[redacted]

November 28, 2005

Mr. Kerry Schutt, President
and General Manager
Nuclear Fuel Services, Inc.
P.O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: INSPECTION REPORT NO. 70-143/2005-207

Dear Mr. Schutt:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine announced criticality safety inspection at your facility in Erwin, Tennessee, from November 7 through 10, 2005. The purpose of the inspection was to determine whether activities involving licensed materials were conducted safely and in accordance with NRC requirements. An exit meeting was held on November 10, 2005. The inspection observations and findings were discussed with members of your staff.

The inspection, which is described in the enclosure, focused on: (1) the most hazardous activities and plant conditions; (2) the most important controls relied on for safety and their analytical basis; and (3) 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 equipment related to nuclear criticality safety (NCS), 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. Throughout this inspection, observations were discussed with your managers and staff. Based on the inspection, your activities involving nuclear criticality hazards were found to be conducted safely and in accordance with regulatory requirements.

[redacted]

[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 Group
Division of Fuel Cycle Safety
and Safeguards

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

Enclosure: Inspection Report 70-143/2005-207

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 Group
Division of Fuel Cycle Safety
and Safeguards

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

Enclosure: Inspection Report 70-143/2005-207

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

Docket No.:	70-143
Licensee No.:	SNM-124
Report No.:	70-143/2005-207
Licensee:	Nuclear Fuel Services, Inc.
Location:	Erwin, TN
Inspection Dates:	November 7 - 10, 2005
Inspector:	Lawrence Berg, Criticality Safety Inspector
Approved by:	Melanie A. Galloway, Chief Technical Support Group Division of Fuel Cycle Safety and Safeguards

Enclosure

[redacted]

[redacted]

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Inspection Report No. 70-143/2005-207

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., Erwin, Tennessee, facility from November 7 through 10, 2005. The inspection included an on-site review of the licensee programs dealing with the NCS program, plant operations, 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 in the Blended Low Enriched Uranium (BLEU) processing areas.

Results

- Nuclear criticality safety analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits. The NCS program as observed was adequate for maintaining acceptable levels of safety.

- Plant operations involving [redacted] materials were conducted safely and in accordance with written procedures.

[redacted]

REPORT DETAILS

1.0 NCS Program (88015)

a. Scope

The inspector reviewed NCS evaluations (NCSEs) to determine that criticality safety of risk-significant operations was assured through engineered features and human performance (controls) with adequate safety margin/certainty, preparation and review by capable staff. The inspector reviewed documentation associated with criticality code validation to confirm that the licensee appropriately validated its criticality codes and had adequate assurance of subcriticality. The inspector reviewed selected aspects of the following documents:

- "Nuclear Criticality Safety Evaluation for the Blended Low Enriched Uranium Preparation Facility [redacted]" Revision 6, dated August 31, 2005
- "Addendum 1 to the Nuclear Criticality Safety Evaluation [redacted]," Revision 0, dated July 13, 2005
- "Nuclear Criticality Safety Analysis for the BLEU Preparation Facility Process Ventilation System," Revision 4, dated October 11, 2005
- "Nuclear Criticality Safety Evaluation for BLEU Preparation Facility Liquid Waste Discard System," Revision 2, dated March 25, 2004
- NFS-HS-A-58, "Nuclear Criticality Safety Evaluations (NCSE)," Revision 9, dated June 24, 2005
- "Nuclear Criticality Safety Evaluation/Analysis Writer's Guide," Revision 5, dated June 24, 2005

b. Observations and Findings

The inspector determined that evaluations and analyses were performed by qualified NCS engineers, that independent reviews were completed for the evaluations and analyses by other qualified NCS engineers, and that subcriticality of the systems and operations was assured through appropriate limits on controlled parameters. The inspector determined that NCS controls for equipment and processes assured the safety of the operations.

c. Conclusions

Nuclear criticality safety analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits. The NCS program as observed was adequate for maintaining acceptable levels of safety.

2.0 Plant Operations (88015)

a. 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 interviewed operators and NCS engineers both before and during walkdowns. The inspector reviewed selected aspects of the following documents prior to performing the walkdowns:

- "Nuclear Criticality Safety Evaluation for the Blended Low Enriched Uranium Preparation Facility [redacted] Revision 6, dated August 31, 2005
- "Addendum 1 to the Nuclear Criticality Safety Evaluation [redacted]," Revision 0, dated July 13, 2005
- "Nuclear Criticality Safety Analysis for the BLEU Preparation Facility Process Ventilation System," Revision 4, dated October 11, 2005
- "Nuclear Criticality Safety Evaluation for BLEU Preparation Facility Liquid Waste Discard System," Revision 2, dated March 25, 2004

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 licensee for controlling criticality risks to acceptable levels. The inspector performed walkdowns of [redacted] activities in the BLEU facility process areas. No safety concerns were noted during walkdowns.

c. Conclusions

Plant operations involving [redacted] materials were conducted safely and in accordance with written procedures.

3.0 Open Item Followup

VIO 70-143/2004-207-01

This item concerned the licensee's failure to comply with the unfavorable geometry bag handling requirements of procedure NFS-HS-CL-27. During inspection 70-143/2004-207, the inspector had identified an open plastic bag not meeting the handling requirements of NFS-HS-CL-27 in the [redacted] of the Oxide Conversion Building. During this inspection, the inspector reviewed the status of the licensee's corrective actions which included re-instruction on the use and control of unfavorable geometry

bags in the Oxide Conversion Building. The inspector verified that the training had been completed. The inspector performed tours of the BLEU facility process areas and discussed the training with randomly selected operators. No examples of improperly handled unfavorable geometry bags were identified during the tours. This item is closed.

VIO 70-143/2004-207-06

This item concerned the licensee's failure to demonstrate that the caustic discard solution concentration was less than [redacted] prior to discharge from favorable geometry to unfavorable geometry. During inspection 70-143/2004-207, the inspector had determined that double contingency protection had been lost as a result of the licensee's attempted release of liquid waste effluent from the caustic discard [redacted] to unfavorable geometry without the demonstration that the U^{235} concentration was [redacted] prior to the transfer. During this inspection, the inspector verified that the corrective actions identified in the licensee's March 10, 2005, reply to the Notice of Violation had been completed. These corrective actions included revisions to operating procedures to improve the implementation of NCS requirements and repair of faulty [redacted] instrument taps to improve functionality of the caustic discard [redacted] level indicators. The inspector noted that all of these corrective actions had been completed prior to the issuance of the Notice of Violation, dated February 11, 2005. The inspector toured the BLEU Preparation Facility, and reviewed caustic tank records of previous tank discards. The inspector did not identify any examples of recurring failures to sample prior to transfer. This item is closed.

VIO 70-143/2005-203-01

This item concerned the licensee's failure to establish double contingency for the [redacted] dilution process ventilation system. During inspection 70-143/2005-203, the inspector had determined that the NCS analysis for the [redacted] dilution process ventilation system credited the performance of an uninstalled [redacted] to prevent the accumulation of a critical mass in the unfavorable geometry portions of the ventilation system. During this inspection, the inspector verified that the corrective actions identified in the licensee's June 21, 2005, reply to the Notice of Violation had been completed. The inspector noted that the corrective actions included: (1) modifying the design of the [redacted] dilution process ventilation system to provide passive engineered controls to prevent uranium [redacted] solution from entering unfavorable geometry ductwork; (2) revising the NCSE for the BLEU Preparation Facility ventilation system to demonstrate the criticality safety of the new design; (3) revising licensee procedure NFS-HS-A-58, "Nuclear Criticality Safety Evaluation," to ensure the consideration, review, and revision as appropriate of other NCSEs which may be impacted by changes made to a process-specific NCSE; and (4) revision of the NCSE/Analysis Writer's Guide to include NCS design considerations for ventilation systems. The inspector reviewed the revised NCSE and verified the installation of the

modified design of the [redacted] dilution process ventilation system. In addition, the inspector reviewed the revised procedure and writer's guide. The inspector noted that the event was directly attributable to an inadequate configuration change process involving weaknesses in both the licensee's procedure for development and approval of NCSEs, and the licensee's NCSE writer's guide that permitted a configuration change to be approved without assurance that double contingency would still be maintained for the process ventilation system. The inspector determined that the revisions to the NCSE procedure and writer's guide ensured that changes to area-specific NCSEs would include a review of applicable ancillary NCSEs to preclude the creation of unanalyzed conditions. The inspector reviewed the revisions and determined that the licensee's corrective actions adequately addressed the root cause of the violation. This item is closed.

URI 70-143/2005-203-02

This item concerned the licensee's failure to recognize a potential NCS violation during review of a non-reportable internal event. During inspection 70-143/2005-203, the inspector questioned why the licensee had not taken prompt corrective action in response to an event precursor to prevent occurrence of a more significant event [redacted]
During this inspection, the inspector determined that the licensee recognized the importance of timely precursor detection and was committed to emphasizing this philosophy plant-wide, including management oversight of operator responses to repetitive false alarms. As noted by the inspector, the licensee's management treated false alarms as actual safety system actuations and was concerned that operators were not fully attentive to recognizing precursor conditions. The inspector noted that the licensee had taken actions to underscore the need for a questioning safety attitude via publication of an in-plant safety newsletter. The inspector determined that the level of management oversight being applied to recognition of event precursors was adequate to prevent occurrence of more risk-significant process upsets. This item is closed.

URI 70-143/2005-203-03

This item concerned the licensee's investigation and identification of potential NCS control failures resulting in [redacted] solution accumulation in the BLEU [redacted] off-gas system. During inspection 70-143/2005-203, the licensee's investigation into the event had not been completed, and the full extent with which established NCS controls had been compromised could not be determined by the end of the inspection. During this inspection, the inspector reviewed the results of the licensee's investigation into the event and determined that no other credited NCS controls had failed. This item is closed.

[redacted]

4.0 Exit Meeting

The inspector presented the inspection scope and results to members of the licensee's management and staff during an exit meeting on November 10, 2005. The licensee acknowledged and understood the findings as presented.

[redacted]

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Opened

None

Closed

VIO 70-143/2004-207-01	Tracks the licensee's failure to comply with the unfavorable geometry bag handling requirements of NFS-HS-CL-27.
VIO 70-143/2004-207-06	Tracks the licensee's failure to demonstrate that the caustic discard solution concentration was less than [redacted]
VIO 70-143/2005-203-01	Failure to establish double contingency for the backflow of solution into the [redacted] dilution process ventilation system.
URI 70-143/2005-203-02	Failure to recognize a potential NCS violation during review of an internal event.
URI 70-143/2005-203-03	Investigation and identification of potential NCS control failures resulting in [redacted] solution accumulation in the BLEU [redacted] process off-gas system.

Discussed

None

2.0 Inspection Procedures Used

IP 88015	Headquarters Nuclear Criticality Safety Program

3.0 Key Points of Contact

Nuclear Fuel Services, Inc.

R. Droke	Director, Safety
R. Shackelford	Manager, NCS
B. Moore	Vice President, Safety and Regulatory
M. Tester	Manager, Radiological Control
J. Nagy	Licensing and Regulatory Compliance
G. Tipton	Director, High Enriched Uranium/BLEU Projects
R. Mauer	NCS Engineer
S. Gizze	NCS Engineer

[redacted]

[redacted]

NRC

D. Rich	Senior Resident Inspector, NRC Region II
S. Burris	Resident Inspector, NRC Region II
L. Berg	Criticality Safety Inspector, NRC HQ

All attended the exit meeting on November 10, 2005.

4.0 List of Acronyms and Abbreviations

BLEU	blended low-enriched uranium
IP	inspection procedure
NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluation
NRC	U.S. Nuclear Regulatory Commission
VIO	violation
URI	unresolved item

[redacted]