

September 21, 2006

Mr. Mark W. Fecteau, Plant Manager
Westinghouse Electric Company
Commercial Nuclear Fuel Division
P.O. Drawer R
Columbia, SC 29250

SUBJECT: INSPECTION REPORT NO. 70-1151/2006-203

Dear Mr. Fecteau:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine and announced criticality safety inspection at your facility in Columbia, South Carolina, from August 28 - September 1, 2006. 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 September 1, 2006, during which inspection observations and findings were discussed with your staff.

The inspection, which is described in the enclosure, focused on nuclear criticality safety (NCS) analysis, risk-significant NCS controls and items relied on for safety, 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 results of this inspection, the NRC has determined that a Severity Level IV violation of NRC requirements occurred. This violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Chief, Technical Support Section, Division of Fuel Cycle Safety and Safeguards; Regional Administrator, Region II; and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

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 <http://www.nrc.gov/reading-rm/adams.html>.

M. Fecteau

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If you have any questions concerning this report, please contact Tamara Powell, of my staff, at (301) 415-5095.

Sincerely,

/RA/

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

Docket No.: 70-1151
License No.: SNM-1107

Enclosure: Inspection Report 70-1151/2006-203

cc w/enclosures: Mr. Marc Rosser
Westinghouse Electric Company

cc w/o enclosures: T. Pearce O'Kelley
Bureau of Radiological Health
South Carolina Department of Health
and Environmental Control

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M. Fecteau

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

Docket No.: 70-1151

License No.: SNM-1107

Report No.: 70-1151/2006-203

Licensee: Westinghouse Electric Company

Location: Columbia, SC

Inspection Dates: August 28 - September 1, 2006

Inspectors: Dennis Morey, Senior Criticality Safety Inspector
Tamara Powell, Criticality Safety Inspector

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

Enclosure

**Westinghouse Electric Company
NRC Inspection Report No. 70-1151/2006-203**

EXECUTIVE SUMMARY

Introduction

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine and announced nuclear criticality safety (NCS) inspection of the Westinghouse Electric Company, Columbia, South Carolina (SC), facility from August 28 - September 1, 2006. The inspection included an on-site review of the licensee NCS program, NCS analyses, recent NCS events, and open items. The inspection focused on risk-significant fissile material processing activities including the uranium recycle and recovery system including solvent extraction and the incinerator, the ammonium diuranate (ADU) conversion area, pelleting equipment, and the integrated fuel burnable absorber (IFBA) and erbia areas.

Results

- A Non-Cited Violation (NCV) was identified due to failure to provide adequate criticality alarm system coverage.
- No safety concerns were identified during review of new and changed criticality safety evaluations (CSEs) and selected items relied on for safety (IROFS).
- Licensee NCS audits and inspections were adequate for maintaining acceptable levels of safety.
- No safety concerns were identified during a review of recent licensee investigation of internal events.
- Plant operations involving fissile materials were conducted safely and in accordance with written procedures.

REPORT DETAILS

1.0 Plant Status

Westinghouse Electric Company manufactures light water reactor fuel at its Columbia, SC, facility. During the inspection, the plant was operating at full capacity in all manufacturing areas. The facility incinerator was shutdown due to a recent fire. During part of the inspection, the uranium hexafluoride (UF₆) cylinder storage area had compensatory measures in place limiting cylinder movement due to incomplete criticality alarm coverage.

2.0 NCS Program (88015)

a. Inspection Scope

The inspectors reviewed NCS evaluations to determine that criticality safety of risk-significant operations was assured through engineered and administrative controls with adequate safety margin and preparation and review by qualified staff. The inspectors accompanied NCS and other technical staff on walkdowns of NCS controls in selected plant areas. The inspectors reviewed selected aspects of the following documents:

- CSE-005-A, "CSE for ADU Bulk Blending System," Revision 1, dated July 14, 2006
- CSE-08-D, "CSE for the Columbia Fuel Fabrication Facility Pellet Grinder Line," Revision 0, dated August 2006
- CSE-3-L, "CSE for Storage of Legacy 8A Cylinders," Revision 0, dated July 2006
- CSE-13-B, "CSE for Decontamination/Cutting Room and Filter Cleaning Hood," Revision 0, dated May 26, 2006
- CSE-3-C, "CSE for Line 4 UF₆ Education Trial," Revision 0, dated June 2006
- CSE-20-A, "CSE for Erbia Bulk Blending System," Revision 0, dated August 11, 2006

b. Observations and Findings

Within the selected aspects reviewed, the inspectors determined that the evaluations were performed by qualified NCS engineers, that independent reviews of the evaluations were completed by other qualified NCS engineers, that subcriticality of the systems and operations was assured through appropriate limits on controlled parameters, and that the licensee met the performance requirements of 10 *Code of Federal Regulations* (CFR) 70.61(b) 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.

NCS-Related IROFS

The inspectors reviewed IROFS for the ADU bulk blending and Erbia bulk blending and noted that the licensee had designated suitable IROFS to meet the performance requirements. The inspectors noted that IROFS are labeled in the plant and are

identified in NCS analyses in fault trees and tables by accident sequence and control type. For both Erbia and ADU, the inspectors reviewed IROFS associated with the accident sequence of introduction of moderating material into the bulk blend container. The inspectors observed the bulk blend IROFS during walkdowns and had no safety concerns.

c. Conclusions

No safety concerns were identified during review of new and changed criticality safety evaluations and selected IROFS.

3.0 NCS Inspections, Audits, and Investigations (88015)

a. Inspection Scope

The inspectors reviewed licensee internal audit procedures and reviewed records of previously completed audits of fissile operations. The inspectors also reviewed the licensee Redbook system for reporting internal events and problems. The inspectors reviewed selected aspects of the following documents:

- RA-106, "Internal Program Audits, Formal Compliance Inspection Audits, and Supplier Audits," Revision 13, dated February 2, 2006
- LTR-EHS-06-155, "NCS Program Audit Report, Audit No. EHS-06-04," dated June 6, 2006
- LTR-EHS-06-122, "Chemical Area Formal Compliance Inspection Audit: Audit No. EHS-06-02," dated April 27, 2006
- LTR-EHS-06-240, "Mechanical Area Formal Compliance Inspection: Audit No. EHS-06-06," dated August 23, 2006

b. Observations and Findings

The inspectors observed that the compliance inspections and NCS program audit were conducted in accordance with the requirements specified in licensee procedure RA-106. The inspectors noted that the NCS program audit was completed in June 2006 and is completed triennially. The inspectors determined that findings from the NCS program audit were entered into the Corrective Action Process (CAP) system for identification and tracking of corrective actions.

c. Conclusions

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

4.0 NCS Event Review

a. Inspection Scope

The inspectors reviewed licensee followup and corrective actions for two non-reportable

NCS-related events occurring since the previous inspection. The inspectors reviewed selected aspects of the following documents:

- Drawing 304F07P102, "Incinerator Off-Gas, Absorbers, Venturi Scrubber System," Sheet 1, Revision C1, dated February 13, 2006
- Drawing 304F07P102, "Scrubber System Modifications," Sheet 2, Revision C2, dated August 28, 2006
- Drawing 304F07P102, "Scrubber System Modifications," Sheet 3, Revision C1, dated July 25, 2006
- Drawing 304F07P102, "Liquid Effluent Monitors," Sheet 1, Revision C1, dated May 16, 2006

b. Observations and Findings

The inspectors reviewed the licensee investigation of a uranium accumulation of the 1030 Scrubber, a packed scrubber supporting the plant ventilation system. The inspectors determined that the accumulation was timely identified, adequately investigated, and appropriate corrective actions taken. The inspectors had no safety concerns regarding the accumulation.

The inspectors reviewed the licensee investigation of a blower fire in the recently restarted incinerator. The inspectors noted that discharge from the quench sump tank was interrupted when uranium content increased beyond discharge limits resulting in an increase in water level in the absorber tanks until the incinerator off-gas ceased to flow through the quench tanks. As a result of increased system pressure, off-gas leaked through the flame blower and caused a fire in the flame blower filter. The incinerator quench system is illustrated in Figure 1.

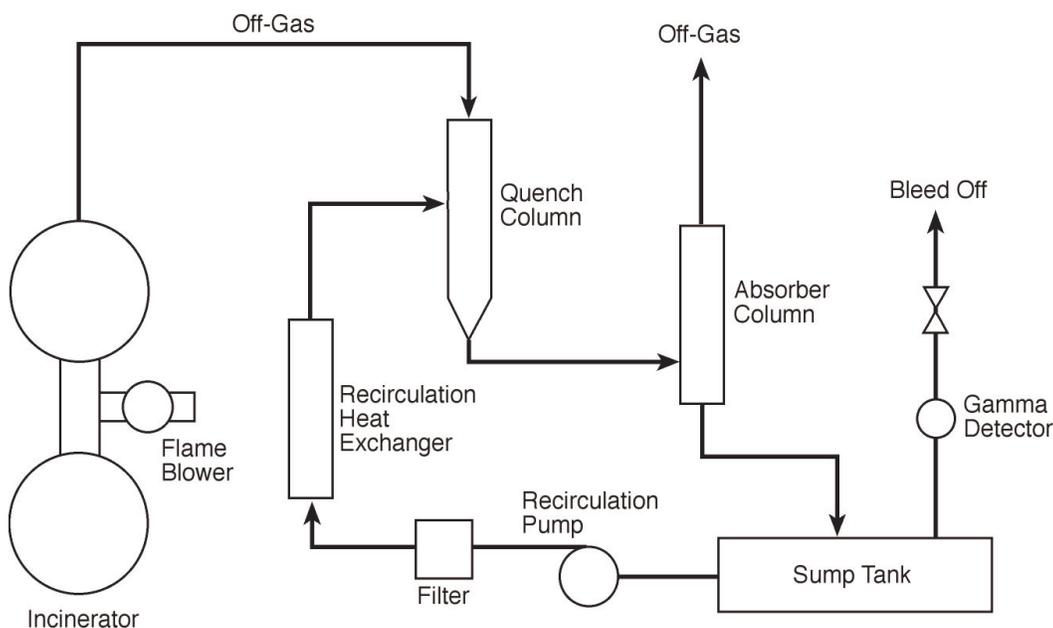


Figure 1

The licensee proposes to correct the problem by redirecting the sump discharge through the quench recirculation line filter to reduce contamination levels at discharge. The licensee investigation was not complete at the time of the inspection. The inspectors did not identify any safety concerns during review of the flame blower fire. Because the incinerator quench system is a key component of the criticality safety basis for the incinerator, corrective actions for the incinerator flame blower fire will be tracked as **Inspection Follow-up Item (IFI) 70-1151/2006-203-01**.

c. Conclusions

No safety concerns were identified during a review of recent licensee investigation of internal events.

5.0 Criticality Alarm System (88015)

a. Inspection Scope

The inspectors reviewed the licensee's criticality accident alarm system including detector placement and audibility. The inspectors reviewed selected aspects of the following documents:

- NSA-TR-06-02, "Westinghouse Criticality Detector Coverage Report, Part 1," Revision 0, dated April 2006
- NSA-TR-06-06, "Westinghouse Criticality Detector Coverage Report, Part 2," Revision 1, dated May 2006

b. Observations and Findings

The inspectors reviewed analyses of criticality alarm detector placement and coverage at the facility. As part of a planned, long-term, upgrade of the criticality safety basis at the facility, the licensee had the criticality alarm system detector placement analyzed to document the adequacy of coverage. The licensee analysis identified that the detector pair covering the UF₆ cylinder storage pad did not fully cover the pad resulting in cylinders at the end of the pad being too far away from the detector for a minimum accident of concern to be seen. The inspectors noted that the UF₆ cylinders are stored three high and only the bottom layer of cylinders is actually allowed to contain UF₆. In order to establish a bounding calculation, the licensee used a model with full cylinders in all layers which resulted in the failure to demonstrate adequate detector coverage.

License Section requires, in part, that the nuclear criticality alarms system radiation monitoring unit detectors will be located to assure compliance with the requirements of American National Standards Institute/American Nuclear Society (ANSI/ANS)-8.3 (1997) and 10 CFR 70.24. Failure to provide criticality alarm coverage of the UF₆ cylinder storage pad violates license requirements. This non-repetitive, licensee-identified, and corrected violation is being treated as an NCV, consistent with Section VI.A.8 of the NRC Enforcement Policy. Failure to provide complete criticality alarm coverage of the UF₆ cylinder storage pad is **Non-Cited Violation (NCV) 70-1151/2006-203-02**.

c. Conclusions

A Non-Cited Violation was identified due to the failure to provide adequate criticality alarm system coverage.

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

b. Observations and Findings

The inspectors 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 inspectors performed walkdowns of the uranium recycle and recovery system including solvent extraction and the incinerator, the ADU conversion area, pelleting equipment, UF₆ storage pad, Viper/FACTS test loop, 1030 Scrubber, and the integral fuel burnable absorber (IFBA) and erbia areas. No safety concerns were noted during walkdowns.

c. Conclusions

Plant operations involving fissile materials were conducted safely and in accordance with written procedures.

7.0 Open Item Followup

IFI 70-1151/2006-201-01

This item tracks NCS analysis and testing of the automated moisture sampler along with incorporation into the Integrated Safety Analysis (ISA) of any required changes to the accident sequences. The inspectors noted that the automated moisture sampling system is in the qualification stage of testing. The licensee expects to have the automated moisture sampling system implemented on two ADU lines by December 2006. This item remains open.

IFI 70-1151/2006-201-03

This item tracks licensee incorporation of quality control instruction (QCI) procedures into electronic training and procedures system (ETAPS). During a previous inspection, the inspectors noted that QCIs are not completely incorporated into ETAPS for change control. During this inspection, the inspectors determined that the licensee had implemented electronic approval for change control of QCIs in ETAPS. This item is closed.

IFI 70-1151/2006-202-01

This item tracks annotation of configuration control approval documents. During the previous inspection, the inspector noted that some configuration management review documents were left blank after the final safety review so that they only contained the safety managers signature, particularly the verification page when no verifications are required. Licensee staff agreed to initiate annotation of the configuration management tracking documents. During the current inspection, the inspectors determined that the licensee was marking 'N/A' in the blank areas of configuration management tracking documents. The inspectors also determined that the licensee had implemented electronic versions of the configuration management tracking documents and that the electronic versions of the configuration management documents become inaccessible once the electronic signature is applied. This item is closed.

IFI 70-1151/2006-202-02

This item tracks completion and implementation of the new floor storage CSE. During a previous inspection, the licensee had committed to draft a new floor storage CSE to clarify the spacing requirements for favorable geometry process containers. During the current inspection, the inspectors noted that the new CSE was complete and was expected to be implemented by the end of the year. This item remains open.

IFI 70-1151/2006-202-03

This item tracks the completion and implementation of the new and separate cleaning and decontamination CSE. During a previous inspection, the licensee had committed to draft a new cleaning and decontamination CSE to clarify the spacing requirements related to containers such as mop buckets. During this inspection, the inspectors noted that the new CSE was expected to be completed by October 2006 and implemented by the end of the year. This item remains open.

8.0 Exit Meeting

The inspectors communicated the inspection scope and results to members of Westinghouse management and staff throughout the inspection and during the exit meeting on September 1, 2006. Licensee representatives acknowledged and understood the findings as presented.

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed and Discussed

Items Opened

- IFI 70-1151/2006-203-01** Tracks licensee corrective actions for the incinerator flame blower fire.
- NCV 70-1151/2006-203-02** Failure to provide complete criticality alarm coverage of the UF₆ cylinder storage pad.

Items Closed

- NCV 70-1151/2006-203-02** Failure to provide complete criticality alarm coverage of the UF₆ cylinder storage pad.
- IFI 70-1151/2006-201-03** This item tracks licensee incorporation of quality control instruction procedures into electronic training and procedures system.
- IFI 70-1151/2006-202-01** This item tracks annotation of configuration control approval documents.

Items Discussed

- IFI 70-1151/2006-201-01** This item tracks NCS analysis and testing of the automated moisture sampler along with incorporation into the ISA of any required changes to the accident sequences.
- IFI 70-1151/2006-202-02** This item tracks completion and implementation of the new floor storage CSE.
- IFI 70-1151/2006-202-03** This item tracks completion and implementation of the new clean-up and decontamination CSE.

2.0 Inspection Procedure Used

- IP 88015 Nuclear Criticality Safety Program

3.0 Partial List of Persons Contacted

Westinghouse Electric Company

C. Alstadt	Operations Manager
R. Winiarski	NCS Manager
D. Graham	NCS Technician
M. Rosser	EH&S Manager
G. Couture	EH&S Engineer
J. Heath	EH&S Project Manager
N. Parr	EH&S Licensing Manager

NRC

D. Morey	Senior Criticality Safety Inspector, NRC HQ
T. Powell	Criticality Safety Inspector, NRC HQ

All Attended the exit meeting on September 1, 2006.

4.0 List of Acronyms and Abbreviations

ADAMS	Agency-wide Documents Access and Management System
ADU	ammonium diuranate
CAP	corrective action process
CFR	Code of Federal Regulations
CSE	criticality safety evaluation
EH&S	environment, health and safety
ETAPS	electronic training and procedure system
IFBA	integral fuel burnable absorber
IFI	inspection follow-up item
IROFS	items relied on for safety
ISA	integrated safety analysis
IP	inspection procedure
NCS	nuclear criticality safety
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
NVC	non-cited violation
QCI	quality control instruction
UF ₆	uranium hexafluoride