

[REDACTED]

December 21, 2006

Mr. Dwight B. Ferguson, President  
and Chief Executive Officer  
Nuclear Fuel Services, Inc.  
P.O. Box 337, MS 123  
Erwin, TN 37650

SUBJECT: INSPECTION REPORT NO. 70-143/2006-209

Dear Mr. Ferguson:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine announced criticality safety inspection at your facility in Erwin, Tennessee, from November 27 through 30, 2006. The purpose of the inspection was to determine whether activities involving licensed materials were conducted safely and in accordance with NRC requirements. Inspection observations were discussed with your management and staff throughout this inspection and at the exit meeting which was held on November 30, 2006.

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 capable, 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 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.

[REDACTED]

[REDACTED]

D. Ferguson

2

[REDACTED]

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

Sincerely,

**/RA/**

Melanie A. Galloway, Chief  
Technical Support Branch  
Division of Fuel Cycle Safety  
and Safeguards

Docket No.: 70-143  
License No.: SNM-124

Enclosure: Inspection Report 70-143/2006-209

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

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2006-209

Licensee: Nuclear Fuel Services, Inc.

Location: Erwin, TN

Inspection Dates: November 27 - 30, 2006

Inspector: Natreon Jordan, Criticality Safety Inspector

Approved by: Melanie A. Galloway, Chief  
Technical Support Branch  
Division of Fuel Cycle Safety and  
and Safeguards, NMSS

**Enclosure**

**EXECUTIVE SUMMARY****Nuclear Fuel Services, Inc.  
NRC Inspection Report No. 70-143/2006-209****Introduction**

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine and announced nuclear criticality safety (NCS) inspection of the Nuclear Fuel Services, Inc. (NFS), Erwin, Tennessee, facility from November 27 through 30, 2006. The inspection included an on-site review of the licensee programs involving the NCS program, inspections, audits, and investigations, plant operations, NCS event review and follow-up, and open items. The licensee 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 [REDACTED] material processing activities including the blended low-enriched uranium (BLEU) oxide conversion building (OCB), the BLEU uranyl nitrate building (UNB), and the BLEU effluent processing building (EPB).

**Results**

- The NCS program as observed was adequate for maintaining acceptable levels of safety.
- The licensee's integrated safety analysis (ISA) was determined to be adequate for observed accident sequences.
- Licensee NCS audits and corrective actions were adequate for maintaining acceptable levels of safety.
- Licensee-identified, NCS-related events and their corrective actions were adequately tracked by the licensee problem reporting system.
- No safety concerns were identified during walkdowns of [REDACTED] material operations.

## REPORT DETAILS

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

#### a. Inspection Scope

The inspector reviewed NCS analyses to determine that criticality safety of risk-significant operations was assured through engineered and human controls with adequate safety margin and preparation and review by qualified staff. The inspectors reviewed selected aspects of the following documents:

- 54T-05-0024, "Nuclear Criticality Safety Evaluation [NCSE] for OCB [REDACTED]," Revision 3, dated July 22, 2005
- NFS-GH-913, "Nuclear Criticality Safety Program," Revision 2, dated February 27, 2004
- NFS-HS-A-58, "Nuclear Criticality Safety Evaluations," Revision 10, dated February 17, 2006
- NCS-07-03, "Nuclear Criticality Safety Evaluation For The Effluent Process [REDACTED], and Liquid Waste Processes," Revision 2, dated September 9, 2004
- NFS-HS-CL-27, "Nuclear Criticality Safety [REDACTED] OCB/EPB," Revision 6, dated October 2, 2006
- 55T-06-1002, "Integrated Safety Analysis Summary - Oxide Conversion and Effluent Processing Buildings," Revision 3, dated January 2006
- SOP-520, Section 11, "[REDACTED] Operation," dated November 11, 2004
- SOP-520, Section 25, "[REDACTED]," dated October 27, 2004
- NFS-GH-43, "Safety-Related Equipment Control Program," Revision 13, dated May 15, 2006

#### b. Observations and Findings

The inspector reviewed Nuclear Criticality Safety Evaluations (NCSEs) and supporting calculations for 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, 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. NCS analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits.

#### c. Conclusions

The NCS program as observed was adequate for maintaining acceptable levels of safety.

## 2.0 Review of Integrated Safety Analysis and Items Relied On For Safety (IP 88015)

### a. Inspection Scope

The inspector reviewed selected NCS-related items relied on for safety (IROFS) to determine that performance requirements have been met for selected accident sequences. During walkdowns, the inspector evaluated the effectiveness of the IROFS to assure adequate subcritical margin for normal and credible abnormal conditions. The inspector reviewed the facility integrated safety analysis (ISA) to determine that appropriate criticality safety accident sequences were identified and controlled consistent with approved criticality safety analysis. The inspector reviewed selected aspects of the following documents:

- NCS-07-03, "Nuclear Criticality Safety Evaluation For The Effluent Process [REDACTED], and Liquid Waste Processes," Revision 2, dated September 9, 2004
- NFS-HS-CL-27, "Nuclear Criticality Safety [REDACTED] OCB/EPB," Revision 6, dated October 2, 2006
- 55T-06-1002, "Integrated Safety Analysis Summary - Oxide Conversion and Effluent Processing Buildings," Revision 3, dated January 2006
- SOP-520, Section 11, "[REDACTED] Operation," dated November 11, 2004
- SOP-520, Section 25, "[REDACTED]," dated October 27, 2004
- NFS-GH-43, "Safety-Related Equipment Control Program," Revision 13, dated May 15, 2006

### b. Observations and Findings

The inspector reviewed selected ISA accident sequences related to NCS and established that the accident sequences and controls corresponded with approved facility criticality safety analysis. The inspector reviewed ISA accident sequences involving uranium analyzers declared as IROFS in the OCB system. The inspector determined that for relevant accident sequences the IROFS defined in the analysis were appropriately identified in the ISA.

### c. Conclusions

The licensee's ISA was determined to be adequate for observed accident sequences.

## 3.0 Inspections, Audits, and Investigations (88015)

### a. Inspection Scope

The inspector reviewed results of the most recent NCS audits to assure that appropriate issues were identified and resolved. The inspector reviewed selected aspects of the following documents:

[REDACTED]

- NCS-2006-34, "Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Analysis [REDACTED]," Revision 3 [REDACTED], First Audit, dated October 19, 2006
- NCS-07-03, "Control Flowdown and Field Verification Checklist - Control Flowdown and Field Verification [REDACTED]," dated September 2006
- NFS-HS-CL-27, "Nuclear Criticality Safety [REDACTED] OCB/EPB," Revision 6, dated October 2, 2006
- 54T-05-0024, "Nuclear Criticality Safety Evaluation for [REDACTED] System," Revision 3, dated July 22, 2005
- NFS-HS-A-16, "Safety Audits and Inspections," Revision 8, dated January 29, 2004
- NCS-2006-32, "Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for [REDACTED]" dated October 4, 2006
- NFS-GH-43, "Safety-Related Equipment Control Program," Revision 13, dated May 15, 2006

b. Observations and Findings

The inspector observed that the licensee NCS audits were conducted in accordance with written procedures. The inspector noted that the audits were performed by NCS engineers who reviewed open NCS issues from previous audits; reviewed the adequacy of control implementation; reviewed plant operations for compliance with license requirements, procedures, and postings; and examined equipment and operations to determine that past evaluations remained adequate. Any deficiencies identified within NCSEs and operating procedures were appropriately captured in the licensee corrective action program and resolved in a timely manner. The inspector had no concerns regarding the identification, assignment and tracking of corrective actions. No safety concerns were noted.

c. Conclusions

Licensee NCS audits and corrective actions were adequate for maintaining acceptable levels of safety.

#### 4.0 **Plant Activities (88015)**

a. Inspection Scope

The inspector performed plant walkdowns to review activities in progress and to determine whether risk-significant [REDACTED] material operations were being conducted safely and in accordance with regulatory requirements. The inspector verified the adequacy of management measures for assuring the continued availability, reliability, and capability of safety-significant controls relied upon by the licensee for controlling criticality risks to acceptable levels.

The inspector performed walkdowns of risk-significant [REDACTED] material processing activities in the following BLEU facilities: OCB, UNB, and EPB. The inspector interviewed operations staff and NCS engineers both before and during walkdowns. The inspector reviewed selected aspects of the following documents prior to performing the walkdowns:

- 54T-05-0024, "Nuclear Criticality Safety Evaluation [REDACTED], [REDACTED]," Revision 3, dated July 22, 2005
- NFS-GH-913, "Nuclear Criticality Safety Program," Revision 2, dated February 27, 2004
- NFS-HS-A-58, "Nuclear Criticality Safety Evaluations," Revision 10, dated February 17, 2006
- NCS-07-03, "Nuclear Criticality Safety Evaluation For The Effluent Process [REDACTED], and Liquid Waste Processes," Revision 2, dated September 9, 2004
- NFS-HS-CL-27, "Nuclear Criticality Safety [REDACTED] OCB/EPB," Revision 6, dated October 2, 2006
- 55T-06-1002, "Integrated Safety Analysis Summary - Oxide Conversion and Effluent Processing Buildings," Revision 3, dated January 2006
- SOP-520, Section 11, "[REDACTED] Operation," dated November 11, 2004
- SOP-520, Section 25, "[REDACTED]," dated October 27, 2004
- NFS-GH-43, "Safety-Related Equipment Control Program," Revision 13, dated May 15, 2006

b. Observations and Findings

The inspector verified that controls identified in NCS analyses were installed or implemented and were adequate to ensure safety. The inspector also verified that safety was maintained for observed facility operations. The cognizant NCS engineers were knowledgeable and had good interfaces with operators on the process floors. No issues were identified during these walkdowns.

c. Conclusions

No safety concerns were identified during walkdowns of [REDACTED] material operations.

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

a. Inspection Scope

The inspector reviewed the licensee response to two internally-reported events. These events were identified as a result of the licensee fourth quarter audits performed by NCS staff. The inspector reviewed the audit findings and interviewed licensee staff regarding immediate and long-term corrective actions. The inspector reviewed selected aspects of the following documents:

[REDACTED]

- NFS-HS-CL-27, "Nuclear Criticality Safety [REDACTED] OCB/EPB," Revision 6, dated October 2, 2006
- NCS-07-03, "Nuclear Criticality Safety Evaluation For The Effluent Process [REDACTED], and Liquid Waste Processes," Revision 2, dated September 9, 2004

b. Observations and Findings

Two events were chosen to review in further detail:

- PIRCS [Problem Resolution, Identification, and Corrective System] 8755 - This problem report was issued to track an action to revise an EPB operating procedure.
- PIRCS 8756 - This problem report was issued to track an action to add more detailed description in the EPB NCSE for the composite sampling of the uranium holdup in the EPB.

The events were identified and entered into the licensee's PIRCS system. The inspector determined that the events entered into PIRCS were reviewed for relevance to NCS, and corrective actions were outlined for the events they identified.

The event associated with PIRCS entry 8756 involved failure to take mass samples as directed by the NCSE and corresponding operating procedure. The EPB process was used to process liquid waste, [REDACTED]. The EPB NCSE required monthly samples to be taken on the inlet and outlet of the EPB system. The purpose of the inlet and outlet sampling was to maintain a mass balance on the uranium in the EPB building for inventory purposes. As a result of the safety audit, the licensee found that only the inlet sampling was being performed. The inspector interviewed NCS and operations staff and walked down the system with the facility NCS engineer. The inspector agreed with the licensee that not including the outlet sampling was conservative since operations were being conducted as if all uranium remained in the system (i.e., no uranium was lost with the outgoing effluent material). As part of the licensee corrective actions, the NCSE will be revised to provide a more detailed description of the sampling process. The inspector communicated to the licensee that the proposed corrective action was adequate and will be tracked as a followup item for the next inspection. The revision of the EPB NCSE to provide a more detailed description of the sampling process will be tracked as Inspector Followup Item (IFI) 70-143/2006-209-01.

No other issues were identified during the investigation of these problem reports. The inspector determined that the licensee adequately identified NCS-related events and tracked the progress of assigned corrective actions. No major events were identified during the investigation of these problem reports.

c. Conclusions

Licensee-identified, NCS-related events and corrective actions were adequately tracked by the licensee problem reporting system.

**6.0 Open Item Followup**

**IFI 70-143/2006-205-02**

This item tracks the licensee's review of its lightning protection system. During a previous inspection, inspectors investigated an event which had taken place at the facility involving an electrical storm. The inspectors noted that the electrical storm had disabled one of two Victoreen detectors and the audible alarm system for the BLEU complex criticality accident alarm system. As a result, IFI 2006-205-02 was opened. During the current inspection, the licensee communicated to the inspector that the review of its lightning protection had not been completed, and a date for completion had not been determined. This item remains open.

**7.0 Exit Meeting**

The inspector presented the inspection results to members of the licensee's management and staff during an exit meeting on November 30, 2006. The licensee acknowledged and understood the findings as presented.

[REDACTED]

## SUPPLEMENTARY INFORMATION

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

#### Items Opened

IFI 70-143/2006-209-01      Tracks revision of the EPB NCSE to provide a more detailed description of the sampling process.

#### Items Closed

None

#### Items Discussed

IFI 70-143/2006-205-02      Tracks licensee review of its lightning protection system.

### 2.0 Inspection Procedures Used

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

### 3.0 Key Points of Contact

#### **Nuclear Fuel Services, Inc.**

S. Gizzie	Engineer, NCS
*R. Shackelford	Manager, NCS
M. Tester	Manager, Radiological Control
T. Coates	Manager, E&I Section
R. Ratner	Health Physicist
*D. Hopson	Manager, BLEU Safety and Regulatory
*R. Droke	Director, Safety
B. Moore	Vice President, Safety and Regulatory
J. Nagy	Senior Licensing and Regulatory Compliance Officer
*J. Wheeler	Manager, ISA
L. Willis	Engineer, Quality
G. Hazelwood	Director, Engineering
T. Sheehan	Director, HEU Operations
K. Schutt	Vice President
P. Johnson	Vice President, Applied Technology
C. Woodhale	Director
D. Ferguson	CEO
A. Ward	General Counsel

**Attachment**

[REDACTED]

