UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

August 25, 2004

Mr. J. Morris Brown
Vice President - Operations
United States Enrichment Corporation
Two Democracy Center
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: NRC INSPECTION REPORT 07007001/2004-006 (DFFI) - PADUCAH

Dear Mr. Brown:

On August 2, 2004, the NRC completed a routine resident inspection at the Paducah Gaseous Diffusion Plant. The purpose of the inspection was to determine whether activities authorized by the certificate were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection on August 2, 2004, the NRC inspectors discussed the findings with members of your staff.

This inspection consisted of an examination of activities conducted under your certificate as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your certificate. Areas examined during the routine resident inspection are identified in the enclosed report. Within these areas, the inspection consisted of a selected examination of procedures and representative records, observations of activities in progress, and interviews with personnel.

Based on the results of this inspection, the NRC did not identify any violations.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA/

Jay Henson, Chief
Fuel Facility Inspection Branch 2
Division of Fuel Facility Inspection

Docket No. 07007001
Certificate No. GDP-1

Enclosure:
Inspection Report 07007001/2004-006(DFFI)

cc w/encls:
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	07007001
Certificate No.:	GDP-1
Report No.:	07007001/2004-006
Facility Operator:	United States Enrichment Corporation
Facility Name:	Paducah Gaseous Diffusion Plant
Location:	Paducah, KY
Dates:	June 23, through August 2, 2004
Inspectors:	Bruce L. Bartlett, Senior Resident Inspector Mary L. Thomas, Resident Inspector
Approved by:	Jay Henson, Chief Fuel Facility Inspection Branch 2 Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

United States Enrichment Corporation
Paducah Gaseous Diffusion Plant
NRC Inspection Report 07007001/2004-006

This inspection included aspects of certificatee operations, maintenance, and plant support. The report covered a six-week period of resident inspection activities, including follow-up to issues identified during previous inspections.

Operations

- Routine operations activities were conducted in accordance with written procedures. Routine communications among operators were adequate. (Paragraph 1.a)

- The inspectors determined that the re-installation of the external speaker on the C-333 Automated Data Processing alarm recorder demonstrated a lack of rigor in ensuring that corrective actions to a previously identified issue were maintained. The certificatee took appropriate action to address the deficiency. (Paragraph 1.b)

- The certificatee identified the presence of greater than one weight percent Uranium-235 in a thin-wall cylinder. The inspectors' review of the certificatee's root cause evaluation and extent of condition will be tracked as an unresolved item. (Paragraph 1.c)

Maintenance and Surveillance Testing

- Maintenance and surveillance activities were conducted appropriately and in accordance with approved procedures. Acceptance criteria contained in surveillance procedures were adequate and, when required, assessment and tracking reports were initiated. (Paragraph 2.a)

Plant Support

- The inspectors concluded that the certificatee was meeting regulatory and certificate requirements with respect to low-level radioactive waste storage and the release of airborne effluent. (Paragraph 3.a)

- The inspectors identified a minor violation of 10 CFR 20.1601(a)(3) which required locking entryways to high radiation areas with positive control over each individual entry. The certificatee took prompt action to address this issue. (Paragraph 3.b)

Attachment:
Partial List of Persons Contacted
Inspection Procedures Used
List of Items Opened, Closed, and Discussed
List of Acronyms

REPORT DETAILS

1. Plant Operations

a. Conduct of Operations - Routine Operations Activities

(1) Inspection Scope (88100 and 88105)

The inspectors observed routine operations activities and discussed routine operations with staff and management. In addition, the inspectors reviewed the applicable area control room (ACR) log books and routine surveillance forms. The inspectors observed operators respond to various alarms.

(2) Observations and Findings

The inspectors observed routine operations in the cascade buildings and area control rooms, the feed vaporization facility, product and tails withdrawal facilities, and the central control facility. The operations staff were alert and generally knowledgeable of the current status of equipment associated with their assigned facilities.

(3) Conclusions

Routine operations activities were conducted in accordance with written procedures. Routine communications among operators were adequate.

b. Re-Installation of External Speaker to an Alarm Recorder

(1) Inspection Scope (88100)

The inspectors conducted a walk down of the C-333 Process Building Area Control Room to assess ongoing activities for compliance with regulatory requirements. The inspectors also reviewed the following documents:

- NRC-Identified ATRC-04-2720, External Speaker Reinstalled on C-333 Automated Data Processor (ADP) alarm recorder;
- ATRC-02-1593, C-333 Unit 2, Cell 2 A Transformer Overheated; and
- PGDP-Lessons Learned Bulletin-02-013, C-333 Unit 2 Cell 2 Transformer Fire.

(2) Observations and Findings

During their walkdown of the C-333 Process Building Area Control Room, the inspectors observed that an external speaker had been re-installed on the Automated Data Processor (ADP) alarm recorder. The presence of the speaker had been identified as part of the root cause for a cell transformer fire that occurred on March 25, 2002. During that incident, the area control room operators did not respond to the “transformer general alarm” received because they were unaware that the alarm had actuated.

At that time, the certificatee determined that the speaker volume had been turned down previous to the incident. On April 3, 2002, the certificatee took corrective action to remove the ADP external speakers in the ACRs of Process Buildings C-333 and C-337. The certificatee also issued a lessons-learned bulletin to stress the importance of not disabling alarm capability.

During discussion with plant staff, the inspectors determined that the speakers had been re-installed by a building manager and some operators who were unaware of the previous corrective actions taken in response to the transformer fire. Subsequently, the ADP external speaker was removed, and the certificatee entered the issue into the corrective action program as Assessment and Tracking Report (ATRC)-04-2720.

(3) Conclusions

The inspectors determined that the re-installation of the external speaker on the C-333 ADP alarm recorder demonstrated a lack of rigor in ensuring that corrective actions to a previously identified issue were maintained. The certificatee took appropriate action to address the deficiency.

c. Fissile Material Identified in a Thin-Wall Cylinder

(1) Inspection Scope (88100 and 92700)

The inspectors followed up on Event Report 40873 involving a thin-wall cylinder containing fissile material. The inspectors discussed the issue with certificatee staff and management. The inspectors reviewed the following documents:

- American National Standards Institute (ANSI) N14.1, “Uranium Hexafluoride Packaging for Transport,” 2001 Revision;
- American National Standards Institute (ANSI) N14.1, “Uranium Hexafluoride Packaging for Transport,” 1995 Revision;
- ATRC-01-2089, “Assay Ascension;”
- ATRC-02-0236, “Mixing Loss Occurred;”
- ATRC-02-5130, “High Pressure Condition Observed;”
- ATRC-04-2756, Cylinder with Heel Assay of 1.1 wt.%;
- NRC Identified ATRC-04-2812, 48G Thin-Wall Cylinder was Found to Contain Material;
- Certificate Event Report 40873, A cylinder, which was to be washed, was determined to contain heel material of greater than 1 weight percent enrichment;
- CP2-EG-NS1031, “Nuclear Criticality Safety,” Revision 7;

- CP4-CO-CN2028, “Cascade Valve and Leak Rating Operations,” Revision 16;
- CP4-CO-CN2045a, “Operation of the C-333A and C-337A Vaporizer Facilities,” Revision 26;
- CP4-CO-CN6045b, “UF_6 Feed Facilities Verifications, Checks, Inspections, Inventories, and Tests,” Revision 9;
- CP4-CU-CH2110, “Operation of the C-400 Cylinder Washing/Testing Facility,” Revision 24;
- CP4-TS-ST7201, “Gas Sampling of UF_6 Systems and Cylinders,” Revision 8;
- Drawing M5E-19518-A02, “PG Feed Header Reroute Bldg. C-337A Autoclave Positions No. 1, 2, 3E, 3W, 4, & 5,” Revision A2;
- Nuclear Criticality Safety Analysis [NCSA] GEN-003, “Handling, Storage, and Valve Change Operations of Large UF_6 Cylinders,” Revision 5;
- Nuclear Criticality Safety Approval [NCSA] 400-012, “Operation of the C-400 Cylinder Washing, Hydrostatic Testing, and Drying Facility,” Revision 2;
- Nuclear Criticality Safety Evaluation [NCSE] 049, “Handling, Storage, and Valve Change Operations of Large UF_6 Cylinders at the Paducah Gaseous Diffusion Plant,” Revision 5; and
- Nuclear Material Accounting System Cylinder History for Cylinder Number 126120.

(2) Observations and Findings

On July 14, 2004, during routine preparations to wash a heeled cylinder, certificatee personnel took independent gas-over-solid samples from the cylinder, as required by Procedure CP4-CU-CH2110, to verify the cylinder contained non-fissile material (less than one weight percent (wt. %) Uranium-235 (^{235}U). However, the sample results for the cylinder indicated that it contained nine pounds of uranium hexafluoride at 1.176 wt.% ^{235}U. The certificatee took immediate actions in accordance with Procedure CP2-EG-NS1031 to isolate the cylinder so that it would not be washed.

The certificatee determined that this event was a condition adverse to quality, and an investigation team was assembled to determine the root cause. The initial root cause was that material from the feed and evacuation headers used for a two wt.% ^{235}U cylinder was back-fed into the thin-wall cylinder.

On September 9, 2003, during heeling of the thin-wall cylinder, which contained natural uranium at 0.711 wt%, the operators observed that the jet on the feed header used for this cylinder was not achieving the desired pressure. The operators contacted the cascade coordinator to determine if they could switch jets and valve in

the jet being used to feed a two wt.% cylinder. The issue regarding mixing loss was discussed at that time, but the potential for back-feeding was not raised. The two wt.% cylinder was isolated from the jet, but the two wt.% feed material remained in the feed and evacuation headers and was inadvertently back-fed into the 0.711 wt.% cylinder.

Nuclear Criticality Safety Analysis GEN-003, Control 3.1.19, required that "thin-wall cylinders shall not be used for material enriched to greater than or equal to 1.0 wt.% ^{235}U." The basis for the enrichment control was from ANSI N14.1, which stated that thin-wall cylinders were not approved for storage and handling of enriched material, as they might be more susceptible to cylinder breach than thick-wall cylinders. The certificatee determined that they had lost one of two criticality safety controls regarding assay limit for the thin-wall cylinder. One leg of double contingency was the argument that it was unlikely that back-feeding would result in significant amounts of fissile material being transferred between cylinders. The sampling program of the cylinders was the second leg of double contingency and resulted in the identification of the issue.

As immediate corrective action, the certificatee revised applicable plant procedures to prevent the practice of cross-tying feed headers containing different assays. The certificatee also performed an extent of condition which was not fully completed by the end of the inspection period. Poor log-keeping by the feed facility operators complicated the certificatee's investigation. The certificatee determined that no thin-wall cylinders that had the potential to be back-fed with enriched material had been shipped off-site. The inspectors' continued assessment of the certificatee's root cause evaluation and extent of condition will be tracked as an unresolved item. (URI 07007001/2004006-001)

(3) Conclusions

The certificatee identified the presence of greater than one weight percent ^{235}U in a thin-wall cylinder. The inspectors' review of the certificatee's root cause evaluation and extent of condition will be tracked as an unresolved item.

d. Miscellaneous Operations Issues

(1) Bulletin 91-01 Reports (92700)

The certificatee staff made the following reports pursuant to Bulletin 91-01 during the inspection period. The inspectors evaluated any immediate nuclear criticality safety (NCS) concerns associated with the report at the time of the initial verbal notification.

Number	Date	Status	Title
40860	07/09/04	Open	Three centrifugal compressor impellers were received as part of a shipment and moved without required documented non-destructive analysis inspections.

40873	07/14/04	Closed	A thin-wall cylinder, which was to be washed, was determined to contain heel material of greater than one weight percent enrichment. This item will be tracked under URI 07007001/2004006-001.

2. Conduct of Maintenance and Surveillance

a. Maintenance and Surveillance Activity Reviews

(1) Inspection Scope (88102 and 88103)

For the maintenance and surveillance activities listed below, the inspectors verified one or more of the following: activities observed were performed in a safe manner; testing was performed in accordance with procedures; measuring and test equipment was within calibration; Technical Safety Requirement Limiting Conditions for Operations were entered, when appropriate; removal and restoration of the affected components were properly accomplished; test acceptance criteria were clear and conformed with the Technical Safety Requirements (TSR) and the Safety Analysis Report (SAR); and any deficiencies or out-of-tolerance values identified during the testing were documented, reviewed, and resolved by appropriate management personnel.

- Work Order (WO) 0404281, Annual Surveillance for T and N [CAAS] Criticality Accident Alarm System Clusters and Quarterly CAAS Surveillances for CAAS Clusters N, T, U, V, W, X, Y, AK in Process Building C-337;
- CP4-GP-IM6514, “C-337/C-337A CAAS Maintenance and Testing,” Revision 8;
- WO 0405338, Quarterly Surveillance for AJ and Z CAAS Clusters in Process Building C-333;
- CP4-GP-IM6512, “C-333/C-333A CAAS Maintenance and Testing,” Revision 8;
- WO 0406901, Perform autoclave alignment test on Autoclave 1 in C-360, Toll, Transfer, and Sampling Building, replacing O-ring as necessary, according to procedure CP3-GP-GP4109;
- CP3-GP-GP4109, “Alignment check of UF_6 Autoclave Head to Shell, O-Ring Check and Replacement, and Knife Switch Stop Block Check and Repair,” Revision 4;
- WO 0407059, Quarterly Surveillance of Criticality Accident Alarm System of the R and S Clusters in the C-360, Toll, Transfer, and Sampling Building;
- CP4-GP-IM6515, “C-360/C-360A Maintenance and Testing,” Revision 10;

- WO 0408685, Perform bi-monthly check of high and low datum instrumentation. Perform work according to CP4-GP-IM6148;
- CP4-GP-IM6148, "C-310 Datum Check," Revision 5;
- WO 0408684, Perform bi-monthly check of high, low, and cell datum instrumentation. Perform work according to CP4-GP-IM6147;
- CP4-GP-IM6147, "OO Process Building Datum and Cell Datum Check," Revision 3;
- WO 0410123, Repair the right rear wheel of the scale cart in Feed Facility C-337A;
- CP4-GP-MM4161, Scale Cart Maintenance," Revision 2;
- CP4-QA-QI6061, "Inspection of Scale Carts," Revision 4;
- WO 0410676, Surveillance Requirements 2.4.3.9-2 and 2.4.4.6-2, Cycle all High Pressure Fire Water sectional valves in direct flow path;
- CP4-CO-CA6016f, "TSR Surveillance - High Pressure Fire Water Sectional Valve Cycling," Revision 2;
- ATRC-04-2932, C-337 CAAS air compressor; and
- WO 0411908, Troubleshoot and repair CAAS air compressor. The air compressor should have maintained the system between 148 and 158 psig. The inspector determined that the system was at 165 psig, and the compressor was still running. The certificatee calibrated a pressure switch to address the issue.

(2) Observations and Findings

The inspectors observed that the certificatee staff effectively implemented work control practices and associated radiological controls during the above listed maintenance activities.

(3) Conclusions

Maintenance and surveillance activities were conducted appropriately and in accordance with approved procedures. Acceptance criteria contained in surveillance procedures were adequate and, when required, assessment and tracking reports were initiated.

3. Plant Support

a. Low Level Radioactive Waste Storage

(1) Inspection Scope (84900, 84850, and 88035)

The inspectors evaluated whether the certificatee was storing low-level radioactive waste safely and in accordance with certificatee requirements. In addition, the inspectors evaluated whether the certificatee was complying with regulations and certificate requirements related to the release of airborne effluent. The inspectors reviewed the following documents:

- ATRC-04-2914, NRC inspector identified questions regarding survey documentation for out-going radioactive material shipment;
- CP2-EW-WM1035, "Handling and Packaging of Low-Level Radioactive Waste," Revision 4;
- CP2-EW-WM1039, "Preparation of Waste for Commercial Disposal," Revision 4;
- CP4-EW-EV6250, "C-310 Vent Stack Sampling," Revisions 6 and 7;
- CP4-EW-WM2107, "Operation of Low-Level Radioactive Waste Storage Facilities," Revision 3;
- National Emission Standards for Hazardous Air Pollutants Radionuclide Emission Reports for Calendar Year 2003; and
- Compliance Testing of Radionuclide Emissions from the Seal Air, Wet Air and Combination Exhaust Systems at the United States Enrichment Corporation, Paducah, Kentucky, January 2003.

(2) Observations and Findings

The inspectors toured the low-level radioactive waste storage sites and determined that the certificatee was storing low-level radioactive waste safely and in accordance with certificatee requirements. The inspectors also reviewed the certificatee's low-level waste program and determined that the certificatee had established and was maintaining adequate management-controlled procedures and quality assurance that reasonably ensured compliance with the requirements of 10 CFR Part 20 and 10 CFR Part 61 applicable to low-level radioactive waste form, classification, stabilization, and shipment manifests and tracking. In addition, the inspectors reviewed the certificatee's program for control of airborne effluent and determined that the certificatee was complying with regulations and certificate requirements related to the release of airborne effluent.

(3) Conclusion

The inspectors concluded that the certificatee was meeting regulatory and certificate requirements with respect to low-level radioactive waste storage and the release of airborne effluent.

b. Control of High Radiation Areas

(1) Inspection Scope (83822)

The inspectors toured the C-360 Toll, Transfer, and Sampling Building to determine if the certificatee was performing activities in compliance with regulatory requirements. The inspectors reviewed the following documents:

- ATRC-04-2717, High Radiation Area Inside Autoclave Number 2 Due To Trapping Evolutions;
- ATRC-04-2719, High Radiation Area Discovered Above Tc-99 Traps;
- ATRC-04-2775, Radiation surveys of the Tc Traps in Both A/C No. 2 and No. 4;
- ATRC-04-3033, High Radiation Area Inside Autoclave Number 3; and
- UE2-HP-RP1030, “Conduct of Radiological Operations,” Revision 2.

(2) Observations and Findings

On August 1, 2004, a health physics (HP) technician surveyed the tops of the technetium traps in autoclaves in the C-360 Toll, Transfer, and Sampling Building. The certificatee had observed that the tops of the technetium traps had the potential of becoming high radiation areas over time due to the depositing of protactinium and thorium on the upper screens of the traps. As a result of those surveys, the HP staff identified high radiation areas in three of the autoclaves.

During a routine night shift tour on August 2, 2004, the inspectors noted that the certificatee posted the areas and used operators to monitor the high radiation area on Autoclave Number 4 until shielding could be locked in place. For the high radiation area in Autoclave Number 2, the certificatee removed the key from the autoclave power switch and locked the switch cover.

However, the inspectors observed that the HP staff had locked the autoclave open/close switch cover open on Autoclave No. 3 which allowed an operator the ability to manipulate the switch. The inspectors did not consider the lock on the open cover to be a positive control to prevent access into the high radiation area in accordance with 10 CFR 20.1601(a)(3). The autoclave, which was located in a contamination area, was in use at the time, heating a cylinder for transfer.

The HP technician on duty was notified of this observation, as well as the front line manager for the building. Operations staff pointed out that the autoclave operating system was interlocked such that when the autoclave was being heated with steam, the autoclave could not be opened. Upon further discussion with operations staff, the inspectors determined that while this interlock was in effect, there was no alarm feature that would annunciate if someone should attempt to open the autoclave. In response, the front line manager locked the autoclave open/close switch cover closed.

Although the interlock was not considered a control device as described in 10 CFR 20.1601(a)(3), the inspectors determined that no personnel entered the high radiation area without the proper precautions being taken, and the certificatee took appropriate action to address the deficiency. Therefore, the inspectors determined that the failure to positively control the high radiation area inside the autoclave constituted a violation of minor safety significance and is not subject to formal enforcement action in accordance with Section IV of the NRC Enforcement Policy.

(3) Conclusions

The inspectors identified a minor violation of 10 CFR 20.1601(a)(3) which required locking entryways to high radiation areas with positive control over each individual entry. The certificatee took prompt action to address this issue.

4. Exit Meeting Summary

The inspectors presented the inspection results to General Manager Russ Starkey and members of the facility management on August 2, 2004. The inspectors asked the certificatee staff whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT

1. PARTIAL LIST OF PERSONS CONTACTED

United States Enrichment Corporation

* S. Penrod, Plant Manager
* S. Cowne, Nuclear Regulatory Affairs Manager
* M. Boren, Nuclear Regulatory Affairs
* R. Helme, Engineering Director
* O. Hickman, Jr., Health Physics Manager
* C. Hicks, Scheduling
* L. Jackson, Operations Manager
* M. Keef, Production Support Manager
* J. Labarraque, Quality Assurance
* M. Mack, Operations
* D. Page, Plant Shift Superintendent
* D. Snow, Industrial Safety
* K. Stratemeyer, UF_6 Handling Manager
* M. Wayland, Maintenance Manager

* Denotes those present at the exit meetings on August 2, 2004.

2. INSPECTION PROCEDURES USED

IP 83822	Radiation Protection
IP 84850	Radioactive Waste Management
IP 84900	Low-Level Radioactive Waste Storage
IP 88035	Radioactive Waste Management
IP 88100	Plant Operations
IP 88101	Configuration Control
IP 88102	Surveillance Observations
IP 88103	Maintenance Observations
IP 88105	Management Organization and Control
IP 92700	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Type	Description
70-7001/2004006-01	Open	URI	Inspector review of certificatee root cause evaluation and extent of condition for CER 40873.
40860	Open	CER	Three centrifugal compressor impellers were received and moved as part of a shipment without documented non destructive analysis inspections.

40873	Closed	CER	A thin-wall cylinder, which was to be washed, was determined to contain heel material of greater than one weight percent enrichment.

4. LIST OF ACRONYMS USED

ACR	Area Control Room
ADAMS	Agencywide Documents Access and Management System
ADP	Automated Data Processor
ANSI	American National Standards Institute
ATR(s)	Assessment and Tracking Report(s)
CAAS	Criticality Accident Alarm System
CFR	Code of Federal Regulations
DFFI	Division of Fuel Facility Inspection
DOE	Department of Energy
GDP	Gaseous Diffusion Plant
HP	Health Physics
NCS	Nuclear Criticality Safety
NCSA	Nuclear Criticality Safety Analysis
NCSE	Nuclear Criticality Safety Evaluation
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PDR	Public Document Room
PGDP	Paducah Gaseous Diffusion Plant
psig	pounds per square inch gauge
SAR	Safety Analysis Report
TSR	Technical Safety Requirement
USEC	United States Enrichment Corporation
WO	Work Order