

August 14, 2008

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

SUBJECT: INSPECTION REPORT NO. 70-1151/2008-202 AND NOTICE OF VIOLATION

Dear Mr. Alstadt:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine, announced criticality safety inspection at your facility in Columbia, South Carolina, from July 14 - 18, 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 July 18, 2008.

The inspection, which is described in the enclosure, focused on: (1) the nuclear criticality safety (NCS) program and its implementing procedures; (2) new and changed NCS analyses; (3) NCS training; (4) NCS inspections, audits and investigations; (5) NCS-related events; and (6) observation of ongoing plant operations. 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.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy that is found on the NRC's web site at [www.nrc.gov](http://www.nrc.gov); select What We Do, then navigate to Enforcement, then Enforcement Policy. The violation is being cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the Notice because it was identified by the NRC during the inspection. The violation that is being cited as a Severity Level IV violation is the failure to ensure that Raschig rings are used and inspected in accordance with ANS/ANSI 8.5.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

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>.

If you have any questions concerning this report, please contact Dennis Morey of my staff at (301) 492-3112.

Sincerely,

**/RA/**

Patricia Silva, Chief  
Technical Support Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Materials Safety  
and Safeguards

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

Enclosures: (1) Notice of Violation  
(2) Inspection Report 70-1151/2008-202

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

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

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## NOTICE OF VIOLATION

Westinghouse Electric Company  
Columbia, South Carolina

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

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted from July 14 through 18, 2008, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Section 3.4 of the License Application states, in part, that operations to assure safe, compliant activities involving nuclear material will be conducted in accordance with approved procedures.

Section 6.1.3.8 of the License Application states, in part, that when Raschig rings are used, their use and maintenance is in accordance with ANSI/ANS-8.5(1996).

ANSI/ANS-8.5(1996), Section 7.4 states, in part, that the initial interval for inspection of Raschig rings shall not exceed 13 months for rings not subjected to agitation.

Contrary to the above, on and before July 15, 2008, the licensee failed to conduct inspections of Raschig rings used in the Q-Tanks in accordance with ANSI/ANS-8.5(1996). Specifically, procedure COP-81705, "Glass Volume Check of Conversion Line Q-Tanks," Revision 13, contained inadequate written instructions to ensure that Raschig rings in the Q-Tanks are inspected at least every 13 months.

This is a Severity Level IV Violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, Westinghouse Electric Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, with copies to the Chief, Technical Support Branch, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, and Regional Administrator, Region II, within 30 days from the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations; and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other actions as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Enclosure 1

Because your response will be made available electronically, for public inspection, in the NRC Public Document Room (PDR), or from the NRC's document system (ADAMS), accessible through the NRC web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld, and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 14 day of August 2008

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

Docket No.: 70-1151

License No.: SNM-1107

Report No.: 70-1151/2002-202

Licensee: Westinghouse Electric Company

Location: Columbia, South Carolina

Inspection Dates: July 14 - 18, 2008

Inspectors: Dennis Morey, Senior Criticality Safety Inspector  
Thomas Marenchin, Criticality Safety Inspector  
Dominique Cooper, Summer Engineer

Approved by: Patricia Silva, Chief  
Technical Support Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

Enclosure 2

**Westinghouse Electric Company  
NRC Inspection Report 70-1151/2008-202**

**EXECUTIVE SUMMARY**

**Introduction**

Staff of the U.S. Nuclear Regulatory Commission (NRC) staff conducted a routine and announced nuclear criticality safety (NCS) inspection of the Westinghouse Electric Company (WEC), Columbia, South Carolina facility from July 14 - 18, 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, solvent extraction, the incinerator, ammonium diuranate (ADU) conversion, pelleting, integrated fuel burnable absorber (IFBA) and Erbia process areas, wastewater processing areas, and laboratories.

**Results**

- A severity level IV violation was identified due to the licensee's failure to ensure that Raschig rings are used and inspected in accordance with ANS/ANSI 8.5.
- No safety concerns were identified regarding licensee NCS administrative and operating procedures.
- No safety concerns were identified regarding licensee training and qualification of NCS engineers.
- No safety concerns were identified regarding licensee NCS audits.
- No safety concerns were identified during review of the licensee Redbook problem reporting system.
- No safety concerns were identified during plant walkdowns.

## REPORT DETAILS

### 1.0 Summary of Plant Status

WEC manufactures light water reactor fuel at its Columbia, SC, facility. During the inspection, the plant was operating at partial capacity in manufacturing areas while troubleshooting of the de-ionized water system was underway.

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

#### a. Inspection Scope

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

- CF-81-201, "Glass Raschig Ring Measurements Conversion Line Q-Tanks," Revision 4, dated December 3, 2004
- COP-810705, "Glass Volume Check of Conversion Line Q-Tanks," Revision 13, dated December 7, 2000
- COP-811601, "On Line Gamma Activity Monitors and Quarantine Tanks System Operation," Revision 21, dated January 25, 2008
- COP-811602, "Acid Wash of Conversion Line Q-Tanks," Revision 15, dated April 12, 2008
- CSA-44, "Criticality Safety Assessment ADU Conversion Area Q-Tank System," Revision 0, dated May 22, 1992
- CSE [criticality safety evaluation]-1-0, "Pellet Inspection Hood Ventilation," Revision 0, dated May 2008
- CSE-08-D, "Pellet Grinder Line," Revision 5, dated March 28, 2008
- CSE-14-A, "Material Handling: Pellet Receipt through Collating or Pre-stacking in the IFBA Area," Revision 3, dated June 2008
- CSE-17-B, "Criticality Safety Evaluation for Final Assembly Wash Pit," Revision 0, dated March 2008
- CSE-21-B, "BWR Pellet Production," Revision 6, dated May 2008
- EHS-06-04, "NCS Program Audit Report," Revision 0, dated June 6, 2006

#### b. Observations and Findings

The inspectors determined that NCS evaluations were prepared by qualified NCS engineers and that independent reviews of the evaluations were completed by other qualified NCS engineers. The inspectors observed that, with the exception noted below, appropriate limits on controlled parameters were established and maintained in the areas reviewed. The inspectors determined that NCS controls for equipment and processes assured the safety of the operations reviewed.

#### **Q-Tank Raschig Rings**

The inspectors reviewed the criticality analysis applicable to the ADU Conversion Area Q-Tank System and noted that the Q-Tank System is comprised of six tanks used to store liquid waste water before it is pumped to the sanitary waste processing area. Only

three of the six Q-Tanks are in service at a time during routine operations. The licensee operates three Q-Tanks for one year then takes them out of service for one year and switches to the other three Q-Tanks. During normal operations the liquid in the Q-Tanks has a uranium concentration of less than 300 ppm. Because of a possible accident sequence of pumping higher concentration solution into the Q-Tanks, the tanks have been filled with Raschig rings to prevent inadvertent criticality.

Section 6.1.3.8 of the License Application requires that when Raschig rings are used, their use and maintenance is in accordance with ANSI/ANS-8.5(1996). ANSI/ANS-8.5(1996) requires that vessels in use are to be inspected every 13 months for settling, fissile solids accumulation, and physical properties of the Raschig rings. The inspectors determined, during document reviews and discussions with licensee staff, that the three Q-Tanks that are in service are inspected, including the Raschig rings, when they are taken out of service at the end of the year of operation. This results in an inspection frequency of approximately two years because the tanks are inspected, placed out-of-service for one year, then placed in service for one year before being inspected again. The inspectors determined that licensee procedure COP-810705 did not include specific instructions to ensure that the Q-Tanks, including the tanks not in service, would be inspected on the required 13 month frequency. The inspectors considered the risk significance of the inadequate Raschig ring inspection procedure to be low because licensee records concerning Raschig rings indicated that settling and other changes were not occurring in the Q-Tanks. The failure to provide adequate written procedures to ensure that Raschig rings are used and inspected in accordance with ANS/ANSI 8.5 is **Violation (VIO) 70-1151/2008-202-01**.

ANSI/ANS-8.5(1996) allows inspection intervals longer than 13 months when justified by analysis. The licensee provided their NCS Program Audit Report, EHS-06-04, from June of 2006, which identified discrepancies between licensee use of Raschig rings and ANSI/ANS 8.5. The report specifically states, "Contrary to ANSI/ANS 8.1(1995) they have been unable to obtain credible evidence that a formal documented approved analysis has been performed to justify that the test should be longer than a maximum of 13 months testing schedule." The licensee added this issue into their corrective action program (CAP) as 06-156-C004, which was open at the time of the inspection. The Q-Tank CAP item contained a response stating that, because the Q-Tanks are in service for 12 months and then inspected, the requirement of inspecting the Raschig rings every 13 months is met based on the in-service time and no corrective actions were needed.

The Q-Tank CAP item was kept open due to other open issues it covered. During the inspection, licensee safety staff noted that the response improperly disregarded the one year out-of-service time and that formal analysis of the extended test period was required. Because the licensee was implementing an NCS Improvement Program (NCSIP) to update all of their CSEs, licensee safety staff felt that the new CSE for the Q-Tanks would resolve the formal analysis requirement. The inspectors noted that no corrective actions were indicated for the Q-Tank CAP item and the new CSE had not yet been issued. The licensee did not have a formal mechanism to assure that the new CSE would resolve the CAP item. The inspectors determined that, without specific corrective actions, the licensee CAP item does not resolve the noncompliance.

c. Conclusions

A severity level IV violation was identified due to the licensee's failure to ensure that Raschig rings are used and inspected in accordance with ANS/ANSI 8.5.

### **3.0 Administrative and Operating Procedures (IP 88015)**

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

The inspectors reviewed licensee NCS administrative and operating procedures to determine whether the NCS program is adequately controlled through adherence to approved written procedures. The inspectors reviewed selected aspects of the following documents:

- RA-301, "Floor Storage of Special Nuclear Material," Revision 19, dated January 24, 2008
- RA-312, "NCS Calc Note Generation, Format, and Content Requirements," Revision 5, dated April 3, 2008
- RA-313, "Criticality Safety Evaluations," Revision 7, dated April 3, 2008
- RA-314, "Implementation of Criticality Safety Evaluations," Revision 7, dated December 6, 2007
- CN-CRI-08-16, "ADU Pelleting Auto-Prep Feed System," Revision 0, dated May 2008

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

The inspectors assessed licensee administrative procedures governing the preparation of NCS analyses and ensured that completed analyses correspond to the procedures listed above. The inspectors also reviewed specific NCS analyses to ensure that analyses were being implemented in accordance with procedure RA-314. The inspectors interviewed NCS staff to verify that documents such as calc notes that support the NCS technical basis were prepared and approved by qualified personnel. The inspectors also reviewed adherence to a selected specialized administrative procedure, RA-301, "Floor Storage of Special Nuclear Material", during walk-downs of the facility. The inspectors determined that the licensee NCS program adequately controlled the preparation of NCS analyses through adherence to administrative procedures.

#### **c. Conclusions**

No safety concerns were identified regarding licensee NCS administrative and operating procedures.

### **4.0 Nuclear Criticality Safety Training (IP 88015)**

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

The inspectors reviewed training and qualifications procedures to determine if the NCS staff met specified qualification requirements. The inspectors interviewed new staff and reviewed qualification records to verify completion of training. The inspectors reviewed selected aspects of the following document:

- RA-125, "Indoctrination, Training, and Qualification of EH&S Personnel," Revision 9, dated January 17, 2008

b. Observations and Findings

The inspectors reviewed the administrative procedure controlling the qualification of NCS engineers and interviewed a new NCS engineering staff member. The inspectors also reviewed licensee NCS staff training and qualification documents to ensure that criticality safety activities are performed by qualified staff, in accordance with license requirements.

c. Conclusions

No safety concerns were identified regarding licensee training and qualification of NCS engineers.

**5.0 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:

- RA-316, "NCS Facility Walkthrough Assessments," Revision 2, dated May 22, 2008
- Facility Walkthrough Assessments, "Erbia Powder Processing," dated June 10, 2008
- Facility Walkthrough Assessments, "UN Bulk Storage," dated May 5, 2008
- Facility Walkthrough Assessments, "PE Test Lab," dated May 20, 2008
- Facility Walkthrough Assessments, "Conversion/Vaporization," dated May 20, 2008
- Facility Walkthrough Assessments, "IFBA Miscellaneous Operations," dated May 30, 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.

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

a. Inspection Scope

The inspectors reviewed the licensee Redbook process for internal reporting of conditions in order to ensure that licensee staff has a means to report and correct criticality safety-related problems. The inspectors reviewed selected aspects of the following documents:

- CA-007, "Corrective and Preventive Action," Revision 23, dated April 10, 2008
- NCS Manual, NCS-010, "Categorizing Potential Scenario's and Criticality Significant Controls," Revision 2, dated September 18, 2007
- Procedure RA-121, "Redbook Internal Reporting System," Revision 3, dated August 22, 2006

b. Observations and Findings

The inspectors reviewed procedures implementing the Redbook and corrective action programs and also reviewed several conditions reported as Redbook items. The inspectors noted that licensee staff, including process operators, routinely report suspect conditions and other problems and that these reports are evaluated by engineering and safety staff for resolution. The inspectors noted that issues are assigned corrective actions, when appropriate, which are then tracked to completion.

c. Conclusions

No safety concerns were identified during review of the licensee Redbook problem reporting system.

**7.0 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:

- CSA-44, "Criticality Safety Assessment ADU Conversion Area Q-Tank System," Revision 0, dated May 22, 1992
- RA-301, "Floor Storage of Special Nuclear Material," Revision 19, dated January 24, 2008

b. Observations and Findings

The inspectors interviewed operators, NCS engineers, and process engineers both before and during walkdowns. The inspectors performed walkdowns of risk-significant fissile material processing activities and areas including uranium recycle and recovery, solvent extraction, the incinerator, ADU conversion, powder processing, and pelleting areas, integrated fuel burnable absorber (IFBA) and Erbia process areas, wastewater processing areas, and laboratories. The inspectors observed selected controls identified in CSEs and noted that the controls were installed or implemented and were adequate to ensure safety.

c. Conclusions

No safety concerns were identified during plant walkdowns.

**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 July 18, 2008. The licensee acknowledged and understood the findings as presented.

## SUPPLEMENTARY INFORMATION

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

#### Items Opened

**VIO 70-1151/2008-202-01** The failure to provide adequate written procedures to ensure that Raschig rings are used and inspected in accordance with ANS/ANSI 8.5

#### Items Closed

None.

#### Items Discussed

None.

### **2.0 Inspection Procedures Used**

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

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

#### Westinghouse Electric Company

C. Alstadt	Plant Manager
G. Couture	EH&S Manager
D. Graham	EH&S
D. Precht	Operations Manager
J. Peterson	Maintenance Manager
M. Rosser	EH&S Manager
T. Shannon	EH&S Operations
R. Winiarski	NCS Manager

#### NRC

D. Cooper	Summer Engineer, NRC HQ
T. Marenchin	Criticality Safety Inspector, NRC HQ
D. Morey	Senior Criticality Safety Inspector, NRC HQ
P. Silva	Chief, Technical Support Branch, NRC HQ

All attended the exit meeting on July 18, 2008.

#### 4.0 List of Acronyms

ADAMS	Agencywide Documents Access and Management System
ADU	ammonium diuranate
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
NCSIP	Nuclear Criticality Safety Improvement Program
PDR	public document room
VIO	violation
WEC	Westinghouse Electric Company (licensee)