August 21, 2008

Mr. Russell B. Starkey, Jr. Vice President - Operations United States Enrichment Corporation Two Democracy Center 6903 Rockledge Drive Bethesda, MD 20817

SUBJECT: INSPECTION REPORT NO. 70-7001/2008-203

Dear Mr. Starkey:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine, scheduled, and announced criticality safety inspection from July 21 - 24, 2008, 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. An exit meeting was held on July 24, 2008, during which inspection observations and findings were discussed with your management and staff.

The inspection, which is described in the enclosure, focused on: (1) the nuclear criticality safety (NCS) program and its implementing procedures; (2) new and changed NCS analyses; (3) NCS inspections, audits and investigations; (4) NCS-related internal events; (5) observation of ongoing plant operations; and, (6) review of open items. The inspection consisted of analytical basis review, selective review of related procedures and records, examinations of relevant 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 10 CFR 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 <u>http://www.nrc.gov/reading-rm/adams.html</u>.

R. B. Starkey, Jr.

If you have any questions concerning this report, please contact Dennis Morey, of my staff, at (301) 492-3112.

Sincerely,

/RA/

Patricia A. Silva, Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards, NMSS

Docket No.: 70-7001

Enclosure: Inspection Report No. 70-7001/2008-203

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

R. B. Starkey, Jr.

- 2 -

If you have any questions concerning this report, please contact Dennis Morey, of my staff, at (301) 492-3112.

Sincerely,

/RA/

Patricia A. Silva, Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards, NMSS

Docket No.: 70-7001

Enclosure: Inspection Report No. 70-7001/2008-203

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

DISTRIBUTION: FCSS r/f KMcCallie, RII

JHenson, RII

JPelchat, RII

MMiller, RII

ML082310366

INDICATE IN BOX: "E"=COPY W/ATT/ENCL; "C"=COPY W/O ATT/ENCL; "N"=NO COPY							
OFFICE	FCSS/TSB		FCSS/TSB		FCSS/TSB		
NAME	DMorey		PJenifer		PSilva		
					/by C. Tripp for/		
DATE	8/18/08		8/18/08		8/21/08		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

Docket No.:	70-7001
Certificate No.:	GDP-01
Report No.:	70-7001/2008-203
Certificate holder:	United States Enrichment Corporation
Location:	Paducah, Kentucky
Inspection Dates:	July 21 - 24, 2008
Inspectors:	Dennis Morey, Senior Criticality Safety Inspector
Approved by:	Patricia A. Silva, Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards, NMSS

Enclosure

United States Enrichment Corporation Paducah Gaseous Diffusion Plant

NRC Inspection Report 70-7001/2008-203

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 in Paducah, Kentucky, from July 21 - 24, 2008. The inspection included an on-site review of certificate holder programs dealing with plant operations, the nuclear criticality safety (NCS) program, audits and inspections, NCS internal events and related corrective actions, and open item review. The inspection focused on risk-significant fissile material processing activities including those in Buildings C-333, C-337, C-337A, and C-400.

Results

- No safety concerns were identified regarding the certificate holder's NCS program.
- No concerns were identified regarding the certificate holder's NCS administrative procedures.
- No concerns were identified regarding the certificate holder's NCS walkthroughs, assessments, and surveillance activities.
- No safety concerns were identified regarding the certificate holder's evaluation and correction of internally-reported, criticality safety-related events.
- No safety concerns were identified during walkdowns of the facility and operations.

REPORT DETAILS

1.0 Summary of Plant Status

U.S. Enrichment Corporation (USEC) enriches uranium for domestic and international customers at the Paducah Gaseous Diffusion Plant. 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 summer, low-power operations with some cascade equipment off-line for maintenance and a maximum cascade assay of approximately 1.6%.

2.0 Nuclear Criticality Safety Program (IP 88015 88016)

a. Inspection Scope

The inspector evaluated the adequacy of the certificate holder's NCS program to assure the safety of fissile material operations. The inspector 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 inspector interviewed the certificate holder's managers, NCS engineers, system engineers, and facility operators. The inspector accompanied NCS and other technical staff on walkdowns of NCS controls in selected plant areas. The inspectors reviewed selected aspects of the following documents:

- NCSE 082, "Operation and Maintenance of the Favorable Geometry UF₆/R-114 Separation System in C-335," Revision 3, dated June 27, 2008
- NCSA 335-004, "Operation and Maintenance of the Favorable Geometry UF₆/R114 Separation System in C-335," Revision 3, dated June 26, 2008
- NCSE 118, "Removal, Handling and Transportation of Small Chemical Traps," Revision 01, dated June 19, 2008
- NCSE 42 "Operation and Maintenance of the C-360, C-333A, and C337A Autoclaves," Revision 6, dated January 30, 2007

b. Observations and Findings

The inspector observed that the certificate holder had an NCS program which was independent from production and was implemented through written procedures. The inspectors reviewed NCS Approvals (NCSAs), NCS Evaluations (NCSEs), and supporting calculations for new, changed, and other selected operations. Within the selected aspects reviewed, the inspector determined that the analyses were performed by qualified NCS engineers, that independent reviews of the evaluations were completed by qualified NCS engineers, and that subcriticality of the systems and operations was assured through appropriate limits on controlled parameters. The inspector noted that the certificate holder is in the final stages of a corrective action plan item to revise and update older NCSE/As. The inspector reviewed changes specific to upgraded NCSE/As

and did not identify any concerns related to the corrective action-related upgrade. The inspector determined that NCSA/Es 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 NCS program.

3.0 NCS Administrative Procedures (IP 88015)

a. Inspection Scope

The inspector 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:

- KY/S-251, "Guidelines for NCSEs," Revision 6, dated July 10, 2008
- CP2-BM-CI1031, "Corrective Action Process," Revision 15, dated February 5, 2008
- CP4-EG-NS1101, "Nuclear Criticality Safety Evaluations and Approvals," Revision 10, July 22, 2008
- CP4-EG-NS1104, "NCS Engineer Response to Emergency, Off-Normal, and Process Upset Conditions," Revision 2, dated January 17, 2006
- CP4-EG-1107, "NCS Oversight Program," Revision 3, dated April 6, 2005

b. Observations and Findings

In conjunction with reviews of NCS analysis and supporting calculations, the inspector reviewed related administrative guidance. The inspector also reviewed administrative guidance related to performing audits and evaluating events. The inspector 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 concerns were identified regarding the certificate holder's NCS administrative procedures.

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

a. Inspection Scope

The inspector reviewed records of previously-completed certificate holder internal NCS walkthroughs of fissile operations in Buildings C-310, C-310A, C-331, C-333, C-360, and C-409. The inspector reviewed selected aspects of the following documents:

- 08-WS-001, "C-360 NCS Walkthrough," dated March 25, 2008
- 08-WS-002, "C-409 NCS Walkthrough," dated June 23, 2008
- 08-WS-003, "C-333 NCS Walkthrough," dated May 29, 2008
- 08-WS-004, "C-310, 310A, and Cylinder Yard NCS Walkthrough," dated June 23, 2008
- 08-WS-005, "C-331 NCS Walkthrough," dated June 13, 2008

b. Observations and Findings

The inspector determined that the certificate holder's NCS engineers observed plant operations to determine adequacy of implementation of NCS requirements and ensured that implementation weaknesses were identified and entered into the corrective action system. The inspector observed that the certificate holder's NCS walkthroughs were performed and documented in accordance with written procedures. The inspector noted that the walkthroughs were performed by NCS engineers who: (1) reviewed NCS issues from previous audits; (2) reviewed the adequacy of control implementation; (3) reviewed plant operations for compliance with certificate holder requirements, procedures, and postings; and (4) examined equipment and operations to determine that past evaluations remained adequate.

c. <u>Conclusions</u>

No concerns were identified regarding the certificate holder's NCS walkthroughs, assessments, and surveillance activities.

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

a. Inspection Scope

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

- NCS-INC-08-003, "NORMATEX Pump Alarm Panel Power Loss," Revision 0, dated February 26, 2008
- NCS-INC-08-004, "Non-fissile Oak Ridge GDP Cylinders with Weight Change," Revision 0," dated March, 11, 2008
- NCS-INC-08-004, "Non-fissile Oak Ridge GDP Cylinders with Weight Change," Revision 0," Revision , dated March 11, 2008
- NCS-INC-08-005, "Non-destructive Analysis Performed in Wrong Location," Revision 0, dated March 26, 2008
- NCS-INC-08-006, "Pitot Box with Visible Contamination," Revision 0, dated April 4, 2008
- NCS-INC-08-007, "Open and Unattended Rad Bag with Valve Stem in Fissile Control Area," Revision 0, dated April 18, 2008
- NCS-INC-08-008, "C-331 Coolant System Evacuated without Disconnecting Recirculating Cooling Water Condenser," Revision 0, dated February 26, 2008

- NCS-INC-08-009, "C-331 Coolant System Evacuated Without 24-hour UF₆ Concentration Sampling," Revision 0, dated May 19, 2008
- NCS-INC-08-010, "Negative Air Machine Filter in Storage Area without Fissile Storage Container Tag," Revision 0, dated May 28, 2008
- NCS-INC-08-011, "Potentially Fissile Tag Attached to Uncharacterized 5.5-gallon Waste Drum," Revision 0, dated July 18, 2008
- Paducah NCS Violation Trend Report, dated June 2008

b. Observations and Findings

The inspector reviewed selected criticality safety incident reports to understand what type of events was reported internally and how the events were evaluated by the NCS staff. The inspector determined that internal criticality-related events were investigated and adequately characterized by qualified NCS staff in accordance with written procedures and that appropriate corrective actions were assigned and tracked.

c. <u>Conclusions</u>

No safety concerns were identified regarding the certificate holder's evaluation and correction of internally-reported, criticality safety-related events.

6.0 Plant Activities (IP 88015)

a. Inspection Scope

The inspector 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 inspector also reviewed the adequacy of management measures relied on to assure the availability of NCS-related controls.

b. Observations and Findings

The inspector performed walkdowns of Buildings C-333, C-337, C-337A, and C-400. The inspector verified that controls identified in the NCS analyses reviewed were adequate to assure safety. The inspector noted that NCS engineers were assigned to specific plant areas or processes and were suitably familiar with the equipment and processes in their assigned areas and were able to explain the basis for NCS controls on those equipment and processes.

c. <u>Conclusions</u>

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

7.0 Open Items

URI 70-7001/2008-201-01

This item tracks the certificate holder's evaluation of the impact on double contingency of the waste pigtail event. During a previous inspection, the inspectors reviewed the documents for the waste pigtail event, NCS-INC-08-002, in which the certificate holder identified a waste pigtail that was discovered in an HP rad bag and not stored in a 58 gallon drum as required by NCSA GEN-038. During the current inspection, the inspector reviewed the autoclave areas where the event occurred and discussed the circumstances of the event with certificate holder NCS staff, but did not reach any definite conclusions. This item remains open.

VIO 70-7001/2008-201-02

This violation concerned the certificate holder's failure to document its justification for using less than optimal reflection conditions in NCSE-118 for chemical trap operations. During a previous inspection, the inspectors reviewed NCSE-118 which covered chemical trap operations and noted that KENO models used to demonstrate that the operation was subcritical under credible process upsets had less than optimal reflection conditions. Specifically, the NCSE required that two-foot spacing between batches of chemical traps be maintained for double contingency purposes. The evaluation of spacing or double batching upsets for the chemical traps did not address the possibility of that type of upset occurring in a corner of the room where reflection is the greatest. Certificate holder NCS staff stated that it was possible to have one batch of chemical traps in a corner, as indicated in the model, but it was not credible to place two batches of traps in the corner in a manner that violated the spacing requirements. The inspectors noted that this information was not documented in the NCSE. The inspectors also noted that the only other significant source of reflection present in the models was from a single person represented by a 12-inch-thick, upright block of water. Certificate holder NCS staff stated that this was considered bounding. The inspectors determined that nothing in the chemical trap operations procedures would limit the operations to a single operator in one location and that no justification for using less than full water reflection was provided in the NCSE.

During the current inspection, the inspector determined that the certificate holder had committed to two corrective actions, revision of procedure CP4-EG-1101 and revision of NCSE-118. The inspector reviewed the revised procedure CP4-EG-1101 and determined that the certificate holder had incorporated additional guidance to require documentation in analyses of engineering judgment related to modeling reflector conditions.

The certificate holder had committed to revise NCSE-118 to provide a more rigorous technical basis for the chemical trap double batching upset and to document the technical basis for considering less than optimal reflection conditions. During the current inspection, the inspector reviewed the revised NCSE-118 and discussed the technical basis with certificate holder NCS staff. The inspector determined that the certificate

holder had retained the double batching against the wall (as opposed to in the corner) as the bounding case and modeled other spacing upset conditions using lower fissile loading. The revised analysis demonstrated that chemical trap fissile loading is always less than 50% of the trap volume due to the presence of the trap media (less than normal trap media would be an additional unlikely upset). The inspector noted that the double batching upset against the wall uses traps filled to 100% of the volume with fissile material. The inspector observed that other upsets including the corner upset were evaluated with 50% of the volume of traps filled with fissile material. The inspector observed to represent people near both the wall and corner upsets. The inspector determined that these assumptions were adequately conservative. The revised NCSE-118 also suitably described optimization of fissile loading and interspersed moderation. The inspector determined that corrective actions for the violations were complete. This item is closed.

8.0 Exit Meeting

The inspector communicated the inspection scope and results to members of Paducah Gaseous Diffusion Plant management and staff throughout the inspection and during an exit meeting on July 24, 2008. Paducah Gaseous Diffusion Plant management and staff acknowledged and understood the findings as presented.

SUPPLEMENTARY INFORMATION

1.0 Items Opened, Closed, and Discussed

Items Opened

None.

Items Discussed

URI 70-7001/2008-201-01 Tracks the certificate holder's evaluation of impact on double contingency during the waste pigtail event.

Items Closed

VIO 70-7001/2008-201-02 Certificate holder's failure to document its justification for using less than optimal reflective conditions in NCSE-118 for chemical trap operations.

2.0 Inspection Procedures Used

IP 88015	Nuclear Criticality Safety Program
IP 88016	Nuclear Criticality Safety Evaluations and Analyses

3.0 Partial List of Persons Contacted

<u>USEC</u>

R. Beck	Engineer, Nuclear Criticality Safety
M. Boren	Nuclear Regulatory Affairs
S. Gunn	Cascade Operations
M. Harris	Engineer, Nuclear Criticality Safety
T. Hofer	Engineer, Nuclear Criticality Safety
J. Labarraque	Manager, Nuclear Safety and Quality
J. Lewis	Plant Manager
E. Paine	Manager, Chemical Operations
S. Penrod	General Manager
V. Shanks	Manager, Nuclear Regulatory Affairs
D. Stadler	Senior Engineer, Nuclear Regulatory Affairs
C. Willet	Manager, Cascade Operations
J. Wittman	Manager, Maintenance

Attachment

<u>NRC</u>

D. MoreySenior Criticality Safety Inspector, HeadquartersM. MillerSenior Resident Inspector, Region II

All attended the exit meeting on July 24, 2008.

4.0 List of Acronyms and Abbreviations

ADAMS	Agency-Wide Document Access and Management System
CFR	Code of Federal Regulation
NRC	U.S. Nuclear Regulatory Commission
DOE	U.S. Department of Energy
IP	inspection procedure
KENO	name of criticality computer code
NCS	nuclear criticality safety
NCSA	nuclear criticality safety approval
NCSE	nuclear criticality safety evaluation
NMSS	Office of Nuclear Materials Safety and Safeguards
USEC	U. S. Enrichment Corporation (certificate holder)
URI	Unresolved Item
VIO	violation