USEC
A Global Energy Company

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U.S. Nuclear Regulatory Commission
Washington, D C. 20555-0001

**Paducah Gaseous Diffusion Plant (PGDP)**
**Docket No. 70-7001, Certificate No. GDP-1**
**Request for Enforcement Discretion – R-114 Coolant System Rupture Discs**

The United States Enrichment Corporation (USEC) requests enforcement discretion from NRC Region II allowing continued operations of the Paducah Gaseous Diffusion Plant beyond the current Technical Safety Requirements (TSR) Limiting Condition for Operations (LCO) 2.4.3.4, Action A Completion Time for the R-114 Coolant Overpressure Control System. This LCO requires cell shutdown within twenty-four hours if the R-114 Overpressure Control System is declared inoperable. While performing an R-114 leak repair on April 30, 2010, roofing tar was discovered on the outboard side of the R-114 rupture disc on C-337 Unit 2 Cell 4. Subsequent extent of condition inspections identified a second condition involving thin plastic packing covers that were left on the outboard side of several rupture discs at the time of installation. A total of twenty-seven (27) cells were determined to be affected by these conditions. The affected systems were conservatively declared inoperable.

Based on the overall potential safety impact to the plant of shutdown of the twenty-seven (27) cells, USEC requested enforcement discretion in a conference call held with NRC management and staff on Saturday, May 1, 2010. The enforcement discretion is necessary to allow adequate time to safely put the equipment into a mode not requiring the system to be operable and/or restore operability of the R-114 Coolant Overpressure Control System. The additional time avoids increasing the likelihood of equipment failure and subsequent operational transients whose safety significance exceeds the minimal safety concerns of continued operations with degraded rupture discs in service until a well planned and coordinated cell shutdown and repair can be executed.

Based on the conference call, NRC provided verbal enforcement discretion for a period of ten (10) days from 1642 hours on Friday, April 30, 2010, allowing adequate time to safely put the equipment into a mode not requiring the system to be operable and/or restore operability of the R-114 Coolant Overpressure Control System. This letter documents the enforcement discretion provided to USEC and the associated justification.

Subsequent to the conference call on May 1, 2010, follow-up verification inspections, conducted by Engineering personnel, on cells that had been inspected prior to the identification of the first plastic packing covers discovered additional cells that have the plastic packing covers installed. The addition of these cells brings the total affected cell count to thirty-two (32). The additional systems were declared inoperable.

The enclosure to this letter addresses the technical justification for this request and provides the information NRC indicates is necessary for processing requests of this nature in NRC Inspection Manual Chapter 9900, "Operations – Notice of Enforcement Discretion for Gaseous Diffusion Plants." Should you have any questions regarding this matter, please contact Mr. Vernon J. Shanks at (270) 441-6039.

Sincerely,

Steven R. Penrod
Vice President and General Manager
Paducah Gaseous Diffusion Plant

Enclosure: Justification for Request for Enforcement Discretion

cc: L. Reyes, NRC Region II Regional Administrator
M. Weber, NRC Director, Nuclear Material Safety & Safeguards
J. Shea, NRC Director, Division of Fuel Cycle Inspection
M. Miller, NRC Senior Resident Inspector
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# JUSTIFICATION FOR REQUEST FOR ENFORCEMENT DISCRETION (ED)

The following justification provides the information suggested by the guidance provided in NRC Inspection Manual Chapter 9900, "Operations – Notice of Enforcement Discretion for Gaseous Diffusion Plants." The NRC guidance is italicized and is followed by USEC's response.

1. *The TSR or other certificate conditions that will be violated.*

TSR 2.4.3.4 Condition A states,

| Condition | Required Action | Completion Time |
|---|---|---|
| A. R-114 cell coolant overpressure relief system inoperable for reason other than B or D below. | A.1.1. An operator shall continuously monitor the R-114 system pressure in order to take action to lower pressure.<br>AND<br>A.1.2 Perform Action A.2<br>OR<br>A.2 Place the affected equipment in mode Cascade 1 with process motors de-energized. | Immediately<br><br>24 hours<br><br>Immediately |

During an R-114 leak repair, a roofing tar substance was found deposited on the outboard side of the rupture discs. During subsequent extent of condition walk-downs, thin plastic covers were also found. The affected systems were declared inoperable. A total of thirty-two operating cascade cells were affected by either the tar or the packing covers. The Technical Safety Requirements (TSR) require shutdown of the affected equipment per LCO Action A.2 if the system cannot be restored to operable status within 24-hours of discovery.

The time required to place this number of operating cells in "mode Cascade 1 with process motors de-engergized" in a planned and safe manner will exceed the action time statement and Enforcement Discretion to extend the 24-hour action time is requested.

To increase confidence regarding the potential presence of plastic packing covers on the inboard disc, we have removed three assemblies (on non-operating cells) with packing covers on the outlets. and have determined that no packing covers were present on the inboard rupture discs. While we do not believe this is an issue, our longer term corrective actions for this event will implement an ongoing check for the presence of inlet plastic packing covers during any maintenance activities requiring the removal of the rupture disc assembly.

2. *The circumstances surrounding the situation, including root causes, the need for prompt action, and identification of any relevant historical events.*

The root cause of this event is roofing tar leaks, from a roofing project conducted in the 1980s, being deposited on the upper surface of the outboard rupture disc and for an undetermined reason leaving plastic packing covers on the rupture discs during installation. Quarterly surveillances

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are required for these systems to verify that the rupture disc block valves are in the open position and to verify that the vent port between the discs is open. The area where the plastic packing covers and the roofing tar were found are not readily accessible to visually inspect and have; therefore. gone undetected until the recent coolant leak repair activity revealed the roofing tar concern.

Prompt enforcement discretion action is requested in order to provide adequate time to repair and/or safely shutdown these affected operating cells. The request to extend the 24-hour action time will allow PGDP to evacuate the $UF_6$ from the cells so that in the event a seal failure occurs upon shutdown, wet air inleakage will not create undesirable operating conditions. Repairs will consist of replacement of those rupture disc assemblies determined to be inoperable due to the presence of roof tar and removal of the plastic packing covers on the balance of the affected systems.

3. *The safety basis for the request, including an evaluation of the safety significance and potential consequences of the proposed course of action. This evaluation should include at least a qualitative risk assessment.*

SAR Accident Analysis Section 4.3.2.1.6 addresses a coolant tube rupture into thc primary system.

> "A failure of coolant tube(s) in a cascade cell gas cooler could result in a significant pressure increase in the primary system. If the coolant leak should occur when the cell is tied to the cascade, sufficient volume is available within the cascade to allow for expansion of the coolant without causing any significant pressurization. Coolant tube failures could be caused by initiators such as fatigue cracks or ruptures, joint failures, corrosion pitting, a loss of RCW cooling coupled with a failure of the coolant high-pressure relief system, or a UF6/hot metal reaction burning a hole in the gas cooler tubes. This event in an off-stream cell (limited volume for expansion) could result in a rapid pressure increase above the normal operating pressures within the primary system. The pressure transient may exceed the rated pressure of the converters and expansion joints, etc. This could lead to a UF6 release regardless of whether the cell is operating above or below atmospheric pressure. This event is an AE based on operational history.
>
> A rupture of coolant tubes into the primary system was evaluated in the PrHA, and it was determined 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. The threshold consequence analysis performed for the PrHA determined that off-site EGs would not be exceeded for this event.

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> The primary concern associated with this event is controlling the UF6 release if the primary system fails. The applicable EGs (see Table 4.2-2) associated with this event are all the EGs for the AE frequency range. EG 4 is addressed by the NCS program (see Section 5.2). EG 3 cannot be ensured for this event, therefore the safety actions of (1) building holdup, and (2) emergency response by on-site personnel are required to maintain the effects of a UF6 release within EGs 1 and 2. No operator action is required for this event, therefore there are no actions required to meet EG 6."

The compensatory measures are to continuously monitor the R-114 system pressure and mitigate any pressure excursion until the rupture discs of each affected system can be replaced or packing covers removed. This proposed course of action does not increase the consequences of a release of material.

The Enforcement Discretion request allows the affected R-114 coolant overpressure control systems to be restored to compliance with TSR 2.4.3.4 in a planned, controlled process in accordance with the standard operating procedures for cell shutdowns at PGDP. The process for safe shutdown of operating cells is documented in controlled operating procedures and is a routine operation.

The Enforcement Discretion request results in a safer restoration of the systems into compliance with TSR 2.4.3.4. SAR Section 4.3.2.1.6 documents the accident analyses for a coolant tube rupture. If the coolant leak should occur when the cell is tied to the cascade, sufficient volume is available within the cascade to allow for expansion of the coolant without causing any significant pressurization. No release of $UF_6$ will occur. The Enforcement Discretion request allows for the operation to continue in accordance with TSR 2.4.3.4 Action A.1.1. Continuing operation in this manner will not increase the likelihood of any of the accident initiators identified in SAR Section 4.3.2.1.6, while maintaining the consequences at the level of no consequences. In either process of shutdown of the cells with the $UF_6$ inventory present or shutdown following obtaining a $UF_6$ negative, cells will be isolated for a short period of time until evacuation operations begin. In either of these processes, the risk of isolation with $UF_6$ inventory for this short period of time with an inoperable cell coolant overpressure control system is negligible since the inventory is rapidly removed thus reducing the source for creating a pressure increase within the coolant system. Trained Operators are assigned the sole duty of continuously monitoring the cell coolant temperature, which directly corresponds to the coolant pressure. The Operators are knowledgeable of the actions to be taken in the event of a temperature increase and at what level to take those actions.

The actions directed by TSR 2.4.3.4 Action A.2 to shutdown numerous operating cells within 24 hours will also lead to a no consequences level for the accident of a coolant tube rupture. However, shutting down numerous cells within this short timeframe would require the shutdown be performed in a manner different than the planned, controlled evolution normally taken for individual cell shutdowns. The $UF_6$ inventory would remain in the shutdown cells, increasing

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the likelihood of equipment failures on shutdown. Equipment failures that occur on shutdown with inventory remaining in the cell would introduce concerns not present on a normal cell shutdown. The shutdown in this manner would require implementation and monitoring of additional Nuclear Criticality Safety controls that are not required when a $UF_6$ negative is obtained prior to cell shutdown. The prompt cell shutdown of numerous cells may also result in perturbations to the cascade flows that increase likelihood of process upsets, including compressor de-blades, which would further complicate returning the systems to compliance with TSR 2.4.3.4.

From this qualitative risk assessment, the actions directed by TSR 2.4.3.4 would introduce additional hazards to the cascade operation while providing no increase in safety for the accident of a coolant tube rupture for which the R-114 coolant overpressure control system is required. The actions allowed by the Enforcement Discretion request will not introduce those additional hazards while maintaining the consequences of a coolant tube rupture at the level of no consequences.

4. *The basis for the certificate holder's conclusion that the noncompliance will not be of potential detriment to the workers nor public health and safety, the environment, safeguards, or security, and that neither an unreviewed safety question nor a significant hazard condition is involved.*

The noncompliance will not be of potential detriment to the workers, public health and safety, or the environment because continuing to monitor the system beyond the allotted 24-hour action time will provide the needed protection to ensure the system does not overpressure and rupture. The R-114 rupture discs are only required to relieve pressure from a significant cell coolant transient. Operators are trained to monitor cell parameters and take actions to preclude overpressure situations requiring the rupture disc to relieve. In the plant's almost 60 years of operation there has not been a coolant system over pressurization that ruptured one of these discs. The steps required to place this number of cells into mode 1 requires a significant amount of operator action and time to achieve without process and criticality safety upsets. An extension to the action completion time will not have any potential to adversely affect worker or public safety. Shutting cells down in a planned manner is a normal operator task. Shutting down the affected cells in a 24-hour timeframe will produce no commensurate benefit to safety. There is no safeguards and security impact affected by this issue.

5. *The basis for the certificate holder's conclusion that the noncompliance will not involve adverse consequences to the environment.*

See above information extracted from SAR Section 4.3.2.1.6.

6. *Any proposed compensatory measure(s).*

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The compensatory measures are to continue to monitor the system beyond the 24-hour action time without shutting the cells down. Trained Operators are assigned the sole duty of continuously monitoring the cell coolant temperature. System pressure is being monitored via system temperature due to the direct correlation between temperature and pressure. SAR Section 4.3.2.1.6 clearly states, "If the coolant leak should occur when the cell is tied to the cascade, sufficient volume is available within the cascade to allow for expansion of the coolant without causing any significant pressurization." Based on this analysis, the proposed compensatory measures are adequate for continued operations.

7. *The justification for the duration of the noncompliance.*

The time to remove the $UF_6$ from an operating cell to a point where the system is at a negative (<10PPM) can vary from cell to cell, but in general terms can take approximately 24 hours to complete. The critical path for achieving compliance is the eight cells with roofing tar present on the rupture discs in the C-337 process building. It is estimated to take a minimum of 8-10 days to achieve a $UF_6$ negative on these cells. This time estimate is based on the amount of cell processing equipment available in each process building to achieve the removal of the $UF_6$. This will allow for either the shutdown of the cell in a controlled manner or the restoration of the rupture disc systems to operable status. The continuous monitoring of system pressures/temperatures with the cell running ensures pressure excursions will be mitigated by operator action.

8. *A statement that the request has been approved by the facility organization that normally reviews safety issues (Plant Onsite Review Committee, or its equivalent).*

This request for Enforcement Discretion was approved by the Plant Operations Review Committee (PORC) at 1345 hours on May 2, 2010.

9. *The request must specifically address how one of the NOED criteria for appropriate plant conditions specified in Section B is satisfied.*

This Enforcement Discretion avoids undesirable plant transients and process upsets as a result of forcing compliance with TSR LCO 2.4.3.4 Action A. The concurrent shutdown of affected operating cells would expose the plant to the potential for increased seal failures, increased out-gassing of $UF_6$, increased wet air inleakage causing potential for $UO_2F_2$ deposits, challenging Operator skill when performing concurrent critical operations, placing the plant in pressure transients, etc. In contrast, the controlled shutdown of the affected cells would provide time for planned evacuation of the $UF_6$ and coolant from the cell thereby avoiding the safety concerns mentioned above.

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*10. If a follow-up TSR/certificate amendment is required, the NOED request must include marked-up TSR pages showing the proposed TSR changes. The actual TSR/certificate amendment request must follow within 48 hours.*

No CAR is needed or expected at this time.

*11. Any other information the NRC staff deems necessary before making a decision to grant a NOED.*

As requested.