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- **RAI #7 NUREG 1748 - Please review Pages 3-3 thru 3-7 of the NUREG to better understand the types of additional information that are useful for the development an EA for a simple licensing action. Other sections of NUREG 1748 should provide further useful discussion and explanations of useful/needed information.**

Response: See attached information formatted as stated within NUREG-1748. Majority of this information has been pulled from the Decommissioning Plan provided to the NRC by letter ACO 17-0015, dated March 1, 2017. Other references are noted where needed.

I. Introduction

As stated within ACO 17-0015 dated March 1, 2017, Section I of DP-2605-0001, *Decommissioning Plan for the American Centrifuge Lead Cascade Facility* (Decommissioning Plan): American Centrifuge Operating, LLC (ACO) is the Licensee for the American Centrifuge Lead Cascade Facility (Lead Cascade) U.S. Nuclear Regulatory Commission (NRC) Materials License (SNM-7003) to possess and use special nuclear, source, and by-product material. ACO is a wholly-owned indirect subsidiary of Centrus Energy Corp. (Centrus), formally named USEC Inc.

The Lead Cascade is located on the DOE reservation, known as the Portsmouth Gaseous Diffusion Plant (PORTS). The reservation is located on approximately 3,708 acres of federally owned land near Piketon, Pike County, Ohio.

As stated within Section 1.1.1 of the License Application, the Lead Cascade facilities (footprint) include the X-3001 Process Building, which houses up to 240 operating centrifuge machines, associated process piping, instrumentation and controls, computer systems, and auxiliary support equipment. The facilities also include the X-3012 Process Support Building to provide oversight and control of the equipment in the cascade. The X-7726 Centrifuge Training and Test Facility provides areas to receive and test centrifuge components, and to assemble and repair the centrifuges. A transporter moves centrifuge machines between the X-7726 facility and X-3001 building through the covered X-7727H Transfer Corridor. The X-3012 building also provides offices, lockers, change rooms, and break rooms. A portion of the X-7725 Recycle/Assembly Building provides similar administrative facilities, buffer storage area for storage, handling, and assembly of centrifuge components and storage and handling of completed centrifuge machines, as well as training rooms, and the storage and maintenance areas for the transporter. PORTS facilities that provide support to the Lead Cascade Facility include the XT-847 Waste Management Staging Facility and the X-710 Technical Services Building.

As stated within ACO 17-0015 dated March 1, 2017, Section I of the Decommissioning Plan: Construction and operation of the prototype Lead Cascade occurred in several steps as various models and configurations of centrifuges were tested with the most recent being a demonstration cascade of 120 AC100 centrifuges. However, in 2016, after successfully testing the Lead Cascade, DOE discontinued funding of the Lead Cascade and Centrus announced (ACO 16-0010) that the Lead Cascade would be shut down and the NRC Materials License (SNM-7003) for the Lead Cascade terminated. Since the NRC Materials License (SNM-2011) for the ACP is not currently being fully implemented, classified and/or contaminated equipment must be removed from the facilities in which the Lead Cascade was operating in order to terminate the NRC Materials License (SNM-7003) for the Lead Cascade. Centrus has not yet made a decision with respect to termination of the NRC Materials License (SNM-2011) for the ACP or the GCEP Lease.

On December 6, 2016 (ACO 16-0046), ACO informed the NRC of Centrus Energy Corp.'s intended actions for the shipment of American Centrifuge Program classified matter and/or contaminated waste. American Centrifuge Program activities in Piketon, Ohio, are conducted pursuant to the NRC Materials License (SNM-7003). On December 20, 2016 (ACO 16-0053)

and supplemental information provided on February 23, 2017 (ACO 17-0014), ACO submitted proposed changes to NR-3605-0010, *Transportation Security Plan for Classified Matter Shipments for the American Centrifuge Plan*, for NRC's review and approval. These proposed changes incorporated packaging closure and securement features, as well as, incorporated the use of the NRC's acceptable method for monitoring shipments. On January 13, 2017 (ACO 17-0008), ACO requested approval of the permanent burial site for the American Centrifuge Program's classified waste as approved by the U.S. Department of Energy (DOE) on November 9, 2016. Upon NRC approval of the Transportation Security Plan and permanent burial site, the classified matter and/or contaminated waste shipments will be performed in accordance with the Lead Cascade License Application and applicable NRC and U.S. Department of Transportation (DOT) regulations.

As stated within ACO 17-0015 dated March 1, 2017, Section VIII.e of the Decommissioning Plan: The Licensee is confident that activities related to dismantling, decontamination, packaging, and shipment can be accomplished within the bounds of the License Application. Changes to current activities or procedures are evaluated using 10 CFR 70.72 to determine if prior NRC approval is required.

The Licensee is confident that decommissioning activities will be completed well within the timeframes outlined within 10 CFR 70.38(h) (i.e., within 24 months after NRC approval of this Decommissioning Plan). Should these circumstances change at any time during the decommissioning efforts, the Licensee will provide the appropriate notification to the NRC in accordance with 10 CFR 70.38(f).

Approximately 315 shipments are anticipated for this decommissioning project and are anticipated to be completed prior to the final license termination which is expected during 2018.

II. Proposed Action

The proposed action is to successfully package and ship classified matter and/or contaminated waste during the Lead Cascade decommissioning efforts in Piketon, Ohio without undue risk to the health and safety of the public and with no significant impact to the environment. In order to maintain compliance with the Licensee's commitments and applicable regulations, there are no alternatives to this proposed action.

As stated within LA-2605-0002, *Environmental Report for the American Centrifuge Lead Cascade Facility*, the reservation is served by southern Ohio's two major highways: U.S. Route 23 and Ohio SR 32. These highways are one and one half miles west of the site and two miles north of the site, respectively. The site is 3.5 miles from the intersection of the U.S. Route 23 and Ohio SR 32 interchange. Both routes are four lanes with U.S. Route 23 traversing north-south and Ohio SR 32 traversing east-west. Approximately 70 miles north of the site, U.S. Route 23 intersects I-270, I-70, and I-71. Traffic may access I-64 approximately 20 miles southeast of Portsmouth, Ohio.

Lead Cascade decommissioning waste will be transported by authorized ground commercial carriers primarily using state highways traveling from Ohio to the destination on well-established routes used by other authorized shippers. Load limits on these routes is controlled by the *Code of Federal Regulations*, Title 49, *Transportation*, at a gross weight of 80,000 pounds. Approximately 315 shipments are anticipated for this decommissioning project and are anticipated to be completed prior to the final license termination which is expected during 2018.

As stated within ACO 17-0015 dated March 1, 2017, Section VIII.e of the Decommissioning Plan: The Licensee is confident that decommissioning activities will be completed well within the timeframes outlined within 10 CFR 70.38(h) (i.e., within 24 months after NRC approval of this Decommissioning Plan). Should these circumstances change at any time during the decommissioning efforts, the Licensee will provide the appropriate notification to the NRC in accordance with 10 CFR 70.38(f).

As stated within ACO 17-0015 dated March 1, 2017, Section XII.a of the Decommissioning Plan: Classified and unclassified, low-level contaminated waste is anticipated to be shipped to the Department of Energy's (DOE) Nevada National Security Site (NNSS) in North Las Vegas, NV.

As stated within ACO 17-0015 dated March 1, 2017, Section VIII.b of the Decommissioning Plan: Lead Cascade decommissioning will be jointly performed by the Licensee (American Centrifuge Operating, LLC [ACO]) and an NNSS-approved waste contractor for package certification and shipment of classified and/or contaminated material. ACO has selected EnergySolutions, LLC (EnergySolutions) to fill this role. ACO will remove and package wastes for disposal in compliance with approved procedures, applicable laws, and regulations. The NNSS-approved contractor will certify that the waste is packaged in accordance with the NNSS Waste Acceptance Criteria (WAC). ACO and EnergySolutions will ensure packaged waste is shipped in accordance with a NRC-approved transportation security plan.

A limited amount of the generated waste will be Low-Level Mixed Waste (LLMW) and as such will require special treatment (macro encapsulation) before burial at NNSS. ACO intends to contract EnergySolutions to perform this special treatment. This facility holds a DOE possessing facility clearance and the associated site security plan protects classified material sent to the site by various generators throughout the DOE complex. This LLMW will be shipped from Piketon, Ohio, to Oak Ridge, Tennessee, for treatment, repackaged in accordance with EnergySolutions procedures, and then continue shipment to NNSS for permanent burial.

III. Need for the Proposed Action

On February 19, 2016, the Licensee made the decision to permanently cease operation at the Lead Cascade and to terminate the NRC Materials License (SNM-7003) following decontamination and decommissioning activities. The overall decommissioning scope for the Lead Cascade is to remove radiological and/or classified material in order to terminate the NRC Materials License (SNM-7003) and to turnover the buildings and facility infrastructure to the DOE for unrestricted use as required by the Gas Centrifuge Enrichment Plant (GCEP) Lease.

During the initial lease of facilities in 2004, as part of standard practice, a review of existing DOE information related to the radiological condition of each facility (and also review for other potential concerns, such as hazardous chemicals) and baseline surveys were performed to ensure contamination levels did not exceed 10 CFR Part 835, Appendix D contamination limits (1,000 dpm/100 cm² removable and 5,000 dpm/100 cm² total). These baseline surveys will assist the Licensee in the turnover back to the DOE, as described in the GCEP Lease.

Classified and/or contaminated equipment removed from the Lead Cascade prior to terminating the NRC Materials License (SNM-7003) for the Lead Cascade has been approved by DOE for disposal at the NNS (Reference ACO 17-0008 dated January 13, 2017), a DOE restricted access reservation.

As part of the Lead Cascade decommissioning efforts, contaminated and/or classified material are required to be disposed of in accordance with approved plans. From a project standpoint, removal of this material is divided into three groups for convenience. These groups are centrifuges, service modules, and the balance of plant equipment. With a few exceptions, the disposal of classified and/or contaminated material will be executed in a fashion similar to the GCEP Cleanup project that transpired in the 2004 time frame.

The centrifuges are stored inside the X-3001 and X-7725 buildings leased by ACO under the GCEP Lease. The X-7727H corridor is an area that provides an enclosed throughway from the X-7725 building or X-7726 facility to the X-3001 building. Currently approved ACO procedures will be used to transfer these centrifuges to the X-7726 facility for disassembly and prepare them for packaging. These currently approved procedures also provide guidance for tracking configuration changes, staging subcomponents for eventual packaging, and security controls required during each phase of this activity.

As stated in ACO 16-0053 dated December 20, 2016, as currently authorized, assembled centrifuge machines, and B-25 and Intermodal Freight Transport (IFT) containers are handled and packaged within security areas in accordance with approved Security Program/Plan requirements prior to preparation for shipment off-site.

Service modules currently located inside the X-3001 building will be partially disassembled to reduce the weight of the unit. Components to be removed from the service module include centrifuge control components and other electrical equipment, ventilation ductwork, as well as Machine Isolation Valves (MIV). The remainder of the service module will be sectionalized to facilitate packaging in IFT or B-25 containers. Access control measures in the X-3001 building during decommissioning of the Lead Cascade are established in NRC-approved NR-3605-0004, *Security Program for the American Centrifuge Plant*, and Security Plan SP-3605-0033, *Classified Material Storage Within The X-3001 Process Building*.

The balance of classified and/or contaminated equipment (centrifuge support systems, spare components, computer network equipment, and miscellaneous materials) will be placed in B-25 or IFT containers. This equipment may be disassembled and/or physically destroyed to reduce the size and volume in order to fit into the shipping container.

In accordance with currently approved operating procedures, 12B cylinders used at the Lead Cascade are being transferred to an authorized receiving entity within the DOE reservation in Piketon, Ohio.

As stated within ACO 17-0015 dated March 1, 2017, Section VIII.e of the Decommissioning Plan: The Licensee is confident that decommissioning activities will be completed well within the timeframes outlined within 10 CFR 70.38(h) (i.e., within 24 months after NRC approval of this Decommissioning Plan). Should these circumstances change at any time during the decommissioning efforts, the Licensee will provide the appropriate notification to the NRC in accordance with 10 CFR 70.38(f).

IV. Environmental Impacts of the Proposed Action

As stated within ACO 17-0015 dated March 1, 2017, Appendix C of the Environmental Report (LA-2605-0002): The general approach to disposition of material located within the Lead Cascade footprint will be to dispose of the material as classified matter and/or contaminated waste in accordance with approved Security Program/Plans. The disposal site is approved by the cognizant security agency for permanent burial. This approach is being taken to minimize personnel exposure during dismantling of equipment, reduce the security risk associated with disposal of equipment, and maintain decommissioning costs as low as practical.

Section III.a of the Decommissioning Plan provides more details related to the site location and description in relation to the environmental aspects surrounding the Lead Cascade.

Infrastructure

As discussed in Section I of the Decommissioning Plan: The footprint of the Lead Cascade is located within a highly developed industrial DOE reservation that has been subject to extensive environmental characterizations. Chapter 3.0 of the Environmental Report (NR-2605-0002) describes the various resources present on and around the DOE reservation as a baseline for the incremental impacts of the Lead Cascade.

A full description of the facility and process description is discussed within Section 1.1 of the License Application. Additionally, Section 1.2.4 of the License Application describes the authorized uses at the Lead Cascade.

Land Use

As discussed within Section 4.2.3 of the Environmental Report, the DOE reservation currently and historically has been used for industrial purposes and since the mid 1950s has been used for uranium enrichment and other nuclear activities. Existing facilities used for previous uranium enrichment were used for the Lead Cascade and no ground was disturbed for refurbishments made to the facility that altered visual characteristics with its surroundings. Likewise, based upon the fact that all decommissioning activities will occur within the Lead Cascade facilities, no impacts to land use would occur.

Transportation

As stated in ACO 17-0012, dated February 24, 2017, the material being shipped from the facility meets the definition of both Low Specific Activity material and Surface Contaminated Objects as specified in both 10 CFR 71.14(b)(3) and 49 CFR 173.427. Additionally, the material has an unlimited A2 value and as such is less than a Type A quantity of material as specified in 10 CFR 71.14(b)(1). Therefore, the Licensee believes that the planned shipments meet all applicable NRC and DOT regulatory requirements.

As stated within Section 4.3.3 of the Environmental Report, impacts on transportation due to decommissioning activities would be negligible. Although there would be minimal increases in traffic, the decommissioning activities would be temporary and would not result in long-term effects.

As stated within LA-2605-0002, *Environmental Report for the American Centrifuge Lead Cascade Facility*, the reservation is served by southern Ohio's two major highways: U.S. Route 23 and Ohio SR 32. These highways are one and one half miles west of the site and two miles north of the site, respectively. The site is 3.5 miles from the intersection of the U.S. Route 23 and Ohio SR 32 interchange. Both routes are four lanes with U.S. Route 23 traversing north-south and Ohio SR 32 traversing east-west. Approximately 70 miles north of the site, U.S. Route 23 intersects I-270, I-70, and I-71. Traffic may access I-64 approximately 20 miles southeast of Portsmouth, Ohio.

Approximately 315 shipments are anticipated for this decommissioning project and are anticipated to be completed prior to the final license termination which is expected during 2018. Lead Cascade decommissioning waste will be transported by authorized ground commercial carriers on well-established routes used by other authorized shippers, primarily using state highways from Ohio to the authorized disposal site. Load limits on these routes is controlled by the *Code of Federal Regulations*, Title 49, *Transportation*, at a gross weight of 80,000 pounds.

Geology, Soils, and Seismicity

As stated within ACO 17-0015 dated March 1, 2017, Section III.e of the Decommissioning Plan: Geologic characteristics of the site and region are discussed within Section 1.3.6 of the License Application and Section 3.4 of the Environmental Report. Specifically, as discussed within Section 1.3.6.5 of the License Application, there are no major geologic fault structures in the vicinity of the site and there have been no historic earthquake epicenters within less than 25 miles from the site. However, there have been eight earthquake epicenters within 50 miles.

As stated within ACO 17-0015 dated March 1, 2017, Section IV.c of the Decommissioning Plan: There were no activities during Lead Cascade operations that would have resulted in contamination exterior of the buildings/facilities. HP personnel have collected surface soil samples within the Lead Cascade footprint to determine the baseline radioactivity levels. This data indicates an average of 4.27 ± 2.32 picocurie (pCi)/g of alpha activity with a maximum value of 10.2 pCi/g. Based on this data, the 95 percent confidence level is estimated to be 8.8 pCi/g of alpha activity.

Volume 2 of NUREG-1757 was consulted to determine the concentrations for soil contamination that would require remediation. Specifically, NUREG-1757, Volume 2, Appendix H, *Criteria for Conducting Screening Dose Modeling Evaluations*, provides screening values for surficial soil residual radioactivity that would meet the requirements of 10 CFR 20.1402 (25 millirem [mrem]). Results of HP soil samples have been less than screening levels for uranium.

As stated within ACO 17-0015 dated March 1, 2017, Section IV.d of the Decommissioning Plan: There were no activities during Lead Cascade operations that would have resulted in subsurface soil contamination.

As stated within ACO 17-0015 dated March 1, 2017, V.a.2 of the Decommissioning Plan: There is no evidence of soil contamination resulting from Lead Cascade operations (reference Section IV.c. of the Decommissioning Plan). Additionally, there are no liquid operations, no permanent Contamination Areas, no instance of airborne radioactivity exceeding 0.1% of the Lead Cascade DAC, and no radiological work has been performed exterior to the facilities (X-3001, X-7726, and X-3012 buildings). Surface soil samples collected annually in support of NRC Regulatory Guide 4.22, *Decommissioning Planning During Operations*, in the vicinities of Lead Cascade facilities that have used or stored licensed material indicate that levels are less than the soil screening levels stated in NUREG-1757 Volume 2, Revision 1, Table B-2.

Water Resources

As stated within ACO 17-0015 dated March 1, 2017, Section III.f of the Decommissioning Plan: Surface hydrology on and around the DOE reservation is described within Section 1.3.4 of the License Application and Section 3.5.1 of the Environmental Report. Additionally, as stated within Section 4.5 of the Environmental Report, potential impacts to surface water quality would be insignificant during operations of the Lead Cascade.

As stated within ACO 17-0015 dated March 1, 2017, Section III.g of the Decommissioning Plan: There are no monitoring wells currently used at the Lead Cascade. As described in Section 4.12.3 of the Environmental Report, non-radiological and radiological environmental monitoring at the DOE reservation includes air, water, sediment, and biota. Environmental monitoring of both radiological and chemical parameters is required by State and Federal regulations, and/or permits, but is also completed to reduce public concerns about the Lead Cascade operations.

There were no radioactive spills/incidents during Lead Cascade operations where radioactive material caused contamination of any ground water. Additionally, as stated within Section 4.5 of the Environmental Report, potential impacts to ground water quality would be insignificant during operations of the Lead Cascade.

As stated within ACO 17-0015 dated March 1, 2017, Section XI.c of the Decommissioning Plan: The Effluent Controls program is discussed within Section 9.2.1.2 of the License Application and maintained in accordance with currently approved operating procedures.

As stated within ACO 17-0015 dated March 1, 2017, Section XI.c of the Decommissioning Plan: No radioactive material is stored within any Underground Storage Tank or Aboveground Storage Tank.

As stated within ACO 17-0015 dated March 1, 2017, Section IV.e of the Decommissioning Plan: There are no surface water bodies that contain residual radioactive material in excess of site background levels.

Ecological Resources

As stated within ACO 17-0015 dated March 1, 2017, Section III.h of the Decommissioning Plan: The area specific to the Lead Cascade includes existing facilities formerly used for GCEP, and located in a fully developed industrial area. As such, the grounds are maintained as lawns and support various species of grasses and herbaceous dicots. Additional discussions related to ecological resources are discussed within Section 3.6 of the Environmental Report.

As stated within ACO 17-0015 dated March 1, 2017, Section VI of the Decommissioning Plan: The Environmental Report (LA-2605-0002) was developed for the Lead Cascade during the initial licensing period and is organized in accordance with the guidance provided in NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*. Consultation, as defined by Section 7 of the *Endangered Species Act*, is contained within Appendix B of the Environmental Report for the proposed action for the installation and operation of the Lead Cascade.

Section 3.5.4, Rare, Threatened, and Endangered Species, of the Environmental Assessment for the Lead Cascade states the following:

*To comply with Section 7 of the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) was contacted to determine if any Federally endangered species may be found at the site. According to the USFWS, the Indiana bat (*Myotis sodalis*) is the only Federally listed endangered animal species whose home range includes the site. Surveys at the reservation revealed no Indiana bats at the site. The Ohio Department of Natural Resources (ODNR) was also contacted, and the ODNR indicates no records of rare or endangered species within the project area.*

Planned decommissioning activities for the Lead Cascade will occur within the existing approved Lead Cascade facilities, with neither new construction activities nor disturbances to the environment occurring; therefore, no new informal consultations were initiated.

Turnover conditions of the GCEP Lease (Section 4.3) require the facilities to be restored to the original state prior to the initial lease. Therefore, the NRC's previous finding of no adverse effect on endangered species remains valid and a new environmental assessment should be excluded under 10 CFR 51.22.

Air Quality

As stated within ACO 17-0015 dated March 1, 2017, Section XI.a of the Decommissioning Plan: As described within Section 9.2.1.1 of the License Application, gaseous and liquid effluent treatment systems, as appropriate, are used to maintain releases of radioactive material to unrestricted areas below the limits specified in 10 CFR 20.1301 and 40 CFR Part 190 and in accordance with the ALARA policy. Gaseous effluent control systems are also used to maintain releases of radioactive material to unrestricted areas below the dose constraint in 10 CFR 20.1101 and the dose limit in 40 CFR 61.92.

The ALARA goal for airborne radioactive releases is 5 percent of the NRC constraint level (10 CFR 20.1101) and EPA limit (40 CFR 61.92), or an annual TEDE of 0.5 mrem to the most exposed member of the public. This is also less than 15 percent of the most restrictive limit under 40 CFR Part 190, based on site experience.

Radiological Air Quality

As stated within ACO 17-0015 dated March 1, 2017, Section XI.a of the Decommissioning Plan: As described within Section 9.2.1.2.1 of the License Application, all routine gaseous effluents from the Lead Cascade flow through the purge vacuum (PV) or evacuation vacuum (EV) systems as described within Section 1.1 of the License Application. The X-3001 building process vent was utilized during Lead Cascade operations; however, it will not be utilized during decommissioning due to the shutdown of the cascade operations.

As described within Section 9.2.1.2.1 of the License Application, centrifuge machines may be disassembled on the static stand in the X-7726 facility (or in appropriate areas of the X-3001 or X-7725 buildings if use of the X-7726 facility equipment is not required). Centrifuge machines that have been in service will be opened using appropriate PPE, and may also include engineered local ventilation systems to capture any residual uranium. Consequently, there should be no airborne radioactive effluents from the X-7726 facility or any of the support buildings (e.g., X-7725, X-7727H, and X-3012 buildings). The workspace air in areas that may have airborne uranium is monitored as described within Section 4.7 of the License Application.

Non-Radiological Air Quality

Since planned decommissioning activities for the Lead Cascade will occur within the existing approved Lead Cascade facilities, the activities are not expected to produce any fugitive dust.

Noise

Noise associated with the decommissioning of the Lead Cascade will be temporary and is not expected to increase the noise level outside of the facility. It is anticipated that there will be slightly elevated noise levels within the Lead Cascade buildings/facility created by the disassembly activities. However, appropriate hearing protection measures (e.g., postings and earplugs) will be incorporated, if necessary, to protect personnel within the elevated noise areas.

Historic and Cultural Resources

As stated within ACO 17-0015 dated March 1, 2017, Section VI of the Decommissioning Plan: The Environmental Report (LA-2605-0002) was developed for the Lead Cascade during the initial licensing period and is organized in accordance with the guidance provided in NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*. Consultation, as defined by Section 106 of the *National Historic Preservation Act*, is contained within Appendix B of the Environmental Report for the proposed action for the installation and operation of the Lead Cascade.

Section 3.8, Historic and Cultural Resources, of the Environmental Assessment for the Lead Cascade states the following:

Historic and cultural resources are evaluated because of NEPA requirements and Section 106 of the National Historic Preservation Act, which protect historic properties from potential adverse impacts resulting from Federal agency actions. Historic, archaeological, and traditional cultural resources should be analyzed in sufficient detail to provide the basis for subsequent analysis and assessment of possible impacts. Adverse effects consist of any action that would diminish the property's location, design, setting, materials, workmanship, feeling, or association. If these resources are found to be impacted, then measures may need to be taken to avoid, minimize, or mitigate any adverse effects as required by 36 CFR Part 800.

PORTS is located within a region where Adena and Hopewell Indian mounds have existed. Additionally, several historic Native American Indian tribes are known to have had villages nearby. Upon being contacted regarding this Environmental Assessment, the Ohio State Historic Preservation Office (SHPO) stated that the SHPO made a finding of no adverse effect for the Lead Cascade. Further, the SHPO stated that the proposed action meets the National Register Criteria for Evaluation (NRCE) (36 CFR 60.4) Criterion A because of the site's significance in the development of nuclear energy potential in post-World War II U.S. history. Criterion A identifies properties that are associated with events that have a significant contribution to U.S. history. Cultural resources are defined as any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet anyone of the NRCE, they may be termed historic properties and are potentially eligible for inclusion on the National Register of Historic Places. Thus, PORTS may be considered for addition to the National Register at some point in the future.

Planned decommissioning activities for the Lead Cascade will occur within the existing approved Lead Cascade facilities, with neither new construction activities nor disturbances to the environment occurring; therefore, no new informal consultations were initiated.

Turnover conditions of the GCEP Lease (Section 4.3) require the facilities to be restored to the original state prior to the initial lease. Therefore, the NRC's previous finding of no adverse

effect on historic places remains valid and a new environmental assessment should be excluded under 10 CFR 51.22.

Visual/Scenic Resources

As discussed within Section 4.10.3 of the Environmental Report, existing facilities used for uranium enrichment at PORTS would be used for the Lead Cascade and no ground would be disturbed or exterior changes made to the facility that would alter visual characteristics with its surroundings; therefore, no impacts to visual/scenic resources occurred.

Planned decommissioning activities for the Lead Cascade will occur within the existing approved Lead Cascade facilities, with neither new construction activities nor disturbances to the environment occurring; therefore, no new informal consultations were initiated.

Socioeconomic

Both, voluntary and involuntary reductions in force have occurred since the company's decision on February 19, 2016, to permanently cease operation at the Lead Cascade and to terminate the NRC Materials License (SNM-7003) following decontamination and decommissioning activities. An increase in contractor support will be needed to complete the decommissioning activities and is expected to extend beyond the region of influence, which is comprised of Jackson, Pike, Ross, and Scioto Counties in Ohio. However, little benefit would be noticed during this brief influx of time needed to complete the packaging and transportation activities associated with the Lead Cascade classified matter and/or contaminated waste.

Environmental Justice

As discussed within Section 4.11.2 of the Environmental Report, the NRC's NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Appendix B, states that "[I]f it is determined that a particular action will have no significant environmental impact, then there is no need to consider whether the action will have disproportionately high and adverse impacts on certain populations." Planned decommissioning activities for the Lead Cascade will occur within the existing approved Lead Cascade facilities and will not generate significant environmental impacts. Therefore, further environmental justice analysis is not required.

Public and Occupational Health

As stated within ACO 17-0015 dated March 1, 2017, Appendix C of the Environmental Report (LA-2605-0002): The Licensee anticipates that the majority of the radioactive material (greater than 80 percent) will be removed from the Lead Cascade upon completion of the project. The remaining radioactive material will be dispersed through the Lead Cascade components and piping. The resulting radiological impacts during decommissioning activities would be far below the EPA standard of 10 mrem/year and the U.S. Nuclear Regulatory Commission TEDE limit of 100 mrem/year.

The maximum impact if all of the remaining radioactive material became airborne would be approximately half that of the predicted maximum annual gaseous effluent.

As stated within ACO 17-0015 dated March 1, 2017, Section IV.a of the Decommissioning Plan: During Lead Cascade operations, areas of the facility were sectioned off into clean areas and areas of potential contamination, where access control requirements have been applied. These are essentially where discrete areas of contamination may be occasionally encountered. Currently approved operating procedures for these areas are encompassed by the RP program, and serve to minimize the spread of contamination and simplify decommissioning.

As stated within ACO 17-0018 dated March 10, 2017:

Worker Radiological Impacts of Waste Packaging During Decommissioning Efforts

Personnel doses at the Lead Cascade have been consistently less than 100 mrem/year total effective dose equivalent (TEDE). The Radiation Protection (RP) program outlined in Chapter 4.0 of the Lead Cascade License Application was constructed to protect personnel entering the Lead Cascade buildings/facilities from unnecessary exposure to ionizing radiation and radioactive materials. This program is based upon the following principles and is implemented through currently approved operating procedures.

- Personnel radiation exposures and the release of radioactive effluents shall be maintained in accordance with the ALARA principle.
- No individual shall receive a radiation dose in excess of any regulatory limit.
- The established personnel monitoring program objectives are:
 - < 500 mrem per year TEDE per person
 - < 10 milligram (mg) per week soluble uranium

Specifically, a review of Fixed Nuclear Accident Dosimeters (FNAD) and area monitoring Thermo-luminescence Dosimeters (TLD) data indicates radiation levels at the Feed Cart have been 0.012 mrem/hour; with all other FNADs and area monitoring indicating <0.001 mrem/hour. Recent surveys indicate background at the Lead Cascade is approximately 0.006 mR/hour; prior to cylinder removal at the Feed Cart, levels were 0.04 mR/hour. Elsewhere in the X-3001 Process Building Train 3 area, average levels were in the 0.008 to 0.010 mR/hour range. Levels in the X-7726 facility are typically < 0.01 mR/hour. The estimated dose rate from 1 kg of natural uranium is 4E-5 rem/hour (0.04 mrem/hour) at 30 cm. Since Lead Cascade items are relatively large compared to a point source and there are no individual components or pieces expected to contain or exceed 1 kg of material, special dose monitoring is not required.

Chapter 4.0 of the Lead Cascade License Application defines restricted areas as areas to which access is limited by ACO to protect individuals against undue risk from exposure to radiation and radioactive materials. Personnel working in restricted areas (Radioactive Material Area (RMA) or higher level of posting) are required to be monitored with a National Voluntary Laboratory Accreditation Program (NVLAP) accredited TLD. This is consistent with the requirements of the Dosimetry Program procedures. Since decommissioning activities will be performed in areas currently posted as an RMA, no changes to current practices are warranted.

Due to the small amount of material within the Lead Cascade equipment, personnel external doses are expected to remain less than 100 mrem/year. The RP requirements that will be used during decommissioning are the same requirements currently implemented at the Lead Cascade. The program elements were developed to ensure worker radiological safety with the risks associated with the hazards at the Lead Cascade. These requirements are implemented by currently approved operating procedures developed in accordance with the requirements of Section 11.4 of the Lead Cascade License Application.

Public Radiological Impacts of Waste Shipments During Decommissioning

In accordance with currently approved operating procedures, the exterior of each waste shipping container will be surveyed prior to loading on the conveyance. Each shipping container will contain items that are internally contaminated with uranium.

Of the total amount of uranium being shipped, most of the activity will be contained in the centrifuge casings. The remainder of the radioactive material (solid radwaste and mixed waste) will be shipped in B-25 containers and Intermodal Freight Transport (IFT) containers.

Uranium daughters ^{231}Th , ^{234}Th , and $^{234\text{m}}\text{Pa}$ are expected to be present in a 1 to 1 ratio to the parent radionuclides.

Based on HP surveys, minimal exposure from shipping containers is anticipated. In the bounding case, recent HP surveys indicated a maximum contact reading of 220 $\mu\text{R}/\text{hour}$. These components will be placed in shipping containers for shipment. The disposal of these components will be limited to one per container. Assuming a distance of 18 inches from the 220 $\mu\text{R}/\text{hour}$ reading, using a line source calculation ($I_1 \times D_1 = I_2 \times D_2$), the expected exposure rate is estimated to be between 3 and 6 $\mu\text{R}/\text{hour}$. A further reduction of the exposure rate is expected due to the wall of the shipping container (12 gauge steel or 7/64 inch). Based on this information, the expected levels would be statistically indistinguishable from background.

It is expected that each container will meet the Radioactive White – I labeling requirements; a maximum radiation level at any point on the external surface of ≤ 0.5 mrem/hour. However, since the shipments will be consigned as Exclusive Use, labeling requirements are outlined in 49 CFR 173.427(a)(6)(vi).

Assuming the maximum container exposure rate (contact reading) is 50 $\mu\text{R}/\text{hour}$ (rather than the current survey data which are much lower); shipment radiation levels will be significantly less than both DOT and NRC limits. The radiation limits for radioactive shipments (found in 49 CFR 173.441 and 10 CFR 71.47) are:

- 200 mrem/hr at any point on the outer surface of the vehicle, including upper and lower surfaces; or, in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle
- 10 mrem/hr at any point two meters (6.6 ft) from the vertical planes represented by the outer lateral surfaces of the vehicle
- 2 mrem/hr in normally occupied spaces of the vehicle; this provision does not apply to carriers if they operate under the provisions of a State or Federally regulated radiation

protection program and if personnel under their control in such an occupied space wear radiation dosimetry devices

Therefore, dose to drivers and the potential exposure to the general public are anticipated to be negligible.

Additionally, unclassified, low-level contaminated liquid waste is anticipated to be handled as an on-site transfer for processing to the U.S. Department of Energy's (DOE's) Prime Contractor for the Decontamination and Decommissioning (D&D) activities at the former Portsmouth Gaseous Diffusion Plant, Fluor-B&W Portsmouth LLC in Piketon, Ohio. Therefore, there will be no dose to drivers and no potential exposure to the general public.

Accident Analysis

As stated within ACO 17-0015 dated March 1, 2017, Section VIII.a of the Decommissioning Plan: An engineering evaluation (EE-2901-0020) was performed to determine which Lead Cascade items relied on for safety (IROFS) are applicable during decommissioning activities or if any new IROFS are needed. This evaluation concluded that no new IROFS are required during decommissioning activities as all of the risks during decommissioning activities are adequately bounded by existing ISA events. However, there are some ISA events that could remain credible during initial decommissioning activities, so any IROFS associated with those events will be maintained.

Five IROFS were determined to be unnecessary once the Lead Cascade was shut down and de-inventoried. Once the releasable UF₆ inventory has been consolidated a minimal number of cylinders and moved to an appropriate area that will have minimal interaction with decommissioning activities and still have fire suppression system coverage, six more IROFS will become unnecessary. Once the releasable UF₆ inventory is removed from the Material Balance Area (MBA), the remaining 26 IROFS will no longer be necessary.

The Lead Cascade has stopped all enrichment activities and consolidated the UF₆ in to one UF₆ cylinder. Once the single UF₆ cylinder is removed from the Lead Cascade MBA no IROFS will be required. The remaining licensed material cannot be released by any credible event that would result in consequences that could exceed the performance requirements per 10 CFR 70.61. The remaining licensed material is referred to as holdup.

Holdup is licensed material that has adhered to the process equipment and piping interior surfaces so it is spread throughout the Lead Cascade. The primary causes of holdup are the presence of water and contaminants on the surfaces and materials of construction. Uranium compounds are formed when UF₆ reacts upon exposure to water, contaminants, or materials of construction. The compounds typically bind to the equipment surfaces and cannot be easily removed, and the compounds are typically solids that cannot be readily released to the atmosphere.

Non-Radiological and Radiological Impacts

As stated within ACO 17-0015 dated March 1, 2017, Section III.g of the Decommissioning Plan: As described in Section 4.12.3 of the Environmental Report, non-radiological and radiological environmental monitoring at the DOE reservation includes air, water, sediment, and biota. Environmental monitoring of both radiological and chemical parameters is required by State and Federal regulations, and/or permits, but is also completed to reduce public concerns about the Lead Cascade operations.

Pathway Assessment

As stated within ACO 17-0015 dated March 1, 2017, Section XI.a of the Decommissioning Plan: As described within Section 9.2.1.1 of the License Application, gaseous and liquid effluent treatment systems, as appropriate, are used to maintain releases of radioactive material to unrestricted areas below the limits specified in 10 CFR 20.1301 and 40 CFR Part 190 and in accordance with the ALARA policy. Gaseous effluent control systems are also used to maintain releases of radioactive material to unrestricted areas below the dose constraint in 10 CFR 20.1101 and the dose limit in 40 CFR 61.92.

The ALARA goal for airborne radioactive releases is 5 percent of the NRC constraint level (10 CFR 20.1101) and EPA limit (40 CFR 61.92), or an annual TEDE of 0.5 mrem to the most exposed member of the public. This is also less than 15 percent of the most restrictive limit under 40 CFR Part 190, based on site experience.

The ALARA goal for liquid radioactive releases is 10 percent of the airborne ALARA goal, or an annual TEDE of 0.05 mrem to the most exposed member of the public. This is equivalent to 0.05 percent of the 10 CFR 20.1301 limit on annual public dose.

Waste Management

As stated within ACO 17-0015 dated March 1, 2017, Section XIII.b of the Decommissioning Plan: As discussed in Section 11.4 of the License Application (LA-2605-0001), a management controls program has been established for the development, issuance, and control of Lead Cascade procedures. The Lead Cascade employees are committed to the use of approved and controlled written procedures to conduct nuclear safety, safeguards, and security activities for the protection of the public, facility employees, and the environment. Procedures are used to ensure safe work practices and apply to workers, visitors, contractors, and vendors. The procedure process utilizes a graded approach to provide the necessary rigor for safe Lead Cascade operation, assure the Licensee's commitments to meeting regulations and standards, and assure a balance of effective safety with practical efficiency in facility operations. Procedures are intended to prescribe those essential actions or steps needed to safely and consistently perform operations and maintenance activities.

As discussed in Chapter 9.0 of the License Application, the Lead Cascade has radioactive effluent control and as low as reasonably achievable (ALARA) programs that meet NRC requirements. The Lead Cascade will not use any radionuclide that has not already been used at

the site reservation and is expected to make a minimal contribution to site effluents. The Lead Cascade Environmental Protection Program will provide protection to the public and the environment while minimizing the chance of human or programmatic error. As discussed in Chapter 4.0 of the License Application, the currently approved Radiation Protection (RP) program ensures occupational radiation exposures and radioactive contamination is kept as low as reasonably achievable (ALARA). Requirements of these programs are flowed into approved operating procedures that will be used during the decommissioning efforts.

As discussed in Section 9.2.2.3 of the License Application, the Lead Cascade has a radioactive and mixed waste program in place. Waste generated by the Lead Cascade is managed in accordance with applicable state and federal regulations. Offsite shipments of radioactive wastes are manifested in accordance with 10 CFR 20.2006. Waste shipments are packaged, labeled, and manifested in accordance with applicable State, DOT, NRC, and EPA requirements.

Additionally, Licensee-generated wastes are disposed of at commercial disposal facilities that are licensed in accordance with 10 CFR Part 61 or applicable NRC Agreement State requirements, or DOE facilities governed by DOE Order 435.1, *Radioactive Waste Management*. Packages are inspected prior to shipment, as appropriate, to verify compliance with applicable packaging and transportation requirements.

Management organization and controls, effluent control and environmental protection, and radioactive waste management inspection modules are conducted annually by the NRC and have routinely been determined to be compliant with license requirements.

As stated within ACO 17-0018 dated March 10, 2017 and ACO 17-0015 dated March 1, 2017, Section XII of the Decommissioning Plan: Anticipated Waste Types and Volumes for the decommissioning efforts is as follows:

Solid Radioactive Waste (Radwaste)

Table 1. Solid Radwaste to be Generated During Decommissioning Activities

Type of Solid Radwaste	Radionuclides Present
Sealed centrifuge casings filled with centrifuge internal components, other contaminated cascade component, and possible dry active waste to fill voids	UF ₆ , UF ₄ , UO ₂ F ₂ , oxides, metals, and other compounds may be present. Each container is expected to contain less than 1,000 g of uranium and less than 15 g of U ²³⁵ .
IFT containers filled with sectioned service modules, other contaminated cascade components, and possible dry active waste to fill voids	
B-25 containers filled with the centrifuge assemblies other than the casing/internals, remaining parts from the cascade, and possible dry active waste	

Class A solid radwaste is estimated to be approximately 180,000 ft³. No Class B, C, or Greater than Class C solid radwaste is anticipated to be generated during the Lead Cascade decommissioning efforts.

Section 9.2.2.3.3 of the Lead Cascade License Application details the current storage capabilities and commitments. These storage requirements are flowed into currently approved operating procedures. Additional classified matter storage requirements are documented within Chapter 2.0 of the Security Program and applicable security plans.

Process equipment will be dismantled and handled as contaminated waste. The waste will be consolidated and containerized to minimize the volume. Containers with access closures installed will be stored in a Security approved interim staging area until ready for shipment. Waste can be shipped from any Lead Cascade facility as necessary. Approved waste handling methods will be utilized to ensure that safety, security, and regulatory requirements are maintained.

The solid radioactive waste removed from the Lead Cascade will be handled and packaged in accordance with Section 9.2.2.3 of the Lead Cascade License Application and activities will be performed in accordance with currently approved operating procedures and/or new procedures developed in accordance with Section 11.4 of the Lead Cascade License Application. Additional handling and packaging requirements may be augmented by the disposal facility selected for final processing.

Additionally, the Lead Cascade does not currently have any volumetrically contaminated solid radwaste and does not expect to generate any during the decommissioning activities.

Liquid Radwaste

Table 2. Liquid Radwaste to be Generated During Decommissioning Activities

Type of Liquid Radwaste	Radionuclides Present
Oils generated from process equipment	UF ₄ or UO ₂ F ₂ . Each container is expected to contain less than 1,000 g of uranium and less than 15 g of U ²³⁵ .

No Class B, C, or Greater than Class C liquid radwaste is anticipated to be generated during the Lead Cascade decommissioning efforts.

Section 9.2.2.3.3 of the Lead Cascade License Application details the current storage capabilities and commitments. These storage requirements are flowed into currently approved operating procedures.

The oils removed from the Lead Cascade process equipment will be handled and packaged in accordance with Section 9.2.2.3 of the Lead Cascade License Application and activities will be performed in accordance with currently approved operating procedures and/or new procedures

developed in accordance with Section 11.4 of the Lead Cascade License Application. Additional handling and packaging requirements may be augmented by the disposal facility selected for final processing.

Unclassified, low-level contaminated liquid waste from centrifuge and component disassembly is anticipated to be handled as an on-site transfer for processing to the DOE's Prime Contractor for the D&D activities at the former Portsmouth Gaseous Diffusion Plant, Fluor-B&W Portsmouth LLC in Piketon, Ohio.

Mixed Waste

It is anticipated that only solid low level mixed waste (LLMW) will be present during decommissioning of the Lead Cascade. Examples of this solid LLMW include various electronic components from the Lead Cascade such as the Distributed Control System, Digital Acquisition System, mass spectrometer electronic components (e.g., servers, modules, switches, PCs, monitors, etc.), and Machine Cooling Water/Purge Vacuum/Evacuation Vacuum panel views.

It is estimated that Class A solid LLMW will be packaged within B-25 containers for disposal during the Lead Cascade decommissioning efforts. No Class B, C, or greater than Class C mixed waste is anticipated to be generated during the Lead Cascade decommissioning efforts.

It is anticipated that there will be minimal radioactive contamination for the solid LLMW identified above.

Prior to shipment to the disposal site, solid LLMW will be stored onsite in an area approved for radioactive material within the Material Balance Area and also approved/designated as a 90 day storage area for hazardous waste.

The solid LLMW generated during Lead Cascade decommissioning efforts will be shipped off site to a treatment facility that will macro-encapsulate the waste prior to being shipped for final disposal. ACO intends to contract EnergySolutions to perform this treatment at their Bear Creek Facility in Oak Ridge, Tennessee. Once the treatment is completed, the LLMW will be repackaged in accordance with EnergySolutions procedures and then shipped for permanent burial.

No other agencies have jurisdiction over the solid LLMW at the Lead Cascade.

Currently, the Lead Cascade is an Ohio Environmental Protection Agency (EPA) conditionally exempt small quantity generator. Storage of the hazardous waste with respect to the EPA requirements is defined within currently approved procedures and processes. No treatment will be performed at the Lead Cascade; therefore, no permits are needed.

VI. Environmental Impacts of the Alternatives to the Proposed Action

There are no alternatives to the previously discussed proposed action. If waste cannot be shipped, then the waste accumulated during decommissioning activities for the Lead Cascade

would remain onsite at the DOE Reservation located in Piketon, Ohio until such time that waste could be shipped to an authorized disposal facility. This no action alternative is not reasonable and does not comply with the decommissioning requirements of 10 CFR 70.38, the commitments contained within the License Application, or the conditions of the GCEP Lease.

VII. Conclusion

The packaging and shipment of radioactive and other hazardous materials will be conducted in compliance with applicable NRC, DOT, and state regulations.

Environmental Impact Statement

As stated within ACO 17-0015 dated March 1, 2017, Section VI of the Decommissioning Plan: During the initial licensing process of the Lead Cascade, the NRC prepared an Environmental Assessment in response to the License Application (Docket Number 70-7003) submitted by USEC Inc., in February 2003 for the construction of the Lead Cascade, a test and demonstration facility designed to provide information on the American Centrifuge technology. As made effective within Amendment 7 of the NRC Materials License (SNM-7003) the direct transfer of the NRC Materials License SNM-7003 from USEC Inc. to ACO (the Licensee) became effective February 8, 2013. The Licensee's proposal was to construct, operate, and decommission this facility within existing facilities at the DOE reservation located in Piketon, Ohio. On the basis of the assessment, the NRC staff concluded that environmental impacts associated with the proposed action would not be significant and did not warrant the preparation of an environmental impact statement. Accordingly, it was determined that a "Finding of No Significant Impact" was appropriate.

Additionally, during the initial licensing process of the American Centrifuge Plant (ACP), the NRC prepared an Environmental Impact Statement (NUREG-1834) in response to the license application (Docket Number 70-7004) submitted by the USEC Inc., in August 2004 for the construction, manufacturing, start-up, operations, maintenance, and decommissioning of a uranium enrichment facility using American Centrifuge technology that will produce approximately 3.8 million separative work units annually, which ultimately resulted in the issuance of NRC Materials License (SNM-2011) for the ACP. As made effective within Amendment 3 of the NRC Materials License (SNM-2011) the direct transfer of the NRC Materials License SNM-2011 from USEC Inc. to the Licensee became effective February 8, 2013. In the Environmental Impact Statement, the NRC staff concluded that there would be only a small impact during decontamination and decommissioning activities for this uranium enrichment facility since the transportation aspects of the decommissioning activities would require less truck shipments for offsite disposal compared to the anticipated truck traffic for site preparation and construction period.

The impact of Lead Cascade decommissioning transportation activities are bounded by this conclusion since only approximately 315 shipments are anticipated for this decommissioning project compared to the thousands of shipments for the ACP which would have 96 cascades and 11,520 centrifuge machines.