February 22, 2010

Mr. Steven A. Toelle
Director, Nuclear Regulatory Affairs
U. S. Enrichment Corporation
2 Democracy Center
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: APPROVAL OF CERTIFICATE AMENDMENT REQUEST RELATED TO TECHNICAL SAFETY REQUIREMENT CHANGES TO ALLOW HEATING CERTAIN CYLINDERS IN C-333-A, C-337-A, AND C-360 FACILITIES, PADUCAH GASEOUS DIFFUSION PLANT (TAC NO. L32733)

Dear Mr. Toelle:

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the August 10, 2009, certificate amendment request (CAR), submitted by United States Enrichment Corporation (USEC or certificate holder), Paducah Gaseous Diffusion Plant (PGDP), regarding proposed revisions to Technical Safety Requirements (TSR) regarding Cylinder Categories definition for PGDP. Specifically, the proposed changes to PGDP TSR would allow heating 48OM, 30A, 48A, and 48F cylinders in the C-333-A, C-337-A, and C-360 facilities at PGDP. The CAR from USEC dated August 10, 2009, is available via NRC's Agencywide Documents Access and Management System (ADAMS) Accession Number ML092240061.

The staff has completed the review of the CAR and found the proposed revision to its TSR acceptable. The staff's Certificate Evaluation Report is contained in Enclosure 1. Enclosure 2 contains Revision 4 to the PGDP's Certificate of Compliance reflecting the revisions approved for this request. The approval of this amendment request is documented in the Certificate of Compliance GDP-1 by the addition of a reference to the August 10, 2009, letter from USEC regarding this CAR.

Neither an environmental assessment nor an environmental impact statement is required for the proposed action because the requested amendment is subject to the categorical exclusion provided in the Title 10 of the *Code of Federal Regulations* (10 CFR) 51.22(c)(19) and will not have a significant impact on the human environment.

If you have any questions regarding this action, please contact Ms. Tilda Liu, at (301) 492-3217, or via e-mail at Tilda.Liu@nrc.gov.

In accordance with 10 CFR, Section 2.390 of the NRC's Rules of Practice, a copy of this letter will be available electronically from the Publicly Available Records component of NRC ADAMS. ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

/RA/

Marissa G. Bailey, Deputy Director
Special Projects and Technical
Support Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

Docket No.: 70-7001
Certificate No.: GDP-1

cc w/enclosures:
Vernon Shanks, USEC-Paducah
Paducah Gaseous Diffusion Plant
P.O. Box 1410
Paducah, KY 42001

Randall M. DeVault,
U.S. Department of Energy – Oak Ridge
P.O. Box 2001
Oak Ridge, TN 37832

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DATE	2/04/2010	2/04/2010	2/22/2010	2/22/2010

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DOCKET NUMBER: 70-7001

CERTIFICATE NUMBER: GDP-1

CERTIFICATE HOLDER: United States Enrichment Corporation
Paducah Gaseous Diffusion Plant
Paducah, Kentucky

SUBJECT: COMPLIANCE EVALUATION REPORT – CERTIFICATE AMENDMENT REQUEST SUPPORTING HEATING OF 48OM, 30A, 48A, AND 48F CYLINDERS IN THE C-333-A, C-337-A, AND C-360 FACILITIES, PADUCAH GASEOUS DIFFUSION PLANT (TAC NO. L32733)

1.0 PROPOSED CHANGES

By letter dated August 10, 2009 (Agencywide Documents Access and Management System [ADAMS] Accession Number ML0922400619), the United States Enrichment Corporation (USEC) submitted a certificate amendment request (CAR) regarding the Certificate of Compliance for the Paducah Gaseous Diffusion Plant (PGDP). The proposed amendment would make changes to the PGDP's Technical Safety Requirements (TSRs) to allow heating Types 48OM, 30A, 48A, and 48F cylinders in the C-333-A and C-337-A Feed Facilities, and C-360 Toll Transfer and Sampling Facility.

Specifically, this CAR proposes to revise the Cylinder Categories Definition (TSR 1.2.5), the Cylinder Heating - Cylinder Accountability Weight (TSR 2.1.4.6) and the Cylinder Heating - Heating Limitations for Certain Cylinders Without Certified Volumes (TSR 2.1.4.7) for the C-360 Toll Transfer and Sampling Facility, the Cylinder Heating - Cylinder Accountability Weight (TSR 2.2.4.4) and the Cylinder Heating - Heating Limitations for Certain Cylinders Without Certified Volumes (TSR 2.2.4.5) for the C-333-A and C-337-A Feed Facilities, and the cylinder tables in Appendix A of TSRs 2.1, 2.2, and 2.3. USEC previously requested a similar CAR dated November 25, 2002 (ADAMS Accession Number ML023370561) to the PGDP TSRs to allow heating of other 48OM cylinders without a certified volume. By letter dated February 19, 2003 (ADAMS Accession Number ML030500274), the staff approved the CAR submitted by USEC on November 25, 2002.

2.0 BACKGROUND

USEC identified that the current wording contained in TSRs 2.1.4.6 and 2.2.4.4 (Cylinder Heating - Cylinder Accountability Weight) could be interpreted that heating of cylinders without certified internal volumes is allowable based on the minimum cylinder design volume (based on all minimum design tolerances) as these TSRs do not provide any additional guidance on how this is accomplished. The cylinders mentioned in these TSRs were manufactured prior to the guidance provided in American National Standards Institute (ANSI) N14.1, "Packaging of Uranium Hexafluoride for Transport," 2001 Edition, which provide certified internal volumes. Because the actual design parameters are not known for cylinders designed and fabricated before the issuance of ANSI N14.1, it is difficult to accurately determine the minimum cylinder design volume. As a result, USEC has taken the conservative approach that the cylinders without certified internal volumes will not be heated until the internal volume is measured to ensure adequate ullage or free volume (i.e., 5 percent [%] or greater) when heated. Because of

the significant volume change as uranium hexafluoride (UF_6) is heated from solid to liquid phase, it is essential that sufficient free volume exists in the cylinder at the heating temperature to prevent hydraulic rupture of the cylinder and release of UF_6.

3.0 DISCUSSION

In ANSI N14.1, the minimum internal volume reported for 48OM cylinders is 135 ft^3. At 235 degrees Fahrenheit (°F), the density of uranium hexafluoride is 207.1 lb/ft^3, and a quantity of UF_6 weighing 26,000 lbs would have a volume of 125.5 ft^3. Therefore, a cylinder weighing less than 26,000 lbs would have a free volume of 7%. This value is greater than the minimum free volume required for heating other Category A cylinders, namely 5% and 3%, that have certified minimum volumes. The staff considers the use of a 7% free space would provide sufficient margin against cylinder rupture.

USEC-PGDP has a number of 48OM Allied cylinders without certified volumes that are not permitted to be heated by existing TSRs 2.1.4.7 and 2.2.4.5 (Cylinder Heating - Heating Limitations for Certain Cylinders Without Certified Volumes). Furthermore, the current wording contained in TSRs 2.1.4.6 and 2.2.4.4 (Cylinder Heating - Cylinder Accountability Weight) could be interpreted that heating of cylinders without certified internal volumes is allowable based on the minimum cylinder design volume. USEC stated that it has conservatively chosen to make field measurements of these cylinders and calculated the actual volume of the cylinders. None of the cylinders measured met the minimum volume requirement of ANSI N14.1 (140 cubic feet [ft^3]). Consequently, if they were filled to the maximum weight limits for UF_6 cylinders as specified in Appendix A of TSRs 2.1, 2.2, and 2.3, it could result in cylinder heating that does not have the required minimum void volume assumed by TSRs 2.1.4.6 and 2.2.4.4. USEC stated that these cylinders contain feed material that it needs to recover for economic reasons, and that it plans to heat these cylinders for the purposes of sampling, transfer or feeding at PGDP.

Appendices A to PGDP TSRs 2.1, 2.2, and 2.3 also contain other cylinders without certified volumes including cylinder models 30A, 48A, and 48F. While it currently does not have any of these cylinders filled with UF_6 material, USEC stated that its future business opportunities may require heating of these cylinder models to recover UF_6 material. Therefore, TSRs 2.1.4.7 and 2.2.4.5 are being revised to add limiting conditions to ensure that those cylinders without certified volumes will have sufficient void volume or ullage if heated in an autoclave.

In addition, USEC proposes to remove these cylinder models from Appendices A, “Maximum Weight Limits for UF_6 Cylinders,” of TSRs 2.1, 2.2 and 2.3, and the requirements for these cylinder models will be governed by the Limiting Conditions for Operation (LCOs) specified in the proposed revisions to TSRs 2.1.4.7 and 2.2.4.5. USEC stated that removing these cylinders from the TSR 2.3 Appendix A table does not have any impact on Product and Tails Withdrawal Facility operations since there are no plans to use these cylinders for withdrawal operations.

TSR 1.2.5, Cylinder Categories Definition

Table 1, “Standard UF_6 Cylinder Data,” of ANSI N14.1, provides requirements for the standard cylinders currently in service. ANSI N14.1, Section 5.5, “Standard UF_6 Cylinders,” states that cylinders listed in Table 1 that are not specifically defined in the standard are acceptable for continued use provided they are inspected, tested, and maintained in accordance with the intent of the standard and the requirements of Table 1. Table 1 lists 48OM Allied, 30A (in footnote d), 48A and 48F cylinders, but the design details of theses cylinders are not defined in the

standard. The maximum fill limits (in pound [lb] UF_6) for these cylinders are provided in Table 1 with the intent that these maximum fill limits are based on certified cylinder volumes. To meet this intent, those cylinders without manufacturer certified volumes may use an alternate method for determining actual cylinder volume.

USEC proposed to revise TSR 1.2.5 in order to clarify this alternate method for cylinders without certified volumes. The definition for Category A cylinders provided in TSR 1.2.5 is being modified to allow heating of certain cylinders that do not have certified volumes. The empty volume of these UF_6 cylinders can be conservatively calculated from measured dimensions and, after weighing, the volume of UF_6 contained in the cylinder when heated can be subtracted from the total volume, leaving the free volume of each cylinder. This will ensure that the cylinder has enough free volume to accommodate expansion of the liquid UF_6 when the cylinder is heated and does not challenge the structural integrity of the cylinder.

USEC stated that it has measured the 48OM Allied cylinders that it wishes to heat and calculated the ullage at 235°F using the same methodology as for the previously NRC-approved CAR dated February 19, 2003, for the 48OM cylinders. Based on its calculation, USEC found that all of the 48OM Allied cylinders, except one, containing the current quantity of UF_6 verified by Nuclear Materials Control and Accountability (NMC&A) weight records and with calculated internal volumes based on field measurements of each cylinder, will result in excess of 7% ullage when heated to 235°F, and that the one overfilled 48OM Allied cylinder may be fed using the controlled/cold feed mode as necessary. The 7% ullage resulted from this proposed TSR change provides a greater safety margin to overpressure and possible hydraulic rupture than the 5% and 3% ullage currently required for Category A cylinders with certified volume. Other UF_6 cylinders without certified volumes including 30A, 48A and 48F cylinders are proposed to be added to allow heating as Category A cylinders if they meet specific limiting conditions proposed in TSR 2.1.4.7, “Cylinder Heating – Heating Limitation for Certain Cylinders Without Certified Volumes,” for Toll Transfer and Sampling Facility, and TSR 2.2.4.5, “Cylinder Heating – Heating Limitation for Certain Cylinders Without Certified Volumes,” for UF_6 Feed Facilities.

<u>TSRs 2.1.4.6 and 2.2.4.4, Cylinder Heating – Cylinder Accountability Weight</u>

TSR 2.1.4.6, “Cylinder Heating – Cylinder Accountability Weight,” for Toll Transfer and Sampling Facility, and TSR 2.2.4.4, “Cylinder Heating – Cylinder Accountability Weight,” for UF_6 Feed Facilities, address heating requirements for cylinders other than those listed in TSRs 2.1.4.7 and 2.2.4.5. TSRs 2.1.4.6 and 2.2.4.4 require that, prior to heating, the weight of a cylinder (not containing tails material) be verified to be less than the “maximum fill limit for shipment” listed in Appendix A (Maximum Weight Limits for UF_6 Cylinders) of TSR Sections 2.1 and 2.2. These TSR limits are based on maintaining 5% ullage in a cylinder when heated to 250°F using the minimum volume for a cylinder of the type specified. If a cylinder is filled beyond the fill limits, as specified in Appendix A, these TSRs would continuously allow the cylinder to be heated, as a Category A cylinder, if it contains greater than 5% ullage when heated to 235°F, as demonstrated by ullage calculation. This is consistent with the guidance provided in Table 1 of ANSI N14.1.

TSRs 2.1.4.6 and 2.2.4.4 provide that the cylinder ullage calculation can be based on the minimum design volume (based on minimum design tolerances) for cylinders without certified volumes. USEC identified that this is not consistent with ANSI N14.1 footnote b, which states: “Fill limits are based on 250°F maximum UF_6 temperature (203.1 lb UF_6 per ft^3), certified minimum internal volumes for all cylinders, and a minimum cylinder ullage of 5%." Therefore, USEC proposes to take the conservative route and be consistent with the guidance provided in

ANSI N14.1 by deleting the references contained in TSRs 2.1.4.6 and 2.2.4.4 on the use of minimum design volume for cylinders without certified volumes for the purpose of determining ullage.

TSRs 2.1.4.7 and 2.2.4.5, Cylinder Heating – Heating Limitations for Certain Cylinders Without Certified Volumes

USEC proposes to revise TSR 2.1.4.7, "Cylinder Heating – Heating Limitations for Certain Cylinders Without Certified Volumes," for Toll Transfer and Sampling Facility, and TSR 2.2.4.5, "Cylinder Heating – Heating Limitations for Certain Cylinders Without Certified Volumes," for UF_6 Feed Facilities, to allow 48OM Allied, 30A, 48A and 48F cylinders to be heated provided that the specified Limiting Conditions are met. These TSRs currently do not permit heating certain cylinders specified by cylinder type and serial numbers because they do not have certified volume.

By letter dated February 19, 2003, the staff approved USEC's proposed revision to TSR 2.1.4.7 and TSR 2.2.4.5 for the 48OM cylinders by adding the ability to heat 48OM cylinders with specific serial numbers as long as they meet the requirements specified in the TSR limiting conditions. As with the previously approved change for 48OM cylinders, the 48OM Allied cylinders were manufactured prior to the ANSI N14.1 standard. Therefore, these cylinders do not have water weights stamped on the cylinder nameplates. USEC stated that it cannot establish a water weight prior to emptying the cylinder by using the process required by the current ANSI N14.1 as the cylinders are full of UF_6. USEC proposes to use an alternate method for determining the volume of these cylinders. This method consists of taking measurements of the physical dimensions of the cylinder and then these dimensions are used to calculate an actual internal volume of the cylinder. USEC stated that it will use the same method to measure the volume of each 48OM Allied cylinder to be heated to verify the volume of each cylinder, and that it will use this volume and the actual net UF_6 weight from NMC&A records to calculate the cylinder ullage at 235°F.

Therefore, the proposed changes to TSRs 2.1.4.7 and 2.2.4.5 would require that an actual cylinder volume be determined based on measured dimensions, and provide a safety margin of a minimum ullage of 7% at a heating temperature of 235°F based on the actual NMC&A UF_6 net weight in the cylinder. The 7% ullage provides an additional safety margin (vs. 5%) to hydraulic rupture for these cylinders.

TSRs 2.1, 2.2, and 2.3, Appendices A, Maximum Weight Limits for UF_6 Cylinders

USEC's proposed revisions to Appendices A, "Maximum Weight Limits for UF_6 Cylinders," contained in TSRs 2.1, 2.2, and 2.3 would delete the 30A, 48A, and 48F cylinder models from Appendices A of the TSRs and place them in the LCOs to conservatively require all of these types of cylinders, that may not have a certified water weight (volume), to be physically measured and adequate ullage verified prior to heating.

The values that USEC proposes to be placed in the LCOs are more conservative that what are currently in Appendices A. While the values currently in Appendices A ensure a minimum void volume (ullage) is maintained when cylinders are heated, the proposed LCOs would ensure that the minimum void volume (ullage) are 7% when the cylinders are heated. The 7% ullage provides a greater margin to hydraulic rupture in order to account for the fact that measured volumes are being used rather than a certified volume.

4.0 ENVIRONMENTAL REVIEW

Issuance of the requested amendment to Certificate of Compliance GDP-1 is subject to the categorical exclusion provided in 10 CFR 51.22(c)(19) and will not have a significant impact on the human environment. Therefore, in accordance with 10 CFR 51.22.b, neither an environmental assessment nor an environmental impact statement is required for the proposed action.

5.0 CONCLUSION

Based on its review and evaluation of the information provided by USEC in its CAR dated August 10, 2009, the staff finds that the proposed revisions to the aforementioned TSRs which would allow heating Types 48OM, 30A, 48A, and 48F UF_6 cylinders in the C-333-A, C-337-A, and C-360 facilities at PGDP would not have a significant increase in risk to the workers, and would continue to provide adequate protection of public health, safety, safeguards, security, and the protection of the environment. Therefore, the staff concludes that the proposed revisions are acceptable and consistent with the requirements of 10 CFR Part 76.

PRINCIPAL CONTRIBUTOR

T. Liu