March 6, 2007

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

SUBJECT: INSPECTION REPORT NO. 70-7002/2007-201

Dear Mr. Starkey:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine, scheduled, and announced nuclear criticality safety (NCS) inspection from February 5 through 7, 2007, at the Portsmouth facility in Piketon, Ohio. The purpose of this 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 February 7, 2007, during which time inspection observations and findings were formally discussed with your management and staff.

The inspection, which is described in the enclosure, focused on NCS analysis; risk-significant NCS controls; and principal management measures for ensuring that NCS controls are capable, available, and reliable. The inspection consisted of reviews of new, changed, and other risk-significant NCS analyses; selective examinations of relevant procedures and records; examinations of safety-related equipment; interviews with plant personnel; and facility walkdowns and observations of in-plant conditions and activities. Based on the inspection, your activities involving nuclear criticality hazards were found to be conducted safely and in accordance with regulatory requirements.

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

If you have any questions concerning this report, please contact Natreon Jordan, of my staff, at (301) 415-7648.

Sincerely,

### /RA/

Wilkins R. Smith, Acting Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards, NMSS

Docket No.: 70-7002

Enclosure: Inspection Report No. 70-7002/2007-201

cc: W. Jordan, Portsmouth General Manager

R. DeVault, Regulatory Oversight Manager, DOE

- G. Workman, Nuclear Regulatory Affairs Manager, Portsmouth
- S. A. Toelle, Manager, Regulatory Affairs, USEC
- C. O'Claire, State Liaison Officer, Ohio

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

Docket No.:	70-7002
Certificate No.:	GDP-02
Report No.:	70-7002/2007-201
Certificatee:	United States Enrichment Corporation
Location:	Piketon, Ohio
Inspection Dates:	February 5 - 7, 2007
Inspector:	Natreon Jordan, Criticality Safety Inspector
Approved by:	Wilkins R. Smith, Acting Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards, NMSS

### United States Enrichment Corporation Portsmouth Gaseous Diffusion Plant

### NRC Inspection Report 70-7002/2007-201

#### **EXECUTIVE SUMMARY**

#### Introduction

Staff of the U. S. Nuclear Regulatory Commission (NRC) performed a routine, scheduled, and announced criticality safety inspection of the Portsmouth Gaseous Diffusion Plant facility in Piketon, Ohio, from February 5 through 7, 2007. The inspection included an on-site review of the certificatee programs dealing with the nuclear criticality safety (NCS) program; NCS-related inspections, audits, and investigations; criticality accident alarm system (CAAS); and plant operations. The certificatee programs were acceptably directed toward the protection of public health and safety and in compliance with NRC regulatory requirements. The inspection focused on risk-significant fissile material processing activities including Buildings X-326, X-330, X-344, X-700, X-705, and XT-847.

#### Results

- No safety concerns were identified regarding the certificatee NCS program.
- No safety concerns were identified regarding the certificatee's internal NCS audits.
- No safety concerns were identified regarding the certificatee criticality accident alarm system.
- No safety concerns were identified during walkdowns of the facility and operations.

#### **REPORT DETAILS**

#### 1.0 Summary of Plant Status

The United States Enrichment Corporation (USEC) operates the Portsmouth Gaseous Diffusion Plant near Piketon, Ohio, in cold standby to maintain U.S. capacity to enrich uranium through diffusion of gaseous uranium hexafluoride ( $UF_6$ ). During the inspection, the certificatee was conducting technicium clean-up, deposit remediation, equipment decontamination, and routine waste handling and processing operations.

### 2.0 Nuclear Criticality Safety Program (88015, 88016)

#### a. <u>Inspection Scope</u>

The inspector reviewed nuclear criticality safety (NCS) evaluations, approvals, and supporting calculations for new, changed, and other selected operations. This was done to determine that criticality safety of risk-significant operations was assured through engineered and administrative controls with adequate safety margin and to ensure that preparation and review were performed by qualified staff. The inspector accompanied NCS and operations staff on walkdowns of NCS controls in selected process and storage areas. The inspector reviewed selected aspects of the following documents:

- XP2-EG-NS1031, "Nuclear Criticality Safety," Revision 8, dated November 5, 2004.
- XP4-EG-NS1001, "Nuclear Criticality Safety Evaluation And Approval,"
- Revision 7, dated February 28, 2001.
- NCSA-PLANT025.A10, "Nuclear Criticality Safety Approval: General Use of Small Diameter Containers for Storing up to 10% Enriched Material," dated October 19, 2006.
- NCSE-PLANT025.E06, "Nuclear Criticality Safety Approval: General Use of Small Diameter Containers for Storing up to 10% Enriched Material," dated October 19, 2006.
- NCSA-PLANT006.A14, "Nuclear Criticality Safety Approval: General Use of Small Diameter Containers for Storing High Enriched Material," dated October 19, 2006.
- NCSE-PLANT006.E08, "Nuclear Criticality Safety Approval: General Use of Small Diameter Containers for Storing High Enriched Material," dated October 19, 2006.
- NCSA-PLANT062.A06, "Nuclear Criticality Safety Approval: Cascade Maintenance, Equipment Removal, and Storage," dated June 1, 2006.
- NCSA-PLANT045.A05, "Nuclear Criticality Safety Approval: Limited Safe Volume Containers," dated June 1, 2006.
- NCSA-PLANT060.A04, "Nuclear Criticality Safety Approval: Cylinder Valve Replacement," dated March 21, 2006.
- XP2-CU-CH2110, "General Nuclear Criticality Safety Requirements For X-700/X-705," Revision 22, dated April 19, 2004.

 NCSA-0705\_076.A05, "Nuclear Criticality Safety Approval For Use of Inadvertent Containers in X-705," dated May 17, 2004.

#### b. Observations and Findings

Based on the selected activities and documents reviewed, the inspector determined that the analyses were performed by qualified NCS engineers, that independent reviews of 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 inspector 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. <u>Conclusions</u>

No safety concerns were identified regarding the certificatee NCS program.

#### 3.0 Nuclear Criticality Safety Inspections, Audits and Investigations (88015)

#### a. <u>Inspection Scope</u>

The inspector reviewed the most recent NCS walk-through reports and surveillance reports related to NCS controls. The inspector reviewed selected aspects of the following documents:

- XP-2006-S019, "Surveillance Report: NCSA-PLANT060 Training," dated March 28, 2006.
- XP-2006-S047, "Surveillance Report: Tc [Technetium] Trap Handling & Conditioning X-710," dated July 28, 2006.
- XP-2006-S057, "Surveillance Report: Surveillance of CAAS Calibration," dated August 7, 2006.
- XP-2007-S003, "Surveillance Report: NCS Walk-Through and Review Program," dated January 15, 2007.

#### b. Observations and Findings

The inspector determined that certificatee programs to identify, evaluate, and correct NCS deficiencies were being adequately applied to facility processes. The inspector observed that the certificatee NCS walkthroughs and assessments were conducted within the required time limit and performed in accordance with written procedures. The inspector noted that the walkthroughs and assessments 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 requirements, procedures, and postings; and (4) examined equipment and operations to determine that past evaluations remained adequate. The inspector observed that NCS issues identified in the nuclear safety and quality (NS&Q)

surveillance report as needing corrective action were addressed by the NCS program. No safety concerns were noted regarding certificatee walkthroughs, assessments, and surveillance.

#### c. <u>Conclusions</u>

No safety concerns were identified regarding the certificatee's internal NCS audits.

### 4.0 Criticality Accident Alarm System (88017)

#### a. Inspection Scope

The inspector reviewed documentation regarding criticality accident alarm detector coverage, interviewed engineering and maintenance staff, and performed facility walkdowns to determine the adequacy of the certificatee criticality alarm system. The inspector reviewed selected aspects of the following documents:

- POEF-LMUS-10, "Criticality Accident Alarm System Coverage and Exclusives," Revision 4, dated April 1999.
- NCS-CALC-98-023, "Analysis of the Criticality Accident Alarm System Coverage Within the XT-847 Building," dated January 1998.
- POEF-SH-39, "Analysis of Criticality Accident Alarm System Coverage in the X-700, X-705, and X-720 Facilities," dated December 1995.
- POEF-LMUS-02, "A Comparison of Two Criticality Accident Alarm System Detector Locations for the X-700 Building at the Portsmouth Gaseous Diffusion Plant," dated February 1999.

#### b. Observations and Findings

The inspector reviewed past certificatee analyses governing the placement of criticality detectors within selected operating facilities. The system consisted of a cluster of neutron detectors in sets of three detectors per location in the X-700, X-705, and XT-847 buildings. The inspector reviewed criticality accident alarm system placement calculations to determine the adequacy of models, assumptions, and results; and visually inspected detector configuration. The inspector determined that the certificatee had installed and maintained a system of criticality detectors that was adequate for monitoring fissile material operations at the facility.

c. <u>Conclusions</u>

No safety concerns were identified regarding the certificatee criticality accident alarm system.

#### 5.0 Plant Operations (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 interviewed operators, NCS engineers, and process engineers both before and during walkdowns.

#### b. Observations and Findings

The inspector verified the adequacy of management measures for assuring the continued availability, reliability, and capability of safety-significant controls relied upon by the certificatee for controlling criticality risks to acceptable levels. The inspector performed walkdowns of Buildings X-326, X-330, X-344, X-700, X-705, and XT-847. The inspector observed ongoing operations and active storage areas including technicium cleanup, equipment decontamination, and waste operations. The inspector reviewed selected NCS analyses and verified that controls identified in those analyses were installed or implemented and were adequate to assure safety. The cognizant NCS engineers were knowledgeable of processes and able to explain the basis for applying applicable controls and any changes in operations.

#### c. Conclusions

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

#### 6.0 Open Item Follow-up

#### IFI 70-7002/2006-201-01

This item tracks the certificatee's actions to assure that non-compliant fissile material storage areas are not inadvertently created. During a previous inspection, the inspector observed that the certificatee was inadvertently creating potential fissile material storage locations due to the practice of storing equipment and components in arrays on the floor of cascade buildings. The certificatee committed to develop a method to cause operations staff to recognize when activities were creating a fissile material storage area and take appropriate actions to address NCS review. The certificatee also committed to take actions to assure that non-compliant fissile material storage areas are not inadvertently created during future operations.

During this inspection, the inspector determined that the certificatee had implemented corrective actions to protect against inadvertently creating non-compliant fissile material storage areas. Requirements for open floor storage are contained in NCSA-PLANT062, NCSA-PLANT045, and NCSA-PLANT060 and certificatee corrective actions included revision of these NCSAs to require a specific posting if a well-defined floor storage area is created. The revised posting requirements include two feet edge-to-edge spacing from other storage areas and all other uranium-bearing equipment. In addition, crew briefings were held to ensure that operations staff were aware of the potential for

inadvertently creating fissile material storage areas when equipment and components are placed in floor storage and what actions were required. Finally, NCS engineers received training on new requirements including the new posting requirements in NCSAs. The inspector walked down facility storage locations to verify that the two feet edge-to-edge spacing was incorporated into the latest relevant NCS postings. The inspector determined that the certificatee had adequately addressed the concern involving operations staff inadvertently creating non-compliant fissile material storage areas. This item is closed.

### 7.0 Exit Meeting

The inspector communicated the inspection scope and results to members of Portsmouth Gaseous Diffusion Plant management and staff throughout the inspection and during an exit meeting on February 7, 2007. Facility management and staff acknowledged and understood the findings as presented.

### SUPPLEMENTARY INFORMATION

## 1.0 List of Items Opened, Closed, and Discussed

### Items Opened

None

### Items Closed

IFI 70-7002/2006-201-01	Tracks the certificatee's actions to assure that non-compliant
	fissile material storage areas are not inadvertently created.

### Items Discussed

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

### **United States Enrichment Corporation**

E. Wagner	Manager,	Nuclear	Criticality	Safety
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- T. Brooks Director, Infrastructure Operations
- D. Fogel Engineer, Nuclear Regulatory Affairs
- G. Workman Manager, Nuclear Regulatory Affairs
- L. Cutlip PM&SP
- D. D'Aquila Lead, Nuclear Criticality Safety
- C. Rausch Engineer, Nuclear Regulatory Affairs
- J. Woodard Operations
- B. Corbin Environmental Safety & Health
- L. Wilber Operations PM&SP
- C. Ashley Operations PM&SP

# <u>NRC</u>

N. Jordan Criticality Safety Inspector, Headquarters

All were in attendance at the exit meeting on February 7, 2007.

# 4.0 Acronym List

ADAMS CAAS CFR	Agencywide Documents Access and Management System Criticality accident alarm systems Code of Federal Regulations
	inspector follow-up item
NCS	nuclear criticality safety
NCSA	nuclear criticality safety analysis
NCSE	nuclear criticality safety evaluation
NS&Q	nuclear safety and quality
PM&SP	Project Management & Strategic Planning
Tc	Technetium
UF	uranium hexafluoride
UH	Uncomplicated Handling
USEC	U.S. Enrichment Corporation (certificatee)