Enclosure 1 of ACO 20-0036

Responses to NRC's Requests for Additional Information Related to the License Amendment Request for the High Assay Low Enriched Uranium Demonstration Program – License Application Chapters 4, 6, 7, and 11

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Reviewing Official: #1014

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REQUEST FOR ADDITIONAL INFORMATION AMERICAN CENTRIFUGE OPERATING, LLC, AMERICAN CENTRIFUGE PLANT LICENSE AMENDMENT REQUEST - HIGH ASSAY LOW-ENRICHED URANIUM (HALEU) DEMONSTRATION PROGRAM

Chapter 4 Radiation Protection

1. Qualification of the Radiation Protection Manager (RPM)/Supervisor

Title 10 to the *Code of Federal Regulations* 70.22(a)(6) requires licensees to be appropriately qualified. Regulatory guide (RG) 1.8, Revision 4, "Qualification and Training of Personnel for Nuclear Power Plants" recommends the NRC staff's minimum qualification necessary to ensure that assigned personnel can independently evaluate risks and safely execute the responsibilities associated with their positions. This includes the need for individuals with no prior Radiation Protection Manager (RPM) experience to have 6 months of time onsite before being assigned RPM duties.

Section 2.1.2.4.2, "Radiation Protection Manager / Supervisor" of the license application removes the previous commitment for the RPM/Supervisor to have at least 6 months of time onsite before being assigned RPM duties.

Restore the commitment for the RPM/Supervisor to have at least 6 months of experience at a uranium processing plant before assuming the management position or provide an equivalent commitment consistent with RG 1.8.

ACO Response:

Upon request from NRC, included experience requirement for the Radiation Protection Manager/Supervisor in accordance with RG -18, Section 4.3.3. Revised License Application Section 2.1.2.4.2 to "The RPM/Supervisor has, as a minimum, a bachelor's degree in engineering, health physics, RP, or the physical sciences or equivalent technical experience, and four years experience in RP, including six months of prior Radiation Protection Manager/Supervisor experience at a nuclear facility."

2. Personnel Monitoring Program

Title 10 to the *Code of Federal Regulations* 70.22(a)(8) requires licensees to have the appropriate procedures to, "protect health and minimize danger to life or property." In addition, 10 CFR 20.1101, "Radiation protection programs," requires licensees to use "sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA)." The guidance in NUREG-1520, Section 4.4.7.3, "Regulatory Acceptance Criteria," sub-bullet three indicates the personnel monitoring program should include

administrative limits. The 10 CFR 20.1502, "Conditions requiring individual monitoring of external and internal occupational dose," requires appropriate monitoring of personnel.

The proposed revision to Section 4.7.2, "Personnel Monitoring," of the license application replaces the sentence, "The established personnel monitoring program consists of the following:" with the alternative text, "A personnel monitoring program can include the following as determined by the RPM." This proposed change eliminates the commitment to implement the five bullets that follow this statement and makes them optional, contingent on the radiation protection manager (RPM). Making administrative dose limits, personnel dosimetry, and dose records optional does not appear consistent with the regulations.

Modify the proposed text in the license application Section 4.7.2 to establish that the bulleted items in that section are required, and not subject to removal or decrease by the RPM. This could be accomplished by restoring the original text. Clarify that ACO provides a commitment to maintain a baseline level of personal monitoring that includes administrative exposure limits, personnel dosimetry, and dose records.

ACO Response:

Revised License Application Section 4.7.2, "Personnel Monitoring", to replace the proposed sentence of "A personnel monitoring program can include the following as determined by the RPM" and restore the original text of "The established personnel monitoring program consists of the following:" to clarify that ACO provides a commitment to maintain a baseline level of personal monitoring that includes administrative exposure limits, personnel dosimetry, and dose records.

3. Neutron Dose Measurements

Title 10 to the *Code of Federal Regulations* 70.9, "Completeness and accuracy of information," Section (a) requires that information submitted to the NRC staff be complete and accurate.

3.1 The license application Section 4.7.2, "Personnel Monitoring" states that, "the ACP maintains onsite capability to determine neutron flux and energy." Table 4.8-2, "Radiological Protection Instrumentation and Capabilities," removes instruments specifically designed to measure neutron dose or dose rate.

Clarify if the neutron dose monitoring is done solely through dosimetry. Clarify what measuring devices are used to, "maintain onsite capability to determine neutron flux and energy," and confirm the accuracy of Table 4.8-2. Confirm that the statements regarding neutron monitoring in Section 4.7.2 and Table 4.8-2 are not contradictory.

3.2 Section 4.6.1, "Ventilation," the first sentence references "gulpers" as a device independent of the ventilation system. This term and its use as part of the ventilation system are not well defined in Chapter 4.

Provide a cross-reference to the description of gulpers in the ISA Summary, (e.g., Section 3.8.2), or any other relevant cross-reference.

ACO Response:

3.1 The 5th Bullet in Section 4.7.2 reference the FNADs used in response to a criticality event. The FNADs consist of a set of TLDs to provide the dose and a set of activation foils that would be evaluated to determine neutron energies. The foils as well as biological material, such as blood or hair samples, collected after a criticality would be sent to a qualified laboratory for analysis, since Centrus does not currently have the equipment for this analysis. ACO contracts with the U.S. Department of Energy (DOE) through its prime contractor to obtain laboratory support located on the Portsmouth Gaseous Diffusion Plant reservation.

While neutrons are not expected for routine operations, as a best practice, neutron dose monitoring is performed solely through dosimetry. Quarterly personal dosimeters have a fourth TLD-600 chip that is neutron sensitive. The personal nuclear accident dosimeter (known as PNAD) is the Indium foil described in the last paragraph of Section 4.7.2. This foil can be evaluated with on-site handheld detectors to screen personnel who may have been exposed to 10 rads during a criticality event.

Table 4.8-2 will be modified to include the REM 500 and Teletector instruments. These instruments were deleted as part of the April 2020 submittal; however, the original text has been restored. Routine use of these instruments is not expected during HALEU; however, they are included in the inventory of the Site Emergency Response organization.

3.2 Gulpers are portable ventilation units designed to capture minor release of UF_6 and reaction products and are used primarily during cylinder connects, disconnects, and system openings to minimize personnel exposure to UF_6 and HF. Gulpers are discussed in detail in Addendum 1 of the ISA Summary for the American Centrifuge Plant - HALEU Demonstration Section 3.8.2. Revised 4.6.1 "Ventilation" to include the reference to Addendum 1 of the ISA Summary for the American Centrifuge Plant.

Chapter 6 Chemical Safety

1. Use of Threshold Quantities when Evaluating Chemical Hazards in the ISA

Title 10 to the *Code of Federal Regulations* 70.62 calls for applicants to conduct an integrated safety analysis that includes consideration of (1) chemical hazards of licensed material and hazardous chemicals produced from licensed material, and (2) facility hazards that could affect the safety of licensed materials and thus present an increased radiological risk. This language is consistent with the NRC-OSHA memorandum of understanding (MOU) which identifies NRC and OSHA regulatory responsibilities (ADAMS Accession No. ML11354A432). Neither 10 CFR Part 70 nor the MOU identifies any threshold quantities in the definition of NRC's regulatory responsibility.

Section 3.1.2.3.1.3.1 of the license application discusses eliminating a chemical hazard from the ISA consideration if the inventory is below the OSHA or EPA threshold quantity. The OSHA and EPA threshold standards do not apply to chemical hazards under NRC's regulatory authority (i.e., chemical hazard generated from licensed material operations or an accident sequence involving the chemical hazard could result in a reduction of the ability of plant personnel to control licensed material operations, and thereby protect the public).

Provide justification for the ISA methodology's elimination of the analysis of chemical hazards under NRC's regulatory jurisdiction if the inventory is below the OSHA or EPA threshold standards.

ACO Response:

The chemical screening criteria provided in Section 3.1.2.3.1.3.1 will be deleted. The screening criteria is not used to eliminate chemical hazards that fall under NRC's regulatory jurisdiction. The ACP ISA Team examines each hazardous substance on its own characteristics and use and considers its potential contribution as an initiator for events involving release of radiological material, hazardous energy, or hazardous chemicals.

Chapter 7 Fire Safety

1. National Fire Protection Association Codes

Title 10 to the *Code of Federal Regulations* 70.22(a)(7) requires the applicant to provide a description of equipment and facilities that will be used by the applicant to protect health and minimize danger to life or property. Section 7.4.3 of NUREG-1520 states that the NRC reviewer will use national recognized codes and standards (including NFPA codes) when evaluating the fire safety program. This information is necessary to determine if the applicant has demonstrated an adequate level of fire safety.

Table 7.1-1 of the license application lists all National Fire Protection Association (NFPA) codes applicable to the ACP. Provide clarification on whether or not ACO intends to meet all aspects of the codes listed. For example, NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials" (NFPA, 2020) has guidelines for performing a Fire Hazards Analysis (FHA), but the license application does not mention in Section 7.2, "Fire Hazards Analysis" this particular NFPA code.

ACO Response:

Section 1.4.6 identifies the NFPA codes applicable to ACP. As noted at the beginning of Section 1.4, the extent to which the Licensee satisfies the requirements of each code or standard is identified individually in the sub-sections. For NFPA 801-2020, subsection 1.4.6 states that the Licensee will utilize this standard for any future modifications to the fire protection program as stated in Section 7.1.1 of this license application. Subsection 1.4.6 should refer to Section 7.0 rather than Section 7.1.1; therefore, this typographical error will be corrected.

Section 7.0 states that new buildings/facilities meet codes and standards applicable at the time of design. Modifications to existing buildings/facilities are evaluated relative to the safety benefit that could be achieved from applying current codes and standards. Justification for any deviations from the codes and standards of record are documented in writing and approved by the Authority Having Jurisdiction (AHJ).

Additionally, Section 7.1 states that the specific NFPA standards applicable to the ACP are identified in Table 7.1-1 of this chapter which includes NFPA 801-2020. Any change where full compliance with the applicable NFPA standards is not maintained will be documented and justified by the AHJ. Therefore, FHAs performed in support of HALEU Demonstration will be performed using the guidelines identified in NFPA 801-2020.

2. Emergency Response

Title 10 to the *Code of Federal Regulations* 70.22(a)(7) requires the applicant to provide a description of equipment and facilities that will be used by the applicant to protect health and minimize danger to life or property. Additionally, the provisions of 10 CFR 70.22(a)(8) require the applicant to provide proposed procedures to protect health and minimize danger to life and property. Section 7.4.3.5 of NUREG-1520 states that the applicant should document the fire emergency response organizations for licensed facilities.

Section 7.1.3 of the license application describes the emergency response organization. However, the licensee has not provided adequate information about the qualified responder that will perform the fire protection functions. Provide information about who this qualified responder is, their location, and any memoranda of agreement (MOA) that exist between the applicant and the qualified responder. This information is necessary to determine if the emergency responder is sufficiently close to the site and has adequate staffing, training, and equipment to respond in the event of a fire emergency.

ACO Response:

ACO contracts with the U.S. Department of Energy (DOE) through its prime contractor to provide emergency response organization functions under Reverse Work Authorization #902093 "Fire Services/Emergency Management/PSS Support for HALEU." DOE, through its prime contractor, is responsible to provide emergency response capabilities to support ACP facilities with a Field Emergency Response Organization staffed, trained, and equipped to respond to emergencies and/or abnormal events at ACP facilities. This includes, but is not limited to, providing the necessary staffing, training, and equipment for conducting emergency planning, drills, and exercises, coordinating and staffing an emergency operations center, providing an incident command system, and management of emergency response activities at ACP facilities.

Chapter 11 Management Measures and QAPD

1. Software Design Control

Title 10 to the *Code of Federal Regulations* 70.62(d) requires establishment of management measures to ensure compliance with the performance requirements of 10 CFR 70.61. The definition of Items Relied on for Safety in 10 CFR 70.4 includes systems, which could include software, firmware, microcode, Programmable Logic Controllers, and/or any digital device, that are relied on to prevent potential accidents at a facility that could exceed the performance requirements in 10 CFR 70.61 or to mitigate their potential consequences.

Section 3.0 of the Quality Assurance Program Description (QAPD), Section 1.4.3.D of the license application, and proposed Condition 19.a of NRC's Materials License contains the updated references to ASME NQA-1-2008 and NQA-1a-2009 for software design control from ASME NQA-1-1994. The proposed reference information includes Part I, Requirement 11 Test Control and Part II, Subpart 2.7, *Quality Assurance Requirements for Computer Software for Nuclear Facility Applications*. However, the licensee did not include all the applicable software design control requirements included in ASME NQA-1-2008 and ASME NQA-1a-2009, which now includes Part I, Requirement 3, Section 800 *Software Design Control*. Software design control requirements are now contained in Section 800 of Part I, Requirement 3 while Subpart 2.7 in Part II now provides the work practice requirements to implement those software design control requirements in Part I, Requirement 3, Section 800. Provide the additional reference information needed to encompass all the applicable software design control requirements to update the three locations where this reference information is found in this amendment request, or justify for not including it. The requested information is required to assess compliance against 10 CFR 70.62(d).

ACO Response:

Revised License Application Section 1.4.3 D to state if design controls related to Items Relied On For Safety (IROFS) consist of computer programs they will be developed, validated, and managed in accordance with NQA-1-2008 and NQA-1a-2009, Basic Part I, Requirement 3, Design Control, Section 800, Requirement 11, Test Control and Part II, Subpart 2.7, Quality Assurance Requirements for Computer Software for Nuclear Plant Facility Applications. The proposed QAPD Section 3.0 and License Application Section 1.4.3 only identified design outputs as this has historically been the focus since it correlates with the implementation portion of NQA-1-2008, Part II, Subpart 2.7. ACP agrees that if any IROFS that use software, firmware, microcode, Programmable Logic Controllers, and/or any digital device, including hardware devices that implement data communication protocols, then compliance with Section 800 of Part I, Requirement 3 is required.

As such, Section 3.0 of the Quality Assurance Program Description (QAPD), Section 1.4.3.D of the license application, and proposed Condition 19.a of NRC's Materials License will be revised to include reference to Part I, Requirement 3, Section 800 for software design control requirements associated with IROFS only.

2. Toxic Chemical Emergency Response Procedure Training

Title 10 to the *Code of Federal Regulations* 70.62(d) requires establishment of management measures, which includes training, to ensure compliance with the performance requirements of 10 CFR 70.61.

Sections 11.3.1.6.1 and 11.3.1.6.2 of the license application provides requirements for operations technician and operations shift supervisor training respectively and includes the deletion of training on required emergency operating procedures, which was replaced by alarm response operating procedures. However, Section 11.4.9 requires emergency procedures for toxic chemical releases as a topic to be covered in procedures separate from alarm response procedures. Provide a reference to the training requirement in the license application for an operations technician and operations shift supervisor on the required emergency procedure for toxic chemical releases or add it to the application. The requested information is required to assess the reasonableness of the management measures as required by 10 CFR 70.62(d).

ACO Response:

The Phase III training provided in Sections 11.3.1.6.1 and 11.3.1.6.2 include classroom and OJT on the IROFS identified in the ISA Summary or Addendum 1 of the ISA Summary. LA-3605-0003A, *Addendum 1 of the ISA Summary for the American Centrifuge Plant – HALEU Demonstration*, includes IROFS 7.3.8.3, Trained Operator Actions. This IROFS refers to the worker's ability to recognize a hazardous material release and minimize the worker's exposure to the release by immediately evacuating the potentially affected area or by sheltering in place, as appropriate. Therefore, the Phase III training on IROFS 7.3.8.3 addresses the training for toxic chemical releases.

3. Personnel Training Limitations

Title 10 to the *Code of Federal Regulations* 70.62(d) requires establishment of management measures, which includes training, to ensure compliance with the performance requirements of 10 CFR 70.61.

Section 1.2 of the QAPD and Section 11.2.1 of the license application contains additional language to the responsibilities for the maintenance work center supervisor. Specifically, "personnel training limitations" was added with respect to the maintenance work center supervisor's direction of activity to provide support services on facilities and equipment within approved personnel training limitations. Clarify what personnel training limitations are being referred to with this new qualification. For example, does this include approved support services by personnel who are not trained in the support area but perform the work with a special approval and/or justification, or simply support services that are only conducted within the scope of the training the personnel receive. The requested information is required to assess the reasonableness of the management measures as required by 10 CFR 70.62(d).

ACO Response:

"Personnel training limitations" refers to a situation in which a person has not successfully completed required training. Their line management is responsible for placing work restrictions or removing the employee from duty where training is deficient. Although the reference to personnel training limitations was added to Section 1.2 of the QAPD and Section 11.2.1 of the License, it is not a new process.

Section 11.3 of the License states that the Training and Qualification program is designed to ensure that those personnel who perform activities relied on for safety have the applicable knowledge and skills necessary to design, operate, and maintain the plant in a safe manner. The Performance Based Training methodology is used for those tasks associated with the design, modification, operation, or maintenance of IROFS identified in the ISA Summary, or Addendum 1 of the ISA Summary for the ACP – HALEU Demonstration. Personnel are indoctrinated, trained and tested as necessary to ensure that they are qualified on practices important to public and worker safety, safeguarding of licensed material, and protection of the environment.

Section 11.3.1 states that the training group notifies line management of personnel who have not successfully completed initial training or who are past due for identified continuing training. Line management is responsible for placing work restrictions or removing employees from duty where training is deficient. If an individual has not completed the training and their job description requires the performance of a task that requires training, that individual would be restricted from performing the task(s) which is referred to as a "training limitation". Therefore, the Performance Based Training methodology and training limitations ensure personnel are adequately training prior to performing a task important to safety.

4. Calibration of Stop Watches

Title 10 to the *Code of Federal Regulations* 70.62(d) requires establishment of management measures to ensure compliance with the performance requirements of 10 CFR 70.61. The definition of Items Relied on for Safety in 10 CFR 70.4 includes equipment and components that are relied on to prevent potential accidents at a facility that could exceed the performance requirements in 10 CFR 70.61 or to mitigate their potential consequences.

Section 12.0 of the QAPD contains additional language for equipment where calibration control is not necessary, specifically for stop watches. However, ASME NQA-1-2008, Requirement 12, "Control of Measuring and Test Equipment," does not include stop watches as an example of commercial equipment that does not require calibration and control measures. Provide justification for why stop watches do not need calibration control for the Centrus American Centrifuge Plant facility, or remove that as an example. The requested information is required to assess the reasonableness of the management measures as required by 10 CFR 70.62(d).

ACO Response:

Section 12 of the QAPD will be revised to remove stop watches as an example.

Corresponding supplemental proposed changes to LA-3605-0001 are contained within Enclosure 4 and QAPD are contained in Enclosure 5. Supplemental proposed changes are identified by the following method:

- [redacted] - Identifies text to be removed
- Red underline – Identifies text to be added