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September 30, 1996

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 96-179

Paducah Gaseous Diffusion Plant (PGDP)
Docket No. 70-7001
Certificate Amendment Request-Cascade Cell Trip Function

Dear Dr. Paperiello:

In accordance with 10 CFR 76.45, the United States Enrichment Corporation (USEC or Corporation) hereby submits a request for amendment to the proposed certificate of compliance for the Paducah, Kentucky Gaseous Diffusion Plant (GDP). This certificate amendment request revises limiting specific values for battery performance specified in Technical Safety Requirement (TSR) 2.4.4.12, Cascade Cell Trip Function.

Issue 48 of the Plan For Achieving Compliance with NRC Regulations for the Paducah Gaseous Diffusion Plant, requires, in part, that the limiting specific values for battery performance listed in TSR 2.4.4.12 be reconfirmed and documented, either through engineering analysis, safety demonstration, or a combination of both methods, and independently verified, to provide adequate margins for determining the operability of the cascade cell trip function. This analysis has been completed and independently verified. As a result of this analysis, the DC voltage requirement specified in TSR 2.4.4.12 have been modified to include a new limiting value for battery voltage of 210 volts. In addition, since the specific gravity of the battery cell is temperature dependent, TSR 2.4.4.12 has also been modified to require that the measured specific gravity obtained during performance of the surveillance requirements be adjusted to 77°F prior to comparison of the measured specific gravity value to the surveillance limit.

Issue 48 of the Plan For Achieving Compliance with NRC Regulations for the Paducah Gaseous Plant also requires that the limiting specific values for air pressure requirements for the "000" air circuit breakers be reconfirmed and documented, either through engineering analysis, safety demonstration, or a combination of both methods, and independently verified, to provide adequate margin for determining the operability of the cascade cell trip function by August 30, 1996. If new limiting specific values are determined as a result of this analysis and/or demonstration, then USEC will submit a revised SAR Section 3.9.1.3.2 within 30 days of verifying these new values. The evaluation associated with Issue 48 has been completed, and independently verified, to support the August 30, 1996 compliance plan date. This evaluation determined that a change to SAR Section 3.9.1.3.2 is required. This change is also provided as part of this submittal.

Enclosure 1 to this letter provides a detailed description and justification for the proposed changes. Enclosure 2 is a copy of the revised TSR pages and the revision to SAR Section 3.9.1.3.2. Enclosure 3 contains the basis for USEC's determination that the proposed changes associated with this certificate amendment request are not significant.

Since this proposed certificate amendment request is not required to support continued operation, USEC requests NRC review and approval at your earliest convenience. The amendment should become effective 60 days from issuance.

Any questions related to this subject should be directed to Mr. Robert L. Woolley, USEC's Manager of Nuclear Regulatory Assurance and Policy, at (301) 564-3413.

Sincerely,

James H. Miller
Vice President, Production

Enclosures: As Stated

cc: NRC Region III Office
NRC Resident Inspector - PGDP
NRC Resident Inspector - PORTS
Mr. J. Dale Jackson (DOE)

OATH AND AFFIRMATION

I, James H. Miller, swear and affirm that I am Vice President, Production, of the United States Enrichment Corporation (USEC), that I am authorized by USEC to sign and file with the Nuclear Regulatory Commission this Certificate Amendment Request for the Paducah Gaseous Diffusion Plant, that I am familiar with the contents thereof, and that the statements made and matters set forth therein are true and corrrect to the best of my knowledge, information, and belief.

James H. Miller

Subscribed to before me on this 30 day of SEPTEMBER, 1996.

Notary Public

CATHERINE E. KEEL
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires February 4, 1997

United States Enrichment Corporation (USEC)
Proposed Certificate Amendment Request
Cascade Cell Trip Function
Detailed Description of Change

The PGDP Safety Analysis Report discusses numerous cascade cell-related scenarios in which operating personnel respond to certain process conditions and alarms by de-energizing (tripping) the process motors to bring the cells below atmospheric pressure, thereby limiting the amount of material released. In order to trip a cell, the DC control and trip power circuit must be operable to open the breaker supplying the process motor. Additionally, tripping the air circuit breakers (ACB) supplying motors of "000" cells, requires air at a sufficiently high pressure to actuate the opening mechanism. Technical Safety Requirement (TSR) 2.4.4.12 establishes operability requirements for batteries and air supplies supporting the trip function. Safety Analysis Report (SAR) Section 3.9.1.3.2 specifies the minimum air pressure to trip "000" ACBs.

Compliance Plan Issue 48 for PGDP requires that the specific values for battery performance and "000" breaker air pressure listed in the TSR and the SAR be reconfirmed and the bases for the values documented. The current values in the TSR and SAR are nominal limiting values based on past operating and maintenance practices. The battery performance and breaker air pressure values have been evaluated, new limiting values have been established, and the bases for these values have been documented. In accordance with the Compliance Plan, the proposed changes to TSR 2.4.4.12 and SAR Section 3.9.1.3.2 are being submitted to reflect the results of the evaluation. The changes include corrections to the values and an expansion of the bases for these values. The changed TSR and SAR pages are attached as Enclosure 2.

TSR 2.4.4.12 has been modified to include a revised limiting value for battery voltage, a clarification to reflect the dependency of battery specific gravity on temperature, and an expanded basis for the limiting battery voltage value. The minimum DC voltage, measured at the battery charger, has increased from 200 to 210 volts. The minimum required operating voltage for critical DC control components required for cell trip, ranges from 40 to 200 VDC. However, the manufacturer's minimum voltage rating on the batteries is 210 VDC, which thus becomes the limiting equipment requirement. With allowances for line losses (which range from approximately 0.1 to 5%), a value of 210 VDC at the output of the battery charger is sufficient to assure more than the minimum required operating voltage at the critical control components required for trip. The largest voltage drop (5% or about 10 VDC) is associated with control components with a minimum operating voltage of 140 VDC or less.

The specific gravity of a battery cell is dependent on the temperature of the cell. To eliminate the effect of this dependency on the battery surveillance, the measured specific gravity must be adjusted to 77°F, nominal room temperature, before comparison to the limit. The proposed change to the surveillance requirement specifies the need for this temperature correction.

The TSR Basis Statement has been modified to identify the basis for the battery voltage limit. The limiting equipment requirement, the battery bank rating, establishes the limit.

The ACB air pressure values for the respective cells specified in SAR Section 3.9.1.3.2, have been regrouped to reflect the actual supply breaker configuration. The air pressure values have been modified and the discussion of the basis for the air pressure requirements has been expanded.

The SAR lists three different air pressure values for ACBs supplying various cell motors. However, the 225 psig value listed refers to breakers that are not required for cell trip. The breakers with the 225 psig pressure requirement are 5000 amp breakers supplying the 14 kV switchhouse bus (see SAR Figure 3.9-1). These breakers were incorrectly listed in the SAR as being required for cell trip. The only ACBs required for cell trip are cell feeder breakers, which are either General Electric breakers with a revised limit of 190 psig or Westinghouse breakers with a revised limit of 118 psig. The proposed revision correctly groups the cascade cells with the pressure limit for the corresponding breaker type.

The current limits of 185 and 112 psig, which are the low air pressure trip lockout setpoints for the respective breakers, have been increased to include a pressure margin above the setpoint sufficient to assure that the lockout setpoint will not be reached. The breaker opening mechanism operates from air contained in a reservoir at the breaker so pressure losses in the air supply headers do not affect the trip function.

The discussion of the air pressure requirements has been expanded to include the basis for the pressure limits. The applicability of the air pressure limits to only the "000" cells, has also been clarified.

The proposed changes to TSR 2.4.4.12 and SAR Section 3.9.1.3.2 provide more conservative limits for battery voltage and ACB air pressure, improve the surveillance requirements for measuring battery cell specific gravity, and establish better bases for the limits. These changes will provide better assurance that the cell trip function will be available if required.

Enclosure 2
GDP96-179
8 Pages

Proposed Certificate Amendment Request Paducah Gaseous Diffusion Plant Letter GDP96-179 Removal/Insertion Instructions	
Remove Pages	**Insert Pages**
VOLUME 1	
Section 3.9 3.9-5/3.9-6	**Section 3.9** 3.9-5/3.9-6 and 3.9-6a/3.9-6b
TECHNICAL SAFETY REQUIREMENTS	
Section 2.4 2.4-41 through 2.4-43	**Section 2.4** 2.4-41 through 2.4-43

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

LCO 2.4.4.12 DC control power and air pressure for cell trip of UF_6 stage motors shall be operable.

APPLICABILITY: Modes: Cascade 1 and 2 when stage motors are energized.

ACTIONS:

Condition	Required Action	Completion Time
A. DC voltage < 210 volts	A.1 Notify Cascade Coordinator of potential need to utilize alternate means of cell shutdown. AND A.2 Restore DC voltage to ≥ 210 volts	Immediately 48 hours
B. Required action A. not satisfactorily accomplished.	B.1 Shutdown affected cascade cell(s). AND B.2 Verify cell isolation.	8 hours
C. Air header pressure feeding a group of "000" air circuit breakers is less than the minimum required to actuate those breakers.	C.1 Notify Cascade Coordinator of potential need to utilize alternate means of cell shutdown. AND C.2 Restore air pressure to greater than the minimum required breaker actuation pressure.	Immediately 48 hours
D. Required action C. not satisfactorily accomplished.	D.1 Shutdown affected cascade cell(s). AND D.2 Verify cell isolation.	8 hours
E. Individual battery (cell) parameters (other than voltage) are outside limits established in surveillance requirements.	E.1 Restore the individual battery (cell) parameters to within limits.	90 days

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)

SURVEILLANCE REQUIREMENTS:

Surveillance		Frequency
SR 2.4.4.12-1	Verify DC voltage ≥ 210 volts at the battery DC charger.	Daily
SR 2.4.4.12-2	Verify "000" air circuit breaker air header pressure is greater than the minimum required actuation pressure.	Daily
SR 2.4.4.12-3	Inspect battery terminals and racks for evidence of corrosion and for leakage of electrolyte.	Quarterly
SR 2.4.4.12-4	Check that the specific gravity of the pilot cell is ≥ 1.180 corrected to 77°F.	Quarterly
SR 2.4.4.12-5	Verify the battery charger output is > 0 DC amps	Quarterly
SR 2.4.4.12-6	Visually check the cell electrolyte levels to verify that the level is above the low level indication and no more than 0.25 inches above the high indication line.	Quarterly
SR 2.4.4.12-7	Check that the specific gravity of the cells is ≥1.180 corrected to 77°F.	Annually
SR 2.4.4.12-8	Utilize the ACR "motor stop" button for planned "00" and "000" cell shutdowns and the motor breaker pistol grip at the local cell panel for planned C-310 cell shutdowns.	Each planned cell shutdown (motors off)
SR 2.4.4.12-9	Verify expected block valve closure and recycle valve opening for the planned cell isolation and initiate corrective actions for any unexpected valve operation.	Each planned cell isolation.

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. In order to demonstrate the reliability of the cell trip function, planned cell shutdowns will be initiated from the ACR for "00" and "000" cells, and at the local cell panel for C-310 cells, with any manual cell trip failures (regardless of initiator) being documented. The same mechanisms apply to C-310 cells with the exception of the ACR cell trip button which 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 an 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.

Transformers are protected by an electrical relaying system which isolates and de-energizes the unit when faults, overloads, and other abnormal conditions occur. This relaying system is redundant and is extremely reliable.

3.9.1.3 14-kV Distribution System

The 14-kV distribution system is composed of five major types of electrical equipment:

- The transition bus ductwork
- 14-kV switchgear
- 14-kV feeder cables
- Synchronous condensers
- 14-kV static capacitors

The transition bus duct transfers power from the low voltage terminals of the main power transformers to the 14-kV switchgear. The switchgear then transfers power to the process transformers via 14-kV feeder cables. The synchronous condensers and 14-kV static capacitors are used for power factor improvement and voltage regulation. They are connected to the 14-kV switchgear via electric feeder cables.

3.9.1.3.1 Transition Bus Ductwork

The 14-kV power is supplied from the transformers to the switchgear via isolated phase bus duct consisting of a metal enclosure containing insulator-supported conductors. Each phase conductor follows a separate enclosed path. The porcelain insulators supporting each conductor insulates it from its metal enclosure and holds it in a fixed location within the enclosure.

The isolated phase bus duct is rated to carry 5,000 amperes continuously with temperature rise not to exceed 50°C over a 40°C ambient temperature. The current conducting portion utilizes either large copper bars or high conductivity aluminum. The bus duct is rated to withstand the maximum possible short circuit stress.

The main current carrying parts of the bus duct are protected by zones of relaying used to detect faults within the protected zone. All metal enclosures of the bus duct are electrically bonded and grounded for personnel safety.

3.9.1.3.2 14-kV Switchgear

The 14-kV switchgear provides the means for disconnecting and protecting electrical equipment. Each switchgear typically has ten adjacent air-operated circuit breakers (ACB) cubicles, each containing an ACB and interconnecting bus conductors. A common 14-kV bus is connected to each ACB. The switchgear units are of the outdoor metal enclosed station cubical-type, with compressed air-operated circuit breakers. Each unit is composed of various combinations of cubicles. A typical switchgear feeder cubicle contains an ACB rated at 2,000 amperes with necessary electrical bus conductors to receive power from the 14-kV bus and to supply power to process distribution 14-kV feeder cable. Each ACB cubicle

contains its air-operated opening and closing mechanism and instrument and current transformers for monitoring the amount of current flowing through the breaker and feeder. In addition, each switchgear has two 5,000 ampere-rated breakers to connect the switchgear bus to the 14-kV transition bus from the main and reserve transformers. One cubicle of the switchgear is reserved for the bus potential transformers which are sensing devices for relaying and voltage monitoring. When required, the switchgear also has breakers to connect the switchgear bus to the synchronous condensers and 14-kV static capacitors. Each ACB contains manually operated disconnect switches which, when opened physically, disconnect the ACBs from sources of electrical power and allow routine maintenance to be performed without removal of the entire switchgear from service.

Air operated circuit breakers are opened to trip compressor motors for the "000" cells. To assure proper operation of the air-operated opening mechanisms for these breakers, a minimum air pressure of 190 psig (for all cells in C-337 and cells C-333-2.2, C-333-5.1, C-333-5.3, C-333-6.5, and C-333-6.7), or 118 psig (all other cells in C-333) is maintained. The minimum operating pressure is slightly above the low pressure lockout device setting (if the lockout actuates, the breaker is inoperable until air pressure is restored to a higher value).

3.9.1.3.3 14-kV Feeder Cables

The feeder cables deliver power from the 14-kV switchgear to the process and auxiliary substations. The 14-kV feeder cable system includes all cables delivering power from the 14-kV switchgear, and the structures necessary to support them. The cables are installed in either underground conduit or overhead cable trays which support, protect, and route each feeder from the 14-kV switchgear ACB to the process or auxiliary substation. The type of support system used for each cable is dependent upon a number of factors, including specific installation requirements and the required route. Each cable is electrically insulated and shielded to provide a reliable barrier between conductor voltage and the surrounding earth potential.

The 14-kV overhead cables are positioned to avoid mechanical damage by vehicular traffic.

3.9.1.3.4 Synchronous Condensers

Since the PGDP load is mostly induction motors, a lagging power factor is produced which must be corrected to provide acceptable area voltages. Both synchronous condensers and static capacitors are used for power factor improvement to maintain voltage levels.

There are eight synchronous condensers; four in the C-531 switch house, two in the C-537 switch house, and two in the C-535 switch house. The synchronous condensers are actually large, hydrogen-cooled, three-phase synchronous motors running overexcited. They are typically rated at 50,000 kVAR at 14-kV. Their output is determined by the amount of field excitation applied and terminal voltage.

Each synchronous condenser is tied to a 14-kV bus via cables and an ACB. Protective relaying devices are located in the switch house control room.

In addition to protective relays, safe operation is dependent upon proper lubrication and cooling. Instrumentation monitors temperatures of bearings and cooling gases, oil levels, and cooling gas pressures. The condenser shell contains hydrogen for the cooling gas, consequently strict procedures for purging with carbon dioxide and air are followed before entry by personnel. Automatic sprinkler systems

are provided underneath the units and around the lube oil pumps. Actuation of these sprinklers also shuts down and valves off associated lube oil pumps. Low oil level alarm and subsequent shutdown are provided.

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United States Enrichment Corporation (USEC)
Proposed Certificate Amendment Request
Cascade Cell Trip Function
Significance Determination

The United States Enrichment Corporation (USEC) has reviewed the proposed changes associated with this certificate amendment request and provides the following Significance Determination for consideration.

1. No Significant Decrease in the Effectiveness of the Plant's Safety, Safeguards or Security Programs

   The proposed changes enhance the availability of the cascade cell trip function and affect no other equipment functions or administrative requirements. The cell trip function is not addressed in plant safety, safeguards or security programs contained in Volume 3 of the Application for United States Nuclear Regulatory Commission Certification for the Paducah Gaseous Diffusion Plant. Therefore, the effectiveness of these programs is unaffected by these changes.

2. No Significant Change to Any Conditions to the Certificate of Compliance

   The proposed changes enhance the availability of the cascade cell trip function and affect no other equipment functions or administrative requirements. None of the Conditions to the Proposed Certificate of Compliance for Operation of Gaseous Diffusion Plants (GDP-1) specifically address the cell trip function. Thus, the proposed changes have no impact on any of the Conditions to the Proposed Certificate of Compliance.

3. No Significant Change to Any Condition of the Approved Compliance Plan

   The Plan of Action and Schedule for Issue 48 of the Plan for Achieving Compliance with NRC Regulations at Paducah Gaseous Diffusion Plant, requires the limiting specific values for battery performance listed in the Technical Safety Requirements and for the air pressure for the "000" air circuit breakers be reconfirmed and documented to provide adequate margin for determining the operability of the cascade cell trip function. As a result of the analysis associated with this reconfirmation required by the Compliance Plan, the current limiting specific values have been revised. The proposed changes are submitted in accordance with the Compliance Plan and create no changes to the Compliance Plan nor to any conditions of the Compliance Plan.

4. No Significant Increase in the Probability of Occurrence or Consequences of Previously Evaluated Accidents

   The proposed changes enhance the availability of the cascade cell trip function and affect no other equipment functions. The cascade cell trip function is not involved in any precursor to an evaluated accident; therefore, the probability of occurrence of an evaluated event is unaffected. The cell trip function is involved in the mitigation of the consequences of

previously evaluated accidents by de-energizing the process motors, thus bringing the cell below atmospheric pressure. Revising the limiting specific values for battery performance and the air pressure requirements for the "000" air circuit breakers enhances the ability of the cell trip function by ensuring that adequate DC voltage and air pressure are available to affect cell trip. Since the proposed changes provide enhanced assurance that the function will be available if required, the consequences of previously evaluated accidents are not increased.

5. No New or Different Type of Accident

The proposed changes establish new operating limits for plant equipment that are within the existing operating ranges of that equipment. The changes create no new operating conditions or new plant configurations that could lead to a new or different type of accident.

6. No Significant Reduction in Margins of Safety

The minimum air pressures (for those breakers actually required for the cell trip function) and battery voltages established by these proposed changes are within the existing operating ranges of the equipment and have been increased to enhance the cell trip function, which is the only safety function affected by these parameters. The incorrect reference to breakers not required for the cell trip function has been deleted from SAR Section 3.9.1.3.2. Consequently, the proposed changes cause no reductions in the margins of safety.

7. No Significant Decrease in the Effectiveness of any Programs or Plans Contained in the Certificate Application

The proposed changes enhance the availability of the cascade cell trip function and affect no other equipment functions or administrative requirements. The cell trip function is not mentioned in any program or plan contained in the Certification Application. Therefore, the proposed changes have no impact on the effectiveness of these programs or plans.

8. The proposed changes do not result in undue risk to 1) public health and safety, 2) common defense and security, and 3) the environment.

The proposed changes to TSR 2.4.4.12 and SAR section 3.9.1.3.2 provide limits for battery voltage and air circuit breaker air pressure, improve the surveillance requirements for measuring battery cell specific gravity, as well as improved bases for the limits. These changes provide improved assurance that the cell trip function will be available, if required. As such, these changes enhance the ability of the cascade trip function to deenergize the process motors ("tripping the cell"), thus bringing the cell below atmospheric pressure. By enhancing the ability to perform the cell trip function, the ability to mitigate the consequences of postulated accidents has been improved. As such, these changes do not represent an undue risk to public health and safety. In addition, these revisions have no impact on plant effluents or on the programs and plans in place to implement physical security. Consequently, these proposed changes only enhance safety and pose no undue risk to the environment or the common defense and security.