract		*Total Population*	*Minority*	*% Minority*	*Population for Whom Poverty is Determined*	*Low-Income Population*	*% Low Income*
Census Tract 22	Block Group 3	665	0	0.0%	665	51	7.7%
Census Tract 23	Block Group 3	1,094	0	0.0%	1,094	354	32.4%
ROI (4-mile radius):		9,956	350	3.5%	9,679	1,993	20.6%

Source: (USCB, 2023d)

Key: % = percent; ROI = region of influence

Note: Green shading indicates a minority population and yellow shading indicates a low-income population comparing the block group to the county.

To determine cumulative burdens to communities with environmental justice concerns, DOE conducted an analysis to identify disadvantaged communities in the United States, which DOE defines as underserved, overburdened front-line communities (DOE, 2022a). DOE's analysis considers a census tract that ranks in or above the 80th percentile of the cumulative sum of 36 burden indicators for a state and has at least 30 (DOE, 2022a) as a disadvantaged community. DOE's Energy Justice Mapping Tool – Disadvantaged Communities Reporter also identifies areas as disadvantaged including among other factors, areas with high housing costs. The cumulative burden includes fossil fuel dependence, energy burden, environmental and climate hazards, and socioeconomic vulnerabilities. The cumulative burden includes fossil fuel dependence, energy burden, environmental and climate hazards, and socioeconomic vulnerabilities. According to DOE's analysis, Beaver Village and Pike Ohio are not considered disadvantaged. In addition, multiple sources of data that estimate cost of living by state and city were reviewed to determine if the potential locations would be considered high-cost housing when considering poverty levels for environmental justice analysis. Cities in Ohio were not considered to have the most expensive housing (Kiplinger, 2024).

The construction and operation of the enrichment facility would have up to MODERATE impacts on communities with environmental justice concerns to accommodate limited housing availability to in-migrating workforce. Although there are low-income populations located within the ROI, no disproportionate and adverse impacts on these populations are anticipated during construction or operation of enrichment facilities at the Centrus location.

GLE Site – Wilmington, North Carolina

The total population of North Carolina is 10,367,022, of which 37.9% would be considered members of a minority population. As shown in Table A-7, *Communities Within Four Miles of the GLE Facility – Wilmington, North Carolina*, four block groups of the 14 block groups within the ROI exceed the county percentage of minority populations and all four are meaningfully greater compared to the county (more than 15%).

The total population for whom poverty is determined in North Carolina is 10,092,759, of which 13.7% would be considered as low income. Four block groups of the 14 block groups within the ROI have low-income percentages above the county level and are meaningfully greater than the county.

Table A-7. Communities Within Four Miles of the GLE Facility – Wilmington, North Carolina

Block Group by Tract		Total Population	Minority	% Minority	Population for Whom Poverty is Calculated	Low-Income Population	% Low Income
Hanover County		225,175	52,065	23.1%	218,563	29,750	13.6%
Census Tract 115.03	Block Group 1	1,556	236	15.2%	1,556	592	38.0%
	Block Group 2	2,335	1,636	70.1%	2,333	111	4.8%
Census Tract 115.04	Block Group 1	1,094	210	19.2%	1,094	116	10.6%
	Block Group 2	2,533	515	20.3%	2,077	434	20.9%
	Block Group 3	989	209	21.1%	934	8	0.9%
Census Tract 116.08	Block Group 2	1,629	329	20.2%	1,625	55	3.4%
Census Tract 116.09	Block Group 2	1,459	27	1.9%	1,459	0	0.0%
	Block Group 3	3,041	361	11.9%	2,994	33	1.1%
Census Tract 116.10	Block Group 1	1,934	612	31.6%	1,401	174	12.4%
	Block Group 2	2,544	1,206	47.4%	2,368	1,049	44.3%
Pender County		59,964	15,440	25.7%	58,786	7,354	12.5%
Census Tract 9205.02	Block Group 1	1,715	421	24.5%	1,714	257	15.0%
Census Tract 9206.02	Block Group 1	2,341	292	12.5%	2,341	390	16.7%
	Block Group 3	1294	588	45.4%	1294	123	9.5%
Brunswick County		133,789	24,995	18.7%	132,910	13,576	10.2%
Census Tract 201.01	Block Group 2	1295	589	45.5%	625	69	11.0%
ROI (4-mile radius):		25,759	7,231	28.1%	23,815	3,411	14.3%

Source: (USCB, 2023d)
Key: % = percent; ROI = region of influence
Note: Green shading indicates a minority population and yellow shading indicates low-income population comparing the block group to the county.

To determine cumulative burdens to communities with environmental justice concerns, DOE conducted an analysis to identify disadvantaged communities in the United States, which DOE defines as underserved, overburdened front-line communities (DOE, 2022a). DOE's analysis considers a census tract that ranks in or above the 80th percentile of the cumulative sum of 36 burden indicators for a state and has at least 30 (DOE, 2022a) as a disadvantaged community. The cumulative burden includes fossil fuel dependence, energy burden, environmental and climate hazards, and socioeconomic vulnerabilities.

DOE's Energy Justice Mapping Tool – Disadvantaged Communities Reporter also identifies areas as disadvantaged including among other factors, areas with high housing costs. The cumulative burden includes fossil fuel dependence, energy burden, environmental and climate hazards, and socioeconomic vulnerabilities. According to DOE's analysis, Wrightsboro, North Carolina, is considered disadvantaged.

In addition, multiple sources of data that estimate cost of living by state and city were reviewed to determine if the potential locations would be considered high-cost housing when considering poverty levels for environmental justice analysis. Cities in North Carolina were not considered to have the most expensive housing (Kiplinger, 2024).

Preconstruction, construction, operation, and decommissioning of the proposed GLE facility would likely have SMALL to MODERATE impacts based on other resource area impacts, but would not be expected to result in disproportionate and adverse impacts on communities with environmental justice concerns.

New Facility

Site selection for a new HALEU enrichment facility is expected to include criteria related to environmental, socioeconomic, and environmental justice factors. Impacts on communities with environmental justice concerns would be dependent on local and regional conditions for a proposed site, the potential for adverse effects, and the presence of communities with environmental justice concerns in the ROI. Based on similar facilities and the application of siting criteria, impacts are expected to be in the SMALL to MODERATE range. Once a site or facility has been selected, specific impacts may be assessed in future NEPA review by the relevant regulatory authority (e.g., NRC).

A.3.3.8 Legacy Health Issues

The NEPA documents used as source information for the health and safety assessment all indicated that going forward impacts to the public and workers were expected to be SMALL. However, uranium enrichment, in particular at the former Portsmouth Gaseous Diffusion Plant, has legacy issues associated with past operating practices and decommissioning and decontamination activities. The differences in projected and past impacts can be attributed to improvements in operational practices and regulatory oversight. However, the legacy of past operations has left many in the public concerned, particularly those impacted by past operations. Given the lack of site-specific information and the range of potential locations for all of the fuel cycle facilities, collection and analysis of affected environment information (e.g., legacy impacts, monitoring data, etc.) at existing sites would not be a reasonable undertaking. Additionally, much of the information would also ultimately not be relevant to any future environmental review of specific sites. Thus, a full discussion of the existing environments and the impact on those existing environments, including legacy impacts, is best left to site-specific environmental analysis under the relevant regulatory authority.

By some measures, this legacy may have had a significant health effect for some residents in the past and continues to affect health in the present. By some studies, a direct result of previous enrichment activity is increased instances of diseases experienced by workers, their families, and other community members. There is a concern by some that the full extent of health impacts from uranium enrichment has not been fully examined.

According to statistics assembled by the National Cancer Institute, Pike County and other counties near the Portsmouth Site have cancer incident rates above both the national average and Ohio state average cancer rates (National Cancer Institute, 2024). For Pike County and the counties surrounding the Portsmouth Site, cancer incidence rates for the years 2016 to 2020 ranged from 1% to 19% higher than the Ohio state averages and 7% to 25% higher than the U.S. average. Some in the local community attribute this entirely to the impacts of the operation of the Portsmouth Gaseous Diffusion Plant. However, an ATSDR report evaluating the radiological sampling data for the area (ATSDR, 2024) concluded "exposure to radionuclides in the off-site outdoor air, soil, sediment, indoor dust, and surface water within a 6-mile radius of the U.S. DOE PORTS facility from 2016 to 2022 is not expected to harm people's health.

The reason for this is the environmental samples collected in this off-site area and timeframe contained radionuclides at levels not expected to cause harmful health effects."

The most notable of the impacts perceived by the public is the closure of the Zahn's Corner Middle School after radionuclide contamination was discovered within the school. Many in the public felt that any radiation found, especially in a location where their children spent significant time, was unacceptable. Following DOE's initial evaluation of the contamination, both DOE and the public agreed to an independent assessment of radiological exposure, including within the middle school. In 2024, ATSDR issued its findings (ATSDR, 2024). The report determined that while radiological contamination above background levels (for this report, ATSDR defined background as background before atmospheric weapons testing) was found in air, soil, and samples taken at Zahn's Middle School, "exposure to radionuclides in the off-site outdoor air, soil, sediment, indoor dust, surface water, and biota within a 6-mile radius of the U.S. DOE PORTS facility from 2016 to 2022 is not expected to harm people's health. The reason for this is the environmental samples collected in this off-site area and timeframe contained radionuclides at levels not expected to cause harmful health effects." However, the middle school remains closed, and the county has decided to replace it.

Actual impacts on human health from enrichment facilities that operate in adherence to modern health and safety requirements are expected to be minor (see Section 3.3.11 of The Technical Report supporting this EIS (Leidos, 2023). However, these legacy issues may remain deeply embedded within the collective psyche of the local community and continue to affect concerns about new proposed projects. Perceived health impacts from operations on the part of the local community, along with actual changes to water and land from the project may have real effects on the mental and physical health of some community members. This may include stress and anxiety levels, which in turn, impact the mental, physical, and social health effects of these local populations.

A.4 HALEU Deconversion

A.4.1 Introduction

HALEU deconversion would occur after the HALEU enrichment process. The HALEU deconversion facility could produce uranium oxide, uranium metal, or other more exotic forms of HALEU. The processes for deconversion of UF_6 to oxide or metal are well-understood technologies and performed routinely for LEU and DU. Because information is lacking regarding construction and operation of deconversion facilities that could produce other forms of HALEU that may be required for some advanced reactor fuels, this HALEU EIS concentrates on deconversion to uranium oxide and uranium metal. Construction and operation of a HALEU deconversion facility that would produce other unique forms of HALEU would be expected to have similar impacts. Regardless, project-specific NEPA documentation would be completed by the NRC before construction and operation of any new deconversion facility.

There is currently no deconversion facility in the United States capable of producing HALEU in the quantities required by the Proposed Action. A facility would need to be constructed. The facility would convert commercially generated HALEU from UF_6 into uranium oxide or metal and fluorine byproducts. The deconversion facility could be co-located with an enrichment facility, co-located with a fuel fabrication facility, or be located as a standalone facility. In addition, a HALEU storage facility could be co-located with the HALEU deconversion facility. A deconversion facility could be sited anywhere in the United States that meets NRC siting requirements. The facility would have to be an NRC Category II facility.

Section 4 of the **Technical Report - Section 4 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

A.4.2 Analysis Methodology

A.4.2.1 Approach to NEPA Analyses

The environmental consequences from construction and operation of a HALEU deconversion facility are expected to be similar to those for an LEU or DU deconversion facility. This HALEU EIS incorporates by reference resource conditions and impact considerations of the primary existing NEPA documentation listed in Section A.4.2.2, *Existing NEPA Documentation*, as well as other available information such as new census data. The analysis also considers comments provided by interested parties during the scoping period.

The intent of the HALEU EIS is to provide a range of potential impacts that could occur for construction and operation of a HALEU deconversion facility using existing NEPA documentation and other available sources, incorporating by reference and summarizing wherever possible. Fundamental to the approach is the relationship of the production throughput for the DU deconversion facilities with existing NEPA documentation (ranging from 3,400 MT to 18,000 MT of depleted uranium hexafluoride [DUF_6] per year) and the required throughput for the HALEU deconversion facility (38 MT of HALEU in the form of UF_6 per year). Minor differences (e.g., equipment/processing batch sizes, administrative controls) in facility design and operation, primarily to address criticality control needed for HALEU but not DUF_6, should not impact environmental impacts associated with the facility. Private industry, along with NRC approvals, would determine the actual technique employed.

Environmental Justice

For environmental justice, DOE presented NEPA document conclusions since site locations could not be determined. Using existing NEPA impact analysis represented the best available information for proposed impacts associated with these activities. If a deconversion facility is co-located with an enrichment facility, environmental justice analysis is presented in Section A.3.3. Additional information can be found in Section 4.3.15 of the **Technical Report - Section 4.3.15 (Leidos, 2023)**.

A.4.2.2 Existing NEPA Documentation

DOE reviewed the NRC's Fluorine/DU EIS (NRC, 2012a) (referred to as the IIFP facility). The Fluorine/DU EIS provides DOE with information and analyses for determining the impacts of construction and operation of a HALEU deconversion facility.

DOE also considered information contained in DOE's *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site (DOE/EIS-0360)* (DOE, 2004a) (referred to as the "Portsmouth DU EIS") and *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site (DOE/EIS-0359)* (DOE, 2004b) (referred to as the "Paducah DU EIS"). DOE is using these currently operating facilities to convert its inventory of DUF_6 to DU oxide and other compounds suitable for beneficial use or disposal. These EISs analyzed the construction, operation, and decontamination and decommissioning of the DUF_6 deconversion facilities at the Portsmouth and Paducah sites; transportation of DU deconversion products and waste materials to a disposal facility; transportation and sale of the hydrogen fluoride (HF) produced as a deconversion co-product; and neutralization of HF to calcium fluoride and its sale or disposal in the event that the HF product is not sold.

A.4.3 Potential Environmental Consequences

This section summarizes the environmental consequences information from NEPA documents for the IIFP facility (NRC, 2012a), the Portsmouth DUF_6 conversion facility (DOE, 2004b), and the Paducah DUF_6 conversion facility (DOE, 2004a). For comparison, the IIFP facility would be able to process 3,400 MT of

DUF_6 per year, the Portsmouth DUF_6 conversion facility can process 13,500 MT of DUF_6 per year, and the Paducah DUF_6 conversion facility can process 18,000 MT of DUF_6 per year. The HALEU deconversion facility addresses a facility that could process 38 MT/yr of HALEU in the form of UF_6 and produce 28 MT/yr of HALEU in the form of an oxide or 25 MT/yr of HALEU in the form of metal. Therefore, many of the attributes of the DUF_6 conversion facilities would be much larger than needed for the HALEU deconversion facility and would likely bound the impacts of construction and operation of a HALEU deconversion facility.

DOE has analyzed construction and operation of a HALEU deconversion facility based on available data for the DUF_6 conversion facilities. Most attributes of the HALEU deconversion facility are expected to be bounded by this analysis. In any event, additional project-specific NEPA documentation would be completed by the NRC before construction and operation of a HALEU deconversion facility.

The Proposed Action's impact assessments for deconversion are presented in Table A-8 below. After the table, see Section A.4.3.1, *Ecological Resources*, through Section A.4.3.4, *Socioeconomics*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding a deconversion facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.4.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-8 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences between the IIFP, Paducah, and Portsmouth facilities are noted. Section 4 of the **Technical Report - Section 4 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

Table A-8. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	40 – IIFP 45 – Paducah 65 – Portsmouth
		Total Site Size (acres)	640 – IIFP 3,556 – Paducah 3,714 – Portsmouth
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers) (feet)	100 – IIFP
		Distance to Nearest Receptor (miles)	1.6 – IIFP 0.8 – Paducah 0.6 – Portsmouth
		BLM VRM Rating	Class IV
Geology and Soils	**SMALL**	Rock and Soil Excavated	42,400 cubic yards – IIFP Small amounts of soil excavated at Paducah and Portsmouth
		Backfill Needed	200 cubic yards – IIFP Small amounts of backfill needed at Paducah and Portsmouth

Table A-8. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Water Resources	**SMALL**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	3,024 to 4,464 – IIFP 109,589 – Paducah 93,425 – Portsmouth
		Floodplains	Floodplains exist within the vicinity of the Portsmouth facility, but outside the perimeter road in which facilities are located.
Air Quality [(c)]	**SMALL to MODERATE** SMALL with effective implementation of fugitive dust control measures	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust. Exceedance of PM_{10} and $PM_{2.5}$ NAAQS for Paducah and Portsmouth would be mitigated with the implementation of fugitive dust controls.
		Operations emissions	Exceedances of $PM_{2.5}$ NAAQS for Portsmouth. Emission controls and regulatory compliance required by a state permit and the NRC would limit emissions to acceptable levels.
Ecological Resources	**SMALL**	Impacts to vegetation, wildlife, wetlands, or special status species	SMALL – IIFP SMALL – Paducah site SMALL – Portsmouth site
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	No – IIFP Yes – Paducah and Portsmouth
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for IIFP, Paducah, and Portsmouth
Infrastructure	**SMALL to MODERATE**	Electrical Use	37,269 MWh per year Paducah
		Water Use	See Water Resources
		Fuel Use	3,000 to 4,000 gpy liquid fuel and 40 to 44 million cubic ft of natural gas for Paducah and Portsmouth
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	1.6 – IIFP 0.8 – Paducah 0.6 – Portsmouth
		Noise Levels	Below EPA guideline of 55 dBA as L_{dn} for residential zones for IIFP, Paducah, and Portsmouth

Table A-8. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	6 to 11 worker injuries and no fatalities expected for construction. 142 to 197 worker injuries and no fatalities expected for operations.
		Construction Radiological Impacts (mrem/yr)	Worker: 0 – IIFP 35 to 40 – Paducah 89 – Portsmouth No impacts to the public.
		Operations Average Worker Dose (mrem/yr)	75 – IIFP, Paducah, and Portsmouth
		Operations MEI Public Dose (mrem/yr)	0.002 – IIFP 2.1×10^{-5} – Paducah and Portsmouth
		Operations Population Dose (person-rem/yr)	0.04 – IIFP 4.7×10^{-5} – Paducah 6.2×10^{-5} – Portsmouth
		Operations Chemical Risk	Uranium and fluorine are the primary chemical hazards. No worker or public health impacts from chemicals are expected.
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	The most significant accident consequences could result in a worker fatality on-site from a criticality, 0.57 rem to the MEI, and 451 person-rem to the public. Worst-case UF_6 release – 686 rem to worker inside room. Cylinder fire – 11.7 rem to MEI and 34 person-rem to general public Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
		Chemical Accidents	The most significant accident consequences (cylinder fire) could result in 680 members of the public and 1,000 noninvolved workers experiencing adverse effects from hydrogen fluoride.

Table A-8. Uranium Deconversion – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
			For a worst-case UF_6 release, a worker outside of building and exposed for 10 minutes could be exposed to 16,000 mg/m^3 hydrogen fluoride. Chances of accident occurrence reduced by application of IROFS. Application of IROFS reduces impacts to SMALL.
Traffic	**SMALL**	Construction – Daily Vehicle Trips: Workers/Trucks	280/40 – IIFP 380 – Paducah and Portsmouth
		Operations – Daily Vehicle Trips: Workers/Trucks	280/20 – IIFP 320 – Paducah and Portsmouth
Socioeconomics	**SMALL to MODERATE**	Peak Construction Employment (direct)	140 – IIFP 190 – Paducah and Portsmouth
		Operations Employment (direct)	140 – IIFP 160 – Paducah and Portsmouth
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected**	Minority or low-income population in ROI	Nearest community with environmental justice concerns is 14 miles from IIFP. Communities with environmental justice concerns are within 50 miles of Paducah and Portsmouth.

Key: BLM VRM = Bureau of Land Management Visual Resources Management; dBA = A-weighted decibels; EPA = U.S. Environmental Protection Agency; ft = feet; gpd = gallons per day; gpy = gallons per year; HALEU = high-assay low-enriched uranium; IIFP = International Isotopes Fluorine Products; IROFS = items relied on for safety; L_{dn} = day-night average sound level; LLW = low-level waste; mg/m^3 = milligram per cubic meters; MEI = maximally exposed individual; MLLW = mixed low-level waste; mrem/yr = millirem per year; MWh = megawatt hour; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter (fine particulates); PM_{10} = particulate matter less than or equal to 10 microns in diameter (coarse particulates); Ports = Portsmouth Plant; ROI = region of influence; UF_6 = uranium hexafluoride

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding the impacts of operating an existing uranium deconversion facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.4.2.2, *Existing NEPA Documentation.* Sections 4.4.3 and Table 4-7 of the **Technical Report - Section 4.4 (Leidos, 2023)** provide the technical support for this portion of the Final EIS.

[c] The impacts of GHGs are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.4.3.1 Ecological Resources

The severity of impacts will be dependent on the current ecological conditions of the selected site, in comparison to the disturbance footprint associated with the facility designs.

It is assumed that activities associated with a construction of a new HALEU deconversion facility at any of the proposed existing industrial sites would occur entirely within the previously developed and disturbed areas. Impacts to ecological resources would be SMALL if new construction were to occur entirely within previously developed and disturbed lands, as these areas are subject to frequent disturbance from human activity, grounds maintenance, or disruptions from ongoing facility operations, and native habitats are no longer present or have likely degraded overtime. Previously developed and disturbed areas are not likely to support habitat for wildlife other than for those species adapted to human disturbance (such as transient small mammals, insects, and birds).

Any new construction occurring within undeveloped lands could have SMALL or MODERATE impacts on ecological resources depending on the resources disturbed and the mitigation and minimization measures employed. Land-clearing activities as part of new construction would likely result in increased erosion, stormwater runoff, and loss of vegetation. Additionally, impacts on wildlife could include habitat fragmentation, disturbance, and injury or mortality—as habitats within the footprint disturbed by construction could be reduced or altered. Loss of habitat could result in a long-term reduction in wildlife abundance and diversity. Habitat disturbance could facilitate introduction, or the spread, of invasive plant species. Wildlife habitat could be adversely affected if invasive vegetation became established in the disturbed areas and adjacent off-site habitats. Construction activities could cause wildlife disturbance, including interference with behavioral activities. Wildlife could respond in various ways, including attraction, habituation, and avoidance. Principal sources of noise would include vehicle traffic and operation of machinery. Regular or periodic noise could cause adjacent areas to be less attractive to wildlife and result in reduced usage. Construction activities could result in the direct injury or death of certain wildlife species. Wildlife could also be exposed to accidental fuel spills or releases of other hazardous materials. Construction at a previously developed site would minimize these impacts to wildlife.

Pending the deconversion facility site selection, an official USFWS IPaC data request would need to be submitted for the project under Section 7 of the Endangered Species Act to generate an *Official Species List* and identify if federally critical habitats are present. Additional analysis would be required to determine the severity and nature of impacts to the protected species as part of the final design and description of the Proposed Action. Removal of native habitats would impact vegetation, wildlife, and possibly special status species. Special status species are defined as those protected under the Endangered Species Act, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and state-listed species.

Migratory birds are protected under the Migratory Bird Treaty Act, 16 U.S.C. §703–712. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act, 16 U.S.C. §668–668d. Numerous migratory birds, including some birds of conservation concern and eagles, likely occur or have the potential to occur as transients throughout the vicinity of the proposed facility sites. The USFWS recommends conducting tree-clearing activities outside of the bird nesting season to avoid the need for active nest relocation or destruction, when appropriate. To avoid impacts to migratory birds, tree clearing within undeveloped lands would need to occur outside of the nesting season (late February through early August). Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities.

Wetlands and/or water features (such as streams, lakes, ponds, or other waters) subject to protection under Section 404 of the CWA, 33 U.S.C. §1344, could occur from a deconversion facility related to the Proposed Action. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, the USFWS's National Wetlands Inventory database would need to be accessed to identify the presence of wetlands or water features subject to protection under Section 404 of the CWA, 33 U.S.C. §1344, that could occur from a deconversion facility related to the Proposed Action. Impacts to federally protected wetlands would require consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent

NEPA analysis under these actions may also be required. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

A.4.3.2 Historic and Cultural Resources

At the IIFP conversion facility, the NRC determined that construction and operation of the proposed facility would not adversely affect historic resources or other cultural resources and defined the potential impacts as SMALL (NRC, 2012a). At the Portsmouth and Paducah sites for the DUF_6 conversion facilities, DOE determined that impacts on cultural resources could occur if ground disturbance resulted in the discovery of previously unrecorded cultural resources that, once evaluated, were determined to be eligible for listing on the NRHP. Operation of a HALEU deconversion facility would not be anticipated to impact cultural resources. In general, construction and operation of a HALEU deconversion facility at an existing uranium fuel cycle facility or industrial site on previously disturbed land, would likely result in SMALL impacts.

Because a site has not been selected for development of a HALEU deconversion facility, the focus of this analysis is on potential impacts, siting considerations, and requirements associated with development of a HALEU deconversion facility that would need to be considered. Site-specific analysis of potential impacts to cultural resources is expected to be undertaken by the NRC when it conducts NEPA analysis once a site has been selected and a design developed.

The Area of Potential Effects for development of a HALEU deconversion facility includes the footprint of the proposed facility construction and any associated infrastructure improvements, such as road construction, where archaeological sites could be disturbed, and an as-yet-undefined area around the new facility where it would be visible and potentially affect the setting of any nearby NRHP-listed or -eligible properties.

Construction activities that may impact cultural resources include but are not limited to ground-disturbing activities, including land clearing, earth moving, excavation, and vehicle and equipment operation on unpaved surfaces. These activities may result in visual and physical disturbance of any surface or subsurface archaeological resources listed on or eligible for listing in the NRHP, where present. Operation of a deconversion facility would not be anticipated to impact cultural resources.

The amount of land clearance and earth moving required would be dependent upon the type and size of the facility, as well as the need for any additional or ancillary infrastructure (such as parking). Generally, the amount of land clearing and total ground disturbance would be associated with the characteristics of the site chosen for the HALEU deconversion facility, in conjunction with the type and size of the facility. Siting a HALEU deconversion facility in previously undeveloped locations would require more ground disturbance of previously undisturbed areas, with greater potential for the presence of intact archaeological resources, than would placement of a facility in an area that is already developed or improved. Constructing a new facility within a previously developed or improved area would not be expected to result in significant impacts to archaeological resources as prior development of these areas typically has already impacted any sites that may have been present. Clearing of undeveloped areas for facility development would have a higher potential to result in adverse effects to archaeological resources; however, the degree of the impact would be dependent on the significance (NRHP eligibility) of the site(s) present. This could result in SMALL to MODERATE impacts.

Development of any type of facility also presents the potential for introduction of a visual intrusion into the setting of nearby NRHP-listed or -eligible properties, if there are any within the viewshed of the new facility. Construction of a new facility in proximity to NRHP-listed or -eligible properties could alter characteristics of their surrounding environment (or setting), and adverse effects could result if that setting contributes to the importance of the historic property. Adverse effects would also result if the new facility, through its design or scale, introduced visual elements that are out of character for the period the historic property represents. The degree of the impact would be dependent on multiple factors, including how visible the new facility will be to any NRHP-listed or -eligible properties, which in turn is a function of how close it is and whether there are any intervening obstructions, the size and design of the new facility, and the integrity of the historic setting in which the new facility would be built. This could result in SMALL to MODERATE impacts.

A.4.3.3 Infrastructure

The infrastructure impacts analysis relies on analyses conducted in the Fluorine/DU EIS that would allow IIFP to construct and operate a fluorine extraction process and DU deconversion plant (NRC, 2012a). Although, the Fluorine/DU EIS did not assess impacts to infrastructure, the document did explain the utilities needed and the demands of a deconversion facility. The infrastructure and utilities needed for construction and operation of a proposed deconversion facility at any of the candidate sites under consideration include electrical power, water, natural gas, steam, compressed air, and nitrogen.

Since the HALEU deconversion facility fuel throughput would be substantially smaller than the throughput evaluated in the Fluorine/DU EIS, the associated demand on infrastructure during HALEU deconversion would also be smaller than that considered in the Fluorine/DU EIS (NRC, 2012a). Construction of a new HALEU deconversion facility would require extension of existing utility service to accommodate new structures and to support operations of the proposed deconversion facilities. However, any needed infrastructure improvements or installation of additional utilities would comply with all applicable permits, service agreements, and regulatory requirements. As such, and with implementation of standard BMPs to further reduce or avoid potential impacts, SMALL impacts to infrastructure would be anticipated from construction and operation of the proposed deconversion activity at any of the candidate sites.

Site selection for a new HALEU deconversion facility is expected to include criteria for adequate utility capacity and infrastructure. These criteria are expected to include the requirement for sufficient capacity to meet the anticipated initial and projected future utility needs of the HALEU deconversion facility without disrupting service to other customers during construction or operation. Impacts for siting the facility in industrial areas would be SMALL as these areas are expected to have existing utility infrastructure and capacity. Impacts could be greater for undeveloped sites and considered MODERATE, as additional utility infrastructure would likely be required. Installation of such infrastructure would result in a greater area of ground disturbance and may adversely affect utility service to existing customers. Allocating available utility capacity for the HALEU deconversion facility could limit utility capacity available for future needs. With the use of siting criteria, these impacts would likely to range from SMALL to MODERATE for undeveloped sites.

A.4.3.4 Socioeconomics

Given the small workforce requirements and resulting population influx associated with both construction (28 workers) and operation (28 workers) activities, the NRC concluded that the potential impacts within the ROI from the IIFP facility would be minimal, representing a 0.06% increase in the ROI population in 2010 (and in 2020). The impacts on employment, housing inventories or vacancies, schools, and public services were considered SMALL.

Therefore, given the small in-migrating population expected to move into the area, and the fact that all the potential sites are well-established industrial sites the socioeconomic impacts associated with a

HALEU deconversion facility would be expected to be SMALL in the ROI. In addition, the economic impacts (e.g., increased jobs, income, and tax revenues) would be considered beneficial to the local and regional economy. In the event a larger (than analyzed) workforce moved into the ROI and a majority of workers chose to reside in the host county, particularly at one of the sites where the host county is more rural in nature and has lower population numbers (and a low population density), the potential impacts may be SMALL to MODERATE, as the higher numbers could adversely affect housing availability and community services such as education, fire protection, law enforcement, and medical resources. At the same time, however, the corresponding increases in income, spending, and tax revenues that would result from a larger workforce, would help benefit the local economy.

A.5 HALEU Storage

A.5.1 Introduction

As part of the Proposed Action, HALEU could be stored in multiple forms. HALEU in the form of UF_6 could be stored at the enrichment facility used to enrich the uranium to 19.75%. HALEU could also be stored in various forms (metal, uranium dioxide [UO_2], or other forms) at the deconversion facility. As noted in the previous section, the deconversion facility could be co-located with an enrichment or fuel fabrication facility or independently sited at another industrial facility or facilities, or an undeveloped site or sites. The storage facility could be as simple as a concrete or gravel pad (typically used for the storage of LEU form of UF_6 and DUF_6 at enrichment facilities currently producing enriched LEU for commercial nuclear reactors). An enclosed structure could also serve as a storage facility. If an enclosed structure were to be used, the storage facility would be a relatively simple structure, with the only operational actions being the receipt, unloading, storage, periodic inspection, loading, and shipping out of the containers of HALEU material.

A.5.2 Analysis Methodology

A.5.2.1 Approach to NEPA Analyses

Activity data developed for use in the analysis of new storage facilities is conservatively based on the assumption that the facilities would store the material that requires the most space, which is UO_2. The project annual and total storage demands for HALEU are 50 and 290 MT of metal, or 56 and 330 MT in the form of UO_2, respectively. DOE has assumed at least two storage facilities would be needed at separation locations. Therefore, based on the number of containers needed to house one half of the total storage demand, or 165 MT of UO_2, the preliminary size of a storage facility is about 12,000 square feet with an assumed height of 25 feet (see below for further details). The design would meet the NRC criteria for the storage of HALEU (such as seismic capability, tornado protection, etc.) and would include the necessary environmental controls to protect staff and the environment. The storage facility would be an NRC Category II facility, with security features meeting NRC requirements for the possession of uranium enriched to between 10% and 20% U-235.

Section 5 of the **Technical Report - Section 5 (Leidos, 2023)** provides the technical support for this portion of the Final EIS.

Construction

The following presents design and activity data estimated for construction of a new HALEU storage facility at a generic industrial site (DOE, 2023a).

The ES-3100 package design was chosen as a surrogate package design for storing UO_2 as it satisfies the safety standards needed for HALEU (NRC, 2021b). Use of the ES-3100 package would require the largest HALEU storage facility and therefore represents the most conservative scenario to evaluate potential construction impacts. The ES-3100 package is a cylindrical container that is about 43 inches in height and 19 inches in diameter and is composed of an outer drum assembly and an inner containment vessel. The purpose of the ES-3100 is to transport bulk high-enriched uranium in various forms. It is assumed that each package would include a containment vessel that would hold about 28 kilograms of UO_2 (INL, 2019). Based on the total storage demand of 165 MT of UO_2, the facility would house 5,893 containers. Assuming there are four containers per pallet (4 feet x 4 feet), stacked three pallets high, this design would result in a footprint of about 7,900 square feet. Considering about 50% of additional floor space is assumed to be needed for the operation of container handling equipment, the final building footprint would be about 12,000 square feet with an assumed height of 25 feet.

The building walls would have precast concrete panels topped with metal exterior siding and roof. The floor would be made of solid reinforced concrete 7 inches thick to handle the expected weight of the stacked storage packages. The facility also would include an associated approach pad constructed of reinforced concrete with a dimension of 40 feet x 30 feet and 12 inches thick to handle the expected weight of the delivery trucks.

Additional construction metrics include the following:

- It is assumed construction would occur in previously disturbed areas of a site.
- The site is level, but excavation would be required for the building slab and approach pad. Construction would disturb 1 acre of land.
- Foundation excavation would require the removal of 295 cubic yards of earth. Excavated soils would be stockpiled on-site and reused for grading post-concrete slab construction.
- Subbase gravel installation would require 363 tons of material at 6 inches thick and would be delivered in 17 truckloads, based on 22 tons per truck.
- The total concrete volume for the building slab and approach pad would amount to 334 cubic yards, which would be delivered by 31 concrete trucks with capacities of 11 cubic yards.
- The building slab and approach pad would require the installation of 520 feet of form material and 11,000 lbs of reinforcement steel bar (rebar), which would be delivered in a total of 2 truckloads.
- Building construction would require 4,600 square feet of 8-inch precast wall panels, 12,000 square feet of 26-gauge galvanized steel panels, and structural steel members, which would be delivered in a total of 8 truckloads.
- Cement and gravel would originate from local sources at a distance of 10 miles.
- Concrete forms would be rented and would be returned to the supplier (no waste).
- The concrete pour would generate up to 10 cubic yards of municipal waste. Two truck loads of construction waste would be delivered to a nearby landfill.

Construction of the storage facility would take approximately 55 days with a duration-weighted average of 15 personnel and a peak workforce of 30 personnel.

A summary of the construction metrics is shown in Table A-9.

Table A-9. Summary of Estimates for Construction of the HALEU Storage Facility

Subtask	***Duration (day)***	***Personnel***	***Equipment***	***Material***	***Material Truck Round Trips***
Earthwork and subbase	6	9	Excavation – CAT D3 Small Dozer, CAT D3 tracked skid steer, CAT 308 Excavator, CAT 60-inch compactor, 2 dump trucks Subbase – CAT D3 Small Dozer, 2 dump trucks	363 tons #57 stone	17
Concrete pad formwork and rebar install	8	13	2 support trucks, 1 long-reach forklift	520 ft of form material and 11,000 lbs #4 rebar	2
Concrete pad pour	1	17	1 concrete pumper, 2 ride-on trowels, 5 concrete trucks (11 cubic yards), 2 support trucks	334 cubic yards 5,000 psi concrete	31
Building construction – install precast concrete panel walls/metal structure	20/10	7/7	3 support trucks, 1 boom crane	4,600 square feet of 8-inch precast wall panels (46,000 lbs). 12,000 square feet of 26-gauge galvanized steel wall panels (12,000 lbs) and structural steel members (220,000 lbs)	8

Source: www.cat.com

Key: CAT = Caterpillar Inc.; ft = feet; HALEU = high-assay low-enriched uranium; lbs = pounds; psi = pounds per square inch

Operation

Operations at a storage facility would include (1) receipt and shipment of HALEU containers by truck, (2) handling of HALEU containers with industrial equipment such as forklifts, and (3) monitoring and inspection of stored HALEU containers. Security could be provided for the facility itself or by existing security of the site location. The following are assumptions for activity data for the operation of each new storage facility.

- The annual and total storage demands for UO_2 are 28 and 165 MT, respectively. The annual and total round trips associated with receipt and shipment of this material, assuming trucks would be fully loaded with material, would be 8 and 47, respectively. Annual round trip mileages generated by receipt and shipment trips 47,600 miles (38,288 one-way kilometers) (Leidos, 2023).
- HALEU containers would be handled by an electric forklift with a rated lift capacity of at least 5,000 lbs to handle a loaded pallet weighing about 2,000 lbs.

- The facility is assumed to house one diesel-powered electric generator (about 200 horsepower) for use in the event of power outages. Otherwise, the generator would operate 1 hour per month for routine maintenance testing.
- Two personnel are assumed to staff the facility 24 hours per day and 365 days per year. Assume 2,190 worker commuter round trips per year (2 employees x 3 shifts per day x 365 days per year) for 6 years.

Affected environment and construction impacts information for the potential enrichment, deconversion, and fuel fabrication facility locations were obtained from the applicable NEPA documents cited in Section A.5.2.2, *Existing NEPA Documentation*, and Appendix B, *Facility NEPA Documentation*.

This section evaluates the construction and operation of one storage facility that is sized to store half of the total amount of HALEU produced under the Proposed Action. Therefore, at least two storage facilities would be required to store the entire amount of HALEU produced. HALEU storage facilities could also be constructed and operated that store less than half the total amount. The impacts of construction and operation of these smaller storage facilities would be bounded by the impacts presented in this section.

Each storage facility could continue to operate in some capacity or could be repurposed for other uses after completion of the Proposed Action. Due to the speculative nature of the future use of the storage facility/facilities, decommissioning of a storage facility is not analyzed in this HALEU EIS, but would be expected to be evaluated in the NEPA analysis by the NRC for the siting/design of any HALEU storage facility.

Environmental Justice

For environmental justice, DOE presented NEPA document conclusions since site locations could not be determined. Using existing NEPA impact analysis represented the best available information for proposed impacts associated with these activities. Additional information can be found in Section 5.3.15 of the **Technical Report - Section 5.3.15 (Leidos, 2023)**.

A.5.2.2 Existing NEPA Documentation

NEPA coverage specifically addressing the construction and operation of a new HALEU storage facility does not exist. However, several NEPA documents are relevant to the current analysis. The following five NEPA documents evaluate building construction at potential locations for a HALEU storage facility and include example affected environment and impact analyses information used in developing this HALEU EIS:

- ***Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*** (NRC, 2006)

  The NRC issued an EIS (NUREG-1834) for the American Centrifuge Plant (ACP) in 2006 (NRC, 2006) (referred to as the "2006 ACP EIS"). In April 2007, a 30-year license (license SNM-2011) was issued to USEC (now Centrus) to construct, operate, and decommission the Centrus ACP, a commercial-scale gas centrifuge uranium enrichment facility. The license is held by American Centrifuge Operating, a subsidiary of Centrus. In 2011, DOE adopted the 2006 ACP EIS (NRC, 2006) and issued DOE/EIS-0468 (DOE, 2011). The NRC's 2006 ACP EIS, adopted in 2011 by DOE, includes dimensions of buildings proposed for construction and analyses of construction and operation impacts.

- ***Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*** (NRC, 2012b) (the "GLE EIS")

The GLE EIS does not disclose dimensions of buildings proposed for construction, as it states they are considered proprietary and contain security-related information. However, it provides analyses of construction and operation impacts.

- ***Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*** (NRC, 2005a) (the "2005 NEF EIS")

The 2005 NEF EIS proposes many construction activities and discloses metrics for site areas and earth moving, but no building dimensions. However, it provides analyses of construction and operation impacts.

- ***Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico*** (NRC, 2012a) (the "Fluorine/DU EIS")

The Fluorine/DU EIS proposes many construction activities but does not disclose metrics for building dimensions. However, it provides analyses of construction and operation impacts.

- ***Environmental Assessment Related to the Renewal of NRC License No. SNM-42 for BWX Technologies, Inc. (BWXT)*** (NRC, 2005b) (the "BWXT EA")

For BWX Technologies, Inc. (BWXT), the NRC completed an EA and Finding of No Significant Impact for renewing Materials License SNM-42 for the BWXT facility in Lynchburg, Virginia.

A.5.3 Potential Environmental Consequences

The environmental consequences associated with the construction and operation of a single storage facility with a capacity of 145 MT of HALEU to support the commercialization of the HALEU fuel cycle are presented here. As described in this section, it is expected that operations would minimally impact all resources. Placing a HALEU storage facility in an existing uranium fuel cycle facility would represent the lower end of potential project construction impacts and locating a HALEU storage facility at an undeveloped (greenfield) site would likely result in the highest construction impacts for some resources. Siting a HALEU storage facility at an unknown location would have to take into consideration site-specific environmental conditions and comply with the applicable regulatory requirements at that location.

Site selection is not addressed in this EIS; specific site impacts would be addressed in subsequent site-specific NEPA (or state equivalent) documentation. Since the storage facility would be a licensed commercial facility, site-specific NEPA (or state equivalent) documentation would be the responsibility of the individual licensee and the NRC.

The Proposed Action's potential environmental consequences impact assessments for HALEU storage are presented in Table A-10 below. After the table, see Section A.5.3.1, *Ecological Resources*, and Section A.5.3.2, *Historic and Cultural Resources*, for summaries of the impacts associated with the respective resources that were determined to have potentially MODERATE or LARGE impacts.

Details regarding a storage facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.5.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-10 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences between various facilities are noted. Section 5 of the Technical Report (Leidos, 2023) provides the technical support for this portion of the Final EIS. **Technical Report - Section 5 (Leidos, 2023)**

Table A-10. HALEU Storage – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [a]	*Impact Indicator*	*Key Information* [b]
Land Use	**SMALL**	Land Disturbed (acres)	1
		Total Site Size (acres)	See enrichment and deconversion (same sites under consideration for this activity).
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers) (feet)	25 – storage building
		Distance to Nearest Receptor (miles)	See enrichment and deconversion
		BLM VRM Rating	See enrichment and deconversion
Geology and Soils	**SMALL**	Rock and Soil Excavated	Minimal excavation needed
		Backfill Needed	Minimal backfill needed
Water Resources	**SMALL**	Effluent Discharge	Minor stormwater runoff from 1 acre site. No process effluent.
		Average Operational Water Use (gpd)	Minor amounts to support 6 personnel
		Floodplains	See enrichment and deconversion
Air Quality [c]	**SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Emissions from vehicles, equipment, and fugitive dust. Potential $PM_{2.5}$ impacts would be mitigated to below NAAQS levels with the implementation of fugitive dust controls.
		Operations emissions	Emissions from vehicles and equipment. Minimal emissions would not contribute to an exceedance of a NAAQS.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	None – UUSA SMALL – Centrus /Portsmouth SMALL to MODERATE – GLE SMALL – IIFP SMALL – Paducah

Table A-10. HALEU Storage – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	See enrichment and deconversion
		Potential for impacts on Traditional Cultural Property (TCP)	See enrichment and deconversion
Infrastructure	**SMALL to MODERATE**	Electrical Use	Minor amounts for building lighting and HVAC
		Water Use	See Water Resources row
		Fuel Use	Minor amounts for vehicles and building heating
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	See enrichment and deconversion
		Noise Levels	See enrichment and deconversion
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	No injuries or fatalities during facility construction or operation.
		Construction Radiological Impacts (mrem/yr)	5 for workers No impacts to the public
		Operations Average Worker Dose (mrem/yr)	100
		Operations MEI Public Dose (mrem/yr)	~0
		Operations Population Dose (person-rem/yr)	~0
		Operations Chemical Risk	No chemical risk from normal operations
Public and Occupational Health – Accidents	**SMALL**	Radiological Accidents	A HALEU storage container breach is the only applicable accident; see enrichment and deconversion.
		Chemical Accidents	A HALEU storage container breach is the only applicable accident; see enrichment and deconversion.
Traffic	**SMALL**	Construction – Daily Vehicle Trips: Workers/Trucks	60/8
		Operations – Daily Vehicle Trips: Workers/Trucks	12/< 1
Socioeconomics	**SMALL**	Peak Construction Employment (direct)	30

Table A-10. HALEU Storage – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
		Operations Employment (direct)	6
		ROI Labor Force	See enrichment and deconversion.
Environmental Justice	**No disproportionate and adverse impacts on communities with environmental justice concerns are expected.**	Minority or low-income population in the ROI	Because of size of the facility (1 acre), small number of workers (6), and no routine release of radioactive or toxic materials, disproportionate adverse impacts are not expected.

Key: < = less than; BLM VRM = Bureau of Land Management Visual Resources Management; ft = feet; GLE = Global Laser Enrichment; gpd = gallons per day; HALEU = high-assay low-enriched uranium; HVAC = heating, ventilation, and air conditioning; IIFP = International Isotopes Fluorine Products; LLW = low-level waste; MEI = maximally exposed individual; MLLW = mixed low-level waste; mrem/yr = millirem per year; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; person-rem/yr = population dose per year; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter (fine particulates); ROI = region of influence; UUSA = Urenco USA

Notes:

a The impacts assessments in this table represent a single facility capable of handling 50% of the HALEU produced under the Proposed Action. Impacts denoted as potentially MODERATE would be associated with the specific site.

b Details regarding constructing and operating a uranium storage facility were developed from relevant NEPA documentation listed in Section A.5.2.2, *Existing NEPA Documentation.* Sections 5.5.3 and Tables 5-4 to 5-6 of the **Technical Report - Section 5.3 (Leidos, 2023)** provide the technical support for this portion of the Final EIS.

c The impacts of GHGs are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.5.3.1 Ecological Resources

Any new construction occurring within undeveloped lands could have SMALL or MODERATE impacts on ecological resources depending on the resources disturbed, mitigation, and the minimization measures employed, despite the relatively small area (less than an acre) impacted by construction. Land-clearing activities as part of new construction could result in increased erosion, stormwater runoff, and loss of vegetation. Additionally, impacts on wildlife could include habitat fragmentation, disturbance, and injury or mortality, as habitats within the footprint disturbed by construction would be reduced or altered, and construction activities would result in habitat fragmentation. Loss of habitat could result in a long-term reduction in wildlife abundance and richness. Habitat disturbance could facilitate the spread and introduction of invasive plant species. Wildlife habitat could be adversely affected if invasive vegetation became established in the disturbed areas and adjacent off-site habitats. Construction activities could cause wildlife disturbance, including interference with behavioral activities. Wildlife could respond in various ways, including attraction, habituation, and avoidance. Principal sources of noise would include vehicle traffic and operation of machinery. Regular or periodic noise could cause adjacent areas to be less attractive to wildlife and result in a reduction in use. Construction activities could result in the direct injury or death of certain wildlife species. Wildlife could also be exposed to accidental fuel spills or releases of other hazardous materials. To avoid these impacts to wildlife, any new construction associated with a new HALEU storage facility should be placed in other previously developed areas of the site, if possible.

Pending site selection, an official USFWS IPaC data request would need to be submitted for the project under Section 7 of the Endangered Species Act to generate an *Official Species List* and identify if federally designated critical habitats are present. Additional analysis would be required to determine the severity and nature of impacts to the federally protected species as part of the final design and description of the project storage facility. Removal of native habitats would impact vegetation, wildlife, and possibly special status species. Special status species are defined as those protected under the Endangered Species Act, the Migratory Bird Treaty Act, 16 U.S.C. §703–712, the Bald and Golden Eagle Protection Act, 16 U.S.C. §668–668d, and state-listed species.

Migratory birds are protected under the Migratory Bird Treaty Act, 16 U.S.C. §703–712. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act, 16 U.S.C. §668–668d. Numerous migratory birds, including some birds of conservation concern and eagles, likely occur or have the potential to occur as transients throughout the vicinity of the proposed facility sites. The USFWS recommends conducting tree-clearing activities outside of the bird nesting season to avoid the need for active nest relocation or destruction, when appropriate. To avoid impacts to migratory birds, tree clearing within undeveloped lands would need to occur outside of the nesting season. Tree-clearing work during the nesting season would require a migratory bird nest survey 72 hours prior to the start of clearing activities.

Wetlands and/or water features (such as streams, lakes, ponds, or other waters) subject to protection under Section 404 of the CWA, 33 U.S.C. §1344, could occur within the Proposed Action area. Wetlands could be impacted by alteration of surface water runoff patterns, soil compaction, or groundwater flow. Pending facility site selection, formal wetland delineation surveys would be required to determine presence or absence of jurisdictional wetlands. Impacts to federally protected wetlands could require consultation with the U.S. Army Corps of Engineers to obtain a permit. Additionally, subsequent NEPA analysis under these actions may also be required.

Impacts on ecological resources are analyzed on a project-specific basis. The severity of impacts (i.e., SMALL or MODERATE) on ecological resources will be dependent on the current ecological conditions of the selected site, in comparison to the disturbance footprint associated with the facility designs. The requisite NEPA analysis for impacts to special status species and wetlands, in accordance with the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, CWA, and applicable state threatened and endangered species laws in its site selection process, and prior to construction of a new HALEU storage facility would need to be performed. The Endangered Species Act Section 7 consultation, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act analysis includes formal and/or informal consultations with the USFWS, while wetland impacts shall be coordinated with the U.S. Army Corps of Engineers. Local and state agencies shall be contacted for adverse impacts to state threatened and endangered species. Therefore, ecological resources impacts would likely be SMALL to MODERATE, depending on site-specific habitat and presence of threatened or endangered species.

Impacts on ecological resources could be expected to be lower (SMALL or none) if construction of a new facility were to occur in an already developed or disturbed site versus an undeveloped or undisturbed site.

A.5.3.2 Historic and Cultural Resources

Construction of a HALEU storage facility at an existing uranium fuel cycle facility or industrial site would likely occur on previously surveyed and disturbed areas and has the potential to impact approximately 1 acre of land. Therefore, impacts of construction at an existing uranium fuel cycle facility or industrial site would likely be SMALL. Construction of a HALEU storage facility at a previously undeveloped location has the potential to impact historic and cultural resources. The degree of impact, while limited due to the relatively small size of the facility and the implementation of BMPs would be dependent upon the historic and cultural characteristics of the selected site. Because of this, the impacts of construction at a previously undeveloped location are expected to result in SMALL to MODERATE impacts.

Operations and maintenance activities at a proposed HALEU storage facility have the potential to affect historic and cultural resources. Because there would be no additional land disturbance, no impacts on undiscovered cultural resources would be expected during operation. Therefore, the impacts from operations would likely be SMALL.

A.6 Transportation

A.6.1 Introduction

This section presents human health considerations associated with transport elements related to the implementation of the Proposed Action. Both radiological and nonradiological transportation impacts could result from shipment of radioactive material (natural uranium and HALEU products) and wastes. Radiological impacts are those associated with the effects from low levels of radiation emitted during incident-free transportation and from the accidental release of radioactive materials. Nonradiological impacts are independent of the nature of the cargo being transported and are expressed as traffic accident fatalities resulting only from the physical forces that accidents could impart to humans. The impacts of greenhouse gases (GHGs) emitted by transportation vehicles are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

Transportation packaging for radioactive materials is designed, constructed, and maintained to contain the package contents and provide radiation shielding. The type of packaging used is determined by the total radioactive hazard presented by the material within the packaging. For example, natural uranium ore is classified as a low-specific activity material with no activity limit and no specific packaging requirements, as covered under 49 C.F.R. §173, *Shippers – General Requirements for Shipments and Packaging*. Requirements for motor carrier transportation can also be found in 49 C.F.R. §350–399. The Technical Report, Section 6, *Human Health – Transportation*, Attachment A, provides additional details on the packaging used for the transport of various uranium forms (e.g., triuranium oxide or yellowcake [U_3O_8], UF_6, HALEU UF_6, HALEU UO_2, or HALEU metal) in this HALEU EIS (Leidos, 2023).

A.6.2 Analysis Methodology

A.6.2.1 Approach to NEPA Analysis

The NRC performed generic analyses of the environmental effects of transportation during uranium fuel cycle activities in the *Environmental Survey of the Uranium Fuel Cycle* (WASH-1248) (AEC, 1974) and transportation of fuel and waste to and from light water reactors (LWRs) in the *Environmental Survey of Transportation of Radioactive Materials To and From Nuclear Power Plants* (WASH-1238) (AEC, 1972) and in a supplement to WASH-1238, NUREG-75/038 (NRC, 1975), and found the impacts to be SMALL. These documents provided the basis for Table S-3 (AEC, 1974) and Table S-4 (AEC, 1972; NRC, 1975) in 10 C.F.R. §51.51 and §50.52, respectively. Impacts are provided for normal conditions of transport and accidents in transport for a reference 1,100 megawatt electrical LWR.[16] Table S-3 in 10 C.F.R. §51.51 summarizes

16 Note that the basis for Tables S-3 and S-4 is a 1,100 megawatt electrical LWR, with the assumption of 80% capacity factor for the operation (Table S-4).

the environmental impacts of transportation for the uranium fuel cycle to be 2.5 person-rem exposure to the workers and public per year. Table S-4 in 10 C.F.R. §50.52 summarizes the estimated dose to transportation workers during normal transportation operations to be 4 person-rem and collective dose to the public along the route and the dose to onlookers were estimated to result in 3 person-rem per reactor per year of operation.

Since the publication of WASH-1238 (AEC, 1972), WASH-1248 (AEC, 1974), and NUREG-75/038 (NRC, 1975), the NRC has undertaken additional studies regarding the risk from the transportation of fuel cycle, unirradiated fuel and spent nuclear fuel (SNF). In 1977, the NRC published NUREG-0170, *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes*, which assessed the adequacy of the regulations in 10 C.F.R. §71, then titled *Packaging and Transportation of Radioactive Waste* – NUREG-0170 (NRC, 1977). In that assessment, the measure of safety was the risk associated with radiation doses to the public under routine and accident transport conditions, and the risk was found to be acceptable. The approach and methodology in this study formed the basis of all future studies in determining the transportation risk involving radioactive materials. Later, the NUREG-0170 model for transport of SNF was further refined. In 1987, in a study known as the "Modal Study," (NUREG/CR-4829) (NRC, 1987), the accident consequences were described in terms of the resultant strains produced in transportation packages (for impacts) and the increase in package temperature (for fires). In 2000, in the re-examination study (NUREG/CR-6672) (NRC, 2000), two generic truck packages and two generic rail packages were analyzed using the refined model on package structures and response to accidents. The study conservatively used semi-trailer truck and rail accident statistics for general freight shipments, because even though more than 1,000 spent fuel shipments had been completed in the United States by the year 2000 and many thousands more had been completed safely internationally, there had been too few accidents involving spent fuel shipments to provide statistically valid accident rates. These two studies estimated smaller assessed risks than had been projected in NUREG-0170.

The analysis for potential transportation-related human health impacts associated with the Proposed Action and post-Proposed Action activities was informed by the studies described above as well as information presented in existing NEPA documentation of potential generic environmental consequences associated with various uranium fuel cycle activities, such as uranium mining and milling (NRC, 2009a), advanced nuclear reactors (ANRs) (NRC, 2021c), and SNF management (NRC, 2014c). Details provided in location-specific NEPA documentation relating to an existing conversion facility (NRC, 2019), enrichment facilities (NRC, 2005a; NRC, 2006; DOE, 2011; NRC, 2012b; NRC, 2015), deconversion facilities (NRC, 2012a), and fuel fabrication facilities (NRC, 2009b; NRC, 2012b) were also considered in the analysis and incorporated by reference (see Table A-11). It was assumed, for purposes of analyzing the Proposed Action, that an enrichment building (NRC Category II facility) is constructed next to an existing LEU enrichment building (NRC Category III). Also, for the purposes of this EIS, and to maximize the impacts in the absence of any specific location within an existing private commercial facility, it was considered that transportation between facilities (such as between an enrichment facility and a deconversion facility) would be most conservatively estimated when using the same route characteristics as the route between the farthest-separated existing facilities (i.e., GLE in Wilmington, North Carolina, and the Framatome [formerly AREVA NP] fuel fabrication facility in Richland, Washington).

A.6.2.2 Existing NEPA Documentation

For **uranium mining and milling**, the NRC's GEIS on uranium milling projects addressed conventional mining, and the GEIS for ISR facilities and its Supplements addressed ISR activities. The ISR GEIS and its

Supplements provided details on the annual number of truck shipments of yellowcake to a conversion facility that were previously analyzed under NEPA:

- *Final Generic Environmental Impact Statement on Uranium Milling Project M-25.* NUREG-0706. U.S. Nuclear Regulatory Commission (NRC, 1980)
- *Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities.* NUREG-1910. U.S. Nuclear Regulatory Commission Office of Federal and State Materials and Environmental Management Programs and the Wyoming Department of Environmental Quality Land Quality Division (NRC, 2009a)
- *Environmental Impact Statement for the Moore Ranch ISR Project In Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 1* (NRC, 2010)
- *Environmental Impact Statement for the Nichols Ranch ISR Project in Campbell and Johnson Counties, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 2* (NRC, 2011a)
- *Environmental Impact Statement for the Lost Creek ISR Project in Sweetwater County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 3* (NRC, 2011b)
- *Environmental Impact Statement for the Dewey-Burdock Project in Custer and Fall River Counties, South Dakota: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 4* (NRC, 2014a)
- *Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report, NUREG-1910 Supplement 5* (NRC, 2014b)
- *Environmental Impact Statement for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report NUREG-1910 Supplement 6* (NRC, 2016)

For the **uranium conversion activity**, the NRC's Metropolis EA provided details on annual shipments (e.g., 700 yellowcake and 600 UF_6) that were previously analyzed under NEPA:

- *Environmental Assessment for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois)* (NRC, 2019)

For **enrichment activities**, to extrapolate the potential environmental consequences of transportation related to enrichment, the analysis drew on the details provided in five NEPA documents that evaluated transportation impacts of annual shipments of UF_6 feed to the enrichment facilities and shipments of enriched UF_6 to fuel fabrication facilities:

- *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio (DOE adopts NUREG-1834)* (DOE, 2011)
- *Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*, *NUREG-1790* (NRC, 2005a)
- *Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio, NUREG-1834* (NRC, 2006)

- *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina, NUREG-1938* (NRC, 2012b)
- *Environmental Assessment for the Proposed Louisiana Energy Services, URENCO USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico* (NRC, 2015)

For **deconversion activities**, impacts would be related to transporting HALEU UF_6 to the deconversion facility if the deconversion is not done at an enrichment facility. To estimate a conservative distance for the transportation of such HALEU UF_6, the distance between a possible deconversion facility (the IIFP facility in New Mexico) and most-distant existing enrichment facility (the GLE facility in North Carolina) was determined. Details in the NRC's EIS for the IIFP deconversion plant in New Mexico regarding shipments of DUF_6 to that plant were used to extrapolate potential environmental consequences associated with transportation of HALEU UF_6 to a deconversion facility as a result of the Proposed Action:

- *Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico – Final Report, NUREG-2113* (NRC, 2012a)

Impacts may also occur when transporting HALEU UF_6 from an enrichment facility to a fuel fabrication facility for deconversion (instead of at IIFP). Analysis for that option is evaluated in the enrichment facilities analyses, as the HALEU UF_6 was assumed to be transported to the farthest fuel fabrication facility from each enrichment facility to envelop the risk. (See the list of existing NEPA documentation for enrichment activities.)

For **HALEU storage activities**, it was determined that HALEU storage could occur at enrichment facilities, deconversion facilities, or a standalone facility. For the purposes of this EIS, and to maximize the impacts in the absence of any specific location within an existing private commercial facility, it was assumed that the storage facility would be located at a location with the same route characteristics as that of the route between GLE in Wilmington, North Carolina, and the Framatome fuel fabrication in Richland, Washington, and the GLE EIS provided details regarding storage capacities and route characteristics for transportation of HALEU intended for storage:

- *Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*, *NUREG-1938* (NRC, 2012b)

For fuel fabrication activities, the impact of transporting HALEU O_2 or metal to a fuel fabrication facility is bounded by the impact analysis evaluated for a fuel storage facility, which was assumed to be located at the Framatome facility in Richland, Washington, to conservatively estimate a distance for transporting enriched uranium to a fuel fabrication facility.

The Draft NRC Advanced Reactor Generic EIS (NUREG-2249) evaluated the various aspects of HALEU use in advanced reactors:

- *Draft Generic Environmental Impact Statement for Advanced Nuclear Reactors (ANRs), NUREG-2249* (NRC, 2021c)

Environmental effects of continued storage of SNF were evaluated in the *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*, which included an evaluation of the potential impacts of transporting SNF to a final repository:

- *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*, *NUREG-2157* (NRC, 2014c)

A.6.3 Potential Environmental Consequences

The NRC issued two Generic EISs (GEISs) for uranium recovery using the conventional mining and milling (NRC, 1980) and ISR mining (NRC, 2009a). These GEISs concluded that the impacts of transporting various radioactive materials to and from the uranium mining and milling sites to be SMALL. The NRC has also issued EAs or EISs for the conversion facility, enrichment facilities, and fuel fabrication facilities, all showing the transportation impacts for radioactive materials transports to be SMALL, as well.

The Proposed Action activities, including uranium recovery, conversion, and shipments of UF_6 to and from enrichment facilities are similar to those of the activities evaluated in the LWRs fuel cycle. The transport of the HALEU in the form of UF_6 to the fuel fabrication facilities is also similar to those used in the LWRs fuel cycle, but with a criticality modified packaging with lower quantities of enriched uranium per shipment. The HALEU fuel may be used in ANRs, as well as research reactors. Several of the potential non-LWR designs are expected to deploy non-UO_2 fuels (e.g., uranium metal, uranium carbide, uranium in a molten salt, etc.) or rely on up-recycled fissile material. In the *Generic Environmental Impact Statement for Advanced Nuclear Reactors - Draft Report for Comment* (hereinafter referred to as the "ANR GEIS") (NUREG-2249) (NRC, 2021c), the NRC evaluated the various potential fuel fabrication needs for the ANRs. In Section 3.14 of that ANR GEIS, the NRC concluded that the assessment of environmental impacts, Table S-3 of 10 C.F.R. §51.51, is expected to bound the impacts for ANRs that rely on uranium oxycarbide/UO_2 fuels if such fuel fabrication is applying the existing processes of the NRC-licensed fuel fabrication facilities, resulting in SMALL impacts (NRC, 2021c, pp. 3-169).

If ANR fuel fabrication, namely metallic fuel and liquid-fuel for molten salt reactors, is not bounded by WASH-1248, project-specific analysis would be required.

The treatment and management of the SNF at both LWRs and ANRs using HALEU are the same. Consistent with the findings in the NRC 2014 final rule on the environmental effects of continued storage of SNF, 10 C.F.R. §51, and NUREG-2157, the *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c), the GEIS concluded that impacts from continued storage of SNF for 60 years, including the potential impacts of transporting the SNF to a final repository would be SMALL. For the transportation of SNF, the NRC staff concluded that the radiological doses would be expected to continue to remain below the regulatory dose limits during continued storage and all of the related activities would have small environmental impacts (NRC, 2014c, p. § 4.16).

Notwithstanding the above conclusions, an evaluation of transportation impacts for uranium fuel cycle activities is included in Section 6 of the Technical Report (Leidos, 2023). The human health transportation risk analysis in this HALEU EIS incorporates by reference resource conditions and impact considerations of the primary existing NEPA documentation sources listed in Section A.6.2.2, Existing NEPA Documentation, as well as other related online/available sources including site-specific NEPA documentation and Federal and state databases (Leidos, 2023).

Radiological impacts are those associated with the effects from low levels of radiation emitted during incident-free transportation and from the accidental release of radioactive materials. Nonradiological impacts are independent of the nature of the cargo being transported and are expressed as traffic accident fatalities resulting only from the physical forces that accidents could impart to humans. Since the EIS does not identify specific locations for fuel cycle facilities, the EIS transportation analysis used some conservative assumptions about the distances traveled during transportation. The analysis is expected to bound the population impacts regardless of where the facilities would be located.

The analysis considered transportation of all forms of uranium materials: from the mines to the mills, from an ISR or mill to the conversion facility, from the conversion facility to enrichment facilities, from the enrichment facility to a deconversion facility, and from the deconversion facility to a storage facility and from the storage facility to the fuel fabrication facility. Decisions on the specific location of facilities are not being made pursuant to this EIS. The locations where companies choose to site their facilities would be subject to further environmental analysis under the relevant regulatory authority. The referenced Technical Report (Leidos, 2023) includes a discussion of the existing NEPA documentation and the approach for determining the potential environmental consequences using the existing NEPA documentation for the Proposed Action activities. For the transportation analysis all facilities were conservatively assumed to be independently sited (i.e., no colocation of facilities).

As indicated above, the human health transportation risk analysis in this HALEU EIS incorporates by reference resource conditions and impact considerations of the existing NEPA documentation prepared by the NRC and DOE, as applicable. These are standard analyses that have been used consistent with the requirements that have been codified in the Code of Federal Regulations, e.g., 10 C.F.R. §51 and 10 C.F.R. §71.

The U.S. Department of Transportation (USDOT) regulates the transportation of hazardous materials in interstate commerce by land, air, and water. USDOT specifically regulates the carriers of radioactive materials and the activities related to transport, such as marking and labeling routing, handling and storage, and vehicle and driver requirements. NRC regulates certain aspects of the packaging and transportation of radioactive material for its licensees, including transportation by commercial shippers of radioactive materials. DOE, through its management directives, Orders, and contractual agreements, ensures the protection of public health and safety by imposing a variety of requirements and standards for transportation activities done on behalf of DOE incorporating the requirements and standards that meet those of USDOT and NRC and establishing that all Departmental shipments achieve an equivalent level of safety to that required by USDOT and NRC. DOE office of Nuclear Energy (DOE-NE) currently has five cooperative agreements with states and Tribes to support engagements on topics related to transportation of SNF. DOE largely engages with states and Tribes through DOE's National Transportation Stakeholders Forum (NTSF), which hosts various meetings, activities, and working groups allowing for state and Tribal input and engagement on transportation related projects and programs.

The analyzed transportation routes in all of the incorporated NEPA analyses were generated using an Oak Ridge National Laboratory route selection computer program software (e.g., TRAGIS, or Web-TRAGIS), which is a geographic information system-based transportation analysis computer program used to identify the highway, rail, and waterway routes for transporting radioactive materials within the United States. The features in this software allow users to determine routes for shipment of radioactive materials that conform to USDOT regulations as specified in 49 C.F.R. §397, ("highway route-controlled quantities"). All of the shipment's routes determined by the TRAGIS/Web-TRAGIS evaluated follow the USDOT transport routing regulations as those for "highway route-controlled quantities"; therefore, all shipments of radioactive materials and wastes are considered to fall in this category. The routes were selected to be reasonable and consistent with routing regulations and general practice, but they are representative routes only because the actual routes would be chosen in the future.

For incident-free transportation, the potential human health impacts from the radiation field surrounding the radioactive packages were estimated for transportation workers and populations along the route (termed off-traffic or off-link), people sharing the route (termed in-traffic or on-link), and people at rest areas and stops along the route.

Potential human health impacts from transportation accidents were evaluated. The risks to human health from the radiological nature of the shipments include analyses of various exposure pathways: (1) external exposure to a passing radioactive cloud; (2) external exposure to contaminated ground; (3) internal exposure from inhalation of airborne contaminants; and (4) internal exposure from the ingestion of contaminated food (related to potential releases in rural areas). The impact of a specific radiological accident is expressed in terms of probabilistic risk, which is defined as the accident probability (accident frequency) multiplied by the accident consequence. The analysis of accident risks accounts for a spectrum of accidents ranging from high-probability accidents of low severity (e.g., a "fender bender") to hypothetical high-severity accidents that have a corresponding low probability of occurrence.

In the HALEU fuel cycle, the activities in uranium recovery, conversion, and shipments of UF_6 to and from enrichment facilities are similar to those of the activities evaluated in the LWRs fuel cycle. The transport of the HALEU in the form of UF_6 to the fuel fabrication facilities is also similar to those used in the LWRs fuel cycle, but with the use of a criticality modified packaging with lower quantities of enriched uranium per shipment.

Because of the similarity of the materials that would be transported under the Proposed Action with those used in LWR fuel cycle facilities, the accident analyses and their associated impacts developed in those facility's NEPA documents are considered to be applicable to this HALEU EIS, as detailed in Section 6 of the referenced Technical Report (Leidos, 2023). Therefore, the analysis of the accident impacts in this HALEU EIS extrapolates the impacts in the incorporated NEPA documents based on the number of shipments for the specific forms of the materials transported.

The HALEU products (uranium hexafluoride, uranium metals or oxides) were assumed to be transported in the to be certified packages (currently active) such as 30B-20 cylinders for the HALEU hexafluoride, Optimus-L for HALEU oxides, and ES-3100 for HALEU metal. The NRC recently certified Optimus-L for transporting HALEU in tri-structural isotropic (TRISO) form, which is uranium carbide. Although not currently certified for use in transporting uranium oxides, it is likely that this same container could be used. Attachment A to Section 6 of the Technical Report (Leidos, 2023) provides additional details on the proposed shipping containers. In addition, the Energy Act of 2020 has provisions for the design and certification of packages specifically for the storage and transportation of HALEU.

The analysis provides a range of potential impacts that could occur for transporting various radioactive materials (e.g., feed, product, and wastes) from each activity/process for HALEU production. Table A-11 summarizes the results of the transportation impacts for the various Proposed Action activities (associated with the transportation needs for one uranium enrichment contract at an assumed production rate of 25 MT per year), along with the sources of NEPA documentation and major assumptions. Table A-12 summarizes the quantitative results of the transportation impacts for the various activities within the HALEU fuel cycle. As shown in this table, and consistent with the expectation as concluded in 10 C.F.R. §51, the impacts of transporting radioactive materials related to the Proposed Action in the HALEU EIS are expected to be SMALL. Overall, there would be a maximum of 380 to 415 annual shipments of various uranium products, and over 1 million km (621,371 miles) traveled annually covering the activities in various steps between the uranium recovery and storage facility for production of 25 MT of HALEU per year.[17] For a 50 MT HALEU production, there would be on the average less than 3 truck transport per day, and about 1.3 million miles of transports per year. The results indicate that it is unlikely that the transportation activities under the Proposed Action would lead to a latent cancer fatality among the workers or general populations from radiological exposures in these transports (Leidos, 2023, p. Sections 6.7 and 6.8).

If the uranium recovery uses only the mining and milling recovery; then there would be 57,400 additional shipments of uranium ore to a milling facility with the maximum estimated potential traffic fatalities of

17. DOE may exercise multiple contracts for HALEU production in support of the Proposed Action. The transportation analysis in this EIS assumed an annual production rate of 25 MT per year per contract (DOE, 2023b). Because the impacts are proportional to the production rate, for a 50 MT per year production rate assumed under the Proposed Action, the cited total annual impacts would be doubled.

two annually. Given that the average number of traffic fatalities in the United States is about 34,030 per year for the 10-year period 2010 through 2019 (USDOT, 2021), the incremental increase in risk to the general population from shipments associated with the Proposed Action would, therefore, be very SMALL.

With respect to emergency response, the Federal Emergency Management Agency, an organization within U.S. Department of Homeland Security (DHS), coordinates Federal and state participation in developing emergency response plans and is responsible for the development and maintenance of the Nuclear/Radiological Incident Annex (DHS, 2023) to the National Response Framework (DHS, 2019). The Nuclear/Radiological Incident Annex to the National Response Framework describes the policies, situations, concepts of operations, and responsibilities of the Federal departments and agencies governing the immediate response and short-term recovery activities for incidents involving release of radioactive materials.

In the event of a release of radiological cargo from a shipment along a route, trained and equipped local emergency response personnel would be first to arrive at the accident scene. It is expected that response actions would be taken in the context of the Nuclear/Radiological Incident Annex protocols. Based on their initial assessment at the scene, trained and fully equipped first responders would involve State and Federal resources as necessary. First responders or State and Federal responders would initiate actions in accordance with the USDOT's *Emergency Response Guidebook* (USDOT, 2024) to isolate the incident and perform any actions necessary to protect human health and the environment. (evacuations or other steps to reduce or prevent impacts on the public.) Cleanup actions are the responsibility of the carrier. DOE engages with states and Tribes on topics of emergency response and transportation through NTSF meetings, webinars, and ad hoc working groups. One ad hoc working group is focused on evaluating the Department's proposed Section 180(c) policy and helping DOE consider issues of importance to state, Tribal and other government entities to effectively conduct planning and training for emergency response in support of a national SNF shipping program. NTSF members also receive information on the Transportation Emergency Preparedness Program (TEPP), an emergency response training program managed by the Office of Environmental Management.

To mitigate the possibility of an accident, DOE issued DOE Order 460.2B, *Departmental Material Transportation Management* (DOE, 2022b). This Order specifies requirements for the planning of operational events (contingencies) and for emergency response. Carriers are expected to exercise due caution and care in dispatching shipments, and the carrier determines the acceptability of weather and road conditions, whether a shipment should be held before departure, and when actions should be taken while en-route. The order emphasizes that shipments should not be dispatched if severe weather or bad road conditions make travel hazardous. Current weather conditions (at the point of origin and along the entire route), and the weather forecast would be considered before dispatching a shipment.

Table A-11. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	*Input: Material/Shipments Needed to Produce 25 MT/yr HALEU*	*Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU*	*NEPA Documentation Sources/Assumptions/Notes*	*Transportation Impacts and Conclusions*
Uranium Mining and Recovery – *Conventional Mining and Milling* *In-Situ Recovery (ISR) of Uranium*	*Mining*: 1,320,000 MT of ore (assuming ore quality of 0.001 [and 91% extraction]) Shipments About 185 truck shipments per day, each containing 23 MT of ore, for 310 days per year transport to the milling processing facility. *ISR*: 0 [all extraction occurs underground]	Output: 1,260 MT of U_3O_8 (yellowcake) [95% purity], leading to ~1,200 MT of yellowcake Containers: 55-gallon drums Shipments: 74 truck loads Based on using 55-gallon drums containing U_3O_8, and 40 drums per truck, or 17.2 MT yellowcake, per truck	NEPA documentation: NUREG-0706 (NRC, 1980) for conventional mining NUREG-1910 (NRC, 2009a) and its Supplements for ISR facilities Also, DOE/EIS-0472 (DOE, 2014) [Uranium Leasing Program PEIS documents] for additional insights on mining	SMALL The annual 74 truck load shipments of yellowcake to the conversion facility are within the range of transports analyzed in NUREG-1910, and consistent with the conclusion in this NEPA document; the overall transportation impacts would be SMALL.
Uranium Conversion – Uranium ore conversion to UF_6 at the ConverDyn facility[18] in Metropolis, IL, or a new conversion facility	Input: 1,260 MT of U_3O_8 With 74 truckloads per year	Output: 1,530 MT of UF_6 (assuming 98% pure UF_6) Container: 48-Y (12.5 MT maximum, or an average of 12 MT) cylinders containing UF_6. Shipments: 123–128 shipments per year	NEPA documentation: NRC's Metropolis EA (NRC, 2019): The existing Metropolis facility (ConverDyn) is also used to supply feed for LEU fuel production and has sufficient conversion capacity to support both LEU and HALEU fuel production.	SMALL Given that the annual shipments of HALEU-related activities (e.g., 74 shipments of yellowcake and up to 128 shipments of UF_6) is a small fraction of the existing transports (e.g., 700 yellowcake and 600 UF_6), in the Metropolis EA, and consistent with the EA's conclusions, the overall transportation impacts would be SMALL. If a new conversion facility is used, the conclusion will remain unchanged, as the number of

18 The ConverDyn facility is used as a surrogate for the purposes of analysis in this EIS.

Table A-11. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	***Input:*** ***Material/Shipments Needed to Produce 25 MT/yr HALEU***	***Output:*** ***Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU***	***NEPA Documentation Sources/Assumptions/Notes***	***Transportation Impacts and Conclusions***
				uranium-related shipments are relatively small—about 6 to 11 shipments per month.
HALEU Enrichment – HALEU enrichment using[19]: Centrifuges at Centrus in OH, Centrifuges at Urenco in NM, or Lasers at GLE in Wilmington, NC[20]	Input: 1,530 MT of UF_6 in 123–128 shipments of 48-Y cylinders per year	Output: 38 MT HALEU UF_6 Container: 30B-20 cylinder in DN30-20 protective structure packaging (PSP) overpack with an average UF_6 mass of 1.25 MT per cylinder), leading to a minimum of 31 DN30-20 PSPs. Shipments: Eight shipments per year (assuming four PSPs per truck).	NEPA Documentation: Urenco, (or UUSA), NM, NUREG-1790 (NRC, 2005a) and NRC UUSA EA (NRC, 2015) Centrus, (ACP) OH, NUREG-1834 (NRC, 2006) and DOE/EIS-0468 (DOE, 2011) [which adopted NUREG-1834] GLE, NC, NUREG-1938 (NRC, 2012b) It was assumed, for purposes of analyzing the Proposed Action, that an enrichment building (NRC Category II facility)[21] is constructed next to an existing LEU enrichment building (NRC Category III).	SMALL The three enrichment facilities evaluated transportation impacts of annual shipments between 900 (GLE) to 1,259 (UUSA) of UF_6 feed, and between 50 (GLE) to 300 (ACP) shipments of enriched uranium to a fuel manufacturing facility. Considering that this EIS has an estimate of 128 shipments of feed and 8 shipments of products, and consistent with the NRC's conclusions in the cited NEPA documents, the overall transportation impacts would be SMALL.
HALEU Enrichment – HALEU enrichment at two locations:* First enrich up to 5% Second, enrich to 19.75%	Input: 1,767 MT of UF_6 In 142–148 Shipments of 48-Y cylinders per year in the first year; 1,627 MT of UF_6	Output: 38 MT HALEU UF_6 Container: 30B-20 cylinder in DN30-20 PSP) overpack with an	NEPA Documentation: Urenco, (or UUSA), NM, NUREG-1790 (NRC, 2005a) and NRC UUSA EA (NRC, 2015) Centrus, (ACP) OH, NUREG-1834 (NRC, 2006) and DOE/EIS-0468	SMALL The three enrichment facilities evaluated transportation impacts of annual shipments between 900 (GLE) to 1,259 (UUSA) of UF_6 feed,

19 These facilities would be analyzed as representative of two types of technologies and facilities that could produce HALEU in the timeframe required.

20 Even though the license for this facility was terminated on January 5, 2021 (NRC website| https://www.nrc.gov/materials/fuel-cycle-fac/new-fac-licensing.html, accessed on May 4, 2023), the facility was selected to represent a new enrichment process and provide a reasonable alternative to gaseous centrifuge.

21 HALEU facilities would be NRC Category II facilities. LEU facilities are NRC Category III facilities. NRC Category II facilities require additional security measures.

Table A-11. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	***Input: Material/Shipments Needed to Produce 25 MT/yr HALEU***	***Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU***	***NEPA Documentation Sources/Assumptions/Notes***	***Transportation Impacts and Conclusions***
* With the use of two enrichment locations there are some inefficiencies in enrichments activities that would lead to the need for larger quantities of natural UF_6 than for a single location, and thus 142–148 shipments of UF_6 for two enrichment locations are addressed as opposed to 124–128 shipments of UF_6 with a single enrichment location.	in 132–136 cylinders then after. Note, about 140 MT of (about 1% enriched U-235) UF_6 would be transported (recycled) from second enrichment location to the first enrichment location, as feed materials.	average UF_6 mass of 1.25 MT per cylinder), leading to a minimum of 31 DN30-20 PSPs. Shipments: Eight shipments per year (assuming four PSPs per truck). The LEU (5% enriched) product shipments between the enrichment locations: 178 MT of UF_6: 15 shipments In 30B cylinders, with an average UF_6 mass of 2.5 MT, as currently being used in the LWRs fuel cycle.	(DOE, 2011) [which adopted NUREG-1834] GLE, NC NUREG-1938 (NRC, 2012b) It was assumed that an enrichment building (NRC Category II facilities)[22] is constructed at Centrus Plant, next to an existing LEU enrichment building (NRC Category III).	and between 50 (GLE) to 300 (ACP) shipments of enriched uranium to a fuel manufacturing facility. Considering that this EIS has an estimate of maximum 148 shipments of feed in the first year and 136 shipments then after, 15 shipments of LEU, and 8 shipments of HALEU products, and consistent with the NRC's conclusions in the cited NEPA documents, the overall transportation impacts would be SMALL.
HALEU Deconversion – HALEU deconversion at enrichment facilities at: Centrus in OH, Urenco in NM, GLE in Wilmington, NC or at a commercial facility	Input: 38 MT HALEU UF_6 in 31 30B-20 PSPs and 8 shipments	Output: 25 MT HALEU metal or 28 MT HALEU O_2 (oxide) Container: *HALEU Metal* in ES-3100 with up to 35 kg of uranium per container This will lead to 715 ES-3100 packages.	Deconversion produces O_2 and metal. Note: If the deconversion is occurring at the enrichment facility, the HALEU UF_6 is already at that facility. If new facilities to be constructed, assumed to be at the International Isotopes	SMALL For the new deconversion facility at the International Isotopes Fluorine Plant facility, the transport of HALEU UF_6 was assumed to be from the GLE enrichment facility, in Wilmington, NC, which leads to farthest distance among the three facilities considered, above.

22 HALEU facilities would be NRC Category II facilities. LEU facilities are NRC Category III facilities. NRC Category II facilities require additional security measures.

Table A-11. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	***Input: Material/Shipments Needed to Produce 25 MT/yr HALEU***	***Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU***	***NEPA Documentation Sources/Assumptions/Notes***	***Transportation Impacts and Conclusions***
		HALEU O_2 in a generic cylinder that could contain 28.12 kg of UO_2 (INL, 2019), leading to 1,009 cylinders. Shipments: *HALEU Metal* 36 shipments of ES-3100 (Assuming 20 ES-3100 per shipment) *HALEU O_2* 8 shipments (Assuming that OPTIMUS®-L is certified, then each can contain 28 cylinders of UO_2, with 5 OPTIMUS®-L per semi-truck, or 3,937 kg of UO_2 per truck)	Fluorine Plant (NM) facility, as evaluated in NUREG-2113 (NRC, 2012a). The impact under this assumption is focused on transporting HALEU UF_6 to the deconversion facility.	Considering that this EIS has an estimate of eight shipments of HALEU UF_6, and consistent with the NRC's conclusions in the cited NEPA document (NUREG-2113) (NRC, 2012a) and adjustment for the expected external dose rate for the HALEU product, the overall transportation impacts would be SMALL.
HALEU Deconversion - HALEU deconversion at existing FFFs at: Framatome (Richland, WA), GNF (Wilmington, NC), Westinghouse (Columbia, SC)	Same as above	Same as above	Assumes deconversion produces O_2 and metal The impact analysis for this option is evaluated in the enrichment facilities analyses, as the HALEU UF_6 was assumed to be transported to the farthest FFF from each enrichment facility to envelop the risk.	SMALL Considering that this EIS has an estimate of eight shipments of products, and these are assumed to be transported from the enrichment facilities to the FFF that is at the farthest distance, and consistent with the NRC's conclusions in the cited enrichment facilities NEPA documents, the

Table A-11. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	*Input: Material/Shipments Needed to Produce 25 MT/yr HALEU*	*Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU*	*NEPA Documentation Sources/Assumptions/Notes*	*Transportation Impacts and Conclusions*
				overall transportation impacts would be SMALL.
HALEU Storage – HALEU storage at existing enrichment facilities, deconversion facility, FFF, or a standalone facility	38 MT HALEU UF_6; 31 30B-20, (Not considered) 25 MT HALEU metal; or in 715 ES-3100 28 MT HALEU O_2 in 1,009 generic cylinders	38 MT of UF6, in 31 30B-20 (Not considered) 25 MT of HALEU metal in 715 ES-3100 36 shipments 28 MT of HALEU O_2 in 1,009 generic cylinders; 8 shipments	For the purposes of this EIS, and to maximize the impacts in the absence of any specific location within an existing private commercial facility, it was assumed that the storage facility would be located at a location with the same route characteristics as that of the route between GLE in Wilmington, NC, and Framatome fuel fabrication in Richland, WA (NRC, 2009b).	SMALL The impact analysis is based on the results presented in NUREG-1938 (NRC, 2012b) and adjusted for the differences in the expected external dose rates for the enriched UF_6 and HALEU O_2 in their respective transportation packages. Consistent with the NRC's conclusions in the cited enrichment facility NEPA document, the overall transportation impacts would be SMALL.
HALEU Fuel Fabrication – HALEU fuel fabrication at: BWXT (Lynchburg, VA), TRISO-X (Oak Ridge, TN), USNC (Oak Ridge, TN), Framatome (Richland, WA), GNF (Wilmington, NC), Westinghouse (Columbia, SC)[23]	25 MT HALEU metal; or 28 MT HALEU O_2	Not specifically analyzed	It was assumed that new HALEU fuel fabrication buildings are constructed next to the LEU fuel fabrication buildings at existing LEU FFFs. Assumes metal, oxide, and TRISO fuels are fabricated.	SMALL The impact of transporting HALEU O_2 or metal to an FFF is bounded by the impact analysis evaluated for the fuel storage facility, which was assumed to be located at the Framatome facility in Richland, WA; see above.
HALEU use in Advanced Reactors	Not specifically analyzed	Not specifically analyzed	Draft NRC Advanced Reactor Generic EIS (NUREG-2249) (NRC,	SMALL

23 These six facilities/sites provide a range of facility sizes and locations that should be representative of other facilities at other locations.

Table A-11. Transportation – Summary of Impacts by Activity for Transportation in the Various Steps of a HALEU Fuel Cycle [(a)]

Activity	***Input: Material/Shipments Needed to Produce 25 MT/yr HALEU***	***Output: Material Type, Containers, and Shipments Needed for 25 MT/yr HALEU***	***NEPA Documentation Sources/Assumptions/Notes***	***Transportation Impacts and Conclusions***
HALEU Spent Nuclear Fuel (SNF) Off-Site Storage HALEU SNF Disposal			2021c) evaluated the various aspects of HALEU use in advanced reactors, with the potential transportation impacts to be SMALL. The environmental effects of continued storage of SNF in NUREG-2157, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c), concluded that impacts from continued storage of SNF for 60 years, including the potential impacts of transporting the SNF to a final repository would be SMALL.	Note: The HALEU SNF, for the most part, (except for the molten salt fuel) are similar to the LWR and other DOE SNFs that are currently being stored at various facilities. Therefore, the general conclusion for the storage and disposition of SNF would be applicable to the HALEU SNF. Given the conclusions in NUREG-2249 and NUREG-2157, the transportation impacts for these HALEU-related activities are expected to be SMALL as well.

Key: % = percent; ACP= American Centrifuge Plant (Centrus); DOE = U.S. Department of Energy; EA = Environmental Assessment; EIS = Environmental Impact Statement; FFF = fuel fabrication facility; GLE = Global Laser Enrichment; HALEU = high-assay low-enriched uranium; HALEU UF_6 = high-assay low-enriched uranium in the form of uranium hexafluoride; HALEU O_2 = high-assay low-enriched uranium dioxide; IL = Illinois; ISR = in-situ recovery; kg = kilograms; LEU = low-enriched uranium; LWR= light water reactor; MT = metric tons; MT/yr = metric tons per year; NC = North Carolina; NEPA = National Environmental Policy Act; NM = New Mexico; NRC = U.S. Nuclear Regulatory Commission; O_2 = oxide; OH = Ohio; PEIS = Programmatic Environmental Impact Statement; PSP = protective structure packaging; SC = South Carolina; SNF = spent nuclear fuel; TN = Tennessee; U-235 = uranium-235; U_3O_8 = triuranium octoxide (i.e., yellowcake, a uranium oxide); UF_6=uranium hexafluoride; UO_2 = uranium oxide; USNC = Ultra Safe Nuclear Corporation; UUSA = Urenco USA; VA= Virginia; WA = Washington

Note:

[a] DOE may exercise multiple contracts for HALEU production in support of the Proposed Action. This EIS assumed an annual production rate of 25 MT per year per contract (DOE, 2023b) or 50 MT per year combined for all contracts. The analyses herein are based on an assumed annual production level of 25 MT of HALEU.

Table A-12. Estimated Annual Transportation Risks for the Production 25 Metric Tons of HALEU

Activity	Shipment Type	Locations (from or to)	Number of Shipments	One-Way Kilometers* Traveled	Incident-Free		Accident [(a)]	
					Crew LCFs [(a)]	Population LCFs [(a)]	Radiological Risk	Nonradiological Risk
Uranium Recovery	Uranium Ore [(b)]	To mill	57,400	34,440,000	2×10^{-2}	3×10^{-3}	Note 1	1.6
Conventional [(b)]	Yellowcake [(b)]	To conversion	74	169,075	Note 1		1×10^{-2}	0.0001
In-situ recovery	Yellowcake	To conversion	74	169,075	Note 1		1×10^{-2}	0.008
Conversion [(c)]	UF_6	To enrichment	128	See enrichment				
Enrichment ACP	UF_6 Feed Note 2	From USA conversion	128	112,525	3×10^{-4}	9×10^{-4}	2×10^{-4}	0.005
		From Canada	128	115,034	3×10^{-4}	1×10^{-3}	5×10^{-4}	0.005
	HALEU UF_6	To FFF [(d)]	8	30,758	7×10^{-6}	2×10^{-5}	7×10^{-5}	0.001
	DUF_6	Note 3	124	Note 3				
	Empty Cylinder	Note 3	2	Note 3				
GLE	UF_6 Feed Note 2	From USA conversion	128	168,192	2×10^{-4}	2×10^{-4}	4×10^{-7}	0.002
		From Canada	128	178,816	2×10^{-4}	2×10^{-4}	9×10^{-7}	0.002
	HALEU UF_6	To FFF [(d)]	8	38,288	1×10^{-4}	4×10^{-4}	5×10^{-8}	0.0004
	DUF_6	Note 4	124	151,156	2×10^{-4}	2×10^{-4}	4×10^{-7}	0.002
	Empty Cylinder	Note 5	2	2,628	2×10^{-5}	4×10^{-5}	3×10^{-11}	0.00003
	LEU Product to ACP (Note 6)	To ACP	15	14,835	4×10^{-5}	5×10^{-5}	2×10^{-6}	0.0004
	UF_6 Feed Notes 6 and 7	From USA conversion	136	178,704	2×10^{-4}	2×10^{-4}	5×10^{-7}	0.002
		From Canada	136	189,992	2×10^{-4}	2×10^{-4}	1×10^{-6}	0.003
	Returned UF_6	From ACP	12	11,868	7×10^{-6}	1×10^{-5}	3×10^{-7}	0.0004
	DUF_6	Notes 4 & 6	133	162,127	2×10^{-4}	2×10^{-4}	4×10^{-7}	0.002
UUSA	UF_6 Feed Note 2	From USA conversion	128	228,851	7×10^{-5}	2×10^{-4}	1×10^{-2}	0.02
		From Canada	128	410,816	2×10^{-4}	4×10^{-4}	4×10^{-2}	0.04
	HALEU UF_6	To FFF [(d)]	8	28,303	3×10^{-6}	1×10^{-5}	3×10^{-3}	0.003

Table A-12. Estimated Annual Transportation Risks for the Production 25 Metric Tons of HALEU

Activity	Shipment Type	Locations (from or to)	Number of Shipments	One-Way Kilometers* Traveled	Incident-Free		Accident [a]	
					Crew LCFs [a]	Population LCFs [a]	Radiological Risk	Nonradiological Risk
	DUF_6	Note 8	124	479,284	9×10^{-5}	3×10^{-4}	9×10^{-3}	0.02
	Empty Cylinder	Note 5	2	3,576	6×10^{-6}	2×10^{-5}	2×10^{-4}	0.0004
	LEU Product to ACP (Note 6)	To ACP	15	36,149	1×10^{-4}	2×10^{-4}	8×10^{-6}	0.001
	UF_6 Feed Notes 6 and 7	From USA conversion	136	243,154	8×10^{-5}	2×10^{-4}	1×10^{-2}	0.02
		From Canada	136	436,492	2×10^{-4}	4×10^{-4}	4×10^{-2}	0.04
	Returned UF_6	From ACP	12	28,919	2×10^{-5}	4×10^{-5}	1×10^{-6}	0.0009
	DUF_6	Notes 5 & 6	133	514,032	1×10^{-4}	3×10^{-4}	1×10^{-2}	0.02
Deconversion	HALEU UF_6	From enrichment	8	18,800	1×10^{-4}	2×10^{-4}	7×10^{-5}	0.0008
	HALEU O_2/metal	Note 9						
HALEU Storage	HALEU O_2	Note 10	8	38,288	5×10^{-4}	2×10^{-3}	5×10^{-8}	0.0004
	HALEU metal	Note 10	36	172,296	5×10^{-4}	2×10^{-3}	2×10^{-9}	0.002
Subtotal [e]	Various	Note 11	380	1,110,130	1×10^{-3}	4×10^{-3}	3×10^{-2}	0.05
Subtotal [f]	Various	Note 11	306	1,123,023	1×10^{-3}	4×10^{-3}	5×10^{-2}	0.06
Subtotal [g]	Various	Note 12	415	1,189,503	1×10^{-3}	4×10^{-3}	4×10^{-2}	0.05
Subtotal [h]	Various	Note 12	341	1,202,394	1×10^{-3}	4×10^{-3}	5×10^{-2}	0.07

Sources: (NRC, 2012b; DOE, 2014; NRC, 2012a; DOE, 2011; NRC, 2015; NRC, 1980)

Key: ACP = American Centrifuge Plant (Centrus); DUF_6 = depleted uranium hexafluoride; FFF = fuel fabrication facility; HALEU UF_6 = high-assay low-enriched uranium in the form of uranium hexafluoride; HALEU O_2 = high-assay low-enriched uranium dioxide; GLE = Global Laser Enrichment; LCFs = latent cancer fatalities; UF_6 = uranium hexafluoride; UUSA = Urenco USA

Notes:

1 The NRC NEPA for these activities did not specifically evaluate the radiation exposure to the public and the truck drivers during routine transports, as these have been determined to be SMALL impacts. The radiological consequences of accidents involving uranium ore are considered to be significantly smaller than those involving yellowcakes.

2 The feed material (natural uranium) UF_6 can come from a U.S. facility (e.g., ConverDyn's Metropolis facility in Illinois, or a new facility) or from Canada, as these were considered in the referenced source documents.

3 Because of the proximity of deconversion facility (e.g., Portsmouth site) to ACP, no DUF_6 transport is evaluated. Also, no return of empty cylinders is considered in the NRC NEPA document.

4 DUF_6 cylinders were transported to Paducah, Kentucky, for conversion to DU oxide for disposal, for maximizing the impacts.

5 Transport of empty cylinders back to the conversion facility in Illinois. Note, this transport includes two empty cylinders per truck and has a higher external dose rate (a

Table A-12. Estimated Annual Transportation Risks for the Production 25 Metric Tons of HALEU

Activity	Shipment Type	Locations (from or to)	Number of Shipments	One-Way Kilometers* Traveled	Incident-Free		Accident [(a)]	
					Crew LCFs [(a)]	Population LCFs [(a)]	Radiological Risk	Nonradiological Risk

dose rate of 2 mrem/hr at 1 m) than those of UF_6 or DUF_6 cylinders (a dose rate of 0.29 or 0.28 mrem/hr at 1 m). In the UUSA EA (NRC, 2015), a dose rate of 1 mrem/hr at 1 m is used for the return of empty cylinders.

[6] This option considers two enrichment locations (enrich to 5% at the first location, transport to the second location and enrich up to 19.75%). For the purposes of this analysis, it was assumed that the first enrichment location would be either GLE or UUSA, and the second location would be ACP. Under this option the HALEU product would only be from ACP location; DUF_6 products would be from first enrichment location, and LEU products would be between the two enrichment locations.

[7] In a two enrichment locations scenario, we would need 148 shipments of UF_6 in the first year and 136 shipments in years after. Here, the risk from an annual shipment of 136 is presented.

[8] DUF_6 cylinders were transported to Portsmouth, Ohio, for conversion to DU-oxide for disposal, for maximizing the impacts.

[9] Even though the deconversion was assumed to be at IIFP facility, the impacts for transporting the products are evaluated in the storage facility activity.

[10] The final products (e.g., HALEU O_2, or HALEU metal) was assumed to come from an equivalent distance between Framatome in Richland, Washington; and GLE in Wilmington, North Carolina; for maximizing the impacts.

[11] Subtotal represents the maximum number of shipments and impacts, annually. This sum does not include the uranium ore shipments or impacts.

[12] Subtotal represents the maximum number of shipments and impacts for the option of using two enrichment locations, annually; see also Note 11.

[a] Risk is expressed in terms of LCFs. Radiological risk is calculated for one-way travel while nonradiological risk (traffic fatality) is calculated for two-way travel. Crew, population, and accident dose-risk (in terms of person-rem) can be calculated by dividing the risk values by 0.0006. LCF and traffic fatality risks are rounded to one non-zero digit.

[b] Conventional uranium recovery requires transport of the uranium ore to a milling processing facility. In the Technical Report, the distance to a processing facility (milling) could be as far as 600 km. The NRC GEIS on conventional mining and milling does not provide the risk estimates for the crew and population for the ore or the yellowcake routine transports. An estimate of the risks in terms of LCF is developed based on the dose rate per kilometer listed in DOE/EIS-0472 (DOE, 2014, pp. D-3).

[c] The impacts from transport of UF_6 to the enrichment facility is listed in the enrichment activities.

[d] The HALEU product (HALEU UF_6) is considered to have been transported to a fuel fabrication facility that leads to largest impact, in this case, it is at Framatome in Richland, Washington.

[e] The subtotal summary reflects the maximum impacts from transporting yellowcake to conversion facility, UF_6 feed from a U.S. conversion facility (all) to the enrichment facility, HALEU UF_6 to fuel fabrication facility or deconversion facility, DUF_6 to Paducah or Portsmouth conversion facility (whichever maximizes the impact), empty cylinders to conversion facility, and HALEU oxide or metal to the storage facility, annually.

[f] The subtotal summary reflects the maximum impacts from transporting yellowcake to conversion facility, UF_6 feed from a Canadian source (all) to the enrichment facility, HALEU UF_6 to fuel fabrication facility or deconversion facility, DUF_6 to Paducah or Portsmouth conversion facility (whichever maximizes the impact), empty cylinders to conversion facility, and HALEU oxide or metal to the storage facility, annually. Note this subtotal does not include transport of uranium ores.

[g] The subtotal is similar to that of Note e, but for the option of two enrichment locations.

[h] The subtotal is similar to that of Note f, but for the option of two enrichment locations.

* To convert kilometers to miles, multiply the numbers by 0.622.

A.7 Related Post-Proposed Action Activities

In addition to the above actions that are a direct part of the Proposed Action, discussions of other actions that would be expected from use of the 290 MT of HALEU are acknowledged as reasonably foreseeable activities, but are discussed in less detail given their more uncertain nature. These actions include:

- Construction and operation of a facility or facilities for fabrication of metal, oxide, and TRISO reactor fuel
- Construction and operation of commercial advanced reactors that use HALEU fuel and the use of HALEU fuel in existing demonstration, test, and isotope production reactors
- HALEU SNF storage and disposition

These actions are dependent upon decisions outside of the Proposed Action activities. The extent to which the actions happen and where they happen is still developing and is only partly known. Therefore, detailed assessment of their total impacts is not currently possible. Each of the activities listed above would be subject to NEPA analysis by the NRC.

A.7.1 HALEU Fuel Fabrication

A.7.1.1 Introduction

Fuel fabrication is the last step in the process of turning uranium into nuclear fuel for reactors. The fuel fabrication facility would receive HALEU from the deconversion facility. The deconversion facility could provide HALEU in forms such as uranium oxides (e.g., uranium dioxide, UO_2), uranium metal, uranium fluorides, uranium silicides, and uranium nitrides. A HALEU fuel fabrication facility or facilities[24] would convert HALEU into fuel for nuclear reactors. The design and composition of nuclear fuels are predominantly dictated by the engineering requirements necessary for their function in reactors of various designs. Depending on the reactor design, the fuel fabrication facility could produce nuclear fuels of varying forms such as uranium oxide fuel, metal fuel, molten salt fuel, TRISO particle fuel, uranium nitride fuel, and advanced ceramic fuel.

A fuel fabrication facility could be sited anywhere in the United States as long as the facility meets NRC siting requirements. The production of HALEU may be accomplished through modification of an existing fuel fabrication facility or through development of a new fuel fabrication facility. Development of a new fuel fabrication facility may be preferred by some organizations because of a specific fuel package requirement for their ANR.

The fabrication of HALEU fuel is required to occur in an NRC Category II facility. However, fabrication of HALEU fuel could also be performed in a Category I (greater security than Category II) facility. The BWXT facility (NRC, 2005b) in Lynchburg, Virginia, is a Category I facility, and the site's fuel fabrication facility is the only U.S. facility currently capable of fabricating HALEU fuel using production-scale equipment. The Framatome (formerly AREVA NP) fuel fabrication facility (NRC, 2009b) in Richland, Washington, the Global Nuclear Fuel – Americas (GNF-A) fuel fabrication facility (NRC, 2009c) in Wilmington, North Carolina, and the Westinghouse Electric Company, LLC. fuel fabrication facility (NRC, 2021d) in Columbia, South Carolina, are Category III facilities currently licensed by the NRC to fabricate LEU nuclear fuel for LWRs. These Category III facilities could be modified to produce HALEU fuel.

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[24] One or more HALEU fuel fabrication facilities could be constructed. For simplicity, this fact is not repeated in the remainder of the section.

Multiple domestic vendors such as X-energy, LLC (X-energy) (X-energy, 2022), GNF-A (GNF-A, 2021), and Ultra Safe Nuclear Corporation (WNN, 2022) either have small quantity HALEU fuel manufacturing capabilities or have expressed an interest in fabricating HALEU fuel. TRISO-X plans to produce TRISO fuel at a fuel fabrication facility in Oak Ridge, Tennessee. X-energy has prepared an Environmental Report for this facility (TRISO-X, 2022), and the NRC is in the process of preparing NEPA documentation.

A.7.1.2 Analysis Methodology

A.7.1.2.1 Approach to NEPA Analyses

This HALEU EIS is based on resource conditions and impact analyses in the existing NEPA documents discussed in Section A.7.1.2.2, *Existing NEPA Documentation*, as well as other available information such as new census data. The intent of the HALEU EIS is to provide a range of potential impacts from construction and operation of a HALEU fuel fabrication facility based on the existing NEPA documentation and other available sources.

A new HALEU fuel fabrication facility could be constructed and operated at any one of the seven fuel fabrication facilities: Framatome, Inc. (Richland, Washington); GNF-A (Wilmington, North Carolina); Westinghouse Electric/Columbia Fuel Fabrication Facility (FFF) (Columbia, South Carolina); Nuclear Fuel Services (Erwin, Tennessee); BWXT (Lynchburg, Virginia); and TRISO-X (Oak Ridge, Tennessee). Although the HALEU fuel fabrication facility could be located at one of the seven described sites, locating the HALEU fuel fabrication facility at another site would likely have similar impacts.

To bound the potential impacts, DOE has assumed that the HALEU fuel fabrication facility would have a full complement of support facilities and structures. If the HALEU fuel fabrication facility were constructed at an existing site with existing site infrastructure, many of the support facilities and much of the infrastructure would likely be used to support the new HALEU fuel fabrication facility along with existing activities. For example, office buildings and warehouses may be able to support both activities, and fences and guards would likely provide protection for all the facilities at the site. Therefore, analyzing construction and operation of a new HALEU fuel fabrication facility would likely overestimate (or bound) the impacts of locating this facility at an existing site.

The fuel fabrication facilities listed above have throughputs ranging from 400 to 1,600 MT of uranium per year. To fabricate fuel from the HALEU produced from the Proposed Action, it has been assumed that the HALEU fuel fabrication facilities would need a total production rate of 50 MT/yr. This could be accomplished by constructing and operating multiple smaller fuel fabrication facilities (< 25 MT/yr) at multiple sites. Therefore, many of the attributes of the LEU fuel fabrication facilities would be much larger than needed for HALEU fuel fabrication and would likely bound the impacts of the HALEU fuel fabrication facility.

DOE has analyzed construction and operation of a HALEU fuel fabrication facility based on available data for the fuel fabrication facilities listed above. Most attributes of facilities that fabricate HALEU fuels are expected to be bounded by this analysis. In any event, project-specific NEPA documentation would be completed by the NRC before construction and operation of a HALEU fuel fabrication facility.

Environmental Justice

For environmental justice analysis, DOE presented NEPA document conclusions, as shown in Table A-13, since site locations could not be determined and due to the number of potential facilities. Using existing NEPA impact analysis represented the best available information for proposed impacts associated with these activities. As discussed above, fuel fabrication activities are required to occur at an NRC Category II or Category I facility. This activity could also occur at a Category III facility, with proper modifications. In addition to providing conclusions from existing NEPA documents, DOE updated demographics for city, county, and/or state to determine the presence or absence of communities with environmental justice concerns (**Technical Report - Section 7.3.15 (Leidos, 2023)**). This analysis was done for locations of NRC Category I facilities (Erwin, Tennessee; Lynchburg, Virginia); locations of NRC Category II facilities (Rockville, Maryland; Oak Ridge, Tennessee); and locations of NRC Category III facilities (Richland, Washington; Wilmington, North Carolina; and Columbia, South Carolina). Seattle, Washington; Columbia, South Carolina; and Rockville, Maryland, showed the presence of minority populations while Wilmington, North Carolina; Columbia, South Carolina; Erwin, Tennessee; and Lynchburg, Virginia, had low-income populations. Note that by not using block groups, the analysis may mischaracterize the presence of communities with environmental justice concerns.

A.7.1.2.2 Existing NEPA Documentation

The affected environment and environmental consequences at a facility that fabricates HALEU fuel are expected to be comparable to those at a facility that fabricates LEU fuel. To understand the impacts of developing a HALEU fuel fabrication facility, DOE reviewed the NRC's NEPA documentation for the Framatome, GNF-A, Westinghouse, and BWXT fuel fabrication facilities. Licensing is in progress for the TRISO-X facility and in the absence of a NEPA document for the facility, DOE reviewed the environmental report submitted to the NRC in support of the license application for evaluation of the TRISO-X Fuel Fabrication Facility. These documents, which provide DOE with information and analyses for determining the impacts of construction and operation of a HALEU fuel fabrication facility, include:

- ***Framatome, Inc. –*** *Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1227 for AREVA NP, Inc. Richland Fuel Fabrication Facility* (NRC, 2009b)
- **Global Nuclear Fuel – Americas (GNF-A) –** *Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1097 for Global Nuclear Fuel – Americas, Wilmington Fuel Fabrication Facility* (referred to as the "GNF-A EA") (NRC, 2009c)
- **Westinghouse Electric Company, LLC –** *Final Environmental Impact Statement for the License Renewal of the Columbia Fuel Fabrication Facility in Richland County, South Carolina,* NUREG-2248 (referred to as the "CFFF EIS") (NRC, 2022a)
- **BWX Technologies, Inc. (BWXT) –** *Environmental Assessment Related to the Renewal of NRC License No. SNM-42 for BWX Technologies, Inc. (BWXT)* (referred to as the "BWXT EA") (NRC, 2005b)
- ***X-energy, LLC (X-energy) / TRISO-X –*** *Environmental Report for the TRISO-X Fuel Fabrication Facility* (referred to as the "TRISO-X FFF ER") (TRISO-X, 2022)

Information related to licensing of the TRISO-X facility is available at https://www.nrc.gov/info-finder/fc/triso-x.html#environmental.

A.7.1.3 Potential Environmental Consequences

The affected environment and environmental consequences at a facility that fabricates HALEU fuel are expected to be similar to those at a facility which fabricates LEU fuel. Therefore, DOE has summarized the environmental consequences information from NEPA documents for the Framatome FFF (NRC, 2009b), the GNF-A FFF (NRC, 2009c), and the Westinghouse Electric Company FFF (NRC, 2021d). In addition, DOE has summarized impacts described in the EA prepared for the BWXT facility and the environmental consequences described in the Environmental Report prepared for the TRISO-X FFF (TRISO-X, 2022).

The LEU fuel fabrication facilities considered in this analysis have throughputs ranging from 400 to 1,600 MT uranium per year. To achieve the Proposed Action of 290 MT of HALEU, approximately 50 MT/yr of HALEU fuel would need to be produced. Therefore, many of the attributes of the LEU fuel fabrication facilities would be much larger than needed for a HALEU fuel fabrication facility and would likely bound the impacts of a HALEU fuel fabrication facility.

DOE has analyzed construction and operation of a HALEU fuel fabrication facility based on available NEPA analyses and other data for the fuel fabrication facilities (Leidos, 2023). Most attributes of a HALEU fuel fabrication facility are expected to be bounded by this analysis. In any event, project-specific NEPA documentation would be completed by the NRC before construction and operation of a HALEU fuel fabrication facility.

The Proposed Action's impact assessments for fuel fabrication facilities are presented in Table A-13 below. Details regarding a fuel fabrication facility to support HALEU production were developed from a range of key impact indicators analyzed in the relevant NEPA documentation listed in Section A.7.1.2.2, *Existing NEPA Documentation*. The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-13 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences among facilities are presented.

Table A-13. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	53 – Framatome 302 – GNF-A 68 – CFFF 39 – BWXT 110 – TRISO-X
		Total Site Size (acres)	320 – Framatome 1,164 – GNF-A 1,151 – CFFF 497 – BWXT 110 – TRISO-X
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL to MODERATE**	Tallest Substantial Structure (other than met/T-line towers) (feet)	100 – stack for TRISO-X
		Distance to Nearest Receptor (miles)	1.5 – Framatome 0.4 – GNF-A 0.6 – CFFF 0.5 – BWXT 0.7 – TRISO-X
		BLM VRM Rating	Class IV
Geology and Soils	**SMALL to MODERATE**	Rock and Soil Excavated (cubic yards)	560,234 – TRISO-X
		Backfill Needed (cubic yards)	362,661 – TRISO-X
Water Resources	**SMALL to MODERATE**	Effluent Discharge	Stormwater runoff, treated wastewater, and potential for

Table A-13. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
			inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	600,000 – GNF-A 120,000 – CFFF
		Floodplains	Framatome – none present GNF-A – none present CFFF – located within flood basin of Congaree River BWXT – 11 major flooding events since 1771 TRISO-X – none present within vicinity of facility
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Attainment for all sites
		Construction emissions	Potential exceedances of PM_{10} and $PM_{2.5}$ NAAQS. Implementation of fugitive dust controls would mitigate impacts to below NAAQS levels.
		Operations emissions	No exceedances of NAAQS at any evaluated site.
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	SMALL – Framatome SMALL to MODERATE – GNF-A SMALL to MODERATE – CFFF None – BWXT SMALL – TRISO-X
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	No NRHP properties for GNF-A, BWXT, and TRISO-X Evidence exists – CFFF
		Potential for impacts on Traditional Cultural Property (TCP)	None identified for Framatome GNF-A, CFFF, BWXT, and TRISO-X
Infrastructure	**SMALL**	Fuel Use	112 million cubic ft per year natural gas and 1.1 million gpy diesel for CFFF 65 million cubic ft per year natural gas for TRISO-X
		Water Use	See Water Resources
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	1.5 – Framatome 0.4 – GNF-A 0.6 – CFFF 0.5 – BWXT 0.6 – TRISO-X
		Noise Levels	Framatome – 40 to 55 dBA daytime noise levels during operations at fenceline.

Table A-13. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
			CFFF and BWXT – mitigated by distance. GNF-A – sound levels ranged from 38.0 to 64.5 decibels. TRISO-X – 50.7 to 59.3 dBA at the adjacent receptors during operations.
Waste Management	**SMALL**	LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL**	Occupational Risk	Max lost-time incident rate of 1.75 – Framatome Max DART Rate of 0.75 – GNF-A Average incident rate of 7.3 – BWXT 0.02 per year – TRISO-X
		Construction Radiological Impacts (mrem/yr)	Worker: 10.5 – GNF-A No impacts to the public.
		Operations Average Worker Dose (mrem/yr)	65 – Framatome 85 – GNF-A 226 – CFFF 50 – BWXT
		Operations MEI Public Dose (mrem/yr)	0.012 – Framatome 0.2 – CFFF 0.65 – BWXT
		Operations Population Dose (person-rem/yr)	0.07 – TRISO-X
		Operations Chemical Risk	Hazards to workers addressed through facility safety and health programs.
Public and Occupational Health – Accidents	**SMALL to MODERATE**	Radiological Accidents	Criticality could be fatal to the involved worker. Accident dose of less than 7 rem at the closest location of public access to the site boundary. (CFFF analysis)
		Chemical Accidents	Nitric acid spill inside the fuel fabrication building could exceed AEGL-2 limit of 7.2 mg/m^3 for the public. (TRISO-X analysis) Methyltrichlorosilane spill outside the fuel fabrication building could exceed AEGL-2 limit of 7.3 ppm for the public. (TRISO-X analysis)

Table A-13. Fuel Fabrication – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment [(a)]*	*Impact Indicator*	*Key Information [(b)]*
Traffic	**SMALL to MODERATE**	Construction – Daily Vehicle Trips: Workers/Trucks	268/24 – TRISO-X
		Operations – Daily Vehicle Trips: Workers/Trucks	1,400 – Framatome 4,200 – GNF-A 2,276 – CFFF 4,800 – BWXT 1,640 – TRISO-X
Socioeconomics	**SMALL to MODERATE**	Peak Construction Employment (direct)	134 – TRISO-X
		Operations Employment (direct)	700 – Framatome 2,100 – GNF-A 1,138 – CFFF 2,400 – BWXT 816 – TRISO-X
		ROI Labor Force	141,394 – Framatome 204,807 – GNF-A 110,000 – BWXT 331,692 – TRISO-X
Environmental Justice	**SMALL to MODERATE- No disproportionate and adverse impacts on communities with environmental justice concerns are expected.**	Minority or low-income population in ROI	Communities with environmental justice concerns near GNF-A and CFFF Communities with environmental justice concerns within 4 miles from TRISO-X

Key: AEGL = Acute Exposure Guideline Levels; BLM VRM = Bureau of Land Management Visual Resources Management; BWXT = BWX Technologies, Inc.; CFFF = Columbia Fuel Fabrication Facility; DART = days away, restricted, or on-the-job transfer; dBA = A-weighted decibels; FFF = fuel fabrication facility; ft = feet; GNF-A = Global Nuclear Fuel – Americas; gpd =gallons per day; gpy =gallons per year; HALEU = high-assay low-enriched uranium; LLW = low-level waste; MEI = maximally exposed individual; mg/m^3 = milligram per cubic meters; MLLW = mixed low-level waste; mrem = millirem; NAAQS = National Ambient Air Quality Standards; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter (fine particulates); PM_{10} = particulate matter less than or equal to 10 microns in diameter (coarse particulates); ppm = parts per million; ROI = region of influence; yr = year

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding the impacts of constructing and operating a fuel fabrication facility to support HALEU production were developed from relevant NEPA documentation listed in Section A.7.1.2.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of GHGs are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.7.2 Construction and Operation of Reactors

HALEU could be used to power ANRs. Commercial HALEU-fueled reactors would be licensed by the NRC.

A.7.2.1 Analysis Methodology

A.7.2.1.1 Approach to NEPA Analyses

Environmental impacts associated with the construction and operation of ANRs is incorporated from the NRC's ANR GEIS. The purpose and need for the ANR GEIS is to present impact analyses for the environmental issues common to ANRs that can be addressed generically and eliminate reproducing the same analyses each time a licensing application is submitted. Use of the ANR GEIS allows future environmental review efforts to focus on issues that can be resolved only once a site is identified. This ANR GEIS is intended to improve the efficiency of licensing ANRs by (1) identifying the types of potential environmental impacts of building, operating, and decommissioning an ANR, (2) assessing impacts that are expected to be generic (the same or similar) for many or most ANRs, and (3) defining the environmental issues that will need to be addressed in project-specific supplemental EISs addressing specific projects.

A.7.2.1.2 Existing NEPA Documentation

Any of the advanced reactor designs might fit within the Plant Parameter Envelope (PPE) and Site Parameter Envelope (SPE) described in the *Generic Environmental Impact Statement for Advanced Nuclear Reactors - Draft Report for Comment* (NRC, 2021c)[25] (referred to as the "ANR GEIS"). The ANR GEIS can provide partial NEPA coverage for reactors that fall within the range of parameters analyzed (allows applicant for license to refer to the ANR GEIS without further analysis if parameters are met).

A.7.2.2 Potential Environmental Consequences

It is likely that most advanced reactors would be designed to fit within PPE and SPE developed in the ANR GEIS. The ANR GEIS shows that environmental consequences for an ANR are expected to range from SMALL to MODERATE. Reactor-specific analyses would provide NEPA coverage for issues not covered by the ANR GEIS analyses.

DOE's evaluation of potential impacts of construction and operation of HALEU-fueled reactors is based on the ANR GEIS (NRC, 2021c). The Draft ANR GEIS evaluates the potential environmental impacts of 121 issues relevant to constructing, operating, and decommissioning of ANRs. The 121 issues are spread across 20 topics that correspond to the resource areas and other topics evaluated in an EIS. The Draft ANR GEIS identifies 100 issues as "Category 1" issues, 19 issues as "Category 2" issues, and 2 issues that are uncertain which are neither Category 1 nor Category 2.

Category 1 issues are those that the NRC staff has preliminarily determined that a generic conclusion regarding the potential environmental impacts of issuing a permit or license for an ANR can be reached, provided that the project is bounded by relevant PPE[26] and SPE[27] values and assumptions. Additionally, Category 1 issues are those that the NRC staff has preliminarily determined will result in no more than a SMALL adverse impact or will have a beneficial impact.

The Draft ANR GEIS identifies 19 issues as Category 2 issues, which are those that the NRC staff has preliminarily determined cannot be resolved generically and for which the NRC staff, in its Draft Supplemental EIS,[28] must analyze in detail. Five of the 19 issues (i.e., purpose and need, need for power, site alternatives, energy alternatives, and system design alternatives) are not related to environmental impacts, which leaves 14 issues of concern.

The 14 Category 2 issues that the NRC has determined it will need to evaluate on a project- and site-specific basis are listed below (NRC, 2021c):

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25 A Final EIS has not been published. DOE considered the information and conclusions contained in the draft as preliminary findings which have not undergone public review. While this information is currently the best available for this topic, it may be revised in a Final EIS.

26 The PPE is a set of reactor and owner engineered parameters that are expected to bound the characteristics of a reactor that might be deployed.

27 The SPE is a set of site parameters that are expected to bound the characteristics of a site where a reactor might be deployed.

28 An NRC Supplemental EIS would be prepared for a specific reactor. A Supplemental EIS would tier from the ANR GEIS.

1. Operations impacts on surface water quality degradation due to chemical and thermal discharges
2. Construction impacts on important terrestrial species and habitats—resources regulated under the Endangered Species Act, 16 U.S.C. §1531–1544
3. Operations impacts on important terrestrial species and habitats—resources regulated under the Endangered Species Act, 16 U.S.C. §1531–1544
4. Construction impacts on important aquatic species and habitats—resources regulated under the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act, Pub. L. 94-265, 90 Stat. 331, codified at 16 U.S.C. §1801 et seq. (the “Magnuson-Stevens Act”)
5. Operations thermal impacts on aquatic biota
6. Operations impacts and other effects of cooling-water discharges on aquatic biota
7. Operations impacts on important aquatic species and habitats—resources regulated under the Endangered Species Act and Magnuson-Stevens Act
8. Construction impacts on historic and cultural resources
9. Operation impacts on historic and cultural resources
10. Severe accidents
11. Construction environmental justice impacts
12. Operation environmental justice impacts
13. Climate change
14. Cumulative impacts

Finally, there are two issues related to electromagnetic fields that are designated as N/A (i.e., impacts are uncertain), which are neither Category 1 nor Category 2. The two issues that are uncertain, currently cannot be evaluated because the relationship of these issues to their impacts is uncertain.

Therefore, it is likely that most issues (100 of 121 issues evaluated in the Draft ANR GEIS) arising from construction and operation of HALEU-fueled reactors would be Category 1 issues with SMALL impacts, and as described above, only 14 issues would need to be evaluated by the NRC on a project- and site-specific basis. In any event, project-specific NEPA documentation would be prepared by the NRC before any HALEU-fueled reactors are constructed and operated.

Additionally, two PPEs were developed to facilitate environmental reviews of potential future advanced reactor demonstration projects for two size ranges: (1) microreactors, which are defined as single units with outputs of 60 megawatts thermal (MWt) or less, and (2) small- to medium-sized advanced reactors with outputs from 60 MWt up to 1,000 MWt (McDowell & Goodman, 2021). The methodology for developing the PPEs included reactor vendor responses to questionnaires, input from Idaho National Laboratory staff, independent assessments by SMEs, and a review of regulatory requirements a vendor would have to meet during construction and operation.

HALEU could also be used in demonstration and test reactors, and for isotope production. The use of HALEU fuel in existing demonstration, test, and isotope production reactors would be within the authorized operating envelope for the reactors and is not likely to appreciably change the environmental impacts of operation of the reactors. For new demonstration, test, and isotope production reactors, the impacts would be expected to be similar to those described above for new HALEU-fueled reactors in general.

The summary of potential impact assessments for construction and operation of reactors that use HALEU fuel is presented in Table A-14. Details regarding advanced reactor operations using HALEU fuel were developed from a range of key impact indicators analyzed in the ANR GEIS and the sources cited therein.

Characteristics associated with microreactor and small- to medium-sized ANR technologies and resource needs are based on Tables E.1 and E.2 of a report from the National Reactor Innovation Center (McDowell & Goodman, 2021; Leidos, 2023). The impact assessments in the source documents were used as the baseline. The uncertainties associated with the absence of a specific location and/or locations were factored into the impact assessment discussions for the Proposed Action. Table A-14 provides key information that was used in the determination of the Proposed Action impact assessments. Where applicable, impact assessment differences among the types of reactors are noted.

Table A-14. Reactor Construction and Operations – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Land Use	**SMALL**	Land Disturbed (acres)	18 – micro 50 – small to medium
		Site Size (acres)	36 – micro 100 – small to medium
		Compatible with Land Use Plans	Likely
Visual and Scenic Resources	**SMALL**	Tallest Substantial Structure (other than met/T-line towers)	50 ft – stack micro 87 ft – stack small to medium
		Distance to Nearest Receptor (miles)	0.5
		BLM VRM Rating	Site specific
Geology and Soils	**SMALL**	Rock and Soil Excavated	20 ft maximum depth of excavation micro 155 ft maximum depth of excavation small to medium
		Backfill Needed	Unlikely to need large quantities due to size of construction area
Water Resources	**SMALL except undetermined for surface water quality**	Effluent Discharge	Stormwater runoff and treated wastewater, and potential for inadvertent leaks/spills of contaminants
		Average Operational Water Use (gpd)	648,000 to 8.42 M (450 gpm micro and 5,850 gpm small to medium)
		Floodplains	No
Air Quality [(c)]	**SMALL**	NAAQS Attainment Status	Site specific
		Construction emissions	Emission of criteria pollutants are less than de minimis levels. Implementation of fugitive dust controls would ensure that impacts remain below NAAQS levels.
		Operations emissions	Emission of criteria pollutants are less than de minimis levels. Emission controls and regulatory compliance required by a state permit and the NRC would limit emissions to acceptable levels and less than the NAAQS.

Table A-14. Reactor Construction and Operations – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Ecological Resources	**SMALL to MODERATE**	Impacts to vegetation, wildlife, wetlands, or special status species	ANR GEIS (NRC, 2021c) (Table 1-1) found 29 Category 1 ecological resource issues with SMALL impacts, and 6 Category 2 ecological resource issues that would require site-specific analysis.
Historic and Cultural Resources	**SMALL to MODERATE**	NRHP property potentially disturbed or impacted	ANR GEIS (NRC, 2021c) (Table 1-1) found two Category 2 cultural resource issues that would require site-specific analysis.
		Potential for impacts on Traditional Cultural Property (TCP)	Site specific
Infrastructure	**SMALL**	Electrical Use	Power reactors are net generators of electricity.
		Water Use	See Water Resources
		Fuel Use	Minor amounts for vehicles and backup generators
Noise	**SMALL**	Distance to Off-Site Receptor (miles)	Site specific
		Noise Levels	65 dBA at site boundary
Waste Management	**SMALL**	SNF (MTU)	290
		LLW, MLLW, Hazardous Waste, and Nonhazardous Waste	There are no unique waste characteristics. Waste has a path to disposal. Waste quantities generated represent a small fraction of the commercial facilities' capacities.
Public and Occupational Health – Normal Operations	**SMALL except uncertain for EMF**	Occupational Risk	SMALL
		Construction Radiological Impacts (mrem/yr)	SMALL
		Operations Average Worker Dose (mrem/yr)	SMALL
		Operations MEI Public Dose (mrem/yr)	SMALL
		Operations Population Dose (person-rem/yr)	SMALL
		Operations Chemical Risk	SMALL
Public and Occupational Health – Accidents	**SMALL except undetermined for severe accidents**	Radiological Accidents	SMALL for design basis accidents. Undetermined for severe accidents.
		Chemical Accidents	SMALL – inventories of regulated substances are less than threshold quantities

Table A-14. Reactor Construction and Operations – Impact Assessments for the Proposed Action by Resource Area

Resource Area	*HALEU Activity Impact Assessment* [(a)]	*Impact Indicator*	*Key Information* [(b)]
Traffic	**Undetermined**	Construction – Daily Vehicle Trips: Workers/Trucks	300 – micro 2,800 – small to medium (truck data not available)
		Operations – Daily Vehicle Trips: Workers/Trucks	300 – micro 826 – small to medium (truck data not available)
Socioeconomics	**SMALL or Beneficial**	Peak Construction Employment (direct)	150 – micro 909 – small to medium
		Operations Employment (direct)	100 – micro 413 – small to medium
		ROI Labor Force	Site specific
Environmental Justice	**Undetermined**	Minority or low-income population in ROI	Site specific

Key: ANR = Advanced Nuclear Reactor; BLM VRM = Bureau of Land Management Visual Resources Management; dBA = A-weighted decibels; EMF = electromagnetic field; ft = feet; gpd = gallons per day; gpm = gallons per minute; HALEU = high-assay low-enriched uranium; LLW = low-level waste; MEI = maximally exposed individual; micro = microreactor; MLLW = mixed low-level waste; mrem = millirem; MTU = metric tons of uranium; NAAQS = National Ambient Air Quality Standards; NRC = U.S. Nuclear Regulatory Commission; NRHP = National Register of Historic Places; ROI = region of influence; SNF = spent nuclear fuel; yr = year

Notes:

[a] Impacts denoted as potentially MODERATE would be associated with the specific site.

[b] Details regarding constructing and operating a reactor using HALEU fuel were developed from relevant documentation listed in Section A.7.2.1.2, *Existing NEPA Documentation* (Leidos, 2023).

[c] The impacts of GHGs are evaluated in Vol. 1, Section 4.3.2, *Greenhouse Gases and Climate Change*.

A.7.3 Spent Nuclear Fuel Storage and Disposition

A.7.3.1 Analysis Methodology

A.7.3.1.1 Approach to NEPA Analysis

Environmental impacts associated with spent fuel storage and disposition are incorporated from the NRC *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c) (the "SNF Storage GEIS"). The assessment of impacts did consider the relatively small amount[29] of SNF potentially generated from the use of the HALEU produced (up to 290 MT in metallic form) as part of the Proposed Action. The NRC considers the continued storage of SNF an activity that is similar for all commercial nuclear power plants and storage facilities. Therefore, a generic analysis was an appropriate, effective, and efficient method of evaluating the environmental impacts of continued storage. The SNF Storage GEIS looked at the environmental impacts of continued storage of SNF at single- and multiple-reactor nuclear power plant sites, in spent fuel pools, at-reactor independent spent fuel storage installations (i.e., ISFSIs), and away-from-reactor ISFSIs. In addition to existing reactor designs and conventional SNF, the NRC also considered reactor and fuel technologies such as mixed oxide fuel and small modular reactors.

[29] Compared to a single LWR lifetime generation of 1,200 to 1,600 MT and off-site consolidated storage of more than 40,000 MT of SNF (NRC, 2014c).

Because the timing of repository availability is uncertain, the SNF Storage GEIS analyzed potential environmental impacts over three possible timeframes: a short-term timeframe, which includes 60 years of continued storage after the end of a reactor's licensed life for operation; an additional 100-year timeframe (60 years plus 100 years) to address the potential for delay in repository availability; and a third, indefinite timeframe to address the possibility that a repository never becomes available. All potential impacts in each resource area were analyzed for each continued storage timeframe.

A.7.3.1.2 Existing NEPA Documentation

The SNF Storage GEIS was used to extrapolate the potential environmental consequences of storage of HALEU SNF at the reactor, as described in the Approach to NEPA Analysis section above:

- *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel, NUREG-2157* (NRC, 2014c)

The NRC EISs for construction and operating of two Consolidated Interim Storage Facilities (CISFs) for SNF were used to extrapolate the potential environmental consequences of storage of HALEU SNF at CISFs:

- *Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas, NUREG-2239* (NRC, 2021e)
- *Environmental Impact Statement for the Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Lea County, New Mexico, NUREG-2237* (NRC, 2022b)

A.7.3.2 Potential Environmental Consequences

A.7.3.2.1 Storage of Spent Nuclear Fuel at the Reactor

In August 2014, the NRC published the *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NRC, 2014c). The NRC considers the continued storage of SNF an activity that is similar for all commercial nuclear power plants and storage facilities. Therefore, a generic analysis was an appropriate, effective, and efficient method of evaluating the environmental impacts of continued storage. Because the timing of repository availability is uncertain, the SNF Storage GEIS analyzed potential environmental impacts over three possible timeframes: a short-term timeframe, which includes 60 years of continued storage after the end of a reactor's licensed life for operation; an additional 100-year timeframe (60 years plus 100 years) to address the potential for delay in repository availability; and a third, indefinite timeframe to address the possibility that a repository never becomes available.

Table A-15 provides a summary of impacts for the three storage scenarios for each resource area, including those that were determined to experience only SMALL impacts (e.g., land use). The resource areas that could have the potential for MODERATE to LARGE environmental consequences (depending on location) are discussed in Section A.7.3.2.1.1, *Ecological Resources,* Section A.7.3.2.1.2, *Historic and Cultural Resources*, and Section A.7.3.2.1.3, *Waste Management – Nonradioactive Waste*, to provide more information on those resources.

Table A-15. At-Reactor Storage of Spent Nuclear Fuel – Summary of Impacts by Resource Area

Resource Area	***Short-Term Storage (60 years)***	***Long-Term Storage (160 years)***	***Indefinite Storage***
Land Use	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL	SMALL
Environmental Justice	Disproportionate and adverse impacts are not expected.		
Air Quality	SMALL	SMALL	SMALL
Climate Change	SMALL	SMALL	SMALL
Geology and Soils	SMALL	SMALL	SMALL
Surface Water: Quality	SMALL	SMALL	SMALL
Surface Water: Consumptive Use	SMALL	SMALL	SMALL
Groundwater: Quality	SMALL	SMALL	SMALL
Groundwater: Consumptive Use	SMALL	SMALL	SMALL
Terrestrial Resources	SMALL	SMALL	SMALL
Aquatic Ecology	SMALL	SMALL	SMALL
Special Status Species and Habitat	Impacts for federally listed threatened and endangered species and Essential Fish Habitat would be determined as part of the consultations for the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act.		
Historic and Cultural Resources	SMALL	SMALL to LARGE	SMALL to LARGE
Noise	SMALL	SMALL	SMALL
Aesthetics	SMALL	SMALL	SMALL
Waste Management: Low-Level Waste	SMALL	SMALL	SMALL
Waste Management: Mixed Waste	SMALL	SMALL	SMALL
Waste Management: Nonradioactive Waste	SMALL	SMALL	SMALL to MODERATE
Transportation	SMALL	SMALL	SMALL
Public and Occupational Health	SMALL	SMALL	SMALL
Accidents	SMALL	SMALL	SMALL
Sabotage or Terrorism	SMALL	SMALL	SMALL

Source: (NRC, 2014c)

A.7.3.2.1.1 Ecological Resources

Short-Term Storage. If continued operation of an ISFSI or spent fuel pool could affect federally listed species or designated critical habitat, and the criteria are met in 50 C.F.R. §402 for initiation or reinitiation of Endangered Species Act Section 7 consultation, the NRC would be required to initiate or reinitiate Section 7 consultation with the National Marine Fisheries Services or the USFWS. With regard to spent fuel pools, impacts on state-listed species and marine mammals would most likely be less than those experienced during the licensed life for operation of the reactor because of the smaller size of the spent fuel pool's cooling system and lower water demands when compared to those of an operating reactor. With regard to dry cask storage of spent fuel, given the small size and ability to site ISFSI facilities away from sensitive ecological resources, the NRC concluded that continued storage of spent fuel in at-reactor

ISFSIs would likely have minimal impacts on state-listed species, marine mammals, migratory birds, and bald and golden eagles (NRC, 2014c).

Long-Term Storage. In addition to routine maintenance and monitoring of ISFSIs, impacts from the construction of a dry transfer system (DTS) and replacement of the DTS and ISFSIs on special status species and habitat would be minimal because of the small size of the ISFSI and DTS facilities and because no water is required for cooling. The NRC assumed that the ISFSI and DTS facilities could be sited to avoid listed species and critical habitat because of the small size of the construction footprint and sufficient amount of previously disturbed areas on most nuclear power plant sites. Therefore, the NRC concluded that construction of a DTS and the replacement of the DTS and ISFSI would likely have minimal impacts on state-listed species, marine mammals, migratory birds, and bald and golden eagles. In the unlikely situation that the continued operation of an ISFSI could affect federally listed species or designated critical habitat, and if the criteria are met in 50 C.F.R. §402 for initiation or reinitiation of Endangered Species Act Section 7 consultation, then the NRC would be required to initiate or reinitiate Section 7 consultation with the National Marine Fisheries Services or USFWS (NRC, 2014c).

Indefinite Storage. Impacts from indefinite storage on state-listed species, marine mammals, migratory birds, and bald and golden eagles would be minimal. The same consultation and any associated mitigation requirements described for the long-term storage timeframe would apply to the construction of the DTS and replacement of the DTS and ISFSI facilities during indefinite storage. In the unlikely situation that the continued operation of an ISFSI could affect federally listed species or designated critical habitat, and if the criteria are met in 50 C.F.R. §402 for initiation or reinitiation of Endangered Species Act Section 7 consultation, the NRC would be required to initiate or reinitiate Section 7 consultation with the National Marine Fisheries Services or USFWS (NRC, 2014c).

A.7.3.2.1.2 Historic and Cultural Resources

Long-Term Storage. Impacts would be SMALL to LARGE. Impacts from continued operations and routine maintenance are expected to be SMALL during the long-term storage timeframe, similar to those described in the short-term storage timeframe. NRC authorization to construct and operate a DTS and to replace a specifically licensed at-reactor ISFSI and DTS would constitute Federal actions under NEPA and would require site-specific environmental reviews and compliance with the National Historic Preservation Act of 1966 before making a decision on the licensing action (NRC, 2014c).

For generally licensed ISFSIs, impacts could be avoided, minimized or mitigated if the licensee has management plans or procedures that require consideration of these resources prior to ground-disturbing activities. The NRC assumed that the replacement of the at-reactor ISFSI and DTS would be constructed on land near the existing facilities. As discussed below, the NRC recognizes that there is uncertainty associated with the degree of prior disturbance and the resources, if any, present in areas where future ground-disturbing activities (i.e., initial and replacement DTS and replacement ISFSI) could occur (NRC, 2014c).

It is possible that historic and cultural resources would be affected by construction activities during the long-term timeframe because the initial ISFSI could be located within a less-disturbed area with historic and cultural resources. Further, the analysis considers uncertainties inherent in analyzing this resource area over long timeframes. These uncertainties include any future discovery of historic and cultural resources; resources that gain significance within the vicinity and the viewshed (e.g., nomination of a historic district) due to improvements in knowledge, technology, and excavation techniques. Therefore, the potential impacts to historic and cultural resources would be SMALL to LARGE. This range takes into consideration routine maintenance and monitoring (i.e., no ground-disturbing activities), the absence or avoidance of historic and cultural resources, and potential ground-disturbing activities that could impact historic and cultural resources. If construction of a DTS and replacement of the ISFSI and DTS occurs in an area with no historic or cultural resource present or construction occurs in previously a disturbed area that allows avoidance of historic and cultural resources then impacts would be SMALL. By contrast, a MODERATE or LARGE impact could result if historic and cultural resources are present at a site and, because they cannot be avoided, are impacted by ground-disturbing activities during the long-term timeframe (NRC, 2014c).

Indefinite Storage. Impacts would be SMALL to LARGE. Impacts regarding the replacement of the ISFSI and DTS would be similar to those described in the long-term storage timeframe. The NRC assumed that replacement at-reactor ISFSI and DTS would be constructed on land near the existing facilities. As stated in Section 1.8 of the SNF Storage GEIS, the NRC assumed that the land where the original facilities were constructed will be available for replacement facility construction; however, the NRC cannot eliminate the possibility that historic and cultural resources would be affected by construction activities during the indefinite timeframe because the initial and replacement ISFSIs and DTS could be located within a less disturbed area with historic and cultural resources in close proximity. Further, the analysis also considers the uncertainties inherent in analyzing this resource area over long timeframes. These uncertainties include any future discovery of historic and cultural resources; resources that gain significance within the vicinity and the viewshed (e.g., nomination of a historic district) due to improvements in knowledge, technology, and excavation techniques. Impacts to historic and cultural resources would be SMALL to LARGE. This range takes into consideration routine maintenance and monitoring (i.e., no ground-disturbing activities), the absence or avoidance of historic and cultural resources, and potential ground-disturbing activities that could impact historic and cultural resources. If construction of a DTS and replacement of the ISFSI and DTS occurs in an area with no historic or cultural resource present or construction occurs in previously a disturbed area that allows avoidance of historic and cultural resources then impacts would be SMALL. By contrast, a MODERATE or LARGE impact could result if historic and cultural resources are present at a site and, because they cannot be avoided, are impacted by ground-disturbing activities during the indefinite timeframe (NRC, 2014c).

A.7.3.2.1.3 Waste Management – Nonradioactive Waste

Impacts from the management of low-level, mixed, and nonradioactive waste generated during indefinite storage of SNF would be SMALL to MODERATE. It is expected that sufficient low-level waste disposal capacity would be made available when needed. A relatively small quantity of mixed waste would be generated from indefinite storage and proper management and disposal regulations would be followed. The amount of nonradioactive waste that would be generated and impacts to nonradioactive waste landfill capacity are difficult to accurately estimate for the indefinite storage timeframe and therefore could result in SMALL to MODERATE impacts (NRC, 2014c).

A.7.3.2.2 Consolidated Interim Storage Facilities for Spent Nuclear Fuel

The NRC EISs for construction and operation of two CISFs for SNF were used to extrapolate the potential environmental consequences of storage of HALEU SNF at CISFs: (1) the Interim Storage Partners CISF for SNF at the Waste Control Specialists facility in Andrews County, Texas; and (2) the Holtec International CISF for SNF in Lea County, New Mexico.

The environmental impacts associated with these proposed facilities were evaluated in the *Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas* (NUREG-2239) (NRC, 2021e) and the *Environmental Impact Statement for the Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Lea County, New Mexico* (NUREG-2237) (NRC, 2022b), respectively. Both EISs concluded that impacts for construction, operation, and decommissioning of the facilities would have SMALL to MODERATE impacts for ecological resources and socioeconomics. For both facilities, the amount of SNF produced as a result of implementation of the Proposed Action (up to 290 MT) would be a small portion of the total inventory of uranium contemplated for storage (initial capacities of 5,000 and 8,680 MT, respectively). The addition of the relatively small amount of Proposed Action SNF to the much larger quantity of SNF analyzed in the NRC EISs for storage at CISFs would not result in a change to the analyzed impacts and would therefore be expected to have a SMALL impact in all resource areas.

A.7.3.2.3 Disposal of Spent Nuclear Fuel

The ultimate disposition of SNF is dependent upon the licensing of a permanent repository. DOE remains committed to meeting its obligations under the Nuclear Waste Policy Act to dispose of SNF. While outside the scope of this program, DOE is currently facilitating an ongoing consent-based siting effort specific to siting a Federal consolidated interim storage facility for SNF. In the interim, as previously described, SNF is being safely stored at more than 70 reactor sites across the country.

A.7.3.3 Conclusions

Storage of SNF at the reactor would have SMALL impacts for most resource areas. As described in this section, there is the potential for MODERATE to LARGE impacts on special status species and habitat, historic and cultural resources, and SMALL to MODERATE impacts from nonradioactive waste management (NRC, 2014c).

The total HALEU SNF generated by the implementation of the Proposed Action would contain 290 MT of HALEU. This is 0.4% of the 86,584 MT heavy metal of SNF in inventory in the United States in 2021 (DOE, 2021, p. 2). Therefore, the HALEU SNF generated would not substantially add to the overall impacts of managing the nation's inventory of SNF.

A.8 Greenhous Gas Emissions Calculations

GHG emissions resulting from the Proposed Action are quantified in this EIS for use as indicators of their potential cumulative contributions to climate change effects. It is unknown at this time where the various Proposed Action activities would take place across the United States. Therefore, to provide a bounding analysis of potential GHG emissions, low- and high-emission scenarios were developed for the cumulative Proposed Action activities and the post-Proposed Action activities of reactor operations and fuel fabrication[30]. The low- and high-emission scenarios are based on operation of the HALEU fuel cycle facility (low), and construction and operation of a new HALEU fuel cycle facility (high). Estimates of GHG emissions for nuclear fuel cycle projects found in recent NEPA documents were used as surrogates to estimate GHG emissions from like kind activities from the Proposed Action. The transportation portion of the GHG emissions are based on the transportation analysis as described in Appendix A, Section A.6 including the conservative assumptions made as part of that analysis.

These activities from the Proposed Action would emit between 0.77 to 2.45 million metric tons of CO_2e emissions. Appendix A Table A-16 through Table A-19 present the data and calculations used to estimate the low- and high-GHG emission scenarios for the Proposed Action.

[30] Spent nuclear fuel (SNF) storage and disposition would not substantially contribute to the GHG emissions calculations. At reactor storage of the SNF is included in the reactor operations GHG emissions estimate. As described in Section A.7.3.3, the total HALEU SNF generated by the implementation of the Proposed Action would be only 0.4% of the 86,584 MT heavy metal of SNF in inventory in the United States in 2021. Therefore, away from reactor storage and disposition of the HALEU SNF is likely to produce only minor amounts of GHG emissions.

In accordance with the 2023 CEQ guidance, the social cost of GHG emissions (SC-GHG) was calculated for the low- and high-emission scenarios estimated for the cumulative Proposed Action activities. The SC-GHG estimate provides an aggregated monetary measure (in U.S. dollars) of the stream of physical damages (e.g., temperature increase, sea level rise, infrastructure damage, and human health effects) associated with adding GHG emissions to the atmosphere. The calculations were based on GHG emissions that would occur from the beginning of construction in year 2026 through the end of reactor operations in 2042. Values were standardized to year 2020 dollars and derived for three discount rates (1.5 percent, 2.0 percent, and 2.5 percent), as presented in recent EPA methodology (EPA, 2023). The estimated SC-GHG for the Proposed Action would range from $96 million to $864 million. The range of SC-GHG values are due to different discount rates used in the EPA methodology, as well as the range of expected GHG emissions. Appendix A, Table A-20 and Table A-21, present the data and calculations used to estimate the SC-GHG values for the Proposed Action.

Table A-16. Greenhouse Gas Emissions Estimated for Activities Associated with the HALEU Project

Activity/Scenario	Surrogate Production	Surrogate CO2e (mt)	Total Project Production	Total Project CO2e (mt)	Yearly Schedule
Uranium Mining - Conventional - High [1]	240,000	13,750	16,830,000	964,219	2027–2032
Uranium Ore Milling - Conventional - High [2]		34	15,120	509,544	2027–2032
Uranium Mining - In-situ Recovery - Low [3]	907.2	41,719	15,120	695,317	2027–2032
Conversion - Low Operations [4]	10,000	18,490	17,800	32,912	2028–2033
Conversion - Construction - High [5]				3,600	2026–2027
Conversion - High Operations [5]				32,912	2028–2033
Enrichment - Low Operations [6]	6,000,000	4,913	12,800,000	10,481	2028–2033
Enrichment - Construction - High [7]				3,600	2026–2027
Enrichment - High Operations [7]	8,264,000	165,894	12,800,000	175,419	2028–2033
Deconversion - Low Operations [8]	3,400	1,945	442	253	2028–2033
Deconversion - Construction - High [8]				2,700	2026–2027
Deconversion - High Operations [8]	3,400	1,945	442	253	2028–2033
Fuel Fabrication - Low Operations [9]	1,600	35,087	329	7,215	2032–2037
Fuel Fabrication - Construction - High [9]				2,700	2030–2031
Fuel Fabrication - High Operations [9]	1,600	35,087	329	7,215	2032–2037
HALEU Storage - Construction [10]				900	2027
HALEU Storage - Low Operations [10]				544	2028–2033
HALEU Storage - High Operations [10]				544	2028–2033
HALEU Reactor - Construction [11]	See footnote 11	18,000	See footnote 11	3,600	2030–2031
HALEU Reactor - Plant Operations [12]	2.68	744	21.44	5,952	2034–2042
HALEU Reactor - Operations Worker Commutes [13]	225	2,776	50	4,935	2034–2042

Notes:

[1] Surrogate Production units in tons of ore mined, from Final Uranium Leasing Program Programmatic Environmental Impact Statement (DOE, 2014) - Table 2.2-3 for annual tons of ore throughput and Table 4.3-1 for annual GHG emissions. Project throughput of 15.3M mt converted to tons.

[2] Life Cycle Greenhouse Gas Emissions from Uranium Mining and Milling in Canada (Parker et al., 2016) - units in kg CO_2e/kg U_3O_8 produced (Table S-10). Total Project Production in metric tons of yellowcake.

[3] EIS for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report (NRC, 2016) - page 2-38 for annual production of yellowcake in mt and Table 2-5 for annual GHG emissions. Total Project Production in metric tons of yellowcake.

[4] EA for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois) (NRC, 2019). Table 2-3

Table A-16. Greenhouse Gas Emissions Estimated for Activities Associated with the HALEU Project

Activity/Scenario	Surrogate Production	Surrogate CO2e (mt)	Total Project Production	Total Project CO2e (mt)	Yearly Schedule

provides estimates of annual CO_2e emissions for years 2010-2014. The EA does not provide the production rates for these years, but it says on page 1-4 - "The licensee reengineered the facility in 2001 and 2007 to increase capacity to 14,000 metric tons (15,432 tons) and 15,000 metric tons (16,535 tons), respectively". To date, the highest production conducted is about 13,000 metric tons (14,330 tons). Assumed the 2014 emissions provided here were due to production of 10,000 mt. Assumes no construction. Total Project Production in metric tons of UF_6.

[5] Assumed that construction of a HALEU conversion facility would produce 20% of the GHGs emitted from construction of a Versatile Test Reactor (VTR) facility at the Idaho National Lab (DOE, 2021, pp. Table 4-5). Conversion High Operations = Low Operations.

[6] GLE EIS (NRC, 2012b), Table 4-31. Production rates = annual/total separative work unit (SWUs) required for the GLE/HALEU projects. Assumes no construction.

[7] High scenario would construct a HALEU enrichment facility that would produce 20% of the GHGs emitted from construction of a VTR facility. Production rates = annual/total SWUs required for the Advanced Nuclear Reactor (GEIS for ANRs, Appendix H, page 3 (NRC, 2021c))/HALEU projects). Updated the CO_2e emission rate from the GEIS with the use of the EPA 2021 eGRID national ave., minus AK, HI, and Puerto Rico data = 852 lbs CO_2/MWh, vs. 1,248 lbs CO_2/MWh used in the NRC analysis - 243,000 * 852/1,248 = 165,890 mt CO_2.

[8] FEIS for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico (NRC, 2012a), Table 4-13. Production rates = annual/total UF6 processed for the Fluoride DU/HALEU projects. High/low HALEU scenarios for operations the same, as no other documentation readily available, except high scenario would construct a HALEU deconversion facility that would produce 15% of the GHGs emitted from construction of a VTR facility.

[9] FEIS for the License Renewal of the Columbia Fuel Fabrication Facility in Richland County, South Carolina (NRC, 2022a), Table 3-11. Production rates = maximum annual/total fuel processed for the CFFF/HALEU projects. High/low HALEU scenarios for operations the same, as no other documentation readily available, except high scenario would construct a HALEU fuel fabrication facility that would produce 15% of the GHGs emitted from construction of a VTR facility.

[10] High/low HALEU scenarios for construction and operations the same, as no other documentation readily available - storage is for 290 mt of HALEU fuel. Both scenarios assume that construction/plant operations/worker commutes for a HALEU storage facility would produce 5/1/3% of the GHGs emitted from these activities identified in the VTR FEIS (DOE, 2022c). Total emissions based on 6 years of operation.

[11] Final Versatile Test Reactor Environmental Impact Statement, Table 4-5 (DOE, 2022c). Includes construction on 25 acres of a VTR reactor building ~280 feet by 180 feet and extending 93 feet below ground. Assumed that construction of a HALEU reactor would require 20% of this effort and would emit 20% of the GHGs emitted from construction of a VTR facility.

[12] Draft GEIS for Advanced Nuclear Reactors (NRC, 2021c), Appendix H identifies diesel electric generators as being the only stationary sources of emissions from reactor operations - assumptions used to estimate these emissions based on 50 MW of combined power ratings for 6 backup generators (Unistar, 2007, pp. 6-22), which is substantially more than required for a HALEU reactor plant. Assumed that the HALEU reactor would require the same amount of generator backup power (2.68 MW) and produce the same amount of resulting annual GHGs as a VTR facility. Total Project Production based on 8 years of operation. High/low scenarios the same.

[13] The HALEU reactor would require 50 fulltime staff and a VTR facility would require 225 staff. Factored annual staff commuting emissions estimated in the VTR FEIS (DOE, 2022c) (Table 4-6) by 50/225 and total emissions based on 8 years of operation. High/low scenarios the same.

Table A-17. Range of Annual/Total GHG Emissions Estimated for Truck Transport of 25/290 MT of HALEU Fuel – HALEU Project

Activity	*Shipment Type*	*Destination*	*Number of Shipments*	*One-Way Kilometers Traveled*	*Round Trip Kilometers Traveled*	*CO2e (gm)* [1]	*CO2e (MT)*
Annual Throughput of 25 MT							
Uranium Recovery – Conventional [2]	Uranium Ore	To Mill	57,400	34,440,000	68,880,000	61,026,302,400	61,026
Uranium Recovery – Conventional [2]	Yellowcake	To Conversion	74	169,075	338,150	299,594,137	300
Uranium In-situ Recovery	Yellowcake	To Conversion	74	169,075	338,150	299,594,137	300
Conversion – low	UF_6	To ACP from USA Conversion Source	128	112,525	225,050	199,389,799	199
Conversion – high	UF_6	To UUSA from Canada Conversion Source	136	436,492	872,984	773,446,364	773
Enrichment – low [3]	HALEU UF_6	ACP to FFF	8	30,758	61,516	54,501,946	55
Enrichment – high [3 4 5 6 7]	HALEU UF_6, etc.	To UUSA, etc.	149	613,821	1,227,642	1,087,666,259	1,088
Deconversion – low [8]	HALEU UF_6	From Enrichment	8	18,800	37,600	33,312,848	33
Deconversion – high [8]	HALEU UF_6	From Enrichment	8	18,800	37,600	33,312,848	33
HALEU Storage – low [9]	HALEU O_2		8	38,288	76,576	67,844,804	68
HALEU Storage – high [9]	HALEU metal		36	172,296	344,592	305,301,620	305
Annual Total – Low							**655**
Annual Total – High							**63,526**
Project Total – Low [10]							**7,594**
Project Total – High [10]							**736,897**

Notes:

Trucking activity data from HALEU EIS Technical Report, Table 6-4 (Leidos, 2023).

[1] Based on a truck emission factor of 1,429 g/mile of CO_2, from the Greet 2022 model (Argonne National Laboratory, 2024).

[2] Conventional uranium recovery requires transport of the uranium ore to a milling processing facility. In this HALEU EIS, the distance to a processing facility (milling) could be as far as 600 km. The NRC GEIS on conventional mining and milling does not provide the risk estimates for the crew and population for the ore or the yellowcake routine transports. An estimate of the risks in terms of LCF is developed based on the dose rate per kilometer listed in DOE/EIS-0472 (DOE, 2014, pp. D-3).

[3] The HALEU product (HALEU UF_6) is considered to have been transported to a fuel fabrication facility that leads to largest impact, in this case, it is at Framatome in Richland, Washington.

[4] Transport of empty cylinders back to the conversion facility in Illinois. Note, this transport has a higher external dose rate (a dose rate of 2 mrem/hr at 1 m) than those of UF_6 or DUF_6 cylinders (a dose rate of 0.29 or 0.28 mrem/hr at 1 m). In the UUSA EA (NRC, 2015), a dose rate of 1 mrem/hr at 1 m is used for the return of empty cylinders.

Table A-17. Range of Annual/Total GHG Emissions Estimated for Truck Transport of 25/290 MT of HALEU Fuel – HALEU Project

Activity	Shipment Type	Destination	Number of Shipments	One-Way Kilometers Traveled	Round Trip Kilometers Traveled	CO2e (gm) [1]	CO2e (MT)

[5] This option considers two enrichment locations (enrich to 5% at the first location, transport to the second location and enrich up to 19.75%). For the purposes of analysis, it was assumed that the first enrichment location would be either GLE or UUSA, and the second location would be ACP. Under this option the HALEU product would only be from the ACP location; DUF_6 products would be from first enrichment location, and LEU products would be between the two enrichment locations.

[6] In a two enrichment locations scenario, we would need 148 shipments of UF_6 in the first year and 136 shipments in years after. Here, the risk from an annual shipment of 136 is presented.

[7] DUF_6 cylinders were transported to Portsmouth, Ohio, for conversion to DU-oxide for disposal, for maximizing the impacts.

[8] Even though the deconversion was assumed to be at IIFP facility, the impacts for transporting the products are evaluated in the storage facility activity.

[9] The final products (e.g., HALEU O_2, or HALEU metal) was assumed to come from an equivalent distance between Framatome in Richland, Washington; and GLE in Wilmington, North Carolina; for maximizing the impacts.

[10] Based on 290 MT of HALEU fuel.

Table A-18. Construction Greenhouse Gas Emissions for Individual HALEU Project Activities

Activity	Total CO2e Emissions in Metric Tons		Yearly Schedule
	Low-Emissions Scenario	High Emissions Scenario	
Uranium Ore Mining and Milling			
Conversion		3,600	2026–2027
Enrichment		3,600	2026–2027
Deconversion		2,700	2026–2027
Fuel Fabrication		2,700	2030–2031
Storage	900	900	2027
Reactor Operations	3,600	3,600	2030–2031
Total Construction Emissions	**4,500**	**17,100**	

Table A-19. Annual and Total Greenhouse Gas Emissions for Individual HALEU Project Activities

Activity	***Low-Emissions Scenario***		***High Emissions Scenario***		***Yearly***
	Total CO2e Emissions (mt)	***Annual CO2e Emissions (mt)***	***Schedule***	***Total CO2e Emissions (mt)***	
Uranium Ore Mining and Milling	695,317	115,886	1,473,763	245,627	2027–2032
Conversion	32,912	5,485	32,912	5,485	2028–2033
Enrichment	10,481	1,747	175,419	29,236	2028–2033
Deconversion	253	42	253	42	2028–2033
Fuel Fabrication	7,215	1,202	7,215	1,202	2032–2037
Storage	544	91	544	91	2028–2033
Reactor Operations	10,887	1,210	10,887	1,210	2034–2042
Trucks - Materials Transport	7,594	1,266	736,897	122,816	2027–2032
Total Operations Emissions	**765,203**		**2,437,890**		
Total Emissions - Construction and Operations	**769,703**		**2,454,990**		
gm CO2e/kWh	**2.00**		**6.38**		
Power Generation from Total Project HALEU Fuel (MW-hr)	**385,089,600**				

Table A-20. Social Cost of Greenhouse Gas Emissions for HALEU Project - Low Emissions Scenario

Emission Changes			
	Emissions Changes (MT)		
Year	CO2	CH4	N2O
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027	118,052		
2028	126,317		
2029	126,317		
2030	124,517		
2031	124,517		
2032	125,719		
2033	8,568		
2034	2,412		
2035	2,412		
2036	2,412		
2037	2,412		
2038	1,210		
2039	1,210		
2040	1,210		
2041	1,210		
2042	1,210		
2043			
2044			
Total	**769,703**	-	-

Source: (EPA, 2023)

Constant discounting			
Number of years (N)	16		
Discount Rate	2.5%	2.0%	1.5%

Present and Annualized Values of CO2 Emission Changes (millions, 2020$)			
GHG	**CO2**	**CO2**	**CO2**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	**$95.81**	**$157.29**	**$270.67**
Annualized Value (16 Years, 2020$)	**$7.34**	**$11.58**	**$19.15**

Present and Annualized Values of CH4 Emission Changes (millions, 2020$)			
GHG	**CH4**	**CH4**	**CH4**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	$0.00	$0.00	$0.00
Annualized Value (16 Years, 2020$)	$0.00	$0.00	$0.00

Present and Annualized Values of N2O Emission Changes (millions, 2020$)			
GHG	**N2O**	**N2O**	**N2O**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	$0.00	$0.00	$0.00
Annualized Value (16 Years, 2020$)	$0.00	$0.00	$0.00

Total Present and Annualized Values of all GHG Emission Changes (CO2, CH4, and N2O)			
GHG	**Total**	**Total**	**Total**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	**$95.81**	**$157.29**	**$270.67**
Annualized Value (16 Years, 2020$)	**$7.34**	**$11.58**	**$19.15**

Table A-21. Social Cost of Greenhouse Gas Emissions for HALEU Project - High Emissions Scenario

Emission Changes			
Year	Emissions Changes (MT)		
	CO2	CH4	N2O
2020			
2021			
2022			
2023			
2024			
2025			
2026	4,950		
2027	374,293		
2028	403,298		
2029	403,298		
2030	406,448		
2031	406,448		
2032	404,500		
2033	36,057		
2034	2,412		
2035	2,412		
2036	2,412		
2037	2,412		
2038	1,210		
2039	1,210		
2040	1,210		
2041	1,210		
2042	1,210		
2043			
2044			
Total	**2,454,990**	**-**	**-**

Source: (EPA, 2023)

Constant discounting

Number of years (N)	17		
Discount Rate	2.5%	2.0%	1.5%

Present and Annualized Values of CO2 Emission Changes (millions, 2020$)			
GHG	**CO2**	**CO2**	**CO2**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	**$305.75**	**$501.90**	**$863.56**
Annualized Value (17 Years, 2020$)	**$22.30**	**$35.12**	**$57.93**

Present and Annualized Values of CH4 Emission Changes (millions, 2020$)			
GHG	**CH4**	**CH4**	**CH4**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	$0.00	$0.00	$0.00
Annualized Value (17 Years, 2020$)	$0.00	$0.00	$0.00

Present and Annualized Values of N2O Emission Changes (millions, 2020$)			
GHG	**N2O**	**N2O**	**N2O**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	$0.00	$0.00	$0.00
Annualized Value (17 Years, 2020$)	$0.00	$0.00	$0.00

Total Present and Annualized Values of all GHG Emission Changes (CO2, CH4, and N2O)			
GHG	**Total**	**Total**	**Total**
Discount Rate	**2.5%**	**2.0%**	**1.5%**
Present Value in 2024 (2020$)	**$305.75**	**$501.90**	**$863.56**
Annualized Value (17 Years, 2020$)	**$22.30**	**$35.12**	**$57.93**

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APPENDIX B – FACILITY NEPA DOCUMENTATION

List of Figures

No figures are presented in this section.

List of Tables

Acronyms and Abbreviations

%	percent
<	less than
HALEU	high-assay low-enriched uranium
ISR	in-situ recovery
LEU	low-enriched uranium
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
SNF	spent nuclear fuel
U-235	uranium-235
U_3O_8	triuranium octoxide
UF_6	uranium hexafluoride
U.S.	United States

Appendix B Facility NEPA Documentation

B.1 Assessment of the NEPA Status of Potential HALEU Facilities

The potential existing and new United States (U.S.) Nuclear Regulatory Commission (NRC) and Agreement State-licensed and other permitted uranium fuel cycle facilities (referred to throughout as "existing facilities") that might support the Proposed Action were reviewed to determine the extent of the existing National Environmental Policy Act (NEPA) coverage for those activities. The extent of existing NEPA coverage was determined using the following judgements:

- **Full coverage** = indicates the existing NEPA documentation covers substantially the same activities that would occur to accomplish a discrete portion of the Proposed Action. In some cases, the amount of material to be processed is unknown, so it cannot be determined if the NEPA documentation covers the total amount of material to be processed.
- **Planned** = indicates that NEPA documentation has not been prepared (or has yet to be completed), but an action has occurred to move toward the stated high-assay low-enriched uranium (HALEU) activity goal. For example, a license application could be in process or may have been submitted to NRC.
- **Proposed** = indicates that NEPA documentation has not been prepared, but there is a statement of a proposal to move toward a stated HALEU activity goal.
- **Partial Coverage** = indicates the existing NEPA documentation covers some, but not all, of the same activities that would occur under the Proposed Action.

The details of the evaluation of NEPA documents are provided in Table B-1 through Table B-17. In the tables, "Full Coverage" is used when the HALEU-related activity is covered by the existing NEPA analysis. This indicates that the activity, or a similar activity, was evaluated in the NEPA document, such that the annual impacts of the activity would likely be bounded. This does not indicate that total impacts would be covered because the total amount of material processed may exceed the amount of material evaluated.

In summary, the status of NEPA coverage for HALEU fuel production activities is as follows for commercial activities:

- Uranium mining, milling, and in-situ recovery (ISR), and the production of uranium oxide (yellowcake, U_3O_8), at existing U.S. commercial facilities has NEPA coverage.
- Commercial conversion of uranium oxide to uranium hexafluoride (UF_6) has NEPA coverage.
- Commercial enrichment to low-enriched uranium (LEU) (less than [<] 5 percent [%] uranium-235 [U-235]) has NEPA coverage.
- Commercial enrichment to HALEU (19.75% to < 20% U-235) has some NEPA coverage, primarily for demonstration quantities of HALEU.
- HALEU enrichment facilities capable of operating at commercially viable throughputs do not have NEPA coverage, although they would be similar to LEU enrichment facilities.
- Commercial deconversion of HALEU in the form of UF_6 to HALEU metal or oxide does not have coverage.
- A commercial HALEU storage facility does not have NEPA coverage.

- BWXT has some coverage for HALEU fuel fabrication. Other fuel fabrication facilities have NEPA coverage for the fabrication of LEU fuel, but not for HALEU fuel. NEPA coverage for new HALEU fuel fabrication facilities is in progress, but not yet available. For example, X-energy has submitted a license application with an Environmental Report for a facility to process 8 (expandable to 16) metric tons of uranium per year.
- HALEU-fueled reactors have partial NEPA coverage via a Generic Environmental Impact Statement.
- HALEU spent nuclear fuel (SNF) storage has partial NEPA coverage for at-reactor storage via a Generic Environmental Impact Statement, and full NEPA coverage for away-from-reactor storage. HALEU SNF disposition does not have NEPA coverage.
- Transportation of commercial quantities of uranium ore, uranium oxide, UF_6, and HALEU have partial coverage in existing NEPA documents.

Table B-1. Nuclear Regulatory Commission NEPA Documentation – Generic

<table>
<tr><th>Activity</th><th>Document #</th><th>Title</th><th>Link</th></tr>
<tr><td rowspan="2">Generic NEPA Coverage for HALEU-Fueled Reactors</td><td>(NRC, 2021a)
NUREG-2249</td><td>Draft Generic Environmental Impact Statement for Advanced Nuclear Reactors (ANRs)</td><td>https://www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/advanced-reactor-generic-environmental-impact-statement-geis.html

https://www.regulations.gov/document/NRC-2020-0101-0033</td></tr>
<tr><td colspan="3">Analysis of NEPA Documentation: Partial Coverage – The purpose and need for this GEIS is to present impact analyses for the environmental issues common to many or most ANRs that can be addressed generically, thereby eliminating the need to repeatedly reproduce the same analyses each time a licensing application is submitted and allowing applicants and NRC staff to focus future environmental review efforts on issues that can be resolved only once a site is identified. This GEIS is intended to improve the efficiency of licensing ANRs by (1) identifying the possible types of environmental impacts of building, operating, and decommissioning an ANR; (2) assessing impacts that are expected to be generic (the same or similar) for many or most ANRs; and (3) defining the environmental issues that will need to be addressed in project-specific supplemental EISs addressing specific projects.

The NRC staff have evaluated fuel cycle impacts for light water reactors, as documented in 10 C.F.R. §51.51 (TN250), Table S-3, Table of Uranium Fuel Cycle Environmental Data. Fuel cycle impacts include uranium mining, uranium milling, UF_6 production, uranium enrichment, fuel fabrication, reprocessing, and disposal. Section 3.14 of the GEIS evaluated the fuel cycle impacts for ANRs and determined that data from Table S-3 could bound the impacts of the fuel cycle for certain advanced reactors. An applicant for an advanced reactor license could meet the requirements of 10 C.F.R. §51.50(b)(3) and 10 C.F.R. §51.50(c) by demonstrating that their fuel falls within the fuel cycle analysis in this GEIS.

The GEIS NEPA documentation for new ANRs should be largely applicable to determining the potential impacts of construction and operation of new ANRs using HALEU fuel. Portions of the GEIS that evaluate uranium fuel cycle impacts should also be applicable.</td></tr>
<tr><td rowspan="2">Generic NEPA Coverage for Storage of HALEU SNF</td><td>(NRC, 2014c)
NUREG-2157</td><td>Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel</td><td>https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2157/index.html</td></tr>
<tr><td colspan="3">Analysis of NEPA Documentation: Partial Coverage – The GEIS analyzes the environmental impacts of continued storage of SNF. The NRC has looked at the direct, indirect, and cumulative effects of continued storage for three timeframes: (1) short term, (2) long term, and (3) indefinite. The NRC is evaluating the continued storage of commercial SNF in this GEIS. Thus, certain topics are not addressed because they are not within the scope of this review. These topics include (1) noncommercial SNF (e.g., defense SNF); (2) commercial HLW generated from reprocessing; (3) GTCC LLW; (4) foreign SNF stored in the United States; and (5) nonpower reactor SNF (e.g., test and research reactors, including foreign generated SNF stored in the United States).

Because the GEIS states that topics such as noncommercial SNF (e.g., defense SNF); foreign SNF stored in the United States; and nonpower reactor SNF (e.g., test and research reactors, including foreign generated SNF stored in the United States) are not within the scope of the GEIS analyses, DOE may be able to rely on this document only for NEPA coverage for commercial nuclear power reactor HALEU SNF.</td></tr>
<tr><td>Generic NEPA Coverage for</td><td>(NRC, 2021b)
NUREG-1437</td><td>Generic Environmental Impact Statement for License Renewal of Nuclear Plants</td><td>https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/index.html</td></tr>
</table>

Table B-1. Nuclear Regulatory Commission NEPA Documentation – Generic

Activity	*Document #*	*Title*	*Link*
Uranium Fuel Cycle	**Analysis of NEPA Documentation: Partial Coverage** – The GEIS for license renewal of nuclear power plants was undertaken to assess the environmental impacts that could be associated with nuclear power plant license renewal and an additional 20 years of operation of individual plants. The general analytical approach to each environmental issue is to (1) describe the activity that affects the environment, (2) identify the population or resource that is affected, (3) assess the nature and magnitude of the impact on the affected population or resource, (4) characterize the significance of the effect for both beneficial and adverse effects, (5) determine whether the results of the analysis apply to all plants, and (6) consider whether additional mitigation measures would be warranted for impacts that would have the same significance level for all plants. In determining the significance of environmental impacts associated with an issue, a determination was made whether the analysis in the GEIS could be applied to all plants and whether additional mitigation measures would be warranted. The categories to which an issue may be assigned follow. Category 1: For the issue, the analysis reported in the GEIS has shown the following: (1) the environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics; (2) a single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective off-site radiological impacts from the fuel cycle and from high-level-waste and spent-fuel disposal); and (3) mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation. Category 2: For the issue, the analysis reported in the GEIS has shown that one or more of the criteria of Category 1 cannot be met, and therefore, additional plant-specific review is required. This Final GEIS assesses 92 environmental issues. Sixty-eight of these issues are found to be Category 1 and are identified in 10 C.F.R. §Part 51 as not requiring additional plant-specific analysis. Because operation of existing power reactors on LEU or LEU+ fuels is outside the scope of the Proposed Action, the NEPA documentation in this document would be largely not applicable. Some areas of discussion on portions of the uranium fuel cycle may be applicable, because HALEU production could, in essence, be tacked on to LEU production. Note: Similar information presented in the *Draft Generic Environmental Impact Statement for Advanced Nuclear Reactors* (NUREG-2249) may be more applicable.		
Generic NEPA Coverage for Uranium Milling	(NRC, 1980) NUREG-0706	*Generic Environmental Impact Statement on Uranium Milling*	https://www.nrc.gov/docs/ML0327/ML032751663
	Analysis of NEPA Documentation: Partial Coverage – This GEIS on uranium milling was prepared to assess the potential environmental impacts of uranium milling operations, in a programmatic context, including the management of uranium mill tailings. In support of this purpose, the principal objective of the statement was to assess the nature and extent of the environmental impacts of conventional uranium milling in the United States from local, regional, and national perspectives on both short- and long-term bases. Conventional uranium milling as used herein refers to the milling of ore mined primarily for the-recovery of uranium. It involves the processes of crushing, grinding, and leaching of the ore, followed by chemical separation and concentration of uranium.		
Generic NEPA Coverage for	(NRC, 2009a) NUREG-1910	*Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/index.html

Table B-1. Nuclear Regulatory Commission NEPA Documentation – Generic

Activity	*Document #*	*Title*	*Link*
Uranium ISR Mining	**Analysis of NEPA Documentation: Full Coverage**[31] – The GEIS was prepared to assess the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of an ISR facility in four specified geographic areas. The intent of the GEIS is to determine which impacts would be essentially the same for all ISR facilities and which ones would result in varying levels of impacts for different facilities, thus requiring further site-specific information to determine the potential impacts. As such, the GEIS provides a starting point for the NRC's NEPA analyses on site-specific license applications for new ISR facilities, as well as for applications to amend or renew existing ISR licenses. Uranium would be recovered from the ore and converted to U_3O_8. This activity would be performed to supply feed for LEU production, and therefore would be no different than currently licensed activities, as well as expected to be within the current license parameters and GEIS NEPA documentation. This GEIS provide coverage for ISL/ISR facilities; conventional mining is not covered.		
Generic NEPA Coverage for Transportation of Radioactive Materials	(NRC, 1977) NUREG 0170	*Final Environmental Impact Statement on the Transportation of Radioactive Materials by Air and Other Modes*	https://www.nrc.gov/docs/ML1219/ML12192A283.pdf
	Analysis of NEPA Documentation: Partial Coverage – This document is an assessment of the environmental impact from transportation of shipments of radioactive material into, within, and out of the United States. The environmental impact of radioactive material transport can be described in three distinct parts: the radiological impact from normal transport, the risk of radiological effects from accidents involving vehicles carrying radioactive material shipments, and all nonradiological impacts. The NRC EIS evaluates these three aspects for transportation of radioactive materials by air and other modes.		

Key: ANR = advanced nuclear reactor; CFR = Code of Federal Regulations; DOE = U.S. Department of Energy; EIS = Environmental Impact Statement; GEIS = Generic EIS; GTCC = greater than Class C; HALEU = high-assay low-enriched uranium; HLW = high-level radioactive waste; ISL = in-situ leach; ISR = in-situ recovery; LEU = low-enriched uranium; LEU+ = uranium enriched 5% up to 10%; LLW = low-level radioactive waste; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SNF = spent nuclear fuel; U_3O_8 = uranium oxide (yellowcake); UF_6 = uranium hexafluoride

Table B-2. Uranium Production – Uranium Mining and Milling using Conventional Processes

Activity	*Document #*	*Title*	*Link*
Conventional Mining and Milling of Uranium Ore		*DOE Uranium Leasing Program*	https://www.energy.gov/lm/uranium-leasing-program
	(DOE, 2014) DOE/EIS-0472	*Final Uranium Leasing Program Programmatic*	https://www.energy.gov/lm/final-uranium-leasing-program-peis

31 In evaluating the applicability of the GEIS NEPA documentation, "Full Coverage" indicates that the NEPA documentation is applicable and additional NEPA documentation is unlikely to be needed for the covered resource areas. A GEIS by nature is not expected to provide NEPA coverage for all potential impacts in all resource areas. This GEIS provides coverage for ISR facilities. Conventional mining is not covered by this GEIS.

Table B-2. Uranium Production – Uranium Mining and Milling using Conventional Processes

Activity	Document #	Title	Link
		Environmental Impact Statement	
	(USDA, 2013)	*Draft Environmental Impact Statement for Roca Honda Mine Sections 9, 10, and 16, Township 13 North, Range 8 West, New Mexico Principal Meridian Cibola National Forest, McKinley and Cibola Counties, New Mexico*	https://www.govinfo.gov/content/pkg/GOVPUB-A13-PURL-gpo40498/pdf/GOVPUB-A13-PURL-gpo40498.pdf
	(USDA, 2012)	*Draft Environmental Impact Statement for the La Jara Mesa Mine Project, Mt. Taylor Ranger District, Cibola National Forest, Cibola County, New Mexico*	https://wp-laramide-2023.s3.ca-central-1.amazonaws.com/media/2023/03/Draft_Environmental_Impact_Statement_La_Jara_Mesa_2012.pdf
	Analysis of NEPA Documentation: Partial Coverage – The *DOE Uranium Leasing Program Programmatic Environmental Impact Statement* evaluates the environmental impacts of management alternatives for DOE's Uranium Leasing Program, under which DOE administers tracts of land in western Colorado for exploration, development, and the extraction of uranium and vanadium ores. This EIS include the environmental impacts of alternatives that include construction, operation, and decommissioning of conventional uranium mines and mills. The applicant submitted an application for a New Mine Permit to the New Mexico Mining and Minerals Division, or the proposed Roca Honda Mine – to the Cibola National Forest (U.S. Forest Service) for development of underground uranium mining and surface support facilities on the Mt. Taylor Ranger District near Grants, New Mexico. The applicant proposes a mine permit area of 1,968 acres, including 48 acres of haul roads, utility corridor, and mine dewater discharge pipeline corridor. There are 218 acres of proposed disturbance. This Draft EIS assesses the potential environmental impacts of implementing the proposed plan. The applicant submitted a plan of operations (plan) for development of underground uranium mining and surface support facilities at the La Jara Mesa property at Mt. Taylor near Grants, New Mexico. The plan includes development, operation, and mine reclamation for an overall time period of up to 20 years. Disturbance on the 16.4 acres includes improvements to existing roads, construction of a new water pipeline		

Table B-2. Uranium Production – Uranium Mining and Milling using Conventional Processes

Activity	*Document #*	*Title*	*Link*
	and electric distribution line in the road right-of-way, and an escape raise/air vent at the top of La Jara Mesa, all of which are directly associated with the applicant's plan. This Draft EIS evaluates the potential environmental impacts of implementing the proposed plan.		

Key: DOE = U.S. Department of Energy; EIS = Environmental Impact Statement; NEPA = National Environmental Policy Act; USDA = U.S. Department of Agriculture.

Table B-3. Uranium Production – Uranium Milling

Activity	*Document #*	*Title*	*Link*
Milling of Uranium Ore		*White Mesa Uranium Mill*	https://deq.utah.gov/waste-management-and-radiation-control/radioactive-materials-license-no-ut1900479-white-mesa-uranium-mill-energy-fuels-resources-usa-inc
	(NRC, 1997a)	*Environmental Assessment for Renewal of Source Material License No. SUA-1358 Energy Fuels Nuclear, Inc. White Mesa Uranium Mill, San Juan County, Utah*	https://www.nrc.gov/docs/ML0206/ML020670497.pdf
	(NRC, 1979) NUREG-0556	*Final Environmental Statement Related to Operation of White Mesa Uranium Project, Energy Fuels Nuclear, Inc.*	https://deq.utah.gov/businesses-facilities/radioactive-materials-license-no-ut1900479-white-mesa-uranium-mill-energy-fuels-resources-usa-inc
	Analysis of NEPA Documentation: Full Coverage – The White Mesa Mill is located in San Juan County, Utah, about 8 km (5 miles) south of Blanding, Utah. The purpose of the 1979 Environmental Statement is to discuss in detail the environmental effects of project construction as well as monitoring and mitigating measures proposed to minimize the effects of the project on the immediate area and surrounding environs. The Proposed Action for the 1997 EA was to renew license SUA-1358 for operation of the White Mesa Mill at a maximum production rate of 4,380 tons of yellowcake per year. Additionally, the applicant is authorized, by license condition, to possess byproduct material in the form of uranium waste tailings and other uranium byproduct waste generated by the milling operations authorized by the renewal license. All operations authorized by the renewed license are conducted within the confines of the existing site boundary. The project site consists of 4,871 acres of private land together with mill site claims. The mill site itself occupies approximately 50 acres and the tailings disposal cells another 450 acres.		

Key: EA = Environmental Assessment; km = kilometers; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission

Table B-4. Uranium Production – Uranium Mining using In-Situ Leach (In-Situ Recovery) Processes

Activity	Document #	Title	Link
ISR of Uranium		*NRC-Licensed Uranium Recovery Facilities*	https://www.nrc.gov/info-finder/materials/uranium/index.html
	(NRC, 2018)	*Final Environmental Assessment for the Ludeman Satellite In Situ Recovery Project, Converse County, Wyoming*	https://www.nrc.gov/docs/ML1818/ML18183A225.pdf
	(NRC, 2016), NUREG-1910, Supplement 6	*Environmental Impact Statement for the Reno Creek In Situ Recovery Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s6/index.html
	(NRC, 2014a), NUREG-1910, Supplement 4, Volume 1	*Environmental Impact Statement for the Dewey-Burdock Project in Custer and Fall River Counties, South Dakota: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s4/v1/index.html
	(NRC, 2014b), NUREG-1910, Supplement 5	*Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities: Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s5/index.html
	(NRC, 2011a), NUREG-1910, Supplement 2	*Environmental Impact Statement for the Nichols Ranch ISR Project in Campbell and Johnson Counties, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s2/index.html#abs
	(NRC, 2011b), NUREG-1910, Supplement 3	*Environmental Impact Statement for the Lost Creek ISR Project in Sweetwater County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s3/index.html
	(NRC, 2010), NUREG-1910, Supplement 1	*Environmental Impact Statement for the Moore Ranch ISR Project in Campbell County, Wyoming: Supplement to the Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities — Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/s1/index.html

Table B-4. Uranium Production – Uranium Mining using In-Situ Leach (In-Situ Recovery) Processes

Activity	Document #	Title	Link
	Analysis of NEPA Documentation: Full Coverage – Uranium would be recovered from the ore and converted to U_3O_8. This activity would be performed to supply feed for LEU production, and therefore would be no different than currently licensed activities, as well as expected to be within the current license parameters and NEPA documentation. These NEPA documents provide coverage for ISL/ISR facilities; conventional mining is not covered.		

Key: ISL = in-situ leach; ISR = in-situ recovery; LEU = low-enriched uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; U_3O_8 = uranium oxide (yellowcake)

Table B-5. Uranium Conversion – ConverDyn (formerly Honeywell), Metropolis, Illinois

Activity	Document #	Title	Link
ConverDyn Conversion of U_3O_8 to 0.711% UF_6		*ConverDyn (formerly Honeywell International), Uranium Conversion*	https://www.nrc.gov/info-finder/fc/honeywell-works-uranium-conv-il-lc.html?panel=0
	(NRC, 2019)	*Environmental Assessment for the Proposed Renewal of Source Material License SUB–526 Metropolis Works Uranium Conversion Facility (Massac County, Illinois)*	https://www.nrc.gov/docs/ML1927/ML19273A012.pdf
	(NRC, 1995)	*Environmental Assessment for Renewal of Source Material License SUB-526 AlliedSignal, Inc. Metropolis, Illinois*	https://www.nrc.gov/docs/ML1623/ML16231A195.pdf
	Analysis of NEPA Documentation: Full Coverage – This plant is currently in "idle-ready" status but plans to restart operations. Plant capacity was 7,000 MTU/yr in 2017. Original plant rated capacity is 15,000 MTU/yr. Uranium oxide ore would be converted to UF_6 as feed to the enrichment facilities. This activity would be performed to supply feed for LEU production, and therefore would be no different than recently licensed activities, as well as expected to be within the current license parameters and NEPA documentation.		

Key: % = percent; LEU = low-enriched uranium; mrem/yr = millirem per year; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; person-rem/yr = population dose per year; U_3O_8 = uranium oxide (yellowcake); UF_6 = uranium hexafluoride

Table B-6. Uranium Enrichment – Centrus, Piketon, Ohio

Activity	***Document #***	***Title***	***Link***
	(NRC, 2022a)	*Centrus Energy Corp. (formerly USEC Inc.), Gas Centrifuge Enrichment Facility*	https://www.nrc.gov/materials/fuel-cycle-fac/usecfacility.html
	(ACO, 2020), LA-3605-0002	*Proposed Changes for LA-3605-0002, Environmental Report (ER) for the American Centrifuge Plant (for the HALEU Demonstration Program)*	https://www.nrc.gov/docs/ML2013/ML20139A098.pdf
	(DOE, 2011), DOE/EIS-0468	*Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio (DOE adopts NUREG-1834)*	https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/EIS-0468-FEIS-2011.pdf
	(NRC, 2006), NUREG-1834	*Environmental Impact Statement for the Proposed American Centrifuge Plant in Piketon, Ohio*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1834/index.html
Centrus – HALEU Enrichment Demonstration (20 kg)	**Analysis of NEPA Documentation: Full Coverage** – ACO, a subsidiary of Centrus Energy Corporation, planned to install a 16-centrifuge HALEU cascade under its American Centrifuge Lead Cascade Facility license. Between December 2019 and June 2020, ACO submitted its HALEU demonstration application documents as an amendment request for its ACP license. The NRC staff completed its reviews of these submittals and on June 11, 2021, issued License Amendment 13 – Approval to Operate Sixteen Centrifuges to Demonstrate Production of High-Assay Low-Enriched Uranium. Transportation of HALEU is not covered by the existing NEPA documents. On January 5, 2022, DOE issued solicitation #89243222RNE000026 for *HALEU Demonstration Cascade Completion and HALEU Production*. The solicitation was looking for operators of the Piketon, Ohio, facility for completion of the demonstration cascade, initial cascade operation and production of 20 kg of HALEU, ongoing cascade operation and production of 900 kg of HALEU in year 1, and ongoing cascade operations for years 2 to 4, 5 to 7, and 8 to 10, at 900 kg per year.		
Centrus – HALEU Enrichment 0.9 MT/yr (9 MT)	**Analysis of NEPA Documentation: Planned** – ACO had indicated that if the NRC approved its HALEU demonstration application (described above), it would likely request the NRC to further amend the ACP license by approving continued operation of the 16-centrifuge HALEU cascade for an additional period of time beyond the contract expiration date. See the above discussion of the DOE solicitation to operate the Piketon, Ohio, facility.		
Centrus – Production Scale HALEU Enrichment (19.75%)	**Analysis of NEPA Documentation: Proposed** – ACO stated that the Piketon, Ohio, facility could be expanded in a modular fashion to match demand. The feed material for a HALEU cascade would be 4.95% LEU produced on-site by an adjacent cascade or purchased elsewhere. Roughly 75% of the SWUs needed to produce HALEU is already contained in the LEU feed material. Also, LEU feed can be produced in an NRC Category III facility up to 10% enrichment. It lowers the costs to perform this in a Category III facility and only perform the last enrichment step (10% to 19.75%) in a Category II facility. Centrus had stated that the next 12 MTU/yr capacity could be brought online within 4 years of securing the necessary funding and/or offtake commitments, and that it could bring at least 12 MTU of additional capacity online each year after that, subject to market conditions.		

Key: % = percent; ACO = American Centrifuge Operating, LLC; ACP = American Centrifuge Plant; DOE = U.S. Department of Energy; ER = Environmental Report; HALEU = high-assay low-enriched uranium; kg = kilograms; LEU = low-enriched uranium; MT = metric tons; MT/yr = metric tons per year; MTU = metric tons of uranium; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SWUs = separative work units

Table B-7. Uranium Enrichment – Global Laser Enrichment (GLE) SILEX, Wilmington, North Carolina; Paducah, Kentucky

Activity	*Document #*	*Title*	*Link*
		SILEX Systems Limited, *Global Laser Enrichment Facility*	https://www.nrc.gov/materials/fuel-cycle-fac/laser.html
	(NRC, 2012b), NUREG-1938	*Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina*	https://www.nrc.gov/docs/ML1204/ML12047A040.pdf
GLE – Production-Scale HALEU Enrichment (19.75%)	**Analysis of NEPA Documentation: Proposed** – GLE Test Loop commissioned in Wilmington in 2009; operational for over 10 years. Operations of the Test Loop are on hold. A full-scale facility was licensed in September 2012, but at present it is not being built due to market conditions. NEPA documentation covers GLE operations in Wilmington, North Carolina. The facility would operate at 3–6 million SWU[32] capacity, deployed in 1 to 1.5 million SWU halls. The facility at Wilmington could be modified to produce HALEU.		

Key: % = percent; GE = General Electric; GLE = Global Laser Enrichment; HALEU = high-assay low-enriched uranium; MTU = metric tons of uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SWU = separative work unit

Table B-8. Uranium Enrichment – Urenco (Louisiana Energy Services), Lea County, New Mexico

Activity	*Document #*	*Title*	*Link*
		Urenco (Louisiana Energy Services), Uranium Enrichment	https://www.nrc.gov/info-finder/fc/urenco-enrichment-fac-nm-lc.html
	(URENCO, 2019) (URENCO, 2020)	*Urenco USA Inc. announces next-step HALEU activities*	https://www.urenco.com/news/usa/2019/urenco-usa-inc-announces-next-step-haleu-activities https://www.leidoseemg.com/haleuEIS.references/
	(NRC, 2015)	*Environmental Assessment for the Proposed Louisiana Energy Services, Urenco-USA Uranium Enrichment Facility Capacity Expansion in Lea County, New Mexico*	https://www.nrc.gov/docs/ML1507/ML15072A016.pdf

32 A separative work unit (SWU) is a unit of measurement used in the nuclear industry, pertaining to the process of enriching uranium for use as fuel for nuclear power plants. It describes the effort needed to separate uranium (U)-235 and U-238 atoms in natural uranium to create a final product that is enriched in U-235 atoms. For 114 kilograms (kg) of natural uranium, it takes about 70 SWUs to produce 10 kg of uranium enriched to 5% U-235. It takes on the order of 100,000 SWUs of enriched uranium to fuel a typical 1,000-megawatt commercial nuclear reactor for a year (NUREG-1938).

Table B-8. Uranium Enrichment – Urenco (Louisiana Energy Services), Lea County, New Mexico

Activity	Document #	Title	Link
	(NRC, 2005a), NUREG-1790	*Environmental Impact Statement for the Proposed National Enrichment Facility in Lea County, New Mexico*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1790/index.html
Urenco – LEU+ Enrichment 5 to < 10%	**Analysis of NEPA Documentation: Planned** – The Urenco facility currently converts U_3O_8 to UF_6 and enriches the UF_6 to < 5% LEU. The 2005 EIS (NUREG-1790) lists the maximum production capacity at 800 metric tons LEU UF_6 per year (NRC, 2005a). Urenco is currently engaging in pre-application activities with the NRC to increase their enrichment limits up to < 10% enriched uranium[33].		
Urenco – Production-Scale HALEU Enrichment (19.75%)	**Analysis of NEPA Documentation: Proposed** – Available space on existing Urenco Category III nuclear-licensed site for additional facilities. Scope for expansion to accommodate Category II facility for HALEU. Urenco estimates that if detailed design, site permits, and contractor selection were undertaken in parallel with the regulatory licensing process, they could construct, commission, and start up a HALEU production unit within 24 months of regulatory licensing approval. Subject to firm customer commitments, Urenco is pursuing the design, licensing, construction, and operation of a facility at the site in New Mexico, to produce HALEU. Although existing enrichment capacity (designed and licensed as a Category III facility) cannot be repurposed to produce HALEU, a separate, relatively small, dedicated facility can be co-located with the existing enrichment capacity at the site to produce HALEU, with the ability to use feedstock generated by the existing facility and to rely on the site's existing infrastructure. For this phase, and as further discussed below, a conceptual design of an enrichment facility is being developed for the New Mexico site that would produce UF_6 enriched up to 19.75% U-235 (Source: Urenco Response to Request for Information).		

Key: < = less than; % = percent; EIS = Environmental Impact Statement; HALEU= high-assay low-enriched uranium; LEU = low-enriched uranium; LEU+ = uranium enriched 5% up to 10%; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; U-235 = uranium-235; U_3O_8 = uranium oxide (yellowcake); UF_6 = uranium hexafluoride

Table B-9. Uranium Deconversion – International Isotopes, Hobbs, New Mexico

Activity	Document #	Title	Link
Depleted UF_6 Deconversion and Fluorine Extraction		*International Isotopes, Depleted Uranium Deconversion*	https://www.nrc.gov/info-finder/fc/iifp-lea-co-nm-lc.html
	(NRC, 2012a) NUREG–2113	*Environmental Impact Statement for the Proposed Fluorine Extraction Process and Depleted Uranium Deconversion Plant in Lea County, New Mexico – Final Report*	https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2113/index.html

33 LEU and HALEU at 5% to < 10% enrichment can be produced in an NRC Category III facility. HALEU at 10% to 19.75% can only be handled in a Category II facility. Therefore, HALEU enrichment between 5% and < 10% can be accomplished with less facility modifications and at less costs than HALEU at 10% to 19.75% enrichment.

Table B-9. Uranium Deconversion – International Isotopes, Hobbs, New Mexico

Activity	Document #	Title	Link
	Analysis of NEPA Documentation: Full Coverage[34] On October 2, 2012, the NRC issued a 40-year license for International Isotopes Fluorine Products, Inc., a subsidiary of International Isotopes, Inc., to construct and operate a fluorine extraction and depleted uranium deconversion (DUF_6 to DU oxide) facility near Hobbs, New Mexico. International Isotopes Fluorine Products, Inc. is licensed to possess up to 750 MT of DU. This activity is for processing of depleted UF_6 tails from uranium enrichment and would not be affected by HALEU production except that the volume of tails available to be processed may increase.		

Key: DU = depleted uranium; DUF_6 = depleted uranium hexafluoride; HALEU = high-assay low-enriched uranium; MT = metric tons; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; UF_6 = uranium hexafluoride

Table B-10. Uranium Deconversion – Portsmouth, Ohio; Paducah, Kentucky

Activity	Document #	Title	Link
Depleted UF_6 Deconversion to Oxide		*Portsmouth and Paducah DUF_6 Conversion*	https://www.energy.gov/em/portsmouth-paducah-depleted-uranium-hexafluoride
	(DOE, 2020) DOE/EIS-0359-S1 DOE/EIS-0360-S1	*Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride*	https://www.energy.gov/nepa/doeeis-0359-s1-and-doeeis-0360-s1-supplemental-eis-disposition-depleted-uranium-oxide
	(DOE, 2004a) DOE/EIS-0360	*Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site*	https://www.energy.gov/nepa/articles/eis-0360-final-environmental-impact-statement
	(DOE, 2004b) DOE/EIS-0359	*Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site*	https://www.energy.gov/nepa/articles/eis-0359-final-environmental-impact-statement
	Analysis of NEPA Documentation: Full Coverage[35] – In 2004, DOE issued Final EISs for construction and operation of facilities to convert DUF_6 to DU oxide at DOE's Paducah site in Kentucky (DOE/EIS-0359) and Portsmouth site in Ohio (DOE/EIS-0360) and two associated RODs to build the facilities. In 2020, DOE published in the *Federal Register*, 85 Fed. Reg. 23022 (Apr. 24, 2020), a Final Supplemental EIS for actions for disposition of DU oxide conversion product generated at these sites and declared waste (DOE/EIS-0359-S1 and DOE/EIS-0360-S1).		

Key: DOE = U.S. Department of Energy; DU = depleted uranium; DUF_6 = depleted uranium hexafluoride; EIS = Environmental Impact Statement; NEPA = National Environmental Policy Act; ROD = Record of Decision; UF_6 = uranium hexafluoride

34 The NEPA documentation for this activity provides full coverage for activities related to HALEU production except the volume of material processed may be greater.

35 The NEPA documentation for this activity provides full coverage for activities related to HALEU production except the volume of material processed may be greater.

Table B-11. Uranium Deconversion and Fuel Fabrication – BWX Technologies, Inc. Nuclear Operations Group, Lynchburg, Virginia

Activity	Document #	Title	Link
BWXT – HALEU Fuel Fabrication		*BWXT Nuclear Operations Group, Fuel Fabrication*	https://www.nrc.gov/info-finder/fc/bwxt-nuclear-lc.html
	(DOE-ID, 2020) DOE-ID-INL-20-004 R3	*DOE-ID CX Determination, TRISO Fuel Production Capability Rev 3*	https://id.energy.gov/Home/DownloadDocument/3971
	(NRC, 2005b)	*Environmental Assessment Related to the Renewal of NRC License No. SNM-42 for BWXT*	https://www.nrc.gov/docs/ML0534/ML053430248.pdf
	(NRC, 1986) NUREG-1227	*Environmental Assessment for renewal of Materials License No. SNM-778 Babcock and Wilcox Lynchburg Research Center*	https://www.nrc.gov/docs/ML2021/ML20212C435.pdf
	Analysis of NEPA Documentation: Full Coverage – The 2020 CX provides NEPA coverage for transportation of HEU from Y-12 to BWXT and demonstration-scale TRISO fuel production at BWXT. The NRC 2005 EA provides broader NEPA coverage for TRISO fuel production.		

Key: BWXT = BWX Technologies, Inc.; CX = categorical exclusion; DOE = U.S. Department of Energy; EA = Environmental Assessment; HALEU = high-assay low-enriched uranium; HEU = highly enriched uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; TRISO fuel = tri-structural isotropic fuel; Y-12 = Y-12 National Security Complex

Table B-12. HALEU Fuel Fabrication – TRISO-X, Oak Ridge, Tennessee

Activity	Document #	Title	Link
TRISO-X Fuel Fabrication		*TRISO-X, Fuel Fabrication*	https://www.nrc.gov/info-finder/fc/triso-x.html
	(TRISO-X, 2022)	*TRISO-X Environmental Report*	https://www.nrc.gov/docs/ML2226/ML22266A269.html
	Analysis of NEPA Documentation: Planned – License application was submitted to the NRC on April 6, 2022, with an Environmental Report submitted in September 2022. The facility is scheduled for start-up as early as 2025 and would initially produce 8 MTU/yr of TRISO fuel supporting about 16 advanced nuclear reactors, potentially expanding production to 16 MTU/yr by the early 2030s. NEPA document pending.		

Key: HALEU = high-assay low-enriched uranium; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; TRISO fuel = tri-structural isotropic fuel

Table B-13. Uranium Deconversion and Fuel Fabrication – Framatome, Richland, Washington

Activity	Document #	Title	Link
Framatome – HALEU Deconversion and Fuel Fabrication		*Framatome, Fuel Fabrication*	https://www.nrc.gov/info-finder/fc/areva-np-lc.html
	(NRC, 2009b)	*Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1227 for AREVA NP, INC. Richland Fuel Fabrication Facility*	https://www.nrc.gov/docs/ML0907/ML090700258.pdf
	Analysis of NEPA Documentation: No Coverage – The existing NEPA documents cover LEU deconversion and fuel fabrication in Category III facilities. The permit limit for operations is 400 MT of uranium dioxide per year although the maximum throughput for the period 2003 through 2007 was 141 MT (NRC, 2009b). HALEU deconversion and fuel fabrication in Category II facilities would require updating the site ER, a license amendment, and additional NEPA documentation. No information is available on any plans to implement at this facility.		

Key: ER = Environmental Report; HALEU = high-assay low-enriched uranium; LEU = low-enriched uranium; MT = metric tons; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission

Table B-14. Uranium Deconversion and Fuel Fabrication – Global Nuclear Fuel, Wilmington, North Carolina

Activity	Document #	Title	Link
GNF – HALEU Deconversion and Fuel Fabrication		*Global Nuclear Fuel, Fuel Fabrication*	https://www.nrc.gov/info-finder/fc/global-nuc-fuels-america-fuel-fab-lc.html
	(NRC, 2009c)	*Environmental Assessment for the Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1097 for Global Nuclear Fuel–Americas, Wilmington Fuel Fabrication Facility*	https://www.nrc.gov/docs/ML0911/ML091180239.pdf
	Analysis of NEPA Documentation: No Coverage – The existing NEPA documents cover LEU deconversion and fuel fabrication in Category III facilities. Production rates are in the 1,100 to 1,400 MT/yr range (NRC, 2009c). HALEU deconversion and fuel fabrication in Category II facilities would require updating the site ER, a license amendment, and additional NEPA documentation. No information is available on any plans to implement at this facility.		

Key: ER = Environmental Report; GNF = Global Nuclear Fuel; HALEU = high-assay low-enriched uranium; LEU = low-enriched uranium; MT/yr = metric tons per year; NEPA = National Environmental Policy Act

Table B-15. Uranium Deconversion and Fuel Fabrication – Westinghouse Electric Company, Columbia, South Carolina

Activity	Document #	Title	Link
Westinghouse – HALEU Deconversion and Fuel Fabrication		*Westinghouse Electric Company, Fuel Fabrication*	https://www.nrc.gov/info-finder/fc/westinghouse-fuel-fab-fac-sc-lc.html
	(NRC, 2022b) NUREG-2248	*Final Environmental Impact Statement for the License Renewal of the Columbia Fuel Fabrication Facility in Richland County, South Carolina*	https://www.nrc.gov/docs/ML2220/ML22201A131.pdf
	(NRC, 1985) NUREG-1118	*Environmental Assessment for Renewal of Special Material License # SNM-1107*	https://www.nrc.gov/docs/ML1719/ML17191A577.pdf
	Analysis of NEPA Documentation: No Coverage – The existing NEPA documents cover LEU deconversion and fuel fabrication in Category III facilities. The facility has a production capacity of 1,500 MTU/yr with a maximum capacity of 1,600 MTU/yr (NUREG-2248). HALEU deconversion and fuel fabrication in Category II facilities would require updating the site ER, a license amendment, and additional NEPA documentation. No information is available on any plans to implement at this facility.		

Key: ER = Environmental Report; HALEU = high-assay low-enriched uranium; LEU = low-enriched uranium; MTU/yr = metric tons of uranium per year; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission

Table B-16. Spent Nuclear Fuel Storage – Interim Storage Partners, Andrews, Texas

Activity	Document #	Title	Link
Interim Storage Partners – HALEU SNF Storage		*Interim Storage Partners (ISP), Consolidated Interim Storage Facility for SNF*	https://www.nrc.gov/waste/spent-fuel-storage/cis/waste-control-specialist.html
	(NRC, 2021e) NUREG-2239	*Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas*	https://www.nrc.gov/docs/ML2120/ML21209A955.pdf
	Analysis of NEPA Documentation: Full Coverage – On September 17, 2021, the NRC issued a license to ISP for its CISF in Andrews County, Texas. Materials License No. SNM2515 authorized ISP to construct and operate its facility as proposed in its license application, as amended, and to receive, possess, store, and transfer SNF, including a small quantity of mixed-oxide fuel, and GTCC LLW at the Waste Control Specialist CISF. The license authorized ISP to store up to 5,000 MTU (5,500 short tons) of SNF for a license period of 40 years.		

Key: CISF = consolidated interim storage facility; GTCC LLW = Greater-than-Class C low-level radioactive waste; HALEU = high-assay low-enriched uranium; ISF = interim storage facility; ISP = Interim Storage Partners; MT = metric tons; MTU = metric tons of uranium; NRC = U.S. Nuclear Regulatory Commission; SNF = spent nuclear fuel

Table B-17. Spent Nuclear Fuel Storage – Holtec International, Lea County, New Mexico

Activity	*Document #*	*Title*	*Link*
Holtec – HALEU SNF Storage		*Holtec International, Consolidated Interim Storage Facility for SNF*	https://www.nrc.gov/waste/spent-fuel-storage/cis/holtec-international.html
	(NRC, 2022c) NUREG-2237	*Environmental Impact Statement for the Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Lea County, New Mexico*	https://www.nrc.gov/docs/ML2218/ML22181B094.pdf
	Analysis of NEPA Documentation: Full Coverage – On May 9, 2023, the NRC issued a license to Holtec International (Holtec) for a CISF, in Lea County, New Mexico. Materials License No. SNM-2516 authorizes Holtec to receive, possess, store, and transfer spent fuel and associated radioactive materials at the HI-STORE CIS Facility. The NRC prepared a Final EIS as part of its environmental review of the Holtec license application to construct and operate a CISF for SNF and GTCC LLW, along with a small quantity of mixed oxide fuel. The NRC license authorized the initial phase (Phase 1) of the project to store up to 8,680 MTUs (9,568 short tons) in 500 canisters for a license period of 40 years.		

Key: CISF = consolidated interim storage facility; EIS = Environmental Impact Statement; GTCC LLW = Greater-than-Class C low-level radioactive waste; HALEU = high-assay low-enriched uranium; ISF = interim storage facility; MT = metric tons; MTU = metric tons of uranium; NEPA = National Environmental Policy Act; NRC = U.S. Nuclear Regulatory Commission; SNF = spent nuclear fuel

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APPENDIX C – FEDERAL REGISTER NOTICES

List of Figures

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Appendix C Federal Register Notices

C.1 Notice of Intent

DEPARTMENT OF ENERGY

Notice of Intent to Prepare an Environmental Impact Statement for High-Assay Low-Enriched Uranium (HALEU) Availability Program Activities in Support of Commercial Production of HALEU Fuel

AGENCY: Office of Nuclear Energy, Department of Energy.

ACTION: Notice of intent.

SUMMARY: In the Energy Act of 2020, the Secretary of Energy is charged with establishing and carrying out, through the Office of Nuclear Energy, a program to support the availability of uranium enriched to greater than 5 and less than 20 weight percent uranium-235 (U–235) (*i.e.*, high-assay low-enriched uranium [HALEU]), for civilian domestic research, development, demonstration, and commercial use. Consistent with the objectives of, and direction in the Energy Act of 2020, the Department of Energy (DOE) proposes to take actions to establish a temporary domestic demand for HALEU to stimulate a diverse, domestic commercial HALEU supply that could ultimately lead to a competitive HALEU market and a more certain domestic HALEU demand. To this end, DOE intends to prepare an environmental impact statement (EIS) in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations that will analyze the impacts of DOE's Proposed Action to facilitate the domestic commercialization of HALEU production and to acquire HALEU for ultimate commercial use or demonstration projects.

DATES: DOE invites public comment on the scope of the EIS during a 45-day public scoping period commencing on June 5, 2023, and ending on July 20, 2023. DOE will hold webcast scoping meetings on June 21, 2023, at 6:00 p.m. ET, on June 21, 2023, at 8:00 p.m. ET, and on June 21, 2023, at 10:00 p.m. ET. In defining the scope of the EIS, DOE will consider all comments received or postmarked by the end of the scoping period. Comments received or postmarked after the scoping period end date will be considered to the extent practicable.

ADDRESSES: Written comments regarding the scope of the EIS should be sent to Mr. James Lovejoy, DOE EIS Document Manager, by mail to: U.S. Department of Energy, Idaho Operations Office, 1955 Fremont Avenue, MS 1235, Idaho Falls, Idaho 83415; or by email to *HALEU-EIS@nuclear.energy.gov*.

FOR FURTHER INFORMATION CONTACT: Further information including public meeting and registration information is available on the project website, *https://www.energy.gov/ne/haleu-environmental-impact-statement*. All requests for additional information including requests to be placed on the email list for project information should be sent to *HALEU-EIS@nuclear.energy.gov*. For information regarding the HAP or the EIS, contact Mr. James Lovejoy, *lovejojb@id.doe.gov*, (208) 526–4519. For general information on DOE's NEPA process, contact Mr. Jason Anderson, *andersjl@id.doe.gov*, (208) 526–0174.

SUPPLEMENTARY INFORMATION:

Background

DOE has an overall uranium strategy that covers a variety of enriched uranium needs, including civilian and commercial needs supported by the Office of Nuclear Energy and national security, nonproliferation, and defense needs supported by the National Nuclear Security Administration's Defense Programs, Defense Nuclear Nonproliferation, and Naval Reactors programs. Section 2001(a) of the Energy Act of 2020 (42 U.S.C. 16281; 134 Stat. 2453; Pub. L. 116–260 Div Z) charges the Secretary of Energy with establishing and carrying out, through the Office of Nuclear Energy, a program to support the availability of HALEU for civilian domestic research, development, demonstration, and commercial use. HALEU (or "HA–LEU") is defined under the Energy Act of 2020 as "uranium having an assay greater than 5.0 weight percent and less than 20.0 weight percent of the uranium-235 isotope." 42 U.S.C. 16281(d)(4). DOE's activities to implement Section 2001(a), generally referred to as the HALEU Availability Program (HAP), include several elements, such as conducting biennial surveys of industry stakeholders to estimate the amount of HALEU needed for domestic commercial use for the subsequent 5 years; establishing a consortium of entities involved in the nuclear fuel cycle to support the availability of HALEU (including by providing survey information and purchasing HALEU made available by the Secretary for commercial use); and acquiring or providing HALEU from a stockpile of uranium owned by the Department or using enrichment technology to supply members of the consortium with HALEU for commercial use or demonstration projects.

The focus of this NOI and related EIS is DOE's implementation of Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects. The Inflation Reduction Act (section 50173) [Pub. L. 117–169] provided $700 million in support of various HALEU program activities directed in the Energy Act of 2020. From these funds, $500 million is being considered for use in stimulating a diverse commercial supply chain for HALEU. The establishment of this commercial supply of enriched uranium is a key element of DOE's uranium strategy.

The current U.S. commercial power reactor fuel cycle is based on reactor fuel that is enriched to no more than 5 weight percent U–235 (low-enriched uranium [LEU]), but many advanced reactor designs require HALEU, which is enriched to greater than 5 and less than 20 weight percent U–235. Using HALEU fuel allows advanced reactor designers to create smaller reactors that produce more power with less fuel than the current fleet of reactors. HALEU will also allow developers to optimize their systems for longer life cores, increased safety margins, and other increased efficiencies. Although some advanced reactor technologies are currently under development, there is no domestic commercial source of HALEU available to fuel them. The lack of such a source could impede both the demonstration of these technologies being developed and the development of future advanced reactor technologies. Initial sources of uranium to meet the requirements of the HAP could be existing DOE stockpiles of highly enriched uranium (HEU) that would be processed or down-blended into HALEU (*e.g.*, activities conducted outside of the Proposed Action and that are covered by separate existing or pending NEPA documentation). As DOE stockpiles are depleted, production would need to be supplemented by or transition to commercially-operated facilities.

To accelerate development of a sustainable commercial HALEU supply capability, an initial public/private partnership is recommended to address the high-fidelity (high-confidence demand) HALEU market (*e.g.*, fuel for demonstration reactors) plus a percentage of the projected commercial demand for power reactors. The private sector could incrementally expand the capacity in a modular fashion to establish HALEU enrichment and supply that are sufficient to meet future needs as a sustainable market develops.

The development of a commercial HALEU fuel cycle would involve: (1) uranium ore production (*e.g.*, in situ-recovery), (2) conversion of the uranium

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ore into enrichment feed (converting the uranium ore into hexafluoride suitable for enrichment), (3) enrichment to HALEU (in particular, HALEU enriched to at least 19.75 and less than 20 weight percent U–235), (4) deconversion (conversion of the uranium hexafluoride into forms suitable for fuel fabrication), (5) transportation services for HALEU (*e.g.,* from the enrichment site to the deconversion site), and (6) storage capability. The EIS will evaluate implementation of the Proposed Action of facilitating the commercialization of HALEU production and DOE's acquisition of HALEU, including the direct and reasonably foreseeable indirect effects of that acquisition.

Certain activities related to the Proposed Action are regulated by other agencies, including, but not limited to the Nuclear Regulatory Commission (NRC) and the Department of Transportation. DOE expects that permits, license amendments, and/or licenses may be required for activities such as mining/recovery; the operation of a conversion facility; the construction and operation of enrichment facilities, a deconversion facility, and HALEU storage facilities; and HALEU transportation. DOE will coordinate with Agreement States [1] and agencies with regulatory authority, utilize existing and related analyses of other agencies, and incorporate, as appropriate, information to ensure a robust and efficient DOE NEPA analysis, as well as to streamline and inform the process at DOE and with other entities with NEPA responsibilities related to the Proposed Action.

Purpose and Need for Agency Action

One of the aspects of a clean energy future is sustainment and expanded development of safe and affordable nuclear power. One key element of that goal is the availability of fuel to power advanced reactors. DOE is committed to support the development and deployment of the HALEU fuel cycle and to acquire and provide HALEU as authorized by Congress in Section 2001 of the Energy Act of 2020.

Development of innovative technologies, including the next generation of advanced reactors, and advanced fuels, will help ensure that nuclear power continues to bolster America's energy security by providing a source of resilient, carbon-free power in the United States.

There is currently insufficient private incentive to invest in commercial HALEU production due to the current market base. There is also insufficient incentive to invest in the necessary commercial deployment of advanced reactors because the domestic fuel supply chain does not exist. The Energy Act of 2020 aims to stimulate HALEU supply to support the development, demonstration, and deployment of advanced reactors in a manner that establishes a diversity of supply and healthy market forces for the future. This concern is a consistent theme in the industry responses to DOE's *Request for Information Regarding the Establishment of a Program to Support the Availability of High-Assay Low-Enriched Uranium* (the "RFI") (86 FR 71055–71058; December 14, 2021). These responders emphasized the importance of the HALEU consortium that is called for in the Energy Act of 2020 and that DOE established on December 7, 2022 (87 FR 75048). Responders also emphasized the opportunity for DOE to be an agent for stability (both in assuring HALEU availability and market price certainty) during the initial phase of HALEU fuel production.

DOE predicts that by the mid-2020s, approximately 22 metric tons of uranium (MTU) of HALEU will be needed for initial core loadings to support DOE's reactor demonstrations and research reactors that were converted from highly enriched uranium fuel with a high-fidelity HALEU (up to 19.75 weight percent U–235 enrichment) with demand of between 8 and 12 MTU annually for the next 10 years and increasing to over 50 MTU by 2035. Additionally, the Nuclear Energy Institute (NEI) surveyed its utility members that plan to utilize HALEU to identify their estimated annual needs through 2035. This survey estimated industry requirements could be as high as 600 MTU of HALEU at between 10.9 and 19.75 weight percent enriched U–235 per year by 2035.

Both DOE and industry groups have recognized that DOE action is needed to facilitate the development of the infrastructure that would support the availability of HALEU fuel to support both near-term research and demonstration needs and to support the U.S. commercial nuclear industry. DOE and the NEI recognize that the main challenge to establishing a commercial HALEU-based reactor economy is the upfront capital investment of more than $500 million (an NEI estimate and consistent with the Inflation Reduction Act funds appropriated to DOE) required to establish the capability of producing quantities of HALEU suitable for commercial fuel fabrication facilities needed for the various types of HALEU reactors proposed.

Proposed Action

The Proposed Action is to acquire, through procurement from commercial sources, HALEU enriched to at least 19.75 and less than 20 weight percent U–235 over a ten-year period of performance, and to facilitate the establishment of commercial HALEU fuel production. The Proposed Action implements Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects. The Proposed Action would be conducted in a manner that prioritizes social equities and the constructive engagement with disadvantaged communities.

Given the variety of HALEU applications, the initial capability is intended to be flexible and able to accommodate:

- Enrichments of U–235 to greater than 5 and less than 20 weight percent;
- Production of between 5 and 145 MTU of HALEU;
- Modular HALEU fuel cycle facility design concepts to accommodate future growth; and
- Deconversion of uranium hexafluoride to forms suitable for production of a variety of uranium fuels, to include oxides and metal.

The NEPA coverage for the Proposed Action will address a broad range of activities. The EIS will analyze reasonable alternatives and the no action alternative, and address the following activities facilitating the commercialization of HALEU fuel production and acquisition of HALEU:

- Extraction and recovery of uranium ore (from domestic and/or foreign sources);
- Conversion of the uranium ore into uranium hexafluoride;
- Enrichment (possibly in up to three steps)
  - Enrichment to LEU to no more than 5 weight percent U–235,
  - Enrichment to HALEU greater than 5 and less than 10 weight percent U–235, and
  - Enrichment to HALEU from 10 to less than 20 weight percent U–235 in an NRC Category II facility; [2]

[1] An Agreement State is a State that has entered into an agreement with the NRC that gives the State the authority to license and inspect byproduct, source, or special nuclear materials used or possessed within their borders.

[2] NRC classifies special nuclear materials (SNM) and the facilities that possess them into three categories based upon the materials' potential for use in nuclear weapons, or their "strategic significance." The NRC's physical security requirements differ by category, from least stringent

- Deconversion of the uranium hexafluoride to uranium oxide, metal, and potentially other forms in an NRC Category II facility;
- Storage in an NRC Category II facility;
- DOE acquisition of HALEU; and
- Transportation of uranium/HALEU between facilities.

In addition to the activities above, there are several reasonably foreseeable activities that could result from implementation of the Proposed Action. They include:

- Fuel fabrication for a variety of fuel types in an NRC Category II facility;
- Reactor (demonstration and test, power, isotope production) operation; and
- Spent fuel storage and disposition.

While not specifically a part of the Proposed Action, the impacts from these reasonably foreseeable activities would be acknowledged and addressed to the extent practicable.

Potential Environmental Issues for Analysis

DOE proposes to address the issues listed in this section when considering the potential impacts of the Proposed Action:

- Potential effects on public health from exposure to radionuclides under routine and credible accident scenarios, such as natural disasters (floods, hurricanes, tornadoes, and seismic events).
- Potential impacts on surface and groundwater, floodplains and wetlands, and on water use and quality.
- Potential impacts on air quality (including climate change) and noise.
- Potential impacts on plants, animals, and their habitats, including species that are Federal- or state-listed as threatened or endangered, or of special concern.
- Potential impacts on geology and soils.
- Potential impacts on cultural and historic resources.
- Socioeconomic impacts on potentially affected communities.
- Potential disproportionately high and adverse effects on minority and low-income populations.
- Potential impacts on land-use plans, policies and controls, and visual resources.
- Potential impacts on waste management practices and activities.
- Potential impacts from the transportation of HALEU-related radioactive materials.
- Potential impacts of intentional destructive acts, including sabotage and terrorism.
- Unavoidable adverse impacts and irreversible and irretrievable commitments of resources.
- Potential cumulative environmental effects of past, present, and reasonably foreseeable future actions.
- Compliance with all applicable Federal, state, and local statutes and regulations, and with international agreements, and required Federal and state environmental permits, consultations, and notifications.

Public Scoping Process

NEPA implementing regulations require an early and open process for determining the scope of an EIS and for identifying the significant issues related to a proposed action. To ensure that a full range of issues related to the Proposed Action are addressed, DOE invites Federal agencies, state, local, and tribal governments, the general public, and the commercial community to comment on the scope of the EIS. Specifically, DOE invites comment on the identification of reasonable alternatives and information and analyses relevant to the Proposed Action and specific environmental issues to be addressed. Analysis of written and oral public comments provided during the scoping period will help DOE further identify concerns and potential issues to be considered in the Draft EIS.

Virtual Scoping Meeting Information

DOE will host three interactive webcasts during the scoping period as listed under the **DATES** section. The purpose of the webcasts is two-fold: the first is to provide the public with information about the NEPA process and the Proposed Action and the second is to invite public comments on the scope of the EIS.

The webcasts will begin with presentations on the NEPA process and the Proposed Action. Following the presentations, there will be a moderated session during which members of the public can provide oral comments on the scope of the EIS. Commenters will be allowed 3 minutes to provide comments. Comments will be recorded.

DOE recommends that members of the public who would like to provide oral comments pre-register for the virtual scoping meetings. Although pre-registration is not required, pre-registered attendees will have prioritized oral comments in the limited 50-minute comment period. Those who attend as a guest will also be able to provide comments but will be added to the end of the comment queue during the meeting. In addition to prioritized comments, advanced registration will allow attendees to receive meeting reminders about their registered event(s). Upon registration, an email containing a unique link to join the meeting will be provided. All links to pre-register for the event will close at noon (ET), June 21, 2023. Parties interested in attending as a guest will not receive email reminders on their chosen event, but the links to attend as a guest will remain open until the meeting concludes. To obtain additional information, meeting links, and audio-only call-in options, please visit *https://www.energy.gov/ne/haleu-environmental-impact-statement*. Written comments will be accepted by mail and email at the addresses identified in the **ADDRESSES** section.

Projected EIS Schedule

DOE expects to announce the availability of the Draft EIS in the **Federal Register** by the end of 2023. This will initiate the public comment period on the Draft EIS during which DOE will hold public hearings. DOE will consider all comments on the Draft EIS received during the public comment period (and to the extent practicable, comments received or postmarked after the public comment period end date) in developing the Final EIS. Availability of the Final EIS is planned to be announced in the **Federal Register** in mid-2024. Publication of the Record of Decision (ROD) will follow no sooner than 30 days after publication of the Final EIS.

Signing Authority

This document of the Department of Energy was signed on May 24, 2023, by Dr. Kathryn Huff, Assistant Secretary for Nuclear Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by the Department of Energy. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned Department of Energy Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This

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for Category III facilities to most stringent for Category I facilities. NRC Category III Facility (low strategic significance), includes facilities containing uranium at enrichments of less than 10 weight percent U–235. NRC Category II Facility (moderate strategic significance), include facilities containing uranium at enrichments from 10 weight percent to less than 20 weight percent U–235. NRC Category I Facility (strategic special nuclear material), include facilities containing uranium at enrichments equal to or greater than 20 weight percent U–235.

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administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on May 31, 2023.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

[FR Doc. 2023–11877 Filed 6–2–23; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings

Take notice that the Commission has received the following Natural Gas & Oil Pipeline Rate and Refund Report filings:

Filings Instituting Proceedings

Docket Numbers: PR23–53–000.
Applicants: Public Service Company of Colorado.
Description: § 284.123(g) Rate Filing: Gas Statement of Rates_5.1.23 to be effective 5/1/2023.
Filed Date: 5/26/23.
Accession Number: 20230526–5183.
Comment Date: 5 p.m. ET 6/16/23.
284.123(g) Protest: 5 p.m. ET 7/25/23.

Docket Numbers: PR23–54–000.
Applicants: Louisville Gas and Electric Company.
Description: § 284.123(g) Rate Filing: Revised Statement of Operating Conditions Exhibit A Statement of Rates to be effective 5/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5023.
Comment Date: 5 p.m. ET 6/20/23.
284.123(g) Protest: 5 p.m. ET 7/31/23.

Docket Numbers: RP23–794–000.
Applicants: Elba Express Company, L.L.C.
Description: Compliance filing: Annual Cashout True-Up 2023 to be effective N/A.
Filed Date: 5/26/23.
Accession Number: 20230526–5182.
Comment Date: 5 p.m. ET 6/7/23.

Docket Numbers: RP23–795–000.
Applicants: Colorado Interstate Gas Company, L.L.C.
Description: § 4(d) Rate Filing: CIG Qtly LUF Filing May 2023 to be effective 7/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5050.
Comment Date: 5 p.m. ET 6/12/23.

Docket Numbers: RP23–796–000.
Applicants: TransColorado Gas Transmission Company LLC.
Description: § 4(d) Rate Filing: TC Quarterly FL&U Update May 2023 to be effective 7/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5116.
Comment Date: 5 p.m. ET 6/12/23.

Any person desiring to intervene or protest in any of the above proceedings must file in accordance with Rules 211 and 214 of the Commission's Regulations (18 CFR 385.211 and 385.214) on or before 5:00 p.m. Eastern time on the specified comment date. Protests may be considered, but intervention is necessary to become a party to the proceeding.

Filings in Existing Proceedings

Docket Numbers: RP23–241–002.
Applicants: Sea Robin Pipeline Company, LLC.
Description: Compliance filing: Motion Revised & Cancelled Tariff Records RP23–241–000 to be effective 6/1/2023.
Filed Date: 5/30/23.
Accession Number: 20230530–5106.
Comment Date: 5 p.m. ET 6/12/23.

Any person desiring to protest in any the above proceedings must file in accordance with Rule 211 of the Commission's Regulations (18 CFR 385.211) on or before 5:00 p.m. Eastern time on the specified comment date.

The filings are accessible in the Commission's eLibrary system (*https://elibrary.ferc.gov/idmws/search/fercgensearch.asp*) by querying the docket number.

eFiling is encouraged. More detailed information relating to filing requirements, interventions, protests, service, and qualifying facilities filings can be found at: *http://www.ferc.gov/docs-filing/efiling/filing-req.pdf.* For other information, call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Dated: May 30, 2023.

Debbie-Anne A. Reese,

Deputy Secretary.

[FR Doc. 2023–11886 Filed 6–2–23; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings #1

Take notice that the Commission received the following electric corporate filings:

Docket Numbers: EC23–90–000.
Applicants: Three Corners Solar, LLC, Three Corners Prime Tenant, LLC.
Description: Joint Application for Authorization Under Section 203 of the Federal Power Act of Three Corners Solar, LLC, et al.
Filed Date: 5/26/23.
Accession Number: 20230526–5253.
Comment Date: 5 p.m. ET 6/16/23.

Docket Numbers: EC23–91–000.
Applicants: Entergy Louisiana, LLC.
Description: Application for Authorization Under Section 203 of the Federal Power Act of Entergy Louisiana, LLC.
Filed Date: 5/26/23.
Accession Number: 20230526–5258.
Comment Date: 5 p.m. ET 6/16/23.

Take notice that the Commission received the following Complaints and Compliance filings in EL Dockets:

Docket Numbers: EL23–72–000.
Applicants: Payton Solar, LLC v. *PJM Interconnection, L.L.C.,* et al.
Description: Complaint of Payton Solar, LLC v. PJM Interconnection, L.L.C. et al.
Filed Date: 5/18/23.
Accession Number: 20230518–5229.
Comment Date: 5 p.m. ET 6/7/23.

Take notice that the Commission received the following electric rate filings:

Docket Numbers: ER22–424–002.
Applicants: Assembly Solar III, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–424 to be effective 2/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5018.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–1136–002.
Applicants: Sac County Wind, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–1136 to be effective 5/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5008.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–1610–003.
Applicants: Big River Solar, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–1610 to be effective 9/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5007.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–1815–002.
Applicants: Mulligan Solar, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–1815 to be effective 8/1/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5005.
Comment Date: 5 p.m. ET 6/20/23.

Docket Numbers: ER22–2385–003.
Applicants: Panorama Wind, LLC.
Description: Compliance filing: Compliance Filing Under Docket ER22–2385 to be effective 7/16/2022.
Filed Date: 5/30/23.
Accession Number: 20230530–5006.
Comment Date: 5 p.m. ET 6/20/23.

C.2 Notice of Availability

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activities, the SAB Staff Office will consider two additional criteria for each new activity: absence of financial conflicts of interest and absence of an appearance of a loss of impartiality.

How to Submit Nominations: Any interested person or organization may nominate qualified persons to be considered for appointment to these advisory

committees. Individuals may self-nominate. Nominations should be submitted in electronic format (preferred) using the online nomination form under the heading "Committees, Panels, and Membership" at the bottom of the SAB home page at *https://sab.epa.gov*. To be considered, all nominations should include the information requested below. EPA values and welcomes diversity. All qualified candidates are encouraged to apply regardless of gender, race, disability, or ethnicity.

The following information should be provided on the nomination form: contact information for the person making the nomination; contact information for the nominee; the disciplinary and specific areas of expertise of the nominee; the nominee's *curriculum vitae;* and a biographical sketch of the nominee indicating current position, educational background; research activities; sources of research funding for the last two years; and recent service on other national advisory committees or national professional organizations. To help the agency evaluate the effectiveness of its outreach efforts, please indicate how you learned of this nomination opportunity. Persons having questions about the nomination process or the public comment process described below, or those who are unable to submit nominations through the SAB website, should contact the DFO, as identified above. The DFO will acknowledge receipt of nominations and in that acknowledgment, will invite the nominee to provide any additional information that the nominee feels would be useful in considering the nomination, such as availability to participate as a member of the committee; how the nominee's background, skills, and experience would contribute to the diversity of the committee; and any questions the nominee has regarding membership. The names and biosketches of qualified nominees identified by respondents to this **Federal Register** notice, and any additional experts identified by the SAB Staff Office, will be posted in a List of Candidates on the SAB website at *https://sab.epa.gov*. Public comments on each List of Candidates will be accepted for 21 days from the date the list is posted. The public will be requested to provide relevant information or other documentation on nominees that the SAB Staff Office should consider in evaluating candidates.

Candidates invited to serve will be asked to submit the "Confidential Financial Disclosure Form for Special Government Employees Serving on Federal Advisory Committees at the U.S. Environmental Protection Agency" (EPA Form 3110–48). This confidential form allows EPA to determine whether there is a statutory conflict between that person's public responsibilities as a Special Government Employee and private interests and activities, or the appearance of a loss of impartiality, as defined by Federal regulation. The form may be viewed and downloaded through the "Ethics Requirements for Advisors" link on the SAB home page at *https://sab.epa.gov*. This form should not be submitted as part of a nomination.

V Khanna Johnston,

Deputy Director, Science Advisory Board Staff Office.

[FR Doc. 2024–04941 Filed 3–7–24; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL OP–OFA–114]

Environmental Impact Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information 202–564–5632 or *https://www.epa.gov/nepa*.

Weekly receipt of Environmental Impact Statements (EIS)

Filed February 26, 2024 10 a.m. EST Through March 4, 2024 10 a.m. EST

Pursuant to 40 CFR 1506.9.

Notice

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/search*.

EIS No. 20240037, Draft, DOE, NAT, Department of Energy Activities in Support of Commercial Production of High-Assay Low-Enriched Uranium (HALEU), Comment Period Ends: 04/22/2024, Contact: James Lovejoy 208–526–6805.

EIS No. 20240038, Draft, BLM, USFS, UT, Bears Ears National Monument Draft Resource Management Plan, Comment Period Ends: 06/11/2024, Contact: Jill Stephenson 435–259–2141.

EIS No. 20240039, Final Supplement, BR, CO, Near-term Colorado River Operations Final Supplemental EIS, Review Period Ends: 04/08/2024, Contact: Genevieve Johnson 702–293–8054.

Dated: March 5, 2024.

Cindy S. Barger,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2024–04957 Filed 3–7–24; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–11586–01–OW]

Deepwater Horizon Natural Resource Damage Assessment Florida Trustee Implementation Group Draft Restoration Plan 3 and Environmental Assessment: Water Quality

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability; request for public comments.

SUMMARY: The Deepwater Horizon natural resource Trustees for the Florida Trustee Implementation Group have prepared the Draft Restoration Plan 3 and Environmental Assessment: Water Quality. The Draft RP3/EA proposes alternatives to help restore water quality impacted by the DWH oil spill. The Draft RP3/EA evaluates a reasonable range of thirteen project alternatives under the Oil Pollution Act, including criteria set forth in the OPA natural resource damage assessment regulations, and the National Environmental Policy Act and its implementing regulations. A no action alternative is also evaluated pursuant to the NEPA. The total estimated cost to implement the Florida TIG's eleven preferred alternatives is approximately $111.5 million. The Florida TIG invites the public to comment on the Draft RP3/EA.

DATES: The Florida TIG will consider public comments on the Draft RP3/EA received on or before April 8, 2024.

Public Webinar: The Florida TIG will host a public webinar on March 27, 2024, at 3 p.m. Eastern Time/2 p.m. Central Time to facilitate public review and comment on the Draft RP3/EA. The public may register for the webinar at *https://attendee.gotowebinar.com/register/8172353705750284118*. After registering, participants will receive a confirmation email with instructions for joining the webinar and how to make comments during the webinar. Shortly after the webinar concludes, the presentation material will be posted on the web at *https://www.gulfspillrestoration.noaa.gov/restoration-areas/florida*.

ADDRESSES: *Obtaining Documents:* You may view and download the Draft RP3/EA at *https://www.gulfspillrestoration.noaa.gov/restoration-areas/florida*. You may also request a flash drive containing the Draft RP3/EA (see **FOR FURTHER INFORMATION CONTACT**).

Submitting Comments: You may submit comments on the Draft RP3/EA by any of the following methods:

- *Website: https://parkplanning.nps.gov/FLTIGRP3*. Follow the online instructions for submitting comments.
- *Mail:* U.S. Fish and Wildlife Service Gulf Restoration Office, 1875 Century Blvd., Atlanta, GA 30345. To be considered, mailed comments must be postmarked on or before the comment deadline given in **DATES**.
- *Public Webinar:* The public may submit comments during the webinar. Webinar information is provided in **DATES**.

Instructions: Once submitted, comments cannot be edited or withdrawn. The Florida TIG may publish any comment received regarding the document. Do not submit electronically any information you consider to be Confidential Business Information or other information whose disclosure is restricted by statute. Please be aware that your entire comment, including your personal identifying information, will become part of the public record.

FOR FURTHER INFORMATION CONTACT:

Sarah Ketron; Florida Department of Environmental Protection; 850–245–2167; *Sarah.Ketron@FloridaDEP.gov*.

Tripp Boone; Environmental Protection Agency; 228–209–7555; *Boone.Tripp@epa.gov*.

SUPPLEMENTARY INFORMATION:

Introduction

On April 20, 2010, the mobile offshore drilling unit Deepwater Horizon, which was drilling a well for BP Exploration and Production, Inc., experienced a significant explosion, fire and subsequent sinking in the Gulf of Mexico, resulting in the release of millions of barrels of oil and other discharges into the Gulf. Under the authority of the OPA, designated Federal and State Trustees, acting on behalf of the public, assessed the injuries to natural resources and prepared the Deepwater Horizon Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement, and the Record of Decision for the Deepwater Horizon Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement, which sets forth the governance structure and process for DWH restoration planning under the OPA NRDA regulations. On April 4, 2016, the United States District Court for the Eastern District of Louisiana entered a Consent Decree resolving civil claims by the Trustees against BP.

The Florida TIG, which is composed of the State of Florida Department of Environmental Protection and the Fish and Wildlife Conservation Commission, the Environmental Protection Agency, the U.S. Department of the Interior, the National Oceanic and Atmospheric Administration, and the U.S. Department of Agriculture, selects and implements restoration projects under the TIG's management authority in accordance with the Consent Decree. The Final PDARP/PEIS, ROD, Consent Decree, and information on the DWH Trustees can be found at *https://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan*.

Background

On November 7, 2022, the Florida TIG issued a notice of solicitation on the Gulf Spill Restoration website requesting project ideas for the Water Quality Restoration Type as described in the Final PDARP/PEIS. On August 7, 2023, the TIG announced on the Gulf Spill Restoration website that they reviewed project idea submissions and initiated drafting the RP3/EA which tiers from the Final PDARP/PEIS and would include a reasonable range of restoration project alternatives for the Water Quality Restoration Type.

Overview of the Florida TIG Draft RP3/EA

In the Draft RP3/EA, the Florida TIG analyzes a reasonable range of thirteen project alternatives and, pursuant to the NEPA, a no action alternative. Two of the alternatives analyzed are not preferred by the TIG at this time. Funding to implement any of the alternatives ultimately selected by the Florida TIG would come from the Water Quality Restoration Type Allocation. The reasonable range of project alternatives evaluated by the TIG are listed below:

1. Pensacola and Perdido Watersheds Microbial Source Tracking (Planning);
2. Pensacola Bay Unpaved Roads Initiative Phase 2 (Planning);
3. Carpenter Creek Hydrologic Restoration and Stormwater Improvements;
4. Hollice T. Williams Stormwater Park;
5. Gulf Breeze Septic to Sewer Conversion;
6. Santa Rosa County Septic to Sewer Conversion;
7. Choctawhatchee Bay Unpaved Roads Initiative;
8. Telogia Creek Watershed Water Quality Improvements;
9. Lower Suwannee National Wildlife Refuge Hydrologic Restoration Phase 2 (Planning);
10. Bond Farm Hydrologic Enhancement Impoundment;
11. Bond Farm Hydrologic Enhancement Southwest Discharge Structure (Planning);
12. Swift Creek Hydrologic Restoration (Non-preferred); and
13. Springfield Stream and Wetland Enhancement (Non-preferred).

The total estimated cost to implement the eleven preferred alternatives is approximately $111.5 million.

Next Steps

After the public comment period ends, the Florida TIG will consider and address all substantive comments received before making a final decision on which, if any, alternatives to fund and implement. A Final RP3/EA and finding of no significant impact, as appropriate, identifying the selected alternatives will be made publicly available.

Administrative Record

The Administrative Record for the Draft RP3/EA can be viewed electronically at *https://www.doi.gov/deepwaterhorizon/adminrecord* under the folder 6.5.4.2.

Authority

The authority for this action is the Oil Pollution Act of 1990 (33 U.S.C. 2701 *et seq.*), its implementing NRDA regulations found at 15 CFR part 990, and the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), its implementing regulations found at 40 CFR parts 1500–1508.

Benita Best-Wong,

Deputy Assistant Administrator.

[FR Doc. 2024–04727 Filed 3–7–24; 8:45 am]

BILLING CODE 6560–50–P

APPENDIX D – CONTRACTOR DISCLOSURE STATEMENTS

List of Figures

No figures are presented in this appendix.

List of Tables

No tables are presented in this appendix.

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Appendix D Contractor Disclosure Statements

D.1 PHE Statement

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF A ENVIRONMENTAL IMPACT STATEMENT FOR DEPARTMENT OF ENERGY ACTIVITIES IN SUPPORT OF COMMERICAL PRODUCTION OF HIGH-ASSAY LOW-ENRICHED URANIUM

CEQ regulations at 40 CFR 1506.5(c), which have been adopted by DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term “financial interest or other interest in the outcome of the project,” for the purposes of this disclosure, is defined in the March 23, 1981 guidance “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations,” 46 FR 18026- 18038 at Question 17a and b.

“Financial or other interest in the outcome of the project ‘includes’ any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm’s other clients),” 46 FR 18026- 18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (a) or (b) to assure consideration of your proposal)

(a) X______ Offeror and any proposed subcontractor have no financial interest in the outcome of the project.

(b) _______ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interests:

1
2
3

Certified by:

Signature

Frederick J. Carey,
P.E. President

Potomac-Hudson Engineering, Inc.

Date: October 4, 2024

D.2 Leidos Statement

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF A ENVIRONMENTAL IMPACT STATEMENT FOR DEPARTMENT OF ENERGY ACTIVITIES IN SUPPORT OF COMMERICAL PRODUCTION OF HIGH-ASSAY LOW-ENRICHED URANIUM

CEQ regulations at 40 CFR 1506.5(c), which have been adopted by DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project," for the purposes of this disclosure, is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026- 18038 at Question 17a and b.

"Financial or other interest in the outcome of the project 'includes' any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)," 46 FR 18026- 18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (a) or (b) to assure consideration of your proposal)

(a) X________ Offeror and any proposed subcontractor have no financial interest in the outcome of the project.

(b) _________ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of
such interest prior to award of this contract.

Financial or Other Interests:

1.
2.
3.

Certified by:

Signature

Christine Borley / Contract Manager / Leidos
Name / Title / Company

October 4, 2024
Date