Centrus
Fueling the Future of Nuclear Power

April 28, 2022
ACO 22-0042

ATTN: Document Control Desk
Mr. John W. Lubinski, Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

American Centrifuge Plant; Docket Number 70-7004; License Number SNM-2011

License Amendment Request for American Centrifuge Operating, LLC's License Application and Supporting Documents for the American Centrifuge Plant

INFORMATION TRANSMITTED HEREWITH IS PROTECTED FROM PUBLIC DISCLOSURE AS CONFIDENTIAL COMMERCIAL OR FINANCIAL INFORMATION AND/OR TRADE SECRETS PURSUANT TO 10 CFR 2.390 AND 9.17(a)(4)
AND
INFORMATION TRANSMITTED HEREWITH IS PROTECTED FROM DISCLOSURE PURSUANT TO 10 CFR PART 810

Dear Mr. Lubinski:

The purpose of this letter is to request in accordance with 10 *Code of Federal Regulations* (CFR) 70.34 and 70.65 the U.S. Nuclear Regulatory Commission (NRC) review and approve the proposed amendment for American Centrifuge Operating, LLC's (ACO) License Application for the American Centrifuge Plant (ACP) in Piketon, Ohio (Materials License SNM-2011).

ACO and the U.S. Department of Energy (DOE) entered into the HALEU Demonstration Contract awarded May 31, 2019, and definitized on October 31, 2019. Work under the contract included licensing and construction of the cascade at the ACP in Piketon, Ohio. The HALEU Demonstration Program commenced on June 1, 2019.

The demonstration of HALEU production was on schedule to produce between 200 kg and 600 kg of HALEU using 16 AC100M centrifuges by June 1, 2022, at the Piketon, Ohio, facility owned by

NMSS20
NMSS

American Centrifuge Operating, LLC
3930 U.S. Route 23 South – P.O. Box 628
Piketon, OH 45661

DOE. However, the demonstration was affected by COVID-19 related supply chain cost and schedule issues near the completion of the work. The HALEU Demonstration contract was initially planned to conclude on May 31, 2022; however, the contract is in the process of being adjusted to allow for a competition for the continuation of the demonstration program. These adjustments were necessary to acknowledge COVID-19 supply chain disruptions and out of contract scope requirements for a Category 2 Special Nuclear Material storage area. Therefore, DOE is extending the current HALEU contract with ACO to allow for continuation under revised milestones to bridge the gap between the current activities and the DOE's planned new contract that will be a competitive award to complete the program to demonstrate the production of HALEU.

Enclosure 1 provides a detailed description, justification, and ACO's significance determination for the proposed changes. Enclosure 2 provides the public proposed changes to LA-3605-0001, *License Application for the American Centrifuge Plant*, and LA-3605-0002, *Environmental Report for the American Centrifuge Plant.* Enclosure 3 provides the withheld proposed changes to NR-3605-0005, *Fundamental Nuclear Material Control Plan for the American Centrifuge Plant.* Enclosure 4 provides corresponding proposed changes to NRC's Materials License SNM-2011 for the American Centrifuge Plant. Proposed changes from the previously NRC-approved documents are noted with revision bars in the right-hand margin. Based upon the 10 CFR 70.32 and 70.72 evaluations, not all proposed changes depicted warrant the NRC's review and approval; however, are provided for completeness to assist in the review efforts.

Additionally, to support this extension request, the following new references are provided:

- Enclosure 5 provides HALEU Demonstration Contract Number 89303519CNE000005, Modification #P00019 for the HALEU Demonstration Program.
- Enclosure 6 provides *Amendment 2 to the Appendix 1 Lease Agreement Between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant.*

Enclosure 3 contains Proprietary and Security-Related Information. In accordance with the guidance provided by the DOE, Enclosure 6 contains Official Use Only information. Therefore, ACO requests these enclosures be withheld from public disclosure pursuant to 10 CFR 2.390(d)(1). An affidavit required by 10 CFR 2.390(b)(1)(ii) is provided as Enclosure 7 of this letter. Additionally, Enclosure 3 has been determined, in accordance with the guidance provided by the DOE, to contain Export Controlled Information and must be protected from disclosure per the requirements of 10 CFR Part 810.

After the NRC staff has had an opportunity to review the enclosures, ACO is available to support a discussion with the NRC to address questions or clarify issues. ACO respectfully requests NRC complete their review and final approval on or before May 31, 2022, to support the six-month extension of the current DOE HALEU Demonstration contract.

If you have any questions regarding this matter, please contact me at (740) 897-3859.

Sincerely,

Kelly L Fitch

Kelly L. Fitch
Regulatory Manager
Enclosures: As stated

cc (without enclosures, unless otherwise noted):
Y. Faraz, NRC HQ (Enclosures)
S. Harlow, DOE HQ
J. Hutson, Contract Support
N. Pitoniak, NRC Region II
L. Pitts, NRC Region II (Enclosures)
J. Tobin, NRC HQ (Enclosures)
T. Vukovinsky, NRC Region II

Enclosure 7 of ACO 22-0042

Affidavit

Information Contained Within
Does Not Contain
Export Controlled Information

Reviewing Official: #1038, ACO

Date: 04/27/2022

AFFIDAVIT OF LARRY B. CUTLIP
SUPPORTING APPLICATION TO WITHHOLD FROM
PUBLIC DISCLOSURE CERTAIN INFORMATION PROVIDED TO NRC IN
LETTER ACO 22-0042

I, Larry B. Cutlip, of American Centrifuge Operating, LLC (ACO), having been duly sworn, do herby affirm and state:

1. I have been authorized by ACO to (a) review the information owned by ACO which is referenced herein relating to ACO's License Amendment Request for the American Centrifuge Plant (ACP) (NRC Materials License SNM-2011) as the described in letter ACO 22-0042, which ACO seeks to have withheld from public disclosure pursuant to section 147 of the Atomic Energy Act (AEA), as amended, 42 U.S.C. § 2167, and 10 CFR 2.390(a)(4), and 9.17(a)(4), and (b) apply for the withholding of such information from public disclosure by the Nuclear Regulatory Commission (NRC) on behalf of ACO.
2. Consistent with the provisions of 10 CFR 2.390(b)(4) of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
   i. The information sought to be withheld from public disclosure is owned and has been held in confidence by ACO.
   ii. The information is of a type customarily held in confidence by ACO and not customarily disclosed to the public. ACO has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute ACO policy and provide the rational basis required. Under that system, information is held in confidence if it falls in one or more of

several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where presentation of its use by any of ACO's competitors without license from ACO constitutes a competitive economic advantage over other companies.

b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage (e.g., by optimization or improved marketability).

c) Its use by a competitor would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of ACO, its customers or suppliers.

e) It reveals aspects of past, present, or future ACO or customer funded development plans and programs of potential commercial value to ACO.

f) It contains patentable ideas, for which patent protection may be desirable.

g) It reveals information concerning the terms and conditions, work performed, administration, performance under or extension of contracts with its customers or suppliers.

iii. There are sound policy reasons behind the ACO system which include the following:

a) The use of such information by ACO gives ACO a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the ACO competitive position.

b) It is information, which is marketable in many ways. The extent to which such information is available to competitors diminishes ACO's ability to sell products and services involving the use of the information.

c) Use by our competitors would put ACO at a competitive disadvantage by reducing their expenditure of resources at ACO expense.

d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components or proprietary information, any one component may be the key to the entire puzzle, thereby depriving ACO of a competitive advantage.

e) Unrestricted disclosure would jeopardize the position of prominence of ACO in the world market, and thereby give a market advantage to the competition of those countries.

f) The ACO capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

iv. The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

v. The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

3. The proprietary information sought to be withheld is contained within Enclosure 3 of letter ACO 20-0013. Enclosure 3 provides proposed changes to NR-3605-0005, *Fundamental Nuclear Material Control Plan for the American Centrifuge Plant.* This enclosure provides details of the Nuclear Material Control and Accountability (NMC&A) Program needed for the deployment of ACO's high-assay, low-enriched uranium (HALEU) Demonstration Program and American Centrifuge Plant; therefore, determined to be proprietary.

   Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of ACO because it may enhance the ability of competitors to position and provide similar products. Further, this information has substantial commercial value as follows:

   - The development of the information described in part is the result of applying many hundreds of person-hours and the expenditure of thousands of dollars on design and analysis activities to achieve the information that is sought to be withheld; and
   - In order for a competitor of ACO to duplicate the information sought to be withheld, a similar process would have to be undertaken and a significant effort and resources would have to be expended.

   Moreover, disclosure of this information may provide insights into the ACO's NMC&A Program for Special Nuclear Material categorized as Security-Related Information, and Export Controlled Information. Therefore, this enclosure should also be withheld from public disclosure pursuant to 10 CFR 2.390(d)(1) and 10 CFR Part 810.

Further the deponent sayeth not.

Larry B. Cutlip, having been duly sworn, hereby confirms that I am the Senior Vice President, Field Operations of American Centrifuge Operating, LLC, that I am authorized on behalf of ACO to review the information attached hereto and to sign and file with the U.S. Nuclear Regulatory Commission this affidavit and the attachments hereto, and that the statements made and matters set forth herein are true and correct to the best of my knowledge, information, and belief.

Larry B. Cutlip

On this 28th day of April 2022, Larry B. Cutlip personally appeared before me, is known by me to be the person whose name is subscribed to within the instrument and acknowledged that he executed the same for the purposes therein contained.

In witness hereof I hereunto set my hand and official seal.

Kathy Richer
State of Tennessee Notary Public
Anderson County
My commission expires October 26, 2024

KATHY RICHER
STATE OF TENNESSEE NOTARY PUBLIC
ANDERSON COUNTY
MY COMMISSION EXPIRES OCTOBER 26, 2024

Enclosure 1 of ACO 22-0042

Detailed Description, Justification, and Significance Determination

Information Contained Within
Does Not Contain
Export Controlled Information

Reviewing Official: #1038, ACO

Date: 04/27/2022

Detailed Description, Justification, and Significance Determination

Detailed Description of Change

American Centrifuge Operating, LLC (ACO) proposes to amend LA-3605-0001, *License Application for the American Centrifuge Plant* (ACP); LA-3605-0002, *Environmental Report for the American Centrifuge Plant*; and NR-3605-0005, *Fundamental Nuclear Material Control Plan for the American Centrifuge Plant*, to:

1) Remove the "three-year" verbiage or extend the contract end date for the High-Assay Low-Enriched Uranium (HALEU) Demonstration Program from May 31, 2022, to November 30, 2022.
2) Extend or clarify the Gas Centrifuge Enrichment Plant (GCEP) Lease Agreement amendments to December 31, 2025, and amendment verbiage based upon the fact that two amendments have been issued by the DOE in support of the HALEU Demonstration Program.
3) Minor administrative/formatting corrections were also noted within these proposed changes.

Proposed changes are also provided for U.S. Nuclear Regulatory Commission's (NRC) Material License SNM-2011 for the ACP, specifically Conditions #15 and #16, to make corresponding date changes.

There are no changes being proposed to the currently described HALEU 16-centrifuge cascade design or operation, and no increase in the approved HALEU possession limits approved within SNM-2011. Furthermore, no changes are warranted under the American Centrifuge Lead Cascade Facility (Lead Cascade Facility) license application and supporting documents.

The proposed changes contained within Enclosures 2, 3, and 4 are identified by the following method:

- ~~Blue Strikeout~~ - Identifies text to be removed
- Red underline – Identifies text to be added

Justification

Modification P0019 of U.S. Department of Energy's (DOE) Contract #89303519CNE000005 for the HALEU Demonstration Program was approved on April 25, 2022 (Reference 5 of this letter). The purpose of this modification is to extend the period of performance from May 31, 2022, to November 30, 2022, in order to facilitate a six-month extension to the NRC License. Under the authority of FAR 52.217-8, *Option to Extend Services.*

This contract and GCEP Lease extensions support continued preparation work to be completed that will lead into the final introduction of gas into the 16-centrifuge HALEU Demonstration cascade under an anticipated follow-on DOE contract. It is also anticipated that the DOE will be issuing a

Request for Proposal for the final operation of the HALEU Demonstration cascade under a separate contract. If awarded to ACO, a separate future amendment will be developed and submitted to the NRC for prior review and approval to support that follow-on contract.

Additionally, *Amendment 2 to the Appendix 1 Lease Agreement Between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant* (GCEP Lease Agreement), approved on September 9, 2021 (Reference 6 of this letter), formally extended the term of the lease until December 31, 2025. Note: *Amendment 1 to the Appendix 1 Lease Agreement Between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant,* was previously provided to the NRC by ACO 19-0008, dated June 27, 2019.

The proposed changes are administrative in nature to amend the completion date of the DOE HALEU Demonstration Program and corresponding GCEP Lease Agreement. There are no changes in the HALEU cascade process descriptions; number of planned operating centrifuges, or possession limits at the current time. Therefore, the proposed changes will not alter the design or performance of an item or activity as described in the Integrated Safety Analysis; LA-3605-0003, *Integrated Safety Analysis Summary for the American Centrifuge Plant*; or LA-3605-0003A, *Addendum 1 of the Integrated Safety Analysis Summary for the American Centrifuge Plant – HALEU Demonstration.* Likewise, the proposed changes will not: 1) decrease the level of the design basis as described in the ACP License Application; 2) result in a departure from a method of evaluation described in the ACP License Application used in establishing the design bases; 3) result in a degradation in safety; or 4) affect compliance with applicable regulatory requirements.

The corresponding proposed date extensions do, however, conflict with existing license conditions, specifically related to SNM-2011 Conditions #15 and #16; therefore, requires the NRC's prior review and approval.

On June 4, 2021, the NRC issued the *Environmental Assessment for the Proposed Amendment of U.S. Nuclear Regulatory Commission License Number SNM-2011 for the American Centrifuge in Piketon, Ohio* (ADAMS Accession No. ML21085A705), which provided for the conclusion and finding of no significant impact (FONSI) for the HALEU Demonstration Program. The basis for this FONSI is the proposed action was not expected to result in new construction, and that the HALEU cascade would be assembled and operated in existing buildings that previously housed a similar system under the Lead Cascade Facility license. The proposed action previously evaluated related to the number of centrifuges used for the HALEU cascade and the possession limits remains unchanged. Therefore, this basis remains unchanged with the newly proposed extension of the DOE contract and GCEP lease dates.

Additionally, during the completion of the Environmental Assessment, NRC staff took into consideration the environmental impacts of operation beyond the contract expiration date of May 31, 2022, specifically anticipated license extensions of up to 10 years. The proposed extension of the DOE contract and lease dates would not result in any significant impact on the demography, socioeconomics, and environmental justice; public and occupational health and safety; non-radiological impacts from normal operations; radiological impacts from normal operations; impacts

from accidents; waste management; transportation; or cumulative impacts. Therefore, ACO believes the environmental assessment remains valid as written.

In accordance with 10 CFR 70.34 and 70.65, the proposed changes discussed above, require the NRC's prior review and approval. The proposed changes will not decrease the ability of the management measures in the License Application to ensure the availability and reliability of IROFS. The proposed changes do not decrease the effectiveness of the design basis as described in the License Application. The proposed changes do not result in a departure from a method of evaluation described in the License Application used in establishing the design bases for the evaluation of HALEU Demonstration Criticality Events; therefore, this results in no degradation of safety. Lastly, the proposed changes do not have an adverse effect on compliance with applicable regulatory requirements.

Significance Determination for Proposed Conforming Changes

The proposed changes are administrative in nature to amend the completion date of the DOE HALEU Demonstration Program and corresponding GCEP Lease Agreement. There are no changes in the HALEU cascade process descriptions; number of planned operating centrifuges, or possession limits at the current time. ACO has reviewed the proposed changes and provides the following Significance Determination.

1. **No significant change to any conditions to the License.**

   The proposed changes are not prohibited by 10 CFR Part 70, license condition, or order. However, two conditions (#15 and #16) are being modified, to align the dates with the anticipated DOE HALEU contract extension to November 30, 2022, as well as Amendment 2 of the GCEP Lease Agreement for a term extension through December 31, 2025.

2. **No significant increase in the probability of occurrence or consequences of previously evaluated accidents.**

   The proposed changes do not remove or change an IROFS that is listed in the ACP ISA Summary and Addendum 1. The proposed changes do not alter any IROFS listed in the ISA Summary or Addendum 1, that is the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61.

3. **No new or different type of accident.**

   The proposed changes do not create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of 10 CFR 70.61 and that have not previously been described in the ISA Summary/Addendum 1.

4. **No significant reduction in the margins of safety.**

   The proposed changes do not decrease the margin of safety associated with any IROFS being credited to ensure the performance requirements of 10 CFR 70.61 are met.

5. **No significant decrease in the effectiveness of any programs or plans contained in the licensing documents.**

   - The proposed changes will not decrease the overall level of security performance needed to protect against the loss or compromise of classified matter, while in use, in storage, or in transit. The control of classified storage areas or vaults, training of classifiers, documentation of classification of matter, etc. will be maintained at an equivalent level. Security plan SEC-18-0002 provides for the protection of cyber systems, maintaining the necessary computer security requirements at an equivalent level as previously approved by the NRC.

   - The proposed changes to the Fundamental Nuclear Materials Control Plan (FNMCP) (NR-3605-0005) are administrative in nature to clarify the terms of the HALEU Demonstration Program within Section 1.1 and will have no effect on the FNMCP meeting the applicable requirements of 10 CFR Parts 70 and 74 for ACP. Likewise, the proposed changes do not affect the function or process to control nuclear material as described within the FNMCP.

   - The proposed changes do not result in a decrease in effectiveness of the approved ACP Emergency Plan. For HALEU demonstration, no Emergency Plan as discussed under 10 CFR 70.22(i) is required. Likewise, the proposed changes will not decrease the abilities of the DOE reservation Responses Organization to mitigate accident consequences or reasonably assure the adequate protection of the health and safety of the off-site and on-site personnel in the event of an emergency.

   - The proposed changes do not result in a change to the Quality Assurance Program Description; thereby, do not represent a relaxation of a requirement of Quality Assurance Program Description.

   Based on the above, the proposed changes will not result in a decrease in the effectiveness of the Security Programs/Plans, FNMCP, Emergency Plan, or the Quality Assurance Program Description contained in the licensing documents.

6. **The proposed change does not result in undue risk to: 1) public health and safety; 2) common defense and security; and 3) the environment.**

   The proposed changes do not involve additional quantities of licensed material and do not change the response to accidents or events associated with licensed material. There will be no generation or increase in hazardous material quantities such that it impacts public health and safety. The proposed changes have no impact to the plant boundary protection, documentation of patrols, performance of rounds, or training of protective force personnel. The proposed changes will not increase the likelihood classified matter or Special Nuclear Material will be

accessible to unauthorized personnel. Therefore, the proposed changes do not result in undue risk to public health and safety, the environment, or to the common defense and security.

7. **There is no change in the type or significant increases in the amounts of any effluents that may be released off-site.**

   The proposed changes do not result in any new or unusual sources of hazardous substances, hazardous waste, or new waste streams that could be generated or used in unacceptable levels that exceed applicable regulatory requirements as a result of the proposed changes. In addition, there is no change in the type or significant increases in the amounts of any effluents that may be released off-site.

8. **There is no significant increase in individual or cumulative occupational radiation exposure.**

   DAC-3901-0005, *Evaluation of No Need for an Emergency Plan for the HALEU Demonstration*, provides the evaluation stipulated in 10 CFR 70.22(i)(1)(i) to demonstrate that no Emergency Plan is required for the HALEU Demonstration Program. The evaluation shows that the maximum dose to a member of the public offsite due to a release of radioactive materials would not exceed 1 rem effective dose equivalent or an intake of 2 mg of soluble U. Therefore, the proposed changes provided within this License Amendment Request to extend the date for the existing DOE HALEU Contract period will not increase radiological or chemical releases beyond applicable regulatory limits (10 CFR 70.61) and will not create any new or unusual sources of radioactive waste. Likewise, the proposed changes will not result in significant increase in individual or cumulative occupational radiation exposure.

9. **There is no significant construction impact.**

   HALEU Demonstration Program construction activities are currently on hold until the DOE issues the follow-on contract to finalize the construction activities, pass the final NRC required Operational Readiness Review inspections, and receive final authorization to introduce gas into the HALEU cascade to meet the DOE's follow-on contract obligations. Therefore, currently there are no foreseen environmental concerns based upon the fact that the HALEU Demonstration Program is being constructed within leased buildings used during the operations of the previous American Centrifuge Lead Cascade Facility; however, on a much smaller scale. Additionally, there will be no new building construction planned for the extension of time for this initial deployment phase of the ACP.

Enclosure 2 of ACO 22-0042

Proposed Changes for LA-3605-0001, *License Application for the American Centrifuge Plant*, and LA-3605-0002, *Environmental Report for the American Centrifuge Plant*

Information Contained Within **Does Not Contain** **Export Controlled Information**	
Reviewing Official:	#1038, ACO
Date:	04/27/2022

For Information Only

1.0 GENERAL INFORMATION

This license application was previously submitted by Centrus Energy Corp. (Centrus), formerly known as USEC Inc., for the American Centrifuge Plant (ACP). It encompasses 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 (SWU) annually.

The United States Enrichment Corporation leases portions of the Portsmouth Gaseous Diffusion Plant (GDP) reservation from the U.S. Department of Energy (DOE) through the *Lease Agreement between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant* (GCEP Lease Agreement). Pursuant to a 2006 amendment to that lease agreement, Centrus subleased space for the American Centrifuge Lead Cascade Facility (Lead Cascade) and the ACP from the United States Enrichment Corporation. Centrus, with approval of the DOE, assigned the sublease for the space for the ACP to the Licensee, American Centrifuge Operating, LLC (ACO). The Licensee and its agents will conduct activities within the leased facilities and access and egress thereto, in accordance with this license application.

The ACP utilizes existing buildings located on the DOE reservation near Piketon, Ohio, that were built to support the gaseous centrifuge process beginning in the 1980s, in addition to several newly constructed buildings and facilities.

The ACP is the third step in the plan to deploy the American Centrifuge technology. The first step was the centrifuge testing in Oak Ridge, Tennessee, to upgrade, and demonstrate an economically attractive gas centrifuge and enrichment process. The second step was the deployment of the Lead Cascade in Piketon, Ohio, which provided reliability, performance, cost, and other vital data on the ACP enrichment process. American Centrifuge technology is modular, with the basic building block of enrichment capacity being a cascade of centrifuges. Information gained and work performed during the centrifuge testing and Lead Cascade projects included vital information on performance, reliability, and economics that will be used in the construction of the ACP. A license application was prepared pursuant to the *Atomic Energy Act* of 1954 as amended, 10 *Code of Federal Regulations* (CFR) Parts 70, 40, 30, and other applicable laws and regulations. The commercial ACP operation is designed to enrich and safely contain and handle uranium hexafluoride (UF_6) up to 10-weight (wt.) percent uranium-235 (^{235}U). This license application includes the High Assay Low Enriched Uranium (HALEU) Demonstration Program which is designed to enrich and safely contain and handle UF_6 with an operational limit that is less than 20.0 wt. percent ^{235}U.

This license application follows the format and content guidelines provided in NUREG-1520, *Standard Review Plan for Fuel Cycle Facilities License Applications*, Revision 2 (Reference 1). The information provided reflects the design in sufficient detail to enable a reviewer to make a definitive evaluation that the ACP can be constructed and operated without undue risk to the health and safety of the public and with no significant impact to the environment.

The ACP uses portions of the Portsmouth Gaseous Diffusion Plant (GDP) and the former DOE Gas Centrifuge Enrichment Plant (GCEP) along with eight new facilities. The ACP utilizes existing utilities and infrastructure that support the DOE reservation along with the utilities and

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infrastructure that were intended to support GCEP. New facilities are necessary for feed, withdrawal, sampling, and blending/transfer operations. Centrus has updated the American Centrifuge technology from that used in the GCEP program, but the American Centrifuge components remain compatible with existing infrastructure and buildings/facilities.

The HALEU Demonstration Program is a program awarded by DOE's Nuclear Energy Oak Ridge Site Office for the demonstration of the HALEU production to support DOE research and development (R&D) activities and programs. The HALEU Demonstration Contract was awarded on May 31, 2019 and definitized on October 31, 2019 (Reference 17). The two primary objectives of the HALEU Demonstration Program is for American Centrifuge Operating, LLC (ACO), the licensee, to deploy a 16-machine AC-100M HALEU cascade in the Piketon facility to produce 19.75% ^{235}U enriched product and to demonstrate the capability to produce HALEU utilizing US-origin uranium enrichment technology. The HALEU Demonstration will be deployed in a subset of the larger ACP with deviations noted as appropriate in the sections that follow.

It is the intent of the licensee to deploy portions of the ACP in a modular fashion to accommodate market demand on a scalable, economical gradation. This modular deployment will encompass utilization of cascades of LEU production for customer product or feed material into HALEU cascades.

1.1 Plant and Process Description

This section describes the buildings and facilities that comprise the ACP located on the DOE reservation in Piketon, Ohio, and describes the process by which the plant will operate. Facilities are those buildings and systems identified in the lease agreement between the United States Enrichment Corporation and DOE. The ACP buildings and facilities are grouped in two categories, primary and secondary in the Integrated Safety Analysis (ISA) Summary. Figure 1.1-1 (located in Appendix B) depicts the entire DOE reservation and the area where the ACP resides in the southwest quadrant. Figure 1.1-2 depicts a closer view of the ACP area and shows the Primary and Secondary buildings. Primary facilities are those buildings or areas that could contain licensed material in quantities that could potentially result in consequences that exceed the performance criteria defined in 10 CFR 70.61 resulting from credible accidents or that directly control a primary facility. All other ACP facilities are considered to be secondary. A further description of primary and secondary facilities and a list of these buildings/facilities are in Sections 1.1.3 and 1.1.4 of this license application.

The uranium element appears in nature in numerous isotopes; the three major isotopes of interest have atomic weights of 234, 235, and 238. The ^{235}U isotopes are fissionable and capable of sustaining a critical reaction. Natural uranium contains 0.711 percent ^{235}U isotope. Isotopic separation processes separate uranium into two fractions, one enriched in the ^{235}U isotope, and the other depleted.

Prior to the enrichment process, uranium is combined with fluorine to form UF_6 from the uranium feed suppliers. The UF_6 arrives at the plant in a solid state and this UF_6 is sublimed from a solid to a gas and fed into the system. In the gas centrifuge process, the isotopic separation is accomplished by centrifugal force, which uses the difference in weight of the uranium isotopes to achieve this isotopic separation. UF_6 can be enriched up to 10 wt. percent assay ^{235}U in the

1.1.7 Roadways

Two major four-lane highways service the DOE reservation: U.S. Route 23, traversing north-south, and State Route 32/124, traversing east-west. The reservation is situated approximately three and one half miles from the intersection of U.S. Route 23 and State Route 32/124. Ingress and egress from the reservation to these major roadways is by the Main Access Road, which connects to U.S. Route 23. The Main Access Road connects to the Perimeter Road, which encircles the fenced portion of the DOE reservation. Alternative ingress and egress from the reservation can be established from the north access road in the event of significant Main Access Road repairs. Service roads throughout the reservation connect to the Perimeter Road with access to the ACP controlled through security portals. The reservation roadways are depicted in Figures 1.1-1 (located in Appendix B) and 1.1-2.

1.1.8 Phased Modular Expansion Plan for the American Centrifuge Plant

It is the intent of ACO to deploy portions of the ACP in a modular fashion to accommodate market demand on a scalable, economical gradation. This modular deployment may encompass utilization of cascades of Low Enriched Uranium (LEU) production for LEU customer product or feed material into HALEU cascades. The ratio of LEU cascades to HALEU cascades would be approximately 6 to 1.

1.1.8.1 High Assay Low Enriched Uranium Demonstration

The HALEU Demonstration cascade utilizes a similar centrifuge design to that used for the Lead Cascade. The equipment necessary to perform the enrichment process is in the X-3001 Process Building and consists of product and tails withdrawal system, UF_6 cylinders, centrifuges, and supporting systems. The product and tails withdrawal systems use three cold boxes. NaF traps are used for additional withdrawal capacity during dumping. A 30B UF_6 cylinder is used for the feed material. Centrifuges and supporting units are placed in the Train 3 area of the X-3001 building. For further plant and process specifics related to the HALEU Demonstration Program, refer to LA-3605-0003A, *Addendum 1 of the Integrated Safety Analysis for the American Centrifuge Plant – HALEU Demonstration* (Reference 7).

In support of this HALEU Demonstration Program and NRC Materials License (SNM-2011) Condition 23, DOE amended (Amendment 1) the *Appendix 1 Lease Agreement between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant* (GCEP Lease Agreement) (Reference 71). The amended GCEP Lease Agreement renewed and extended the term of the lease through May 31, 2022. The ACO sublease incorporates the terms of the GCEP Lease Agreement. Furthermore, in September 2021, the DOE amended (Amendment 2) the GCEP Lease Agreement to extend the term through December 31, 2025. All other terms of the GCEP Lease as amended by Amendment 1 remained unchanged.

At the conclusion of the ~~three-year~~ HALEU Demonstration Program, the facilities will be either returned to the DOE in accordance with the requirements of the GCEP Lease Agreement or the parties will amend the GCEP Lease Agreement to allow the performance of other work on the leased premises.

Fluor-BWXT Portsmouth, LLC (FBP) is the DOE contractor for D&D of the GDP. FBP is responsible for the D&D of 415 facilities and structures that supported the uranium enrichment operations conducted at the site. During D&D, Fluor-BWXT prepares contaminated facilities for demolition by deactivating utilities and removing stored waste, materials, process equipment such as converters and compressors, and piping.

The plant also includes various support structures that provide feed and transfer operations and site services such as maintenance; steam generation; cleaning; process heat removal; electrical power distribution; and water supply storage and distribution.

Pixelle Specialty Solutions™, formerly Glatfelter Specialty Papers, operates a lumberyard on the north edge of the DOE reservation. This facility is utilized as a sorting and transfer area for commercial and paper grade lumber.

1.2.2 Financial Qualifications

Under the HALEU Contract (Reference 17), DOE agreed to reimburse the Company for 80 percent of its costs incurred in performing the contract. The Company's cost share is the corresponding 20 percent and any costs incurred above these amounts. Costs under the HALEU Contract include *program costs*, including direct labor and materials and associated indirect costs that are classified as *Cost of Sales*, and an allocation of corporate costs supporting the program that are classified as *Selling, General, and Administrative Expenses*. Services to be provided over the ~~three-year~~ HALEU contract period include constructing and assembling centrifuges and related infrastructure in a cascade formation. When estimates of remaining program costs to be incurred for such an integrated construction-type contract exceed estimates of total revenue to be earned, a provision for the remaining loss on the contract is recorded to *Cost of Sales* in the period the loss is determined. Our corporate costs supporting the program are recognized as expense as incurred over the duration of the contract term. The accrued loss on the contract will be adjusted over the remaining contract term based on actual results and remaining program cost projections (Reference 22).

In support of this HALEU Demonstration Program, DOE amended (Amendment 1) the GCEP Lease Agreement, in which the parties agree that all work performed under the HALEU Demonstration Contract on leased premises shall be considered a permitted use; any alterations or changes to the premises pursuant to the Demonstration Contract with the DOE shall be a permitted change to the premises; and that any liabilities of the Corporation (Licensee) arising from or incident to the performance of work under the Demonstration Contract with the DOE shall be governed solely by such contract. Both the GCEP Lease and the Demonstration Contract afford indemnification pursuant to the Price Anderson Act.

The Company has long-term nuclear fuel sales and supply contracts in place that extend to 2030; these contracts will provide a stream of revenue for many years and provide a foundation for growth (Reference 22).

At the time of initial licensing and remains as the basis for the initial Materials License approval, the Licensee estimated the total cost to construct the initial 3.8 million SWU capacity

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to satisfactorily fulfill customer orders up to 20 wt. percent ^{235}U. ACP shall not input parameters to extract product material for the assay above 20 wt. percent ^{235}U at any time.

Within the ACP Operations, the Licensee will provide a minimum 60-day notice to the NRC prior to initial customer product withdrawal of licensed material exceeding 5 wt. percent ^{235}U enrichment. This notice will identify the necessary equipment and operational changes to support customer product withdrawal, storage, processing, and shipment for these assays.

1.2.5 Special Exemptions or Special Authorizations

The following exemption to the applicable 10 CFR Part 20 requirements are identified in Section 4.8 of this license application:

- UF_6 feed, product, and depleted uranium cylinders, which are routinely transported inside the DOE reservation boundary between ACP locations and/or storage areas at the ACP, are readily identifiable due to their size and unique construction and are not routinely labeled as radioactive material. Qualified radiological workers attend UF_6 cylinders during movement.

- Containers located in Restricted Areas within the ACP are exempt from container labeling requirements of 10 CFR 20.1904, as it is deemed impractical to label each and every container. In such areas, one sign stating that every container may contain radioactive material will be posted. By procedure, when containers are to be removed from contaminated or potentially contaminated areas, a survey is performed to ensure that contamination is not spread around the reservation.

- In lieu of the requirements of 10 CFR 20.1601(a), each High Radiation Area with a radiation reading greater than 0.1 Roentgen Equivalent Man per hour (REM/hour) at 30-centimeters (cm) but less than 1 REM/hour at 30 cm is posted Caution, High Radiation Area and entrance into the area shall be controlled by an RWP. Physical and administrative controls to prevent inadvertent or unauthorized access to High and Very High Radiation Areas are maintained. The on-site radiological impacts from the proposed exemptions to the requirements of 10 CFR 20.1904 and 20.1601 would be minimal and are consistent with previously approved exemptions found in the GDP certification. Moreover, pursuant to the regulations in 10 CFR 20.2301, the requested exemption is authorized by law and would not result in undue hazard to life or property.

The following exemption from the applicable 10 CFR 70.50 reporting requirement is identified in Section 11.6.3 of this license application:

- The 10 CFR 70.50(c)(2) reporting criteria require that the ACP submit a written follow-up report within 30 days of the initial report required by 10 CFR 70.50 (a) or (b) or by 10 CFR 70.74 and Appendix A of Part 70. In lieu of the 30-day requirement described in 10 CFR 70.50(c)(2), NRC approval to submit the required written reports within 60 days of the initial notifications is hereby requested.

10 CFR 70.17 allows the Commission, upon application of any interested person or upon its own initiative, to grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The requested exemption is authorized by law because there is no statutory prohibition on extending the reporting period to 60 days.

Furthermore, granting this exemption request will not endanger life or property or the common defense and security, in that the exemption request does not relieve the ACP from other requirements contained in 10 CFR 70.50 (a) or (b) or by 10 CFR 70.74 and Appendix A of Part 70, such as 1-hour, 4-hour, and 24-hour reporting requirements for defined events.

The proposed exemption would result only in written reports being submitted within the time limit currently allowed under 10 CFR 50.73 for commercial nuclear power plants. It would be consistent with the exemption granted to the gaseous diffusion plants for reporting of events pursuant to 10 CFR 76.120(d)(2) (67 Federal Register 68699, November 12, 2002) and the exemption granted to the Lead Cascade during licensing.

This proposal allows for completion of required root cause analyses after event discovery and fewer supplemental reports, thereby reducing regulatory burden and confusion. Thus, it is clearly consistent with the public interest.

The Licensee notes that the requirements of 10 CFR 20.2201 and 20.2203 require written reports of certain events within 30 days after their occurrence. The Licensee is not requesting an exemption from these reporting requirements.

The following exemption from the requirements of 10 CFR 70.25(e) and 10 CFR 40.36(d) addressing the decommissioning funding requirements is identified in Section 10.1 of this license application:

- 10 CFR 70.25(e) and 10 CFR 40.36(d) require, in part, that "The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning…".

  In support of HALEU Demonstration Program, as noted in Section 10.1 of this license application, DOE amended the *Appendix 1 Lease Agreement between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant* (GCEP Lease Agreement). In the amended (Amendment 1) GCEP Lease Agreement, DOE assumes all liability for the decontamination and decommissioning of such facilities and equipment installed, and any work performed, under the HALEU Demonstration Contract with the Department including any materials or environmental hazards on the site. Therefore, exempting ACO from any financial assurance for any liability or lease turnover conditions shall be required from the Corporation (Licensee). Additionally, as stated within the amended GCEP Lease

For Information Only

Agreement, the parties agree that should any liabilities of the Corporation (Licensee) arise from or incident to the performance of work under the Demonstration Contract with the DOE shall be governed solely by such contract and any financial protection afforded to the Corporation (Licensee) as a person indemnified under the Act.

The following exemption from the requirements of 10 CFR 70.25(e) and 10 CFR 40.36(d) addressing the decommissioning funding requirements is identified in Section 10.2.10.4 and the DFP of this license application:

- 10 CFR 70.25(e) and 10 CFR 40.36(d) require, in part, that "The decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning…".

  In support of future expansion of the ACP, as noted in Section 10.2.10.4 of this license application, the financial assurance for a portion of the decommissioning costs, to include the disposition of centrifuges and UF_6 tails, which constitutes a major portion of the decommissioning liability, will be provided incrementally as centrifuges are built/installed and UF_6 tails generated. Full funding for decommissioning of the facilities will be provided in the initial executed financial assurance instrument.

  This exemption is justified for the following reasons: 1) It is authorized by law because there is no statutory prohibition on incremental funding of decommissioning costs. 2) The requested exemption will not endanger life or property or the common defense and security for the following reasons: the unique modular aspects of the American Centrifuge technology allow enrichment operations to begin well before the full capacity of the plant is reached. Thus, the decommissioning liability for centrifuges and UF_6 tails is incurred incrementally as more centrifuges are added to the process, until full capacity of the facility is reached; at which point the UF_6 tails are generated at a relatively constant rate throughout the life of the plant. As such, requiring full funding for decommissioning liability, to include centrifuges and UF_6 tails disposition, incurred over the lifetime of the plant, at the time of initial license issuance, produces an unnecessary financial burden on the licensee.

  Furthermore, incremental funding of decommissioning costs, to include centrifuges and UF_6 tails disposition, is justified based upon the Licensee's commitments to update the cost estimates and provide a revised funding instrument for decommissioning annually, to cover the upcoming period of operation, prior to operation at full capacity, and after full capacity has been reached to annually adjust the cost estimate for UF_6 tails disposition and to adjust all other decommissioning costs periodically, and no less frequently than every three years. In addition, the relative stability of the factors, which are utilized to generate the UF_6 tails volumes, allows actual inventory values to be provided for prior periods of operation and reliable estimates for the upcoming periods of operation. The NRC has previously accepted an incremental approach to decommissioning funding costs for the United States Enrichment Corporation's operation of the GDPs. 3) Finally, granting this exemption is in the public interest for

For Information Only

the same reasons as stated above and will facilitate deployment of gas centrifuge enrichment technology by eliminating an unnecessary financial burden on the licensee.

The following exemption from the requirements of 10 CFR 70.24 addressing criticality monitoring is identified in Section 3.10.6 of the ISA Summary and discussed in Section 5.4.4 of this License Application. Exemption is required for criticality monitoring of the UF_6 cylinder storage yards.

- 10 CFR 70.24, *Criticality Accident Requirements*, requires that licensees authorized to possess special nuclear material in a quantity exceeding 700 g of contained ^{235}U shall maintain in each area in which such licensed special nuclear material is handled, used, or stored, a monitoring system capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads of combined neutron and gamma radiation at an unshielded distance of two meters from the reacting material within one minute.

  10 CFR 70.17 allows the Commission, upon application of any interested person or upon its own initiative, to grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The requested exemption is authorized by law because there is no statutory provision prohibiting the grant of the exemption. The requested exemption will not endanger life or property or the common defense and security and is otherwise in the public interest for the reasons discussed below.

  Transportation, handling and storage of solid UF_6 filled cylinders are doubly contingent. Double contingency is established by multiple controls that limit the likelihood for a solid product cylinder to be breached during transportation, handling or storage, and the likelihood for a breach to not be identified and repaired before sufficient moderation results in a criticality. Moderation control of UF_6 filled cylinders is maintained by ensuring cylinder integrity through periodic cylinder inspections. If a UF_6 filled cylinder is found to be breached, the cylinder is covered within 24-hours after discovery to reduce the potential accumulation of moderating material, i.e., rainwater. This time limit ensures a corresponding heavy rainfall will not result in accumulation of sufficient amounts of water to cause a criticality. Damaged cylinders are repaired as necessary and emptied. UF_6 cylinders are uniquely identified and their design requirements are controlled to further ensure cylinder integrity and reliability (i.e., UF_6 cylinders are QL-1 components and are controlled in accordance with the Quality Assurance Program Description), and the Licensee implements onsite cylinder handling practices (i.e., requiring the use of approved equipment in accordance with approved procedures), which reduces the likelihood that a solid UF_6 cylinder would be breached. These requirements are established as items relied on for safety to ensure the health and safety of the public and workers.

  The UF_6 cylinders stored in storage yards are not covered by a criticality monitoring system unless those cylinders contain licensed material greater than 5.0 weight percent ^{235}U. NCS evaluation of product cylinders of any size, configured in infinite planar

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arrays, containing material enriched up to 5.25 weight percent ^{235}U, has concluded that subcritical conditions are maintained. The ACP ISA has concluded that cylinders containing licensed material less than or equal to 5.0 weight percent ^{235}U cannot be involved in a criticality accident sequence that has a probability of occurrence that exceeds 5×10^{-6}/year.

The frequencies of criticality events in the cylinder yards have been decreased to the Highly Unlikely range ($<10^{-5}$/year) through the establishment of preventive controls established by the ISA in accordance 10 CFR 70.62. Considering the conservatism of the ISA methodology in developing the unmitigated frequency and actual historical data related to cylinder operations, the frequency values could be reduced further. This additional reduction considers the fact that during 50 years of GDP operations, only one cylinder breach has occurred due to mishandling or equipment failure. Since that occurrence, cylinder handling equipment has been redesigned and cylinder handling methods have been revised to minimize the potential for breaches to occur. Another fact not considered in the ISA is that holes with a dimension of less than one inch will self-seal such that moderating material cannot infiltrate the breach. A third factor not considered in the ISA is that enriched cylinder operations require constant use and monitoring of cylinders such that corrosion breaches in enriched cylinders are highly unlikely. Allowing for this additional reduction in frequency, the probability for a criticality event becomes incredible, therefore CAAS coverage is not necessary.

The increased vehicular and pedestrian traffic in support of CAAS maintenance and calibration requirements would cause a subsequent increased likelihood for impact events involving cylinders and there would be an increased safety risk for workers from radiation exposure due to the ongoing CAAS maintenance and calibration requirements. To meet the CAAS coverage requirements in ANSI 8.3 and the operating requirements for the ACP, enriched cylinder storage yards would require a minimum of 60 clusters. Clusters would need to be at a height of approximately 40 feet, which would require maintenance equipment and pedestrian traffic to perform testing and preventative maintenance tasks to ensure their reliability and operability. This equipment and traffic would increase the likelihood for fire and impact events in the cylinder storage yards such that workers would be at a higher risk for injury and exposure relative to the minimal mitigative value produced by the presence of CAAS.

The following exemption from the requirements of 10 CFR 140.13b crediting DOE indemnity in lieu of nuclear liability insurance as discussed in Section 1.2.2 of this license application.

- 10 CFR 140.13b requires, that "Each holder of a license issued under Parts 40 or 70 of this chapter for a uranium enrichment facility that involves the use of source material or special nuclear material is required to have and maintain liability insurance. The liability insurance must be the type and in the amounts the Commission considers appropriate to cover liability claims arising out of any occurrence within the United States that causes, within or outside the United States, bodily injury, sickness, disease, death, loss of or damage to property, or loss of use of property arising out of or resulting from the

radioactive, toxic, explosive, or other hazardous properties of chemical compounds containing source material or special nuclear material. Proof of liability insurance must be filed with the Commission as required by § 140.15 before issuance of a license for a uranium enrichment facility under parts 40 and 70 of this chapter."

In support of this HALEU Demonstration Program, DOE amended (Amendment 1) the GCEP Lease Agreement, in which the parties agree that all work performed under the HALEU Demonstration Contract on leased premises shall be considered a permitted use; any alterations or changes to the premises pursuant to the Demonstration Contract with the DOE shall be a permitted change to the premises; and that any liabilities of the Corporation (Licensee) arising from or incident to the performance of work under the HALEU Demonstration Contract with the DOE shall be governed solely by such contract. Therefore, the Demonstration Contract exempts ACO from any financial assurance for any liability insurance during the ~~three-year~~ HALEU ~~c~~Contract period.

In support of future expansion of the ACP, in accordance with Section 3107 of the USEC *Privatization Act*, the Lease with DOE for the DOE owned facilities that will be used for the ACP includes an indemnity agreement from DOE under Section 170d of the *Atomic Energy Act* (AEA) for liability claims.

The Commission may, pursuant to 10 CFR 140.8, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and are otherwise in the public interest. This exemption is authorized by law because there is no statutory prohibition on crediting the DOE indemnity agreement in lieu of nuclear liability insurance. The DOE indemnity agreement contained in the Lease pursuant to DOE's authority in Section 170d of the AEA is sufficient to meet the requirements of Section 193(d) of the *Atomic Energy Act* of 1954, as amended. Section 193(d) states that "the Commission shall require, as a condition of the issuance of a license … for a uranium enrichment facility, that the licensee have and maintain liability insurance of such type and in such amounts as the Commission judges appropriate to cover liability claims …"

The Lease requires that the Licensee obtain "financial protection to cover public liability, [as defined in the AEA] in such amount and of such type as is commercially available at commercially reasonable rates, terms and conditions" (Lease at Section 10.1(c)). To the extent required by the Lease, the Licensee will obtain such financial protection and will provide proof of such financial protection to the NRC prior to commencing operations.

The indemnity agreement contained in the Lease will "cover liability claims arising out of any occurrence within the United States that causes, within or outside the United States, bodily injury, sickness, disease, death, loss of or damage to property, or loss of use of property arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of chemical compounds containing source material or special nuclear material." Section 193(d) affords the Commission the discretion to determine the type and amount of liability insurance that is required to cover liability claims. The

For Information Only

Commission has the discretion to conclude that no liability insurance is required in light of the DOE indemnity agreement. Therefore, the requested exemption is authorized by law.

Moreover, the requested exemption is in the public interest since it will facilitate deployment of the ACP, thereby maintaining domestic enrichment capacity using more efficient centrifuge technology. Requiring separate nuclear liability insurance would at best impose an unnecessary financial burden on the licensee and at worst preclude the construction of the ACP if commercial insurance ultimately is unavailable for facilities, such as the ACP, which are located on a DOE owned site. ANI, the only company providing commercial nuclear liability insurance in the U.S., has informed us that it has never insured a facility located on a DOE owned site. Furthermore, the separate liability insurance would not provide a commensurate benefit to the public since the DOE indemnity covers any public liability under Section 170 of the AEA up to the statutory limit of liability. The DOE indemnity agreement in the Lease adequately provides financial protection for the public for public liability as defined in the AEA. Therefore, the requested exemption is in the public interest.

The following exemption from NRC's Materials License Condition 15 related to financial funding as discussed in Section 1.2.2 of this license application.

- In order to meet the financial qualifications requirements for construction and operation of the facility, the Licensee proposes that the license be conditioned as follows:

  > Construction of each additional incremental future expansion of the ACP shall not commence before funding for that increment is available or committed. Of this funding, the Licensee or affiliates must demonstrate before constructing such increment, arrangements that solely or cumulatively are sufficient to ensure funding for the particular increment's construction costs. The Licensee will make available for NRC inspection, documentation of both the budgeted costs for such phase and the source of funds available or committed to pay those costs.
  >
  > Operation of additional expansion of the ACP shall not commence until the Licensee or affiliates has in place, either: (1) long term contracts lasting five years or more that provide sufficient funding for the estimated cost of operating the facility for the five year period; (2) documentation of the availability of one or more alternative sources of funds that provide sufficient funding for the estimated cost of operating the facility for five years; or (3) some combination of (1) and (2).

  In general, the Licensee's financial qualifications to construct and operate the HALEU 16-centrifuge cascade under the Demonstrations' Contract is demonstrated by the contract with DOE and the Selected Financial Data and detailed Consolidated

Financial Statements within the latest information filed with the U.S. Securities Exchange Commission by its parent Centrus.

Under the HALEU Contract, DOE agreed to reimburse the Company for up to 80 percent of its costs incurred in performing the contract. The Company's cost share is the corresponding 20 percent and any costs incurred above these amounts. Costs under the HALEU Contract include *program costs*, including direct labor and materials and associated indirect costs that are classified as *Cost of Sales*, and an allocation of corporate costs supporting the program that are classified as S*elling, General, and Administrative Expenses*. Services to be provided over the ~~three-year~~ HALEU ~~e~~Contract period include constructing and assembling centrifuges and related infrastructure in a cascade formation and production of up to 600 kgU HALEU. When estimates of remaining program costs to be incurred for such an integrated construction-type contract exceed estimates of total revenue to be earned, a provision for the remaining loss on the contract is recorded to *Cost of Sales* in the period the loss is determined. Our corporate costs supporting the program are recognized as expense as incurred over the duration of the contract term. The accrued loss on the contract will be adjusted over the remaining contract term based on actual results and remaining program cost projections. The Licensee requests an exemption to this condition during the ~~three-year~~ HALEU Contract period.

The following Special Authorization has been identified in this license application:

- Surface Contamination Release Levels for Unrestricted Use – Items may be released for unrestricted use if the surface contamination is less than the levels listed in Table 4.6-1.

The following exemption from the requirements in 10 CFR 95.57(c) is identified in Section 1.17.c) of the *Security Plan for the Protection of Classified Matter at the American Centrifuge Plant*:

- NRC regulations in 10 CFR 95.57(c) require that all classification actions (documents classified, declassified, or downgraded) to be submitted to the NRC Division of Security Operations. These may be submitted either on an "as completed" basis or monthly. The information may be submitted either electronically by an on-line system or by paper copy using NRC Form 790. Historically, the Licensee has utilized NRC Form 790 for each classification action, has compiled them monthly, and submitted them to the NRC. The Licensee must also submit a quarterly classification summary document to the DOE for all derivative classification decisions made during the previous quarter. This dual reporting is burdensome to the Derivative Classifiers and the Classification Officer and creates a situation where the classification actions may be double counted. Accordingly, in lieu of filing its classification actions with NRC, the Licensee will continue to submit the quarterly classification summary documents to DOE and will make them available for NRC inspection at the facility.

For Information Only

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10.0 DECOMMISSIONING

In accordance with NUREG-1520, *Standard Review Plan for Fuel Cycle Facilities License Applications* (Revision 2), this chapter provides an overview of proposed decommissioning activities for the American Centrifuge Plant (ACP). The ACP is located in a leased area of the U.S. Department of Energy's (DOE) reservation in Piketon, Ohio.

10.1 High Assay Low Enriched Uranium (HALEU) Demonstration Program

The Licensee, American Centrifuge Operating, LLC (ACO or Corporation), is deploying a 16-machine AC100M HALEU cascade in leased areas under contract with the U.S. Department of Energy (DOE or Department). In support of this HALEU Demonstration Program, DOE amended the *Appendix 1 Lease Agreement between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant* (GCEP Lease Agreement). The amended (Amendment 1) GCEP Lease Agreement renewed and extended the term of the lease through May 31, 2022. ~~Additionally, t~~The amended GCEP Lease Agreement permitted~~s~~ the construction and operation of the demonstration cascade by the Corporation (Licensee), the sublessee of the GCEP Lease and holder of the U.S. Nuclear Regulatory Commission (NRC) American Centrifuge Plant (ACP) Materials License. Furthermore, in September 2021, the DOE amended (Amendment 2) the GCEP Lease Agreement to extend the term through December 31, 2025. All other terms of the GCEP Lease as amended by Amendment 1 remained unchanged.

~~The amended~~ Amendment 1 of the GCEP Lease Agreement include~~s~~d the following statements pertaining to decommissioning liability:

- As of May 31, 2019, the Corporation (Licensee) had fully satisfied the lease turnover conditions and any existing financial assurance provided under Section 4.3 (of the GCEP Lease Agreement) was released, surety bonds were cancelled, and collateral returned to the Corporation (Licensee).

- Any facilities or equipment constructed or installed by the Corporation (Licensee) under the Demonstration Contract with the Department shall be included in Exhibit B (of the GCEP Lease Agreement) as Leased Personality and may be returned to the Department in an "as is" condition at the end of the lease term ~~(May 31, 2022)~~.

- The Department hereby assumes all liability for the decontamination and decommissioning of such facilities and equipment installed, and any work performed, under the Demonstration Contract with the Department including any materials or environmental hazards on the site. Therefore, no financial assurance for any liability or lease turnover conditions shall be required from the Corporation (Licensee).

- The parties agree that any work performed under the HALEU Demonstration Contract on the leased premises shall be considered a permitted use; any alternations or changes to the premises pursuant to the Demonstration Contract with the DOE shall be a permitted change to the premises; and any liabilities of the Corporation (Licensee) arising from or incident

to the performance of work under the Demonstration Contract with the DOE shall be governed solely by such contract and any financial protection afforded to the Corporation (Licensee) as a person indemnified under the Act.

Pursuant to the modified DOE HALEU Contract, title to depleted uranium hexafluoride (UF_6) by-product (tails) from the HALEU enrichment process will be retained by DOE.

At the conclusion of the HALEU Demonstration Program, the facilities will be either returned to the Department in accordance with the requirements of the GCEP Lease Agreement or the Licensee will amend the ACP Materials License to allow phased implementation of expanded centrifuge enrichment cascades as described in Section 1.1.8 of the license application. At that time, a revised decommissioning funding plan, including an updated decommissioning cost estimate would be provided to the NRC for prior review and approval to reflect any new decommissioning liabilities.

10.2 American Centrifuge Plant (ACP) Decommissioning

The Licensee previously requested a 30-year license to operate the ACP. At the end of useful plant life, the ACP will be decommissioned such that the facilities will be either returned to the DOE in accordance with the requirements of the Lease Agreement with the DOE or will be released for unrestricted use. The criteria for final disposition of facilities will be established in the Decommissioning Plan (DP) which, as noted below, will be submitted prior to license termination. Nevertheless, for the purposes of the License Application for the ACP, the decommissioning discussions in this application and the decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 *Code of Federal Regulations* (CFR) 20.1402. Information about the Licensee, the location of the site, and the types and authorized uses of licensed material are provided in Section 1.2 of the license application and a description of the site and immediate environs is provided in Section 1.3 of the license application.

Similar to the successful decommissioning efforts for the American Centrifuge Lead Cascade Facility, a more detailed DP for the ACP will be submitted by the Licensee in accordance with 10 CFR 30.36 (g), 10 CFR 40.42 (g), and 10 CFR 70.38(g) and applicable risk-informed NRC guidance provided in NUREG-1757, *Consolidated Decommissioning Guidance* (Volumes 1 - 3) prior to the time of license termination. Prior to decommissioning, an assessment of the radiological status of the ACP will be made. Enrichment equipment will be removed, leaving only the building shells and the plant infrastructure, including equipment that existed at the time of lease with the DOE (e.g., rigid mast crane, utilities, etc.). Classified material, components, and documents will be destroyed or disposed of in accordance with the *Security Plan for the Protection of Classified Matter at the American Centrifuge Plant*. Requirements for nuclear material control and accountability will be maintained during decommissioning in a manner similar to the programs in force during ACP operation (NR-3605-0005). Depleted UF_6 material (tails), if not sold or disposed of prior to decommissioning, will be sold, or converted to a stable, non-volatile uranium compound and disposed of in accordance with regulatory requirements utilizing facilities constructed by DOE, as authorized by the *USEC Privatization Act*, and/or other licensed facilities.

Radioactive wastes will be disposed of at licensed low-level waste disposal sites. Hazardous wastes will be treated or disposed of in licensed hazardous waste facilities.

The DP submitted at the time of license termination consists of several interrelated components, including (1) site characterization information, (2) remediation plan, and (3) a final status survey plan. The costs for activities required for these components have been identified in this chapter and estimated in the Decommissioning Funding Plan (DFP). Costs projected were developed based on the experience at the Portsmouth Gaseous Diffusion Plant during the transition to Cold Standby operation and decommissioning cost estimates developed for the American Centrifuge Demonstration Facility. Additionally, the Licensee had performed dismantling and decontamination work at the gaseous diffusion plants. Data and experience from these activities allowed a realistic estimation of expected decommissioning financial expenditures.

Using the cost data as a basis, financial arrangements are made to cover costs required to release the ACP for unrestricted use and to dispose of the tails. Updates on cost and funding will be provided periodically as described in Section 10.2.10.4. In accordance with 10 CFR 70.22(a)(9), 30.35, 40.36, and 70.25(a)(1), a DFP (NR-3605-0006) was previously submitted as part of the original license application for the ACP.

The following assumptions are utilized in the plan for decommissioning:

- No credit is taken for salvage value of equipment or materials.
- Decontamination liability is anticipated in the X-3001 and X-3002 Process Buildings, X-3012 Process Support Building, X-3344 Customer Services Building, X-3346 Feed and Withdrawal Building, X-3346A Feed and Product Shipping and Receiving Building, X-7725 Recycle/Assembly Building, X-7726 Centrifuge Training and Test Facility, X-7727H Interplant Transfer Corridor, X-2232C Interconnecting Process Piping, and miscellaneous cylinder storage yards.
- No decontamination is anticipated for the other ACP leased facilities.
- Decommissioning estimated costs are based on decontaminating the plant to the radiological criteria for unrestricted use in 10 CFR 20.1402.

The centrifuge assembly area in the X-7725 building is identified as the Decontamination Service Area (DSA). The centrifuge transport system is used to transport the centrifuges from the cascade area to the DSA.

The remaining sections of this chapter describe decommissioning plans and funding arrangements, and provide a detailed examination of the decontamination aspects of the program. The information herein was developed in connection with the decommissioning cost estimate and is provided for information. Specific elements of the planning may change with the submittal of the detailed DP required near the time of license termination.

The plan for decommissioning is to decontaminate or remove materials from the facilities promptly after cessation of ACP operations. Decommissioning planning begins by incorporating special design features into the plant. These features simplify dismantling and decontamination. The plans are implemented through proper management of Radiation Protection and Industrial Health and Safety programs for the ACP. Decommissioning policies address radioactive waste management, physical security, and nuclear material control and accountability.

10.2.1 Decommissioning Design Features

Specific features are incorporated into the plant design to accommodate decontamination and decommissioning activities. The major features are described below.

10.2.1.1 Radioactive Contamination Control

The following features primarily serve to minimize the spread of radioactive contamination during operation, and simplify the eventual plant decommissioning. As a result, worker exposure to radiation and radioactive waste volumes are maintained as low as reasonably achievable (ALARA).

- Areas of the plant are sectioned off into clean areas and potentially contaminated areas, called Contamination Control Zones (CCZs) that have access control requirements. CCZs are buffer zones established where discrete areas of contamination might be occasionally encountered. Areas that are contaminated are called Contamination Areas (CAs). Figure 10.2.1-1 (located in Appendix D of this license application) provides a diagram showing the CCZ boundary. Procedures for these areas are encompassed by the Radiation Protection Program and serve to minimize the spread of contamination and simplify eventual decommissioning.

- Non-radioactive process equipment and systems are minimized in locations subject to likely contamination. This limits the size of the CCZs, and limits the activities occurring inside these areas.

10.2.1.2 Worker Exposure and Waste Volume Control

The following features primarily serve to minimize worker exposure to radiation and minimize radioactive waste volumes during decontamination activities. As a result, the spread of contamination is minimized as well.

- Ample access is provided for efficient equipment dismantling and removal of equipment that may be contaminated. This minimizes the time of worker exposure.

- Connections in the process systems are provided for thorough purging. This removes a significant portion of radioactive contamination prior to disassembly.

- Design drawings prepared for the plant, simplify the planning and implementing of decontamination procedures.

10.3 References

1. *Appendix 1 Lease Agreement between the U.S. Department of Energy and United States Enrichment Corporation for the Gas Centrifuge Enrichment Plant* (GCEP Lease Agreement), as amended~~Amendment dated May 31, 2019~~

2. Federal Register, Volume 68 Number 192, *Financial Assurance for Materials Licensees*, Final Rule, October 3, 2003

3. HALEU Demonstration Contract Number 89303519CNE000005, awarded May 31, 2019, and definitized on October 31, 2019, as amended

4. NUREG-1520, *Standard Review Plan for Fuel_Cycle Facilities License Applications,* Revision 2

5. NUREG-1757, Consolidated Decommissioning Guidance, Volume 1~~,~~, *Decommissioning Process for Materials Licensees,* Revision 2

6. NUREG-1757, Consolidated Decommissioning Guidance, Volume 2, *Characterization, Survey, and Determination of Radiological Criteria,* Revision 1

7. NUREG-1757, Consolidated Decommissioning Guidance, Volume 3, *Financial Assurance, Recordkeeping, and Timeliness,* Revision 1

8. NR-3605-0005, *Fundamental Nuclear Material Control Plan for the American Centrifuge Plant*

9. NR-3605-0006, *Decommissioning Funding Plan for the American Centrifuge Plant*

10. SP-3605-0041, *Security Plan for the Protection of Classified Matter at the American Centrifuge Plant*

11. W. Brown (DOE) letter to Mr. Phil Sewell (USEC), *Conversion and Disposal of Depleted Uranium Hexafluoride (DUF6) Generated by USEC at the American Centrifuge Plant in Piketon, Ohio*, dated February 10, 2006

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In 1991, DOE suspended production of highly enriched uranium (HEU) at PORTS. The plant continued to produce low enriched uranium (LEU) for use by commercial nuclear power plants until May 2001. The GDP transitioned to Cold Shutdown status on October 1, 2005 and the Decontamination & Decommissioning (D&D) of inactive facilities began. In August of 2010 the DOE awarded the contract for complete D&D of the GDP (excluding facilities supporting other reservation entities, including the Lead Cascade and ACP). D&D of multiple facilities started in 2010 and at present remains ongoing (FBP-ER-RCRA-WD-RPT-0288).

In accordance with the *Energy Policy Act* of 1992, the United States Enrichment Corporation, a newly created government corporation, assumed full responsibility for uranium enrichment operations at PORTS on July 1, 1993. DOE retains certain responsibilities for decontamination and decommissioning, waste management, depleted uranium hexafluoride cylinders, and environmental remediation. The NRC granted the United States Enrichment Corporation a Certificate of Compliance for operation of the GDP pursuant to 10 CFR Part 76 on November 26, 1996 and the GDP was officially transferred to NRC oversight on March 3, 1997. USEC subsequently became a publicly held private corporation on July 28, 1998.

The DOE leases portions of the Portsmouth Gaseous Diffusion Plant to the United States Enrichment Corporation (USEC) through the GCEP Lease Agreement. Pursuant to an amendment to the lease agreement, Centrus subleased space for the Lead Cascade and American Centrifuge Plant (ACP) from USEC. Centrus, with approval from DOE, assigned the sublease for the ACP to American Centrifuge Operating LLC (ACO).. In addition to the GDP buildings, extensive support facilities are required to maintain the diffusion process. The support facilities include administration buildings, a steam plant, electrical switchyards, cooling towers, cleaning and decontamination facilities, water and wastewater treatment plants, fire and security headquarters, maintenance shops, warehouses, and laboratory facilities.

1.0.2 American Centrifuge Plant Program Overview

Following the suspension of development of the Atomic Vapor Laser Isotopic Separation (AVLIS) enrichment technology in June 1999, USEC began an evaluation of centrifuge and other technologies to replace its gaseous diffusion technology. Gaseous diffusion technology requires large amounts of power. These power requirements significantly affect the cost of production of enriched uranium. Since the use of foreign centrifuge technology and other third generation technologies including the Separation of Isotopes by Laser Excitation (SILEX), a laser-based technology under development in Australia, have the potential to lower the cost of production, these alternative enrichment technologies were also investigated. As part of the evaluation, USEC, in partnership with University of Tennessee-Battelle, the operator of DOE's Oak Ridge National Laboratory, undertook to refine gas centrifuge technology under a DOE approved Cooperative Research and Develop Agreement (CRADA).

USEC began design of an improved centrifuge by taking advantage of commercial advances in materials of construction and manufacturing methods. The improved centrifuge technology is intended to achieve performance levels approximately equivalent to those demonstrated in DOE's earlier testing programs, but at a substantially reduced cost.

On June 17, 2002, USEC and the U.S. Government, represented by the DOE, entered into an agreement, which has as one of its fundamental objectives to facilitate the deployment of new, cost effective centrifuge enrichment technology in the U.S. (DOE-USEC Agreement). Assuming successful demonstration of the technology, the DOE-USEC Agreement requires that USEC begin operation of a commercial enrichment plant with annual capacity of 1 million SWU in accordance with certain milestones.

The DOE-USEC Agreement contemplates three steps towards the development of a Commercial Centrifuge Plant, as discussed below. The environmental impacts of the first step, research and development of the centrifuge components (Demonstration Project) in Oak Ridge, were examined in a DOE Environmental Assessment (DOE 2002b) and a Finding of No Significant Impact (FONSI) was issued on October 18, 2002. The environmental impacts of the second step, deployment and system testing through a Lead Cascade Demonstration Facility, were covered in a NRC Environmental Assessment (USEC 2004b) and a FONSI was issued on February 24, 2004. The environmental impacts of an independent third step, a Commercial Centrifuge Plant, are the subject of this ER.

The buildings/facilities and grounds used for this project have been studied and characterized extensively by both the DOE and the Licensee.

Demonstration Project

The Demonstration Project demonstrated centrifuge performance in Oak Ridge, Tennessee under DOE regulatory oversight. The standard measure of enrichment in the uranium enrichment industry is the SWU. The Demonstration Project demonstrated that the centrifuge machine design is capable of economically producing 300+ SWU per year. The Demonstration Project verified the integrated centrifuge design while maintaining 300+ SWU per year performance, provided a solid basis for the centrifuge cost estimate, and obtained initial reliability data. The demonstration centrifuges were operated and SWU performance was optimized in highly instrumented test stands in DOE's East Tennessee Technology Park (ETTP) in Oak Ridge, Tennessee. Additional centrifuges were operated in other test stands to evaluate the initial reliability of an integrated centrifuge design. The Demonstration Project ended and final decommissioning efforts were completed in 2019.

American Centrifuge Lead Cascade Demonstration Facility

For the Lead Cascade Demonstration Facility, the NRC previously issued a 10 CFR Part 70 license to possess and use special nuclear material. The Lead Cascade Demonstration Facility consisted of up to 240 operating centrifuges at the DOE reservation in Piketon, Ohio. The Lead Cascade Demonstration Facility was a real time demonstration of the basic building block for a gas centrifuge enrichment process in a multiple stage configuration and provided data that is vital to provide reliability, performance, and cost information.

All or part of the centrifuges for the Lead Cascade were manufactured and balanced in Oak Ridge, Tennessee or at the Piketon DOE reservation. Locating the Lead Cascade Demonstration Facility at the DOE reservation required the refurbishment of existing equipment and buildings of the former GCEP. The Lead Cascade operated from 2007 to 2016 and associated releases to air

and water, exposure to personnel, and personnel injuries/illnesses were monitored to enable assessment of environmental impacts. Based on this monitoring, it was concluded that operation of the Lead Cascade did not result in any unanticipated releases, discharges, or exposures to the environment, the public, or employees (DP-2605-0001). Decommissioning efforts of the Lead Cascade were completed in 2018.

American Centrifuge Plant

The ACP was the third step in the plan to deploy the American Centrifuge technology. The ACP encompasses the construction, startup, operation, maintenance, and decommissioning of a uranium enrichment process to produce, as an initial target, 3.8 million SWU per year, potentially expandable to 7.6 million SWU per year, using American Centrifuge technology. The ACP utilizes existing buildings located on the DOE reservation near Piketon, Ohio, that were built to support the gaseous diffusion process beginning in the 1950s and the gaseous centrifuge process beginning in the 1980s, in addition to several newly constructed buildings and facilities.

American Centrifuge technology is modular, with the basic building block of enrichment capacity being a cascade of centrifuges. Information gained and work performed during the Demonstration Project and Lead Cascade included vital information on performance, reliability, and economics that will be used in the final construction of the ACP.

A license application for the ACP was prepared pursuant to the *Atomic Energy Act* of 1954 as amended, 10 *Code of Federal Regulations* (CFR) Parts 70, 40, 30, and other applicable laws and regulations. The ACP LEU cascade is designed to enrich and safely contain and handle uranium hexafluoride (UF_6) up to 10 weight (wt.) percent ^{235}U.

The ACP uses portions of the DOE reservation and the former DOE GCEP along with eight new proposed facilities. The ACP utilizes existing utilities and infrastructure that support the DOE reservation including the utilities and infrastructure that were intended to support GCEP. New proposed facilities may be necessary for feed, withdrawal, sampling, and blending/transfer operations. The Licensee has updated the American Centrifuge technology from that used in the GCEP program, but the American Centrifuge components remain compatible with existing infrastructure and facilities.

On October 31, 2019, ACO signed a ~~three-year~~ contract with the DOE to deploy a cascade of centrifuges to demonstrate production of high-assay, low-enriched uranium (HALEU) fuel with existing United States origin enrichment technology and provide DOE with HALEU for near term use in its research and development for the advancement of civilian nuclear energy and national security, as well as other programmatic missions. HALEU is a component for advanced nuclear reactor fuel that is not commercially available today and may be required for a number of advanced reactor designs currently under development in both the commercial and government sectors. The program has been under way since the Licensee and DOE signed a preliminary letter agreement on May 31, 2019, which allowed work to begin while the full contract was being finalized.

The Licensee's long-term goal is to resume commercial enrichment production consistent with market demand. It is the intent of the Licensee to deploy portions of the ACP in a modular

fashion to accommodate market demand on a scalable, economical gradation. This modular deployment will encompass utilization of cascades of LEU production for customer product or feed material into ~~High Assay Low Enriched Uranium (~~HALEU~~)~~ cascades. The HALEU cascades will be deployed as part of the DOE's HALEU Demonstration Program which has two primary objectives:

1) Deploy a 16-centrifuge AC-100M HALEU cascade in the Piketon facility to produce 19.75 percent wt. ^{235}U enriched product.
2) Demonstration of the capability to produce HALEU.

Results from the operation of the HALEU demonstration program will be used in preparation of the design for the full-scale ACP facility. The HALEU Demonstration will be designed to enrich and safely contain and handle uranium hexafluoride (UF_6) up to but less than 20 weight (wt.) percent ^{235}U. During the process of remediation, construction, infrastructure modification, manufacturing, and test operations for the scope of this ER, the design for these elements are reviewed for compliance with regulatory standards for releases, emissions, and wastes generated and for minimization of the quantity and toxicity of the materials used and wastes generated.

1.1 Purpose and Need for the Proposed Action

Nuclear power generates about 20 percent of the electricity for the United States. Construction and operation of a gas centrifuge plant utilizing the US-origin advanced technology is key to supporting DOE's national energy security goals by providing a reliable and secure domestic source of enriched uranium. The primary purpose of this action is to allow the Licensee to construct and operate a plant to enrich uranium up to 10 weight (wt.) percent with an initial capacity of approximately 3.8 million SWU expandable to 7.6 million SWU, at the Licensee's option, using advanced U.S. centrifuge technology at the DOE reservation located in Piketon, Ohio.

The gas centrifuge is an enrichment process that increases the concentration of ^{235}U, the isotope desired for production of nuclear energy. The gas centrifuge process has three inherent characteristics that make it particularly attractive: (1) it is a proven technology; (2) it has low operating cost; and (3) it is amenable to modular architecture. The low energy requirements of gas centrifuge technology, approximately 5 percent of that required by a comparably-sized Gaseous Diffusion Plant, provide for considerably lower operating costs (electricity usage comparison shown in Table 1.1-1). The modularity of gas centrifuge technology allows for a flexible deployment of enrichment capacity, enabling responsiveness to market demand.

Table 1.1-1 Electricity Usage Estimates

Resource	Paducah Usage 4.6 M SWU	American Centrifuge Plant Usage 7.6 M SWU
Electricity (megawatt hr)	11,000,000 (CY 2005 estimate)	650,000

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2.0 ALTERNATIVES

This section describes the alternatives discussed in detail in this ER, as well as those alternatives that were not considered to be reasonable and which were therefore, eliminated from further study. This section also includes a discussion of cumulative effects, as well as a table (Table 2.4-1) comparing potential environmental impacts of the Proposed Action, the PGDP Siting Alternative, and the No Action Alternative.

2.1 Detailed Description of the Alternatives

2.1.1 No Action Alternative

This alternative involves not deploying the ACP. This alternative does not meet the need underlined in the Congressional mandate to privatize USEC and provide the nation with an assured source of domestic uranium enrichment capability or the business need for lower cost production and to replace the former GDP. The No Action Alternative is also not consistent with the DOE-USEC Agreement. The DOE-USEC Agreement requires the Licensee to deploy an advanced technology enrichment facility.

Other activities on the DOE Reservation will continue, such as the recently constructed depleted uranium hexafluoride (DUF_6) Conversion Facility on the reservation adjacent to the ACP, activities related to the D&D of the former PORTS GDP, and environmental restoration activities in a number of locations on the reservation.

2.1.2 Proposed Action

As discussed in section 1.2 above, the Proposed Action is to refurbish, construct and operate the ACP at the DOE reservation in Piketon, Ohio. The purpose of the ACP is to meet the DOE-USEC Agreement requirements for the Licensee to deploy an advanced technology enrichment plant and meet the need for lower cost production and for replacement of the former GDP. D&D of the GDP facilities will continue (DOE 2004b).

Corporate Identity

The Licensee's principal office is located at 6903 Rockledge Drive, Bethesda, MD 20817. Private and institutional investors own the outstanding shares of the Licensee. The principal officers of the Licensee are citizens of the United States.

Proposed Site Location

The DOE reservation is located at latitude 39°00'30" north and longitude 83°00'00" west measured at the center of the DOE reservation on approximately 1,497 ha (3,700 acres) in Pike County, Ohio, one of the state's lesser populated counties. The DOE reservation is located between Chillicothe and Portsmouth, Ohio, approximately 113 km (70 mi) south of Columbus, Ohio. Figure 1.0.1-1 shows the regional area surrounding the DOE reservation.

The DOE reservation consists of approximately 1,497 ha (3,700 acres) with approximately a 526 ha (1,300 acre) central area surrounded by the Perimeter Road. The DOE reservation land outside the Perimeter Road is used for a variety of purposes, including a water treatment plant; lagoons for the process wastewater treatment plant; sanitary and inert landfills; and open and forested buffer areas.

Most of the improvements are located within the fenced core area. The core area is largely devoid of trees, with grass and paved roadways dominating the open space.

The ACP is situated on approximately 81 ha (200 acres) of the southwest quadrant of the Controlled Access Area.

In June 2004, DOE issued a *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility* at the Portsmouth, Ohio site that described the preferred alternative for managing depleted UF_6 (DOE 2004). DOE issued a Record of Decision on July 20, 2004 (DOE 2004c).

In addition, in 2008, DOE constructed a conversion facility at the DOE reservation in Piketon, Ohio, which is currently operated by Mid-America Conversion Services, LLC. The facility converts DOE's inventory of depleted UF_6 from the DOE reservation in Piketon, Ohio, and at the ETTP in Oak Ridge, Tennessee, to a more stable chemical form acceptable for transportation, beneficial use/reuse, and/or disposal. A related objective is to provide cylinder surveillance and maintenance of the DOE inventory of depleted UF_6, low-enrichment UF_6, natural assay UF_6, and empty and heel cylinders in a safe and environmentally acceptable manner. The location of the conversion facility is depicted in Figure 3.1-2. The time period considered is an operational period of 18 years, with a 3-year period for D&D of the facility. This assessment is based on the conceptual conversion facility design proposed by the selected contractor, Uranium Disposition Services, LLC (UDS) (DOE 2004).

HALEU Demonstration Program

The initial stage of Uranium Enrichment activities will consist of deploying a 16-centrifuge AC-100M HALEU cascade to produce 19.75 weight (wt.) percent ^{235}U enriched product as a demonstration project, with enrichment not to exceed 20 wt. percent ^{235}U. On October 31, 2019, the Licensee signed a ~~three-year~~ contract with the DOE to operate this ~~project~~program. The program has been under way since the Licensee and DOE signed a preliminary letter agreement on May 31, 2019, which allowed work to begin while the full contract was being finalized.

The HALEU demonstration program will be similar to, but at a much smaller scale than the full project discussed below. Components for the HALEU centrifuges will be manufactured at the Licensee's facilities located in both Piketon, Ohio and Oak Ridge, Tennessee. The project will utilize the four existing facilities recently used in the Lead Cascade Project, and no facilities will be constructed.

The X-3001 Process Building will be used to house the centrifuges and support systems necessary to perform the actual enrichment process, as well as UF_6 cylinder receipt and storage. The X-7725 Recycle/Assembly Building will be used for an area where centrifuges can be

manufactured, assembled, tested, and maintained. In the HALEU Demonstration, the X-7725 building will only be used for temporary storage, heat shield manufacturing shortly before centrifuge assembly, and for interior transport to and from the X-7726 facility. The casings are prepared in the X-7726 facility before being assembled. Some assembly activities may be performed in the X-3001 building including any further preparations of the centrifuges. Areas of the X-7725 building are also designed for shipping, receiving, and storage of materials. The X-7726 Centrifuge Training and Test Facility contains areas where material and components are received; components or subassemblies are inspected and tested; components are manufactured; the components are assembled as centrifuges; casing and component preparation; and the final assembly is evacuated and leak checked. The X-7727H Interplant Transfer Corridor will be used for transport of centrifuges and other materials between the X-7725 building to the process building(s) or back as necessary and movement of feed cylinders. It will also serve as a shipping and receiving area for equipment and components during construction and operation activities. The X-3012 Process Support Building will be used to house the operational area, maintenance area (For HALEU, this is only non-uranium bearing maintenance), and the transfer aisleway that services the X-3002 Process Building.

Design of the full-scale uranium enrichment facilities will be performed after the results of the ~~three-year~~ HALEU demonstration program have been received.

Full Scale Uranium Enrichment Activities

Under the Proposed Action, refurbishment, construction and operations activities will occur within newly constructed and existing facilities with a production capacity of approximately 3.8 million SWU. This environmental report also examines the impacts of construction of two new process buildings and support facilities that would increase the plant production capacity to approximately 7.6 million SWU annually. Construction of a manufacturing area, process support building, a new withdrawal building, the expansion of the existing feed building and a number of cylinder storage pads are also planned as part of the Proposed Action.

Connected manufacturing/assembly operations may consist of the manufacturing of centrifuge components, assembly and testing of sub-assemblies and assemblies. The option for this manufacturing/assembly process will be an ongoing activity through the production of approximately 12,000 completed centrifuges and sufficient spares to operate a 3.8 million SWU plant and approximately 24,000 centrifuges for the 7.6 million SWU plant. The production rate capability will be developed to ramp up to approximately 16 completed centrifuges per day.

Centrifuge manufacturing could take place on site or at a commercial manufacturing plant located off the DOE reservation. The impacts of manufacturing on the DOE reservation are considered as part of the Proposed Action. The impacts of manufacturing at a commercial manufacturing plant off of the DOE reservation would be similar. Centrifuge manufacturing and assembly operations could be conducted in the X-7725 building or other comparable site building. The manufacturing/assembly operations consist of the manufacturing of centrifuge components, assembly, and testing of sub-assemblies and assemblies. The manufacturing/assembly process will be an ongoing activity through the production of approximately 24,000 completed centrifuges and sufficient spares to operate a 7.6 million SWU per year plant. Each of the manufacturing/assembly areas has multiple workstations and equipment sets to allow for the

Enclosure 4 of ACO 22-0042

Proposed Changes for NRC's Materials License for the American Centrifuge Plant SNM-2011

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increment's construction costs. ACO shall make available for NRC inspection, documentation of both the budgeted costs for such phase and the source of funds available or committed to pay those costs.

November 30, 2022

Operation of the ACP, with the exception of operation of the HALEU demonstration cascade until expiration of DOE's HALEU Demonstration contract on ~~May 31, 2022~~, shall not commence until the Licensee has in place either: (1) long term contracts lasting five years or more that provide sufficient funding for the estimated cost of operating the facility for the five year period; (2) documentation of the availability of one or more alternative sources of funds that provide sufficient funding for the estimated cost of operating the facility for five years; or (3) some combination of (1) and (2).

December 31, 2025

16. ACO shall provide final copies of the proposed financial assurance instruments to NRC for review at least six months prior to the planned date for obtaining licensed material (except for the sealed source and byproduct material calibration sources described in LC 6 and the HALEU demonstration cascade under the lease agreement with DOE ending ~~May 31, 2022~~), and provide to NRC final executed copies of the reviewed financial assurance instruments prior to the receipt of licensed material (except for the sealed source and byproduct material calibration sources described in LC 6 and the HALEU demonstration cascade under the lease agreement with DOE ending ~~May 31, 2022~~). The amount of the financial assurance instrument shall be updated to current year dollars and include any applicable changes to the decommissioning cost estimate. The decommissioning cost estimate shall include an update to ACO's Analysis of Depleted Uranium Disposal Costs for the ACP. To develop this update, ACO shall coordinate with DOE to determine necessary changes to the DOE contractor's depleted uranium cost estimate utilized as input to the ACO specific analysis.

17. The initial and subsequent updated Decommissioning Funding Plan (DFP) cost estimates, up to the time of full capacity operations, and revised funding instruments shall be provided annually and shall provide full funding for decontamination and decommissioning of the full-size facility, except:

    (1) The cost estimate for decontamination and removal of the centrifuges shall be provided on an annual forward-looking basis based on planned incremental enrichment capacity increases; and

    (2) The cost estimate for depleted uranium byproduct generation shall be provided on a projected annual forward-looking basis. The decommissioning cost estimate shall include an update to ACO's Analysis of Depleted Uranium Disposal Costs for the ACP. To develop this update, ACO shall coordinate with DOE to determine necessary changes to the DOE contractor's depleted uranium cost estimate utilized as input to the ACO specific analysis.

    Once full capacity operation is achieved, the licensee shall provide cost estimates for depleted uranium byproduct generation on an annual forward-looking basis and cost estimates for decontamination and decommissioning the remainder of the facility at

Enclosure 5 of ACO 22-0042

DOE Contract #89303519CNE000005, Modification #P00019
for the HALEU Demonstration Program

Information Contained Within
Does Not Contain
Export Controlled Information

Reviewing Official: #1038, ACO

Date: 04/27/2022

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO.: P00019

3. EFFECTIVE DATE: See Block 16C

4. REQUISITION/PURCHASE REQ. NO.:

5. PROJECT NO. (If applicable):

6. ISSUED BY CODE 893035

EM-Oak Ridge
EMCBC
U.S. Department of Energy
200 Administration Road
Oak Ridge TN 37831

7. ADMINISTERED BY (If other than Item 6) CODE 03011

OREM
U.S. Department of Energy
Oak Ridge
Office of Environmental Management
P.O. Box 2001
Oak Ridge TN 37831

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

American Centrifuge Operating, LLC
Attn: Charles Kerner
6901 Rockledge Dr Ste 800
Bethesda MD 208171867

CODE 079679750 FACILITY CODE

(x) 9A. AMENDMENT OF SOLICITATION NO.:

9B. DATED (SEE ITEM 11):

x 10A. MODIFICATION OF CONTRACT/ORDER NO.: 89303519CNE000005

10B. DATED (SEE ITEM 13): 05/31/2019

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended. ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
X	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A. FAR 52.217-8, Option to Extend Services
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

DUNS Number: 079679750

UEI: L8VHV5CNBV97

The purpose of this modification is to extend the period of performance from 31 May 2022 to 30 Nov 2022 in order to facilitate a six month extension to the NRC license. Under the authority of FAR 52.217-8, Option to Extend Services. The Contract period of performance is hereby extended from 31 May 2022 to 30 November 2022, however the contractor is not authorizied to perform work beyond 31 August 2022, unless authorized by the CO beyond that date. All other terms and conditions and conditions remain in full force and effect.

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print): Charles Kerner, Director Contracts

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print): Jeffrey C. Fogg

15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)

15C. DATE SIGNED 4/20/22

16B. UNITED STATES OF AMERICA (Signature of Contracting Officer) Digitally signed by Jeffrey C. Fogg Date: 2022.04.25 16:28:52 -06'00'

16C. DATE SIGNED

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	89303519CNE000005/P00019	2	2

NAME OF OFFEROR OR CONTRACTOR
American Centrifuge Operating, LLC

ITEM NO. (A)	SUPPLIES/SERVICES (B).	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Payment: VIPERS https://vipers.doe.gov Any questions, please contact by call/email 855-384-7377 or VipersSupport@hq.doe.gov Period of Performance: 05/31/2019 to 11/30/2022				