

November 8, 2010

MEMORANDUM TO: Thomas G. Hiltz, Chief
Advanced Fuel Cycle, Enrichment,
and Uranium Conversion Branch
Special Projects and Technical
Support Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

FROM: Kevin S. Mattern, Project Manager **/RA/**
Advanced Fuel Cycle, Enrichment,
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Special Projects and Technical
Support Directorate
Division of Fuel Cycle Safety
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Office of Nuclear Material Safety
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SUBJECT: NOVEMBER 1, 2010, TELEPHONE CONFERENCE SUMMARY
REGARDING CERTIFICATE AMENDMENT REQUEST TO
REVISE TECHNICAL SAFETY REQUIREMENTS FOR THE
R-114 OVERPRESSURE CONTROL SYSTEM, PADUCAH
GASEOUS DIFFUSION PLANT (TAC NO. L32754)

The U.S. Nuclear Regulatory Commission's (NRC) staff and representatives of the United States Enrichment Corporation (USEC) held a telephone conference on November 1, 2010, to discuss the staff's questions concerning the June 22, 2010 (Agency Documents Access and Management System [ADAMS] Accession No. ML101800341), submittal provided by USEC regarding its proposed revisions to the Paducah Gaseous Diffusion Plant's (PGDP) Technical Safety Requirements (TSR). The submittal was based on a Notice of Enforcement Discretion (NOED) (ML101260041) granted by the NRC on May 6, 2010. The NOED requested that USEC review the adequacy and appropriateness of Limiting Condition for Operation (LCO) 2.4.3.4 of the TSR and, if necessary, to submit a Certificate Amendment Request (CAR) to the NRC within 60 days.

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(301) 492-3221

The conference call was useful in clarifying the intent of the staff's questions. The additional information USEC provided, both verbally and in writing, provided the staff with additional clarity regarding the operation of the R-114 Overpressure Control System. This was accomplished by providing additional references to the PGDP Safety Analysis Report (SAR) and applicable American Society of Mechanical Engineers (ASME) code.

While no regulatory decisions were made during the telephone conference, the staff informed USEC representatives that the staff's questions, which were provided to the certificate holder by e-mail on October 28, 2010, will not be issued as formal RAIs via separate correspondence.

Enclosure 1 provides a list of those who participated in the telephone conference. Enclosure 2 contains a listing of the questions that the staff provided to USEC and draft responses provided by USEC, via email, on November 1, 2010, to facilitate the telephone discussion.

USEC has had an opportunity to review and comment on this summary.

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

Enclosures:
As stated

cc w/enclosures:
Mr. Steven Toelle, USEC-HQ, MD
Mr. Vernon Shanks, USEC-Paducah, KY
Mr. Randall DeVault, DOE-Oak Ridge, TN

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**LIST OF PARTICIPANTS FOR TELEPHONE CONFERENCE
TO ADDRESS NRC STAFF QUESTIONS**

**Regarding June 22, 2010, Certificate Amendment Request to Revise Technical Safety
Requirements for the R-114 Overpressure Control System**

United States Enrichment Corporation

Paducah Gaseous Diffusion Plant

November 1, 2010

NAME

AFFILIATION

Kevin Mattern
Tilda Liu
Mike Boren
Bill Kassebaum
Louis Moffatt
Doyle Warriner

Nuclear Regulatory Commission (NRC)
NRC
United States Enrichment Corporation (USEC)
USEC
USEC
USEC

NRC STAFF QUESTIONS

Regarding June 22, 2010, Certificate Amendment Request to Revise Technical Safety Requirements for the R-114 Overpressure Control System

United States Enrichment Corporation

Paducah Gaseous Diffusion Plant

Pressure/Temperature

Action: Provide additional documentation or a cite PGDP reference document, e.g. SAR, TSR, etc., which clearly states or shows that the R-114 coolant system is operated at saturated conditions, where knowledge of either pressure or temperature implies knowledge of the other. Alternatively, if a reference does not exist, provide plant data which relates temperature and pressure in the R-114 system. Provide additional information regarding the statement that adding temperature measurement to the TSR Required Action increases operational flexibility.

Basis: The submittal states that the R-114 system operates at saturation conditions so temperature/pressure are equivalent indications of system conditions. While this statement is true for saturated conditions, it is not necessarily true for other thermodynamic conditions. A review of the SAR did not uncover a direct statement that the system is operated at saturated conditions. If the TSR is revised to include temperature as a means to monitor pressure, it is necessary to ensure that operation is at saturated conditions, and that over temperature can be directly correlated to over pressure. SAR Section 3.3.5.9.3, "Temperature Instrumentation" states that coolant pressures are monitored and controlled at the local cell panel. In order for the TSR to be modified, an increase in safety or an increase in operational flexibility with little or no impact on safety should be demonstrated. While it does not appear to decrease safety, it is not entirely clear why adding temperature monitoring to the TSR would increase flexibility

RESPONSE: *The Process Cooling System is a natural circulation based coolant system that utilizes R-114 as the working fluid. The system operates as a saturated liquid/gas system. Liquid R-114 in the process cooler absorbs heat from the process gas and boils. The resulting vapor sent to an elevated condenser via piping where heat absorbed by the Recirculating Cooling Water (RCW) system and the R114 condensed. The condensed R-114 returns via piping to the lower process cooler where the process repeats. The system does not require any pumps to operate and relies on the phase changes of the R-114 to move the liquid/gas around the system to transfer heat from the process to the RCW system. SAR Section 3.3.5.5 provides a description of the Process Cooling System and SAR Figure 3.3-13 provide a simplified schematic of the operation showing the major system components including relative elevation, R-114 phase changes during operation, and system flow path. Having the option of monitoring R-114 coolant temperature and/or pressure will allow operations to use alternate installed instrumentation depending on plant conditions and instrumentation availability.*

Cascade Mode

Action: It is demonstrated in the submittal via reference to SAR Section 4.3.2.1.6, that placing multiple cells in Cascade Mode 1 with the process motors de-energized in a rapid fashion could have potentially negative safety implications via a significant pressure increase in the primary system resulting in a UF₆ release. It is also stated in the Justification of the Changes section of the submittal that “the consequences could include significant on-site impact in the above atmospheric pressure or below atmospheric pressure operating modes for the enrichment cascade process if no mitigation were provided.” Provide further explanation regarding the relative safety impact of cells isolated from the cascade below atmospheric pressure versus cells isolated above atmospheric pressure. Provide data from the threshold consequence analysis to support this claim.

Basis: The proposed changes are justified by stating that in some scenarios the revision to the TSR will increase safety, however, in other cases it is unclear as to whether there is an increase or decrease in overall plant safety. Any changes to the TSR must not cause an increase in risk or a decrease in safety.

RESPONSE: *The threshold analysis for this scenario did not calculate consequences for both above atmospheric pressure and below atmospheric pressure. The above atmospheric condition bound the threshold analysis since more UF₆ inventory is present in the cell than below atmospheric pressure. The threshold analysis for the above atmospheric scenario found there were no off-site consequences. The cell ruptures and causes a UF₆ release regardless whether the cell is below or above atmospheric pressure. The threshold analysis (DAC-M0848401-SAR-44) can be provided if necessary. In all cases, there is not an increase in the probability or consequences of an event due to the proposed changes.*

Operator Action

Action: Provide documentation of the qualifications and training required for authorized persons who may be assigned to monitor the R-114 system temperature/pressure during periods of overpressure system inoperability in excess of 24 hours. Provide documented procedures which describe “pre-defined action, either stopping the source of overpressure or opening alternative means of pressure relief” and that the “authorized person shall be dedicated to this task and shall have no other duties when performing this task.”

Basis: ASME BPVC Section VIII, Appendix M-5.6(d), describes the procedural and operational requirements for use when the overpressure protection system is inoperable. Since PGDP has committed to the Section VIII of the ASME code in the SAR, this information is necessary to ensure operational consistency with the code. Additionally, since the proposed modifications to the TSR would allow for longer periods of operation without an operable overpressure control system, this information is necessary to ensure that there is no measured decrease in the safety of the workers or the public.

RESPONSE: *The operations personnel and procedure applicable for the persons assigned to monitor the R-114 system temperature/pressure will be the same as that utilized during the relief provided by the Notice of Enforcement Discretion (NOED) provided. The procedure was revised to specifically address the conditions of the NOED. The training and procedure utilized is available.*

The procedure (and subsequent training) that will satisfy the new proposed TSR actions has not been developed at this time. As part of standard implementation of the revised TSR, the procedures are developed but not approved until after NRC approval of the TSR change. USEC has established an internal commitment to have the procedures in place and training complete prior to implementation of the applicable TSR.

Inoperability

Action: Provide an exact reference to the ASME BPVC section and version which is consistent with the indefinite inoperability of the overpressure protection system provided that the device is being repaired or replaced as stated in the Justification of the Changes in Enclosure 2 of this submittal. Provide additional justification for the removal of all time constrained operating limits when the overpressure control system is inoperable.

Basis: The intent of the TSR as written and the proposed revision is to allow operational flexibility in the operation of PGDP systems provided that there is no measurable increased safety risk incurred. While it is likely that the limit of 24 hours in Cascade Mode 2 while the R-114 system is inoperable is conservative and overly limiting, it is not clear that indefinite operation in this condition is appropriate. While the event associated NOED granted a time extension from 24 hours to 10 days, further justification is needed to remove the time constraint entirely and ensure that operations in this condition are consistent with safe shutdown as opposed to indefinite operation in a limiting condition. The Description of Change section of the submittal states that the basis of the TSR shall be revised to “clearly delineate that the R-114 cell coolant overpressure control system shall be made operable expeditiously,” however, the proposed TSR Basis section does not clearly delineate this requirement.

RESPONSE: *The ASME BPVC section and version referenced in the CAR is: ASME Section VIII, UG-125, Overpressure Protection (2009 & +2010 Section VIII- Division 1)). UG-125(d) states “Pressure relief devices shall be constructed, located, and installed so that they are readily accessible for testing, inspection, replacement, and repair and so that they cannot be readily rendered inoperative (see Appendix M).” Appendix M, (same ASME Section and version) Section M-5.6, “Stop Valve(s) Provided Upstream or Downstream of the Pressure Relief Device Exclusively for Maintenance of That Device” provides the guidance for maintenance of the relief valves with isolation valves. This guidance does not have any time restrictions referenced or implied. The guidance does state: “The system shall be isolated from its pressure relief path only for the time required to test, repair, and or replace the pressure relief device.” The discrepancy between the description of the change and the actual change to the basis section of TSR 2.4.3.4 is unintended.*