

June 6, 2008

Mr. Cary Alstadt, Plant Manager  
Westinghouse Electric Company  
Commercial Nuclear Fuel Division  
P.O. Drawer R  
Columbia, SC 29250

SUBJECT: INSPECTION REPORT NO. 70-1151/2008-201

Dear Mr. Alstadt:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine and announced criticality safety inspection at your facility in Columbia, South Carolina, from May 5 through May 9, 2008. The purpose of the inspection was to determine whether activities involving licensed material were conducted safely and in accordance with NRC requirements. Observations and findings were discussed with your staff throughout the inspection and during an exit meeting held on May 8, 2008.

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 nuclear criticality safety (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.

In accordance with 10 CFR 2.390 of NRC's "Rules of Practice," a copy of this letter and the enclosure will be made publicly available in the public electronic reading room of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/ADAMS.html>.

C. Alstadt

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If you have any questions concerning this report, please contact Thomas Marenchin, of my staff, at (301) 492-3209.

Sincerely,

**/RA/**

Deborah A. Jackson, Chief  
Technical Support Branch  
Division of Fuel Cycle Safety  
and Safeguards, NMSS

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

Enclosure: Inspection Report 70-1151/2008-201

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



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

Docket No.: 70-1151

License No.: SNM-1107

Report No.: 70-1151/2008-201

Licensee: Westinghouse Electric Company

Location: Columbia, South Carolina

Inspection Dates: May 5 - 9, 2008

Inspectors: Thomas Marenchin, Criticality Safety Inspector  
Tamara Powell, Criticality Safety Inspector

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

Enclosure

## **EXECUTIVE SUMMARY**

### **Westinghouse Electric Company NRC Inspection Report 70-1151/2008-201**

#### **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 facility from May 5 through May 9, 2008. The inspection included an on-site review of the licensee NCS program, NCS evaluations, NCS audits, recent NCS-related events, and open items. The inspection focused on risk-significant fissile material processing activities and areas including uranium recycle and recovery including solvent extraction and the incinerator, ammonium diuranate conversion, pelleting, integrated fuel burnable absorber (IFBA) and Erbium process areas, wastewater processing areas, and laboratories.

#### **Results**

- No safety concerns were noted regarding the licensee NCS program.
- No safety concerns were identified regarding licensee NCS audits.
- No safety concerns were identified during a review of recent licensee investigation of internal events.
- No safety concerns were identified during a review of licensee criticality accident alarm system.
- Plant operations involving fissile materials were conducted safely and in accordance with written procedures.

## REPORT DETAILS

### 1.0 Summary of Plant Status

Westinghouse Electric Company (WEC) manufactures light water reactor fuel at its Columbia, SC facility. During the inspection, the plant was shutdown for a maintenance outage in all manufacturing areas.

### 2.0 NCS Program (IP 88015, IP 88016)

#### a. Inspection Scope

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

- RA-313, "Criticality Safety Evaluations [CSE]," Revision 7, dated April 2, 2008
- NCS-002, "Criticality Safety Evaluation Guidelines," Revision 3, dated November 6, 2007
- NCS-010, "Categorizing Potential Criticality Scenarios and Criticality Safety Significant Controls," Revision 2, dated September 18, 2007
- CSE-2-A, "CSE for Uranyl Nitrate Bulk Storage and HF Spiking Station," Revision 0, dated March 20, 2008
- CSE-10-B, "CSE for Product Assurance Rod Inspection," Revision 1, dated March 13, 2008
- CSE-13-B, "CSE for Spent Filter Storage, Decontamination/Cutting Room and Filter Cleaning Hood," Revision 2, dated January 10, 2008
- CSE-14-D, "CSE for IFBA Pail Storage Racks," Revision 0, dated November 6, 2007
- CSE-16-F, "CSE for Floor Storage of Special Nuclear Material," Revision 0, dated January 28, 2007
- CSE-16-G, "CSE for Archive Pellet Can Storage and Handling," Revision 0, dated April 20, 2007
- CSE-18-A, "CSE for VIPER/PE Lab," Revision 2, dated April 2, 2008
- CSE-20-A, "CSE for Erbia Bulk Blending System," Revision 2, dated January 16, 2008
- CN-CRI-006-18, "Storage of 55-gal Drums," Revision 1, dated July 18, 2006
- CN-CRI-007-41, "Uranyl Nitrate Bulk Storage System," Revision 0, dated December 13, 2007
- LTR-RAC-08-26, "Quarterly Status Report of Nuclear Criticality Safety Improvement Project – April 2008," dated March 31, 2008

#### b. Observations and Findings

The inspectors determined that NCS evaluations were prepared by qualified NCS engineers, independent reviews of the evaluations were completed by other qualified NCS engineers, and that appropriate limits on controlled parameters were established

and maintained. The inspectors determined that NCS controls for equipment and processes assured the safety of the operations.

The inspectors noted that the nuclear criticality safety improvement program is ongoing and quarterly status reports have been submitted to the NRC.

c. Conclusions

No safety concerns were identified regarding the licensee NCS program.

**3.0 NCS Inspections, Audits, and Investigations (IP 88015)**

a. Inspection Scope

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

- NCS-003, "NCS Facility Walkthrough Assessments," Revision 5, dated November 1, 2008
- RA-316, "NCS Facility Walkthrough Assessments," Revision 1, dated January 31, 2008
- Facility Walkthrough Assessments, "PE Test Lab," dated February 19, 2008
- Facility Walkthrough Assessments, "URRS Safe – Geometry Dissolver," dated February 20, 2008
- Facility Walkthrough Assessments, "Conversion Scrap Cage," dated March 4, 2008
- Facility Walkthrough Assessments, "UN Bulk Storage," dated February 28, 2008

b. Observations and Findings

The inspectors reviewed licensee audit reports and interviewed NCS staff. The inspectors discussed the selected audit findings with the licensee NCS staff. The inspectors determined that licensee NCS audits were conducted in accordance with written procedures. The inspectors noted that the audits involved review of open NCS issues from previous audits; review of the adequacy of NCS control implementation; and review of plant operations for compliance with license requirements, procedures, and postings.

c. Conclusions

No safety concerns were identified regarding licensee NCS audits.

**4.0 Nuclear Criticality Safety Event Review and Follow-up (IP 88015, 88016, 88017)**

a. Inspection Scope

The inspectors reviewed licensee response to internally-reported events. The inspectors reviewed the progress of investigations and interviewed licensee staff

regarding immediate and long-term corrective actions. The inspectors reviewed selected aspects of the following documents:

- RA-121, "Redbook Internal Reporting System," Revision 3, dated August 22, 2006
- RA-107, "Corrective Action Process for Regulatory Events," Revision 17, dated November 1, 2007

b. Observations and Findings

The inspectors reviewed selected licensee internally-reported events. The inspectors observed that internal events were investigated in accordance with written procedures and appropriate corrective actions were assigned. The inspectors had no safety concerns regarding licensee reporting, investigation, and correction of internal NCS related events.

c. Conclusions

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

## 5.0 Criticality Alarm System (IP 88017)

a. Inspection Scope

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

- RA-304, "Criticality Accident Alarm System," Revision 12, dated December 6, 2007
- MCP-202037, "GA-6M Criticality Alarm Calibration," Revision 16, dated November 1, 2007
- NSA-TR-06-02 [Nuclear Safety Analysis], "Westinghouse Criticality Detector Coverage, Part 1," Revision 0, dated April 2006
- NSA-TR-06-06, "Westinghouse Criticality Detector Coverage, Part 2," Revision 1, dated May 2006

b. Observations and Findings

The inspectors verified that the licensee's placement of criticality accident alarm detectors has been established in accordance with the criteria described in 10 CFR 70.24. The inspectors reviewed criticality accident alarm system placement calculations to determine the adequacy of models, assumptions, and results and visually inspected detector configuration.

c. Conclusions

No safety concerns were identified during a review of licensee criticality accident alarm system.



## 6.0 Plant Operations (IP 88015, IP 88016)

### 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 reviewed selected aspects of the following documents:

- CSE-1D, "CSE for Ammonia Fume Ventilation System," Revision 0, dated May 2, 2008
- CSE-16-F, "Floor Storage of Special Nuclear Material," Revision 0, dated January 28, 2007
- CSE-16-G, "CSE for Archive Pellet Can Storage and Handling," Revision 0, dated April 20, 2007
- RA-301, "Floor Storage of Special Nuclear Material," Revision 19, dated January 24, 2008
- RA-306, "Movable Non-Favorable Geometry Containers in the Chemical Area," Revision 9, dated May 25, 2006
- CN-CRI-08-10, "Ammonia Fume Ventilation System, Revision 0, dated May 2, 2008

### b. Observations and Findings

The inspectors verified that controls identified in NCS analyses were installed or implemented and were adequate to ensure safety. The cognizant, NCS engineers were knowledgeable and interacted regularly with operators on the process floors. 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.

### c. Conclusions

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

## 7.0 Open Item Review

### **URI 70-1151/2007-202-01**

This item concerned the use of calculations based on facility features that might credibly be changed to demonstrate that criticality accident sequences are not credible. During a previous inspection, the inspectors noted that several accident sequences involving spacing upsets for 55-gallon drums were considered "not credible." The inspectors questioned whether these accident sequences were truly not credible, because they mainly involved the failure of administrative controls. During this inspection, the inspectors reviewed NCS-010, "Categorizing Potential Criticality Scenarios and Criticality Safety Significant Controls," which contains methodology for categorizing criticality scenarios as credible, abnormal or incredible events. This procedure had not been

issued when this finding was originally observed by the inspectors. The inspectors determined that the spacing upset accident sequences for the 55-gallon drums met the requirements of NCS-010 to be categorized as incredible. This item is closed.

## **8.0 Exit Meeting**

The inspectors presented the inspection scope and results to members of the licensee's management and staff during an exit meeting on May 8, 2008. The licensee acknowledged and understood the findings as presented.

## SUPPLEMENTARY INFORMATION

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

#### Items Opened

None

#### Items Closed

**URI 70-1151/2007-202-01** Use of calculations based on facility features that might credibly be changed to demonstrate that criticality accident sequences are not credible.

#### 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

#### WEC

|              |  |
|--------------|--|
| G. Couture   | Environment, Health, and Safety (EH&S) |
| D. Graham    | EH&S                                   |
| M. Rosser    | EH&S                                   |
| R. Winiarski | NCS Manager                            |
| C. Snyder    | NCS Technician                         |
| J. Peterson  | Maintenance Manager                    |

#### NRC

|              |  |
|--------------|--|
| R. Gibson    | Fuel Facility Inspector, NRC Region II |
| T. Marenchin | Criticality Safety Inspector, NRC HQ   |
| T. Powell    | Criticality Safety Inspector, NRC HQ   |
| P. Startz    | Fuel Facility Inspector, NRC Region II |
| S. Subosits  | Fuel Facility Inspector, NRC Region II |

All attended the exit meeting on May 8, 2008.

**Attachment**

#### **4.0 List of Acronyms**

|       |   |
|-------|---|
| ADAMS | Agencywide Documents Access and Management System |
| CFR   | Code of Federal Regulations                       |
| CSE   | criticality safety evaluation                     |
| EH&S  | environment, health, and safety                   |
| IFBA  | integral fuel burnable absorber                   |
| IP    | inspection procedure                              |
| NCS   | nuclear criticality safety                        |
| URI   | unresolved item                                   |
| WEC   | Westinghouse Electric Company (licensee)          |
| NSA   | nuclear safety analysis                           |