August 11, 2011

Mr. Robert Van Namen
Senior Vice President – Uranium Enrichment
United States Enrichment Corporation
6903 Rockledge Drive
Bethesda, MD 20817

SUBJECT: INSPECTION REPORT NO. 70-7001/2011-203

Dear Mr. Namen:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine, scheduled, and announced criticality safety inspection July 11-14, 2011, at the Paducah Gaseous Diffusion facility in Paducah, Kentucky. The purpose of the inspection was to determine whether activities authorized by your certificate involving special nuclear material were conducted safely and in accordance with regulatory requirements. Throughout the inspection, observations were discussed with your staff. An exit meeting was held on July 14, 2011, during which inspection observations and findings were discussed with your management and staff.

The inspection, which is described in the enclosure, focused on the most hazardous activities and plant conditions; the most important controls relied on for safety and their analytical basis; and the principal management measures for ensuring controls are available and reliable to perform their functions relied on for safety. The inspection consisted of analytical basis review, selective review of related procedures and records; examinations of relevant nuclear criticality safety (NCS)-related equipment; interviews with NCS engineers, and plant personnel; and facility walkdowns to observe plant conditions and activities related to safety basis assumptions and related NCS controls.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390 of NRC's "Rules of Practice," a copy of this letter and the enclosure will be available in the public electronic reading room of the NRC's Agency-Wide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning this report, please contact Tamara Powell, of my staff, at 301-492-3211.

Sincerely,

/RA/

Margaret Kotzalas, Acting Chief
Technical Support Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No. 70-7001

Enclosure:
Inspection Report No. 70-7001/2011-203

cc: S. Penrod, Paducah General Manager
V. Shanks, Paducah Regulatory Affairs Manager
W. Jordan, Portsmouth General Manager
S. A. Toelle, Director, Nuclear Regulatory Affairs, USEC
R. M. DeVault, Regulatory Oversight Manager, DOE
G. A. Bazzell, Paducah Facility Representative, DOE
Janice H. Jasper, State Liaison Officer

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NAME	TPowell	SAtack	DWalker	MKotzalas
DATE	8/ 05/11	8/10/11	8/10/11	8/11/11

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U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

Docket No.:	70-7001
Certificate No.:	GDP-01
Report No.:	70-7001/2011-203
Certificate Holder:	United States Enrichment Corporation
Location:	Paducah, Kentucky
Inspection Dates:	July 11-14, 2011
Inspectors:	Tamara D. Powell, Criticality Safety Inspector Sabrina Atack, Quality Assurance Engineer
Approved by:	Margaret Kotzalas, Acting Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards Office of Nuclear Material Safety and Safeguards

Enclosure

United States Enrichment Corporation
Paducah Gaseous Diffusion Plant

NRC Inspection Report 70-7001/2011-203

EXECUTIVE SUMMARY

Introduction

Staff of the U. S. Nuclear Regulatory Commission (NRC) performed a routine, scheduled, and announced criticality safety inspection of the Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky, from July 11-14, 2011. The inspection included an on-site review of the certificate holder's programs dealing with plant operations, the nuclear criticality safety (NCS) program, audits and inspections, and NCS-related corrective actions. The inspection focused on risk-significant fissile material processing activities including those in Buildings C-310, C-331, C-333, C-335, C-337, C-360, C-400, C-409, and C-410.

Results

- No safety concerns were identified regarding the certificate holder's NCS program.
- No safety concerns were identified during review of NCS administrative and operating procedures.
- No safety concerns were identified during review of NCS training and qualification.
- No safety concerns were identified regarding the certificate holder's NCS evaluations.
- No safety concerns were identified regarding the certificate holder's NCS audits, walkthroughs, assessments, and surveillances.
- No safety concerns were identified regarding the certificate holder's internal event reporting, investigation, and corrective actions.
- No concerns were identified regarding the certificate holder's criticality accident alarm system (CAAS) coverage of fissile material operations.
- No safety concerns were identified during walkdowns of the facility and operations.

REPORT DETAILS

1.0 Summary of Plant Status

U.S. Enrichment Corporation enriches uranium for domestic and international customers at the PGDP. In conjunction with routine enrichment activities, the certificate holder performs laboratory operations, cleaning and decontamination services, and maintenance and support activities. During the inspection, the certificate holder was performing routine enrichment and support operations.

2.0 Nuclear Criticality Safety Program (IP 88015)

a. Inspection Scope

The inspectors reviewed the certificate holder's NCS program. The inspectors evaluated the adequacy of the program to assure the safety of fissile material operations. The inspectors interviewed the certificate holder's managers, NCS engineers, system engineers, and facility operators during document review and facility walkdowns. The inspectors reviewed NCS administrative procedures and selected NCS controls to determine whether the procedures adequately implemented the NCS program described in the certificate. The inspectors reviewed selected aspects of the following documents:

- CP2-EG-NS1031, "Nuclear Criticality Safety," Revision 9, dated February 8, 2011

b. Observations and Findings

The inspectors observed that the certificate holder had an NCS program which was independent from production and was implemented through written procedures. The inspectors determined that the certificate holder's NCS program was conducted in accordance with written administrative procedures that reflected the program described in the certificate.

c. Conclusions

No safety concerns were identified regarding the certificate holder's NCS program.

3.0 Administrative and Operating Procedures (IP 88015)

a. Inspection Scope

The inspectors reviewed the certificate holder's NCS administrative and operating procedures to verify that the NCS program is adequately controlled through adherence to approved, written procedures. The inspectors reviewed selected aspects of the following documents:

- CP2-EG-NS1032, "Software Configuration Control Program for Nuclear Criticality Safety Code Systems," Revision 1, dated April 15, 2011
- CP2-EG-NS1033, "Enrichment and Exempt Waste Verification," Revision 12, dated May 25, 2011

- CP2-EG-NS1071, "Configuration Management System Control," Revision 3, dated June 30, 2011
- CP2-PS-PS1031, "Procedure Control Process," Revision 2, dated July 7, 2011
- CP4-CO-CA2027e, "Operation of the C-335 Seal Exhaust and Wet Air Station," Revision 14, dated December 10, 2010
- CP4-CO-CN2010, "Operation of the C-310 Product and Side Withdrawal System," Revision 20, dated July 7, 2011
- CP4-CU-CH2108, "Operation of the C-400 Spray Booth," Revision 27, dated July 2, 2010
- CP4-GP-IM6360, "Cascade R-114/RCW DP and Coolant High Temperature Switch Calibration," Revision 1, dated March 23, 2011
- CP4-GP-IM6361, "UF_6 System Maintenance in Autoclave Buildings," Revision 1, dated March 2, 2011
- ATRC-10-1367, "Overflow Piping in C-409," dated May 21, 2010
- ATRC 10-2312, "SCALE 4.4 Software Catalog Not Up-to-date," August 16, 2010
- ATRC 10-2640, "GEN-001 Flowdown Issue," dated September 16, 2010
- ATRC 11-1292, "Procedure Improvement Recommendation," dated May 27, 2011

b. Observations and Findings

The inspectors evaluated certificate holder NCS administrative and operating procedures to ensure that NCS procedures were adequate and effectively implemented. The inspectors verified that NCS considerations were included in written operating procedures and were maintained consistent with nuclear criticality safety approval (NCSA) controls, even when procedure revisions were made. The inspectors determined that procedure changes, where associated with an action tracking record, incorporated all elements of the actions identified to correct a deficiency or prevent recurrence. Procedure changes also included a full review of related nuclear criticality safety evaluations (NCSEs) and NCSAs, and were reviewed and approved prior to implementation. The inspectors noted that discussions with NCS engineers and operations personnel demonstrated that facility staff were aware of which procedure steps were associated with an NCSA requirement and understood the criticality safety implications of failure to perform such steps appropriately.

c. Conclusions

No safety concerns were identified during review of NCS administrative and operating procedures.

4.0 Nuclear Criticality Safety Training and Qualification (IP 88015)

a. Inspection Scope

The inspectors reviewed the certificate holder's program for the training and qualification of NCS personnel as well as a sample of PGDP personnel training and qualification records to verify that persons performing, reviewing, or supervising NCS-related activities established and maintained proficiency in the technical disciplines needed to perform their job functions. The inspectors reviewed selected aspects of the following documents:

- CP2-EG-NS1030, "Nuclear Criticality Safety Training," Revision 1, Change E, dated December 17, 2010

b. Observations and Findings

The inspectors, through a review of selected personnel records and personnel interviews, verified that NCS staff managing, performing, or reviewing NCS evaluations, analyses, or activities possessed the requisite education and experience for their position and adequate knowledge of the PGDP, criticality safety principles, and plant operations. The inspectors determined that the NCS training program was of sufficient detail to ensure adequate implementation of NCS controls and to address NCS aspects of facility hazards affecting fissile material operations. The inspectors verified that personnel received training commensurate with their level of access to fissile material and their level of responsibility for plant operations, and that such training was provided on periodic basis to ensure the maintenance of proficiency and sharing of knowledge gained from lessons learned.

The inspectors determined that NCS staff was actively involved in development, review, presentation, and oversight of NCS training for staff and operators and that NCS training was updated as needed to account for recent upward trends in criticality safety incidents and programmatic changes.

c. Conclusions

No safety concerns were identified during review of NCS training and qualification.

5.0 Nuclear Criticality Safety Evaluations and Analyses (IP 88016)

a. Inspection Scope

The inspectors reviewed NCS analyses to determine that criticality safety of risk-significant operations was ensured through engineered and administrative controls with adequate safety margin including preparation and review by qualified staff. The inspectors verified that NCS controls indentified in NCSEs and NCSAs were appropriately flowed down into implementing procedures. The inspectors reviewed selected aspects of the following documents:

- CP4-EG-NS1101, "Nuclear Criticality Safety Evaluations and Approvals," Revision 10, dated December 16, 2009
- KY/S-251, "Guidelines for Nuclear Criticality Safety Evaluations at the Paducah Gaseous Diffusion Plant," Revision 7, dated September 2008
- NCSE-03, "UF6 Subsampling and Uranium Analysis Laboratories," Revision 5, dated May 20, 2011
- NCSE-051, "C-409 Uranium Precipitation System at the Paducah Gaseous Diffusion Plant," Revision 10, dated May 12, 2011
- NCSE-095, "Operating and Shutdown of the Diffusion Cascade," Revision 4, dated December 11, 2009
- NCSE-108, "Operation of the Fixed High Efficiency Filter Systems in C-310 and C-360," Revision 2, dated October 22, 2009
- NCSE-GEN-06, "NCSE of the Use of Calibration/Sample Buggies at the Paducah

Gaseous Diffusion Plant," Revision 7, dated November 2, 2003
- NCSA-409-001, "C-409 Uranium Precipitation," Revision 8, dated July 12, 2011
- NCSA 331-001, "C-331 Instrument Maintenance Shop," Revision 5, dated September 21, 2005
- NCSA CAS-021, "Operation and Shutdown of the Diffusion Cascade," Revision 3, dated December 16, 2009
- NCSA GEN-013, "Operation of the Fixed High Efficiency Filter Systems in C-310 and C-360," Revision 2, dated March 2, 2011
- NCSA WMO-001, "Operation of Temporary Fissile Storage Areas at PGDP," Revision 10, dated February 1, 2011

b. Observations and Findings

The inspectors reviewed NCS approvals, NCS evaluations, and supporting calculations for new, changed, and other selected operations. Within the selected aspects reviewed, the inspectors determined that the analyses were performed by qualified NCS engineers, that independent reviews of the evaluations were completed by qualified NCS engineers, that subcriticality of the systems and operations was assured through appropriate limits on controlled parameters, and that double contingency was assured for each credible accident sequence leading to inadvertent criticality. The inspectors determined that NCS controls for equipment and processes assured the safety of the operations. Nuclear criticality safety analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits.

c. Conclusions

No safety concerns were identified regarding the certificate holder's NCSEs.

6.0 Nuclear Criticality Safety Inspections, Audits and Investigations (IP 88015)

a. Inspection Scope

The inspectors reviewed records of previously-completed certificate holder surveillances, walkthroughs, audits, and self-assessments. The inspectors reviewed selected aspects of the following documents:

- Self-Assessment C28-SA-11-03, "Nuclear Criticality Safety Staff Training," dated April 11, 2011
- 11-WS-003, "NCS Walkthrough of C-400 Facility," dated June 21, 2011
- Self-Assessment C12-SA-11-02, "2011 NCS Operations Self-Assessment," dated May 20, 2011
- Nuclear Safety & Quality Surveillance KPRA-S11004, "Nuclear Criticality Safety Engineering," dated March 22, 2011
- Self-Assessment C41-SA-11-07, "I&C Criticality Safety," dated April 19, 2011
- Paducah Internal Audit Report KP-OP-2010-A257, "Operations," dated December 16, 2010
- ATRC 11-1366, "BCS Bags in C-400 Maintenance FCA," dated June 6, 2011
- CP4-GP-IM1001, "NCSA Requirements for Buggy Maintenance in C-331/C-720 Instrument Shops," Revision 11, dated August 24, 2010

- CP4-GP-IM6499, “30-Inch Process Stage Control Valve Rebuild and Repair,” Revision 5, dated August 23, 2010

b. Observations and Findings

The inspectors verified that the certificate holder maintains a program for the routine inspection of fissile material operations and programs by NCS staff and management. The inspectors observed that NCS self-assessments ensured that process conditions were maintained consistent with NCSE conditions and that procedures were being followed to ensure compliance with NCSA controls. The inspectors noted that walkthroughs were performed of fissile material operations areas.

The inspectors determined that the certificate holder has an audit program to ensure the independent evaluation of NCS program. The inspectors observed that the audit program incorporated the results of companion programmatic surveillances to provide a comprehensive assessment of operations, engineering, maintenance, and inspection activities associated with NCS. The inspectors verified that audit reports were forwarded to plant management and appropriate staff for review.

The inspectors verified that NCS walkthroughs, self-assessments, surveillances, and audits were conducted by qualified and trained personnel on a frequency commensurate with their importance and the periodicity established in the safety analysis report and implementing program documents and procedures. Further, the inspectors found that NCS walkthroughs, self-assessments, surveillances, and audits (1) incorporated a review of previously identified issues and performance trends; (2) assessed plant operations for compliance with certificate holder’s requirements, procedures, and postings; (3) examined equipment and operations to determine that existing NCS evaluations and analyses remained adequate; and (4) prompted entry of any NCS limit or control violations, process or procedure noncompliances, or conditions needing improvement into the corrective action program. The inspectors observed that corrective actions initiated for NCS events were well-developed, assigned to responsible individual(s) for investigation and performance of corrective actions, and reviewed for completion.

Through discussions with plant personnel and operators, the inspectors verified that individuals having unescorted access to fissile material areas are aware of the appropriate actions to take for suspected or known violations of NCS requirements and procedures.

c. Conclusions

No safety concerns were identified regarding the certificate holder’s NCS walkthroughs, self-assessments, surveillances, and audits.

7.0 Nuclear Criticality Safety Event Review and Follow-up (IP 88015)

a. Inspection Scope

The inspectors reviewed recent internally- and externally-reported NCS-related events. The inspectors reviewed selected aspects of the following documents:

- CP2-BM-CI1031, "Corrective Action Process at PGDP," Revision 15, dated April 20, 2009
- CP4-EG-NS1041, "Remediation of NCSE and NCSA Non-Compliance," revision 0, dated August 13, 2010
- CP4-EG-NS1104, "Nuclear Criticality Safety Engineer Response to Emergency Off-Normal and Process Upset Conditions," Revision 2, dated February 1, 2010
- NCS Anomalous Condition Incident Report 11-003, Revision 0, dated March 25, 2011
- NCS Anomalous Condition Incident Report 11-004, Revision 0, dated June 6, 2011
- NCS Anomalous Condition Incident Report 11-005, Revision 0, dated June 20, 2011
- ATRC-11-0758, "1S Cylinder Transport," dated March 25, 2011
- ATRC-11-1366, "BCS Bags in C-400 Maintenance FCA," dated June 6, 2011
- ATRC-11-1501, "PEH Deposit in A-Line in C-337," dated June 20, 2011

b. Observations and Findings

The inspector determined that events were investigated in accordance with written procedures and appropriate corrective actions were assigned.

c. Conclusions

No safety concerns were identified regarding the certificate holder's internal event reporting, investigation, and corrective actions.

8.0 Criticality Alarm System (IP 88017)

a. Inspection Scope

The inspectors reviewed documentation of criticality accident alarm detector coverage, interviewed engineering and maintenance staff, and performed facility walkdowns to determine the adequacy of the certificate holder's criticality alarm system. The inspectors reviewed selected aspects of the following documents:

- KY/S-255, "Criticality Accident Alarm Detector Placement and Coverage at the PGPD," dated February 1996

b. Observations and Findings

The inspectors determined that the certificate holder had installed and maintained a system of criticality detectors that were capable of monitoring fissile material operations at the facility and reliably detecting the minimum accident of concern.

c. Conclusions

No concerns were identified regarding the certificate holder's CAAS coverage of fissile material operations.

9.0 Plant Activities (IP 88015)

a. Inspection Scope

The inspectors performed plant walkdowns to review activities in progress and to determine whether risk-significant fissile material operations were being conducted safely and in accordance with regulatory requirements. The inspectors verified the adequacy of management measures for assuring the continued availability and reliability of safety-significant controls relied upon by the certificate holder for controlling criticality risks to acceptable levels. The inspectors performed walkdowns of Buildings C-310, C-331, C-333, C-335, C-337, C-360, C-400, C-409, and C-410.

b. Observations and Findings

The inspectors verified that controls identified in the NCS analyses reviewed were adequate to assure safety. The cognizant NCS engineers were knowledgeable and able to explain the basis for changes in operations and controls.

c. Conclusions

No safety concerns were identified during walkdowns of the facility and operations.

10.0 Exit Meeting

The inspectors communicated the inspection scope and results to members of PGDP management and staff throughout the inspection and during an exit meeting on July 14, 2011. PGDP management and staff acknowledged and understood the findings as presented.

SUPPLEMENTARY INFORMATION

1.0 Items Opened, Closed, and Discussed

Items Opened

None.

Items Closed

None.

2.0 Inspection Procedures Used

IP 88015	Nuclear Criticality Safety Program
IP 88016	Nuclear Criticality Safety Evaluations and Analyses
IP 88017	Criticality Alarm Systems

3.0 Partial List of Persons Contacted

USEC

D. Stadler	Senior Engineer, Nuclear Regulatory Affairs
B. Chenier	Engineer, Nuclear Criticality Safety
J. Nelson	Engineer, Nuclear Criticality Safety
T. Henson	Manager, Nuclear Criticality Safety
S. Penrod	General Manager
V. Shanks	Manager, Nuclear Regulatory Affairs

NRC

Tamara D. Powell	Criticality Safety Inspector
Sabrina Atack	Quality Assurance Engineer
M. Miller	Senior Resident Inspector, Region II
R. Russell	Resident Inspector, Region II

All attended the exit meeting on July 14, 2011.

4.0 List of Acronyms and Abbreviations

ADAMS	Agency-Wide Document Access and Management System
CAAS	criticality accident alarm system
CFR	Code of Federal Regulations
CSA	criticality safety analysis
DOE	U.S. Department of Energy
IFI	inspector follow-up item
IP	inspection procedure
NCS	nuclear criticality safety
NCSA	nuclear criticality safety approval
NCSE	nuclear criticality safety evaluation
PGDP	Paducah Gaseous Diffusion Plant
SAR	safety analysis report
UF_6	uranium hexaflouride
USEC	U. S. Enrichment Corporation (certificate holder)
VIO	violation