

May 24, 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. 70-1151/2006-202

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 May 8 through 12, 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 May 12, 2006.

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. Throughout this inspection, observations and findings were discussed with your managers and staff.

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 Dennis Morey, of my staff, at (301) 415-6107.

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 70-1151/2006-202

cc w/enclosures: Mr. Sam McDonald  
Westinghouse Electric Company

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

M. Fecteau

-2-

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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.: 70-1151/2006-202

Licensee: Westinghouse Electric Company

Location: Columbia, SC

Inspection Dates: May 8 - 12, 2006

Inspector: Dennis Morey, Senior 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. 70-1151/2006-202**

**EXECUTIVE SUMMARY**

**Introduction**

Staff of the U.S. Nuclear Regulatory Commission performed a routine and announced nuclear criticality safety (NCS) inspection of the Westinghouse Electric Company, Columbia, South Carolina, facility from May 8 through 12, 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**

- No safety concerns were identified during review of new and changed criticality safety evaluations (CSEs).
- No safety concerns were identified during review of NCS-related items relied on for safety (IROFS).
- No safety concerns were identified during review of the licensee internal event reporting and auditing system.
- A weakness was identified in the final safety approval of proposed configuration changes where no verification is required.
- Plant operations involving fissile materials were conducted safely and in accordance with written procedures.

## REPORT DETAILS

### 1.0 Plant Status

Westinghouse Electric Company manufactures low-enriched light water reactor fuel at its Columbia, SC facility. During the inspection, the plant was operating at full capacity in all manufacturing areas and was preparing to restart the low-level waste incinerator. The licensee is approximately halfway through a planned upgrade of the criticality safety program.

### 2.0 NCS Program (88015)

#### a. Inspection Scope

The inspector 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 inspector accompanied NCS and other technical staff on walkdowns of NCS controls in selected plant areas. The inspector reviewed selected aspects of the following documents:

- CSE-005-A, "Criticality Safety Evaluation (CSE) for ADU Bulk Blending System," Revision 0, dated April 27, 2006
- CSE-7-A, "CSE for the Solvent Extraction System," Revision 0, dated April 28, 2006
- CSE-13-A, "CSE for Incinerator System," Revision 2, dated February 27, 2006
- CSE-15-A, "CSE for Waste Treatment Tanks T-1148, T-1149, and T-1147," Revision 0, dated April 25, 2006

#### b. Observations and Findings

Within the selected aspects reviewed, the inspector 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 inspector determined that NCS controls for equipment and processes assured the safety of the operations.

#### c. Conclusions

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

### **3.0 NCS-Related IROFS**

#### **a. Inspection Scope**

The inspector reviewed the new incinerator CSE to determine that risk-significant NCS controls were reflected as IROFS in the facility integrated safety analysis (ISA). The inspector reviewed selected aspects of the following documents:

- CSE-13-A, "CSE for Incinerator System," Revision 2, dated February 27, 2006
- COP 83021, "Incinerator Operation," Revision 30, dated February 13, 2006
- MCP 203638, "Verification of Burn Cycle Timer," Revision 1, dated February 9, 2006
- MCP 203639, "Verification of Interlock INCIN 105, 106, 109," Revision 1 dated February 9, 2006
- OM 85016, "Incinerator Annual Safety Interlock OM," dated January 9, 2006

#### **b. Observations and Findings**

The inspector determined that risk-significant NCS controls identified in the incinerator were appropriately identified as IROFS in the facility ISA. The inspector noted that the ISA contained an adequate description of the IROFS along with specific management measures to assure that the performance requirements of 10 CFR 70.61(b) were met for the affected NCS accident sequence.

#### **c. Conclusions**

No safety concerns were identified during review of NCS-related IROFS.

### **4.0 NCS Inspections, Audits and Investigations (88015)**

#### **a. Inspection Scope**

The inspector reviewed the licensee Redbook system for reporting internal events and problems. The inspector reviewed quarterly audits of Redbook issues. The inspector reviewed selected aspects of the following documents:

- Letter EHS-05-434, Redbook Status Report, dated December 15, 2006
- Letter EHS-06-64, Redbook Status Report, dated March 13, 2006

#### **b. Observations and Findings**

The inspector observed that the licensee performs quarterly audits of the Redbook internal reporting system to identify trends. The inspector observed that the licensee quarterly audit reports related internally-reported events and problems to IROFS in order to identify trends related to IROFS' failures and repetitive challenges. The inspector did not identify any safety concerns related to the licensee Redbook system or periodic audits of the Redbook reports.

c. Conclusions

No safety concerns were identified during review of the licensee internal event reporting and auditing system.

**5.0 Configuration Management (88015)**

a. Inspection Scope

The inspector reviewed the licensee configuration management program including implementing procedures and the review and approval process. The inspector reviewed selected aspects of the following documents:

- TA-500, "Columbia Manufacturing Plant Configuration Control," Revision 16, dated March 24, 2005
- RA-104, "Regulatory Review of Configuration Change Authorizations," Revision 20, dated April 6, 2006

b. Observations and Findings

The inspector focused on how the licensee controlled in-process changes and out-of-service equipment. The inspector interviewed staff responsible for the configuration management program and implementing procedures. The inspector reviewed examples of change tracking documents for changes currently in review. The inspector noted that all construction and facilities are under configuration management. All activities that could constitute a change are reviewed by safety staff including NCS staff, required actions including verifications are listed in a change package, and the completed change package is approved by the safety manager prior to implementation. The inspector noted that some documents in the change package were left blank after the final safety review and only contained the safety manager's signature. The inspector observed that the installation verification checklist was completely blank in some completed change packages. The licensee noted that the blank installation verification checklist meant that the change reviewers had not required any verification actions and the management signature on that page was an acknowledgment. The licensee agreed that annotating "none" on the blank verification document would more accurately reflect an understanding that no verifications were required. Licensee staff agreed to initiate annotation of the tracking documents. Annotation of configuration control approval documents will be tracked as **Inspection Follow-up Item (IFI) 70-1151/2006-202-01**.

c. Conclusions

A weakness was identified in the final safety approval of proposed configuration changes where no verification is required.



## 6.0 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 licensee for controlling criticality risks to acceptable levels. The inspector performed walkdowns of the uranium recycle and recovery system including solvent extraction and the incinerator, the ADU conversion area, pelleting equipment, and the 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 70-1151/2004-202-02**

This item tracks licensee actions to clarify spacing requirements for favorable geometry process containers. The licensee had committed to draft a new floor storage criticality safety analysis which would clarify the spacing requirements for favorable geometry process containers. The new CSE would have included all types of portable containers stored in arrays on the facility floor including, for example, mop buckets. The licensee has now separated cleaning and decontamination from floor storage and is preparing separate analyses for each. The new floor storage CSE will address the issues raised by this item. Completion and implementation of the new floor storage CSE will be tracked as **IFI 70-1151/2006-202-02**. This item is closed.

### **VIO 70-1151/2004-202-04**

This item concerned the failure to identify mop bucket limits and controls in a CSE. Previously, mop bucket storage was not analyzed in a CSE, and the licensee had planned to include this analysis in the new floor storage CSE as discussed above in IFI 70-1151/2004-202-02. During this inspection, the inspector noted that, separate from the new floor storage CSE, the licensee is drafting a new cleaning and decontamination CSE which will clarify spacing requirements related to containers such as mop buckets. Completion and implementation of the new and separate cleaning and decontamination CSE will be tracked as **IFI 70-1151/2006-202-03**. This item is closed.

**VIO 70-1151/2004-202-10**

This item concerned the failure to implement a specifically-identified control by failing to regularly perform radiological surveys of the incinerator cross-over pipe. This item was reviewed previously by Region II staff who determined that corrective actions were adequate based on the licensee strengthening of the ISA and improving procedural compliance. During the current inspection, the inspector noted that the need for the survey to support NCS assumptions has been eliminated by the replacement of the previous cross-over pipe with a safe geometry configuration. This item is closed.

**VIO 70-1151/2004-202-14**

This item concerned the failure to communicate to engineering staff in the Uranium Recovery and Recycle Systems organization the bounding assumption that uranium concentration was limited in the incinerator system. During a previous inspection, the inspector determined that training of staff associated with the incinerator would be completed in February 2006. The inspector observed that all training is complete and that bounding assumptions have been effectively communicated to operations staff. This item is closed.

**IFI 70-1151/2005-201-02**

This item tracks licensee corrective actions for updating or removing single parameter limits based on the superceded limit of  $k_{\text{eff}} < 1.0$ . The licensee committed to develop specific corrective actions for updating single parameter limits. During the current inspection, the inspector reviewed three tables of single parameter limits that the licensee relies on in the place of previous limits. The inspector determined that the tables met license requirements for calculated limits. This item is closed.

**URI 70-1151/2005-201-05**

This item tracks a concern regarding maintenance of double contingency for the sponge jet blaster. This item is being addressed through an escalated enforcement action. This item is closed.

**URI 70-1151/2005-201-06**

This item tracks a concern regarding the appropriate use of procedure TA-500, "Configuration Management," to review changes to NCS controls. This item is being addressed through an escalated enforcement action. This item is closed.

**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. The inspector noted that the automated moisture sampling system is not yet implemented. Due to difficulty with equipment, licensee staff was unsure when testing would be completed. 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). The inspector noted that QCIs are not yet completely incorporated into the licensee ETAPS for change control. Licensee staff expects that the ETAPS incorporation will be completed within the next 6 months. This item remains open.

**8.0 Exit Meeting**

The inspector communicated the inspection scope and results to members of Westinghouse management and staff throughout the inspection and during the exit meeting on May 12, 2006. Licensee representatives acknowledged and understood the findings as presented.

## SUPPLEMENTAL INFORMATION

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

#### Items Opened

- IFI 70-1151/2006-202-01** Tracks annotation of configuration control approval documents. (Section 5.0)
- IFI 70-1151/2006-202-02** Tracks completion and implementation of the new floor storage CSE. (Section 7.0)
- IFI 70-1151/2006-202-03** Tracks completion and implementation of the new clean-up and decontamination CSE. (Section 7.0)

#### Items Closed

- IFI 70-1151/2004-202-02** This item tracks licensee actions to clarify spacing requirements for favorable geometry process containers.
- VIO 70-1151/2004-202-04** This item concerned the failure to identify mop bucket limits and controls in a CSE.
- VIO 70-1151/2004-202-10** This item concerned the failure to implement a specifically-identified control by failing to regularly perform radiological surveys of the incinerator cross-over pipe.
- VIO 70-1151/2004-202-14** This item concerned the failure to communicate to engineering staff in the Uranium Recovery and Recycle Systems organization the bounding assumption that uranium concentration was limited in the incinerator system.
- IFI 70-1151/2005-201-02** This item tracks licensee corrective actions for updating or removing single parameter limits based on the superseded limit of  $k_{\text{eff}} < 1.0$ .
- URI 70-1151/2005-201-05** This item tracks a concern regarding maintenance of double contingency for the sponge jet blaster.
- URI 70-1151/2005-201-06** This item tracks a concern regarding the appropriate use of procedure TA-500, "Configuration Management" to review changes to NCS controls.

#### 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 70-1151/2006-201-03** This item tracks licensee incorporation of quality control instruction procedures into electronic training and procedures system.

## **2.0 Inspection Procedure Used**

IP 88015                      Criticality Safety

## **3.0 Partial List of Persons Contacted**

### **Westinghouse Electric Company**

*D. Graham	NCS Technician
*J. Vining	EH&S Manager
*G. Couture	EH&S Engineer
*R. Winiarski	NCS Manager
M. Rosser	Acting EH&S Manager

### **NRC**

\*D. Morey                      Criticality Safety Inspector, NRC HQ

\*Attended the exit meeting on May 12, 2006.

## **4.0 List of Acronyms and Abbreviations**

ADAMS	Agency-wide Documents Access and Management System
ADU	ammonium diuranate
CFR	code of federal regulations
CSE	criticality safety evaluation
EH&S	environment, health and safety
ETAPS	electronic training and procedure system
IFBA	integrated fuel burnable absorber
IFI	inspection follow-up item
IROFS	items relied on for safety
ISA	integrated safety analysis
IP	inspection procedure
$k_{eff}$	effective neutron multiplication factor
NCS	nuclear criticality safety
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
QCI	quality control instruction