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June 23, 1997

Dr. Carl J. Paperiello
Director, Office of Nuclear Material
Safety and Safeguards
Attention: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SERIAL: GDP 97-0105

Paducah Gaseous Diffusion Plant (PGDP)
Docket No. 70-7001
Response to Request for Additional Information
Certificate Amendment Request - Cascade Cell Trip Function Requirements

Dear Dr. Paperiello:

The purpose of this letter is to provide a response to Issue 2 of the NRC's request for additional information (TAC. No. L32027) on the Certificate Amendment Request (CAR) dealing with cascade cell trip function requirements. USEC's response to Issues 1 and 3 through 8 of the NRC information request was previously provided in Reference 2. The request for additional information was provided to USEC in Reference 1 and identified additional information required by NRC to allow final action to be taken on the subject Certificate Amendment Request.

Enclosure 1 provides USEC's response to Issue 2 of the request for additional information. Based on NRC's comment, USEC has revised the Safety Analysis Report (SAR) page which discusses the reliability of the manual cell shutdown system. The revised SAR page is provided as Enclosure 2 to this letter. This revised SAR page has been evaluated in accordance with the requirements of 10 CFR 76.68. Based on the results of this 10 CFR 76.68 evaluation, the enclosed SAR page does not require prior NRC review and approval and is provided for information only. USEC has reviewed the Enclosure 1 (Detailed Description of Change) and Enclosure 3 (Significance Determination) which were previously transmitted in our April 14, 1997 Certificate Amendment Request (Reference 3) and has determined that the conclusions of these enclosures are still valid.

NF04

Dr. Carl J. Paperiello
June 23, 1997
GDP 97-0105 Page 2

In addition, our previous response to the request for additional information (Reference 2) included the basis page associated with TSR 2.4.4.12. This basis page (TSR Page 2.4-43) provided in Reference 2 did not reflect the revisions to the basis statements previously approved in Amendment 1 to the Certificate of Compliance. This approved amendment was implemented on May 4, 1997 and was incorporated into the application in Revision 9. The approved revisions to the basis statement for TSR 2.4.4.12 have been reflected in TSR Page 2.4-43 and included in Enclosure 2 to this letter. The enclosed TSR page is a replacement page for TSR page previously provided in Reference 2.

This submittal completes our response to the request for additional information (TAC No. L32027) provided to USEC in Reference 1. Any questions related to this subject should be directed to Mr. Mark Smith at (301) 564-3244. There are no new commitments contained in this submittal.

Sincerely,

James H. Miller
Vice President, Production

Enclosures:
1. Response to Additional Information Request, Issue 2 (TAC No. L32027)
2. Revised Technical Safety Requirements Basis Page and Safety Analysis Report Page

cc:
NRC Region III Office
NRC Resident Inspector - PGDP
NRC Resident Inspector - PORTS
DOE Regulatory Oversight Manager

References

1) NRC Letter from Merri Horn to Mr. James H. Miller, "Paducah Certificate Amendment Request - Cascade Cell Trip Function Requirements (TAC L32027)" dated May 23, 1997.

2) USEC Letter GDP 97-0096, Mr. James H. Miller to Dr. Carl J. Paperiello, "Paducah Gaseous Diffusion Plant (PGDP)-Docket No. 70-7001-Certificate Amendment Request-Cascade Cell Trip Function Requirements," dated June 13, 1997.

3) USEC Letter GDP 97-0047, Mr. James H. Miller to Dr. Carl J. Paperiello, "Paducah Gaseous Diffusion Plant (PGDP)-Docket No. 70-7001-Certificate Amendment Request-Cascade Cell Trip Function Requirements," dated April 14, 1997.

Response to Additional Information Request
Issue 2, (TAC No. L32027)

Issue 2:

While the SAR may not explicitly state that the 5 year interval for testing the manual shutdown of each cell was utilized as an assumption in the accident analysis, it is not clear that it was not used as a supporting basis. The SAR states that the reliability of the manual cell shutdown system is verified through the manual shutdown of each cell within a five year period. In addition USEC is committed to and is expected to conduct its operations in accordance with the SAR, including the five year surveillance frequency. The manual cell shutdown system is one of the means relied on to mitigate a UF_6 release. While the SAR may refer to the diversity of the manual cell shutdown system, USEC chose the motor stop button/motor breaker pistol grip as the method to place in the TSR. Other methods can not be relied on without making the mechanism for the method a safety system.

Response:

The SAR accident analysis discusses numerous cascade cell-related scenarios (e.g. 4.3.2.1.2, 4.3.2.1.5, 4.3.2.1.6, 4.3.2.2.2, 4.3.2.3.2, and 4.3.2.4.1) in which operating personnel respond to certain process conditions and alarms by de-energizing the process motors ("tripping the cell"), thus bringing the cell below atmospheric pressure. When the cell motors are stopped, the cell pressure decreases below the normal operating pressure and the cell block valves are closed if necessary to isolate the cell and mitigate UF_6 releases. This manual shutdown is normally accomplished from the ACR using the motor stop button.

Prior to development of the Technical Safety Requirements and transition to NRC oversight, PGPD had no requirement to perform surveillances on the ACR motor stop button, or on any of the other diverse means for manual cell shutdown. Therefore, at PGDP, there is no documented record of manual cell shutdown system failures which could be used to draw a conclusion as to the reliability of this system. However, based on discussions with operations personnel at PGDP who have been working in the cascade facilities for years, the manual cell shutdown system has been utilized on numerous occasions to shut down cells and has functioned reliably. At PORTS, manual shutdown of the cells using the ACR motor stop button was addressed in the Operational Safety Requirements with the requirement to document any failures. Operating experience at PORTS has also indicated that the manual cell shutdown system has performed reliably.

At PGDP, there were cells shutdown at the time of transition to the TSRs which may not have been shutdown using the ACR motor stop button. As such, there was no means available to demonstrate the operability of the ACR motor stop button in accordance with the existing TSR surveillance

requirement, since for these shutdown cells, there was no documented evidence that the ACR motor stop button had been utilized to trip the cell. Therefore, USEC submitted a revision to TSR 2.4.4.12, to allow an alternate means to perform the surveillance on the ACR motor stop button for those cells that were shutdown at the time of transition to NRC oversight.

The descriptive information contained in the SAR accident analysis, which describes that cells are shutdown within a five year time frame, is not material to the accident analysis assumptions, bases, or conclusions. The descriptive material that mentioned five years between cell shutdowns was provided to give a sense for how long a cell typically is operated on a continuous basis between shutdowns and that planned shutdowns do not typically occur on a shorter time frame such as monthly, quarterly or annually. It has never been PGDP practice to require shutdown of a cell on a five year interval; indeed, some cells have been operating continuously for longer than a five year period.

In addition, shutdown of a cell is a perturbation to the cascade which challenges safety systems and interrupts steady state operation of the cell, which is the safest mode of cascade operation. Therefore, the benefits of cell shutdown, on a routine, periodic basis, such as every 5 years, purely for the purpose of testing the manual cell shutdown system, do not clearly outweigh the risks of shutdown and the challenges to these safety systems.

To avoid the risks associated with cell shutdown on a periodic basis, a method could be developed to allow testing of the manual cell shutdown system while the cell is operating in a steady state mode. However, this would clearly require modification to the plant. Had USEC understood that the basis for certification required routine surveillance of the manual cell shutdown system on a periodic basis, we would have included a plan for the modification in the Compliance Plan, similar to other issues where modifications were required to satisfy NRC requirements at the GDPs. These modifications were not included in the Compliance Plan and were not understood by USEC as a certification requirement.

To clarify this issue, the SAR Section in question has been revised to clearly indicate that there is no surveillance frequency associated with the functional test associated with the manual cell shutdown system other than either at each planned cell shutdown or prior to restart following a planned cell shutdown. The revised SAR page has been evaluated in accordance with 10 CFR 76.68. Based on the results of the 10 CFR 76.68 evaluation, the SAR page included in Enclosure 2 does not require prior NRC review and approval and is provided for information only.

USEC believes that continued safe operation of PGDP is afforded by a TSR that requires functional testing of the ACR motor stop button, or the motor breaker pistol grip for the C310 cells, either at each planned cell shutdown or prior to restart after each planned shutdown, as specified in our proposed Certificate Amendment Request which revises TSR 2.4.4.12.

**Revised Technical Safety Requirements Basis Page
and Safety Analysis Report Page**

as the air-operated circuit breaker (ACB) ("000" equipment) or 15 kV transformer secondary breaker (TSB) ("00" equipment) failing.

Tables 4.3-2 and 4.3-3 list the control points where cell shutdown can be accomplished, relay action required, type of DC power required and the operator and relay action response time required for cell motor trip. The breaker trips with greater than 5 minute response time were listed to show the diverse means of the trip system. It should be noted that these would only be used as the "last resort" due to operational problems and possible safety considerations in the manual breaker trip situation.

Reliability of the manual cell shutdown system is verified by performance of a functional test which demonstrates the operability of the system. This functional test is performed either at each planned cell shutdown or prior to restart after each planned cell shutdown. It is estimated that most cells will be shutdown via a planned cell shutdown at least one time within five years. However, cells may operate continuously beyond this estimated five year period. Regardless of the duration of operation between planned cell shutdowns, performance of the functional test to demonstrate operability of the manual cell shutdown system will be performed at each planned cell shutdown or prior to restart following a planned cell shutdown. Manual cell shutdowns are normally accomplished from the ACR using the motor stop button (for the "00" and "000" cells) or the motor breaker pistol grip at the local cell panel (for C-310 cells).

A shutdown of cell motors is the only requirement to bring a cell below atmosphere. The operation of the motor brakes including the time to shut down is described in Section 3.3.4.3. However, the time for the discharge pressure to be less than atmospheric pressure would be less than the time to complete motor shutdown. When cell motors are stopped, the cell pressure decreases to one-half the operating pressure. Cell block valves can then be closed if necessary to isolate the cell.

The diversity of the manual cell shutdown system, the low probability of failure, and the fast response time make the manual cell shutdown system an adequate means to mitigate a possible UF_6 release.

4.3.2.1.2 Fatigue Failure

Fatigue failure refers to the failure of materials under the action of repeated stress. Most steels have well-defined stress limits and fatigue failures are not experienced at levels below these. Nonferrous metals do not have well-defined stress limits and therefore, are most susceptible to fatigue cracking. Fatigue failures in the cascade would most likely occur on nonferrous instrument lines and expansion joints due to mechanical vibration, thermal cycling, and repeated stress and stress reversals. Weld joints are another point of stress concentration where failure could occur.

Experience has shown that although several years are necessary for a fatigue failure to occur, its occurrence is likely with continued operation of the plant. The exact nature and size of fatigue failures are impossible to predict. Breaks could range from small hairline cracks, instrument line failure, or complete joint failures. The frequency of failure should be greatest in the least significant types of breaks with a very small failure frequency for the larger failures. Most of the equipment that would be operating at above atmospheric pressure was replaced during CUP which should minimize fatigue failures for several years.

Fatigue failures were considered during CIP/CUP design by installing buffered, double-walled expansion joints, buffer flow detectors to detect small leaks, and buffered valve bellows. These features should be effective in detecting and mitigating small leaks.

The worst-case fatigue failure, considered to be a low probability event, is a weld joint failure in a 30 in. diameter pipe which opens to 1/32 in. The area of the break is 2.9 in^2 and the release rate is

SECTION 2.4 SPECIFIC TSRS FOR ENRICHMENT CASCADE FACILITIES

2.4.4 GENERAL LIMITING CONDITIONS FOR OPERATION

2.4.4.12 CASCADE CELL TRIP FUNCTION (continued)

BASIS:
The accident analysis presented in SAR chapter 4 discusses numerous cascade cell-related scenarios (e.g., 4.3.2.1.2, 4.3.2.1.5, 4.3.2.1.6, 4.3.2.2.2, 4.3.2.3.2., and 4.3.2.4.1) in which operating personnel respond to certain process conditions and alarms by de-energizing the process motors ("tripping the cell"), thus bringing the cell below atmospheric pressure. In order to initiate a cell shutdown, the DC control and trip power circuit must be functional.

Two methods can be used to perform the functional test to demonstrate the reliability of the cell trip function. The first, for both the "00" and the "000" cell motors, is at the time of planned shutdown. Use of the ACR cell motor stop button at the time of planned cell shutdown demonstrates cell trip reliability. Note that Planned Cell Shutdown is defined as the process of manually de-energizing the process motors in accordance with approved procedures. However, only the use of the ACR motor stop button (for the "00" or the "000" cells) or the motor breaker pistol grip at the local cell panel for C-310 cells or equivalent functional test prior to startup satisfies the surveillance requirement. Unplanned Cell Shutdown is therefore any automatic trip of the process motors

The second method of testing depends upon the type of cell, "00" or "000", being tested.

The reliability of the cell trip function for "00" cell motors can also be demonstrated using the ACR "motor stop" button with the process substation transformer secondary breaker open and the motor breakers closed. Actuating the ACR push button will open the motor breakers thereby verifying the ACR trip circuit functions correctly.

The reliability of the cell trip function for "000" cell motors can also be demonstrated using the ACR "motor stop" button with the 15kV Air Circuit Breaker (ACB) disconnects open, process motor breakers open, and switch house 15kV ACB closed. Actuating the ACR push button will open the 15 kV ACB thereby verifying the cell trip function.

Planned cell shutdowns must be initiated at the local control panel for C-310 cells because an ACR trip button is not provided for C-310 cells.

The minimum air pressure required to trip the "000" breakers varies with the breaker type. The minimum required breaker actuation pressure for the "000" breaker groups and the bases for those values are identified in SAR Section 3.9.1.3.2. The minimum DC control voltage is 210 volts DC. Control components required for cell trip are rated to operate at 200 VDC or greater; however, the minimum voltage rating for the battery banks is 210 VDC and thus is the limiting equipment requirement.

The alternate means of cell shutdown referred to in required action A.1 are discussed in SAR Table 4.3-2 for the "00" cells and includes alternate means of shutdown from the ACR. For the "000" cells, alternate shutdown is manually accomplished from the switch house if DC power is unavailable; or, from either the switch house, relay house, or C-300, depending on the status of individual breaker air tank pressure.