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Attn: Document Control Desk
Office of Nuclear Safety and Safeguards
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Louisiana Energy Services, LLC
NRC Docket No. 70-3103

Subject: Materials License SNM-2010 Amendment Request (LAR-11-11) to Add "TC21 Centrifuges" to SAR Table 5.1-2, "Safety Criteria for Buildings/Systems/Components"

Pursuant to the requirements of License Condition 30 and in accordance with 10 CFR 70.34, URENCO USA (UUSA) requests an amendment to Materials License SNM-2010.

The proposed change is the addition of the ETC Model TC21 centrifuge to Safety Analysis Report (SAR) Table 5.1-2, "Safety Criteria for Buildings/Systems/Components".

The page changes to the SAR are shown in Enclosure 2. Revision bars and strikethroughs were utilized to highlight the changes.

Should there be any questions regarding this LAR, please contact Perry Robinson, VP Regulatory Affairs & General Counsel, at 575.394.6598.

Respectfully,

David E. Sexton
Chief Nuclear Officer and Vice President of Operations

Enclosures: 1. Background, Proposed Change, Basis for Change
2. Mark-up of Safety Analysis Report Changes

NMSS01

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ENCLOSURE 1

BACKGROUND, PROPOSED CHANGE, BASIS FOR CHANGE

Background

URENCO USA's (UUSA's) Safety Analysis Report (SAR), Chapter 5, "Nuclear Criticality Safety", Table 5.1-2, "*Safety Criteria for Buildings/Systems/Components*" lists criticality control mechanisms and the associated safety parameter for different components within the facility. Centrifuge diameter is listed as the Control Mechanism for centrifuges. ETC Model TC21 centrifuges will be used in Separations Building Module 1003 (SBM-1003) and beyond. TC21 centrifuge diameter is different than the TC12 centrifuge diameter currently in use in SBM-1001 and listed in SAR Table 5.1-2.

Proposed Change

The proposed change is a revision of SAR Table 5.1-2 to include TC21 centrifuges and identify the Control Mechanism and Safety Parameter to prevent criticality in an individual centrifuge .

Basis for Change

The basis for the change to SAR Table 5.1-2 is to be current with existing facility components. The physical dimensions of the TC21 centrifuge are different than the TC12 centrifuges currently in use in SBM-1001 and identified in the table.

Safety Significance

As described in ETC4156706 Issue 1, "*Criticality Safety Assessment of TC21 centrifuge cascade arrangement at 6% Enrichment - fully filled bores*", the TC21 centrifuge diameter is conservatively assumed to be the outside diameter of the centrifuge. A single centrifuge was modeled as a cylinder of moderated uranyl fluoride at an H/U of 7. The cylinder was modeled with varying thicknesses of water reflector to simulate partial and full water reflection. Additionally, the centrifuge was modeled immersed in water both standing and lying on its side on a concrete base. A single isolated machine, completely filled with wet uranyl fluoride at an H/U of 7 is within the safety criterion of k_{eff} <0.95 (where $k_{eff} = k_{calc} + 3\sigma$).

For an array of TC21 centrifuges, the bores were completely filled with wet uranyl fluoride at an H/U of 7. The analysis increased the filled bores by one at a time until the safety criterion was exceeded. The modeled array conditions included adjusting the spacing between the bores to account for any distance variation due to installation tolerances; flooding to 60 cm; and a tightly wrapped spurious reflector around the bores filled with uranyl fluoride. Bores without enriched uranyl fluoride were modeled as empty aluminum cylinders. With this configuration, three completely filled bores are within the safety criterion of $k_{eff} < 0.95$.

The only potential for a criticality incident in a centrifuge cascade is by gross uranium accumulation in an array of failed centrifuges. A criticality event in a cascade would require an array of failed centrifuges to be completely filled with uranic breakdown (as $UO_2F_2 \cdot 3.5H_2O$). In the enrichment process, gas centrifuges are operated such that there

is insufficient mass available to have a criticality event without abnormal operating conditions.

Accumulation of a safe mass would require multiple adjacent centrifuges in the cascade to each have air in-leakage at a rate sufficient to cause deposits but not large enough to prevent cascade operation. With regard to moderator, the UF_6 gas reacts vigorously with any water introduced, according to the reaction $UF_6 + 2H_2O \rightarrow 4HF + UO_2F_2$. This chemical reaction would eliminate much of the water introduced; removing the hydrogen bound in water as gaseous HF, effectively eliminating the water as a moderator. Cascades are monitored continuously by instruments and overseen in the control room. Operators have many indications to identify light gas in-leakage and preclude any such event from progressing. Due to the significant number of human errors and events that must occur, a criticality event in a cascade is not credible. The extreme yet precise upset conditions required for uranic accumulation, moderation, and the duration that these conditions must be maintained could never credibly occur in practice and therefore an inadvertent criticality event in a centrifuge cascade is not credible.

Introduction of TC21 centrifuges does not pose a significant increase in risk for a criticality event at the facility.

Environmental Concerns

There are no significant environmental impacts associated with the changes proposed in this License Amendment Request (LAR-11-11). The proposed changes do not meet the criteria specified in 10 CFR 51.60(b) (2) since they do not involve a significant expansion of the site, a significant change in the types of effluents, a significant increase in the amounts of effluents, a significant increase in individual or cumulative occupational radiation exposure, or a significant increase in the potential for or consequences from radiological accidents. Consequently, a separate supplement to the Environmental Report is not being submitted.

Summary and Conclusions

The update of SAR Table 5.1-2, *Safety Criteria for Buildings/Systems/Components*, is required to maintain the table consistent with the current facility configuration. TC21 centrifuges are shown to maintain k_{eff} <0.95 for all normal and credible accident sequences.

This SAR change will not affect the ability of UUSA to prevent, detect, or respond to a criticality event.

ENCLOSURE 2

MARK-UP OF SAFETY ANALYSIS REPORT CHANGES

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SAFETY ANALYSIS REPORT

Revision 30f

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Table 5.1-2 Safety Criteria for Buildings/Systems/Components

Building/System/Component	Control Mechanism	Safety Criteria
Enrichment	Enrichment	5.0 $^{w}/_{o}$ (6 $^{w}/_{o}$ ^{235}U used in NCS)
SBM-1001 Centrifuges	Diameter	< 22.4 cm (8.8 in)
SBM-1003 Centrifuges	Diameter	Note 1
Product Cylinders (30B)	Moderation	H < 0.98 kg (2.16 lb)
UF_6 Piping	Diameter	< 22.4 cm (8.8 in)
Chemical Traps	Diameter	< 22.4 cm (8.8 in)
Product Cold Trap	Diameter	< 22.4 cm (8.8 in)
Contingency Dump System Tails System	Enrichment	1.5 $^{w}/_{o}$ ^{235}U (used in NCS)
Tanks	Mass	< 12.2 kg U (26.9 lb U)
Feed Cylinders	Enrichment	< 0.72 $^{w}/_{o}$ ^{235}U
Uranium Byproduct Cylinders	Enrichment	< 0.72 $^{w}/_{o}$ ^{235}U
UF_6 Pumps	Volume	< 19.3 L (5.1 gal)
Individual Uranic Liquid Containers, e.g., PFPE Oil Bottle, Laboratory Flask, Mop Bucket	Volume	< 19.3 L (5.1 gal)
Vacuum Cleaners Oil Containers	Volume	<19.3 L (5.1 gal)

Note 1 - Sensitive information - see ETC4156706 Issue 1, "*Criticality Safety Assessment of TC21 centrifuge cascade arrangement at 6% Enrichment - fully filled bores*", for the outside diameter assumed in the criticality calculation.