



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

July 15, 2005

NMED Nos. 050350 and 030848  
EA 04-096

Westinghouse Electric Company  
ATTN: Mr. M. Fecteau, Manager  
Columbia Plant  
Commercial Nuclear Fuel Division  
Drawer R  
Columbia, SC 29250

SUBJECT: NRC INSPECTION REPORT NO. 70-1151/2005-004 AND NOTICE OF VIOLATION

Dear Mr. Fecteau:

The U.S. Nuclear Regulatory Commission (NRC) conducted an announced, above core (regional initiative), inspection in the areas of criticality safety and management organization and controls. The inspection was conducted at your facility in Columbia, South Carolina, from June 13-17, 2005. The purpose of the inspection was to determine whether activities involving licensed materials were conducted safely and in accordance with regulatory requirements. An exit meeting was held on June 16, 2005, during which time observations from the inspection were discussed with you and members of your staff.

The inspection consisted of facility walk downs; selective examinations of relevant procedures and records; examinations of safety-related structures, systems, equipment and components; interviews with plant personnel; and observations of plant conditions and activities in progress. Throughout the inspection, observations were discussed with your managers and staff.

Based on the results of this inspection, the NRC has determined that a Severity Level IV violation of regulatory requirements occurred. The violation involved the failure to establish double contingency protection for a ventilation system, resulting in the failure to control one or more parameters of this ventilation system in accordance with specific limits and controls identified in criticality safety analyses and evaluations. The circumstances surrounding the violation is described in detail in the subject inspection report.

The violation was evaluated in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, which is included on the NRC's web site at <http://www.nrc.gov/what-we-do/regulatory/enforcement.html>. The violation is cited in the enclosed Notice of Violation (Notice). 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," this document may be accessed through the NRC's public electronic reading room, Agency-Wide Document Access and Management System (ADAMS) on the Internet at <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this letter, please contact us.

Sincerely,

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Jay L. Henson, Chief  
Fuel Facility Inspection Branch 2  
Division of Fuel Facility Inspection

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

Enclosures: 1. Notice of Violation  
2. NRC Inspection Report

cc w/encls:  
Sam McDonald, Manager  
Environment, Health and Safety  
Commercial Nuclear Fuel Division  
Westinghouse Electric Corporation  
P. O. Box R  
Columbia, SC 29250

Henry J. Porter, Assistant Director  
Div. of Radioactive Waste Mgmt.  
Dept. of Health and Environmental  
Control  
Electronic Mail Distribution

R. Mike Gandy  
Division of Radioactive Waste Mgmt.  
S. C. Department of Health and  
Environmental Control  
Electronic Mail Distribution

Distribution w/encls: (See page 3)



## NOTICE OF VIOLATION

Westinghouse Electric Company, L.L.C.  
Columbia, SC

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

During an NRC inspection on June 13 through 17, 2005, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

Safety Condition No. S-1 of Special Nuclear Material License No. 1107 requires that material be used in accordance with the statements, representations, and conditions in the License Application dated April 30, 1995, and supplements thereto.

Section 6.1.1 of the License Application states, in part, that the double contingency principle will be the basis for design and operation of processes using special nuclear material. Double contingency protection means that all process designs will incorporate sufficient margins of safety to require at least two unlikely, independent and concurrent changes in process conditions before a criticality accident is possible.

Section 6.1.3 of the License Application states, in part, that nuclear criticality safety will be achieved by controlling one or more parameters of a system within subcritical limits with sufficient factors of safety as described in Subsection 6.1.1 of the License Application.

Contrary to the above, on and before May 20, 2005, double contingency protection for the IFBA-7113 ventilation system was not established by controlling one or more parameters of the system within subcritical limits. Specifically, criticality in the FL-7113 HEPA filter housing was credible, and the technical safety basis did not assure that at least two unlikely, independent and concurrent changes in process conditions would be needed before a criticality accident was possible.

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 Group, Division of Fuel Cycle Safety and Safeguards, NMSS, and the Regional Administrator, Region II, within 30 days of 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.

NOV

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.

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), which is accessible from 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 2.390(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 at Atlanta, Georgia  
this 15th day of July 2005

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 70-1151

License No.: SNM-1107

Report No.: 70-1151/2005-004

Licensee: Westinghouse Electric Company

Location: Columbia, SC

Inspection Dates: June 13-17, 2005

Inspectors: Deborah Seymour, Senior Fuel Facility Inspector  
Dennis Morey, Senior Criticality Safety Inspector

Accompanying Personnel: Jay Henson, Chief, Fuel Facility Inspection Branch 2, DFFI

Approved: Jay Henson, Chief  
Fuel Facility Inspection Branch 2, DFFI  
Region II

## EXECUTIVE SUMMARY

### Commercial Nuclear Fuel Division NRC Inspection Report 70-1151/2005-004

This announced inspection involved a regional initiative inspection of the licensee's criticality safety and management organization and controls programs. The inspection identified the following aspects of the licensee's programs as outlined below:

#### **Criticality Safety**

- A Severity Level IV violation was identified for the failure to establish double contingency for the integral fuel burnable absorber (IFBA)-7113 ventilation system (Paragraph 2).
- The licensee investigation and reportability determination for a nuclear criticality safety-related interlock failure in the vaporization area was adequate (Paragraph 3).
- Other than in the IFBA area, plant operations involving fissile materials were conducted safely and in accordance with written procedures (Paragraph 4).

#### **Management Organization and Controls**

- Recently hired individuals met the training and educational requirements for performing independent crucial nuclear criticality safety (NCS) tasks, and these individuals had strong NCS backgrounds. However, the formal documentation of these qualifications was not complete. The inspectors concluded that this documentation issue was an issue of low safety significance. The long-term NCS engineers' qualification documentation met the requirements specified in the license application. (Paragraph 6.a).
- The licensee was progressing in the program to eliminate administrative safety significant controls. The methodology to identify and prioritize the controls was appropriate. The elimination of these controls will be a strength when completed (Paragraph 6.b).

#### Attachment

Persons Contacted

Inspection Procedures

Items Opened, Closed, and Discussed

Acronyms

## REPORT DETAILS

### **1.0 Summary of Plant Status**

Routine fuel manufacturing operations and maintenance activities were conducted in ammonium diuranate (ADU) conversion, Uranium Recycle and Recovery System (URRS), and pelleting. No significant plant upset conditions occurred during the inspection period.

### **2.0 Nuclear Criticality Safety (NCS) Program (Inspection Procedure (IP) 88015)**

#### **a. Scope and Observations**

The inspectors reviewed a recent reportable event (Event Number (EN) 41723 and Nuclear Materials Event Database (NMED) Number 050350) related to inadequate NCS analysis of a process ventilation system. The inspectors reviewed selected aspects of the following documents:

- , Section 8.4, "Nuclear Criticality Safety Appendices for Ventilation Systems," Integrated Safety Analysis ISA-01, "Ventilation System," Revision 0, dated March 31, 1998
- , Section 5.3.2.16, "Quality Control Pellet Inspection Hoods Ventilation System," Integrated Safety Analysis ISA-01, "Ventilation System," Revision 0, dated March 31, 1998
- , Integrated Safety Analysis ISA-01, "Ventilation System," Revision 0, dated October 16, 2004
- , Criticality Safety Evaluation for IFBA (integral fuel burnable absorber) Ventilation System - 7113, Revision 0, dated October 16, 2004

On May 20, 2005, the licensee discovered uranium dioxide (UO<sub>2</sub>) powder in the integral fuel burnable absorber (IFBA)-7113 HEPA filter housing where UO<sub>2</sub> powder was not expected. The licensee reported that approximately 22 kilograms of uranium was held up in the 32 filters in the housing. Licensee investigation revealed that the HEPA filter was intended to be used to recycle breathing air but was connected to the IFBA oxidation furnace hoods so that the system received process air with entrained UO<sub>2</sub> powder. Because fissile material was not expected in the HEPA filter, criticality in the system, like all breathing air systems in the plant, was determined to be non-credible, and no criticality safety controls were in place. The inspectors noted that the 22 kilograms of uranium found in the HEPA filters did not present an immediate safety concern because it was less than the minimum critical mass for uranium at 5 weight per cent enrichment and because it was an order of magnitude less than the mass required for a critical system involving typical HEPA filters.

The inspectors determined that the IFBA ventilation system was a different design from the remainder of the plant in the way that air flows were connected prior to entering the HEPA. The design included dry off-gas expected to contain entrained UO<sub>2</sub> powder and was unique to the IFBA process area. The novel configuration was not recognized by licensee NCS analysts who determined that the HEPA filter involved was not connected to

fissile air flows and therefore failed to assure that the technical safety basis required at least two unlikely, independent and concurrent changes in process conditions before a criticality accident was possible. The inspectors noted that the licensee root cause investigation was still in progress during the inspection.

The inspectors noted that the licensee NCS analysis considered ventilation systems that handled dry off-gas expected to contain entrained  $UO_2$  powder and had established controls appropriate for that type of system, primarily surveillance but also including removal of uranium by a bag or cartridge filter before entering the HEPA filter and drains in the HEPA filter housing. Although the IFBA ventilation system handled dry air with entrained  $UO_2$  powder, the established NCS controls were not implemented because the system was inappropriately designated as air-handling with criticality not credible.

Section 6.1.1 of the License Application states, in part, that the double contingency principle will be the basis for design and operation of processes using special nuclear material. Double contingency protection means that all process designs will incorporate sufficient margins of safety to require at least two unlikely, independent and concurrent changes in process conditions before a criticality accident is possible.

Section 6.1.3 of the License Application states, in part, that nuclear criticality safety will be achieved by controlling one or more parameters of a system within subcritical limits with sufficient factors of safety as described in Subsection 6.1.1 of the License Application.

Double contingency protection for the IFBA-7113 ventilation system was not established by controlling one or more parameters of the system within subcritical limits. Specifically, criticality in the FL-7113 HEPA filter housing was credible, and the technical safety basis did not assure that at least two unlikely, independent and concurrent changes in process conditions would be needed before a criticality accident was possible. The failure to establish double contingency for the IFBA-7113 ventilation system is **Violation 70-1151/2005-004-01**.

b. Conclusions

A SL IV violation was identified for the failure to establish double contingency for the IFBA-7113 ventilation system, resulting in the failure to control one or more parameters of the IFBA-7113 ventilation system in accordance with limits and controls necessary for the safe and effective operation of the system.

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

#### **a. Scope and Observations**

The inspectors reviewed the licensee response to an internally reported event. The inspectors reviewed the investigation and interviewed licensee staff regarding immediate and long-term corrective actions. The inspectors reviewed selected aspects of the following document:

SEP-007, "Notification Guidelines for NRC and Other Agencies," Revision 1, dated March 17, 2005

On January 3, 2005, the licensee determined that the steam valve to a UF<sub>6</sub> vaporizer failed to close on actuation of the UF<sub>6</sub> cylinder high pressure interlock. Licensee operators observed that after exceeding the limiting pressure and activating the interlock, the steam pressure remained constant. Licensee investigation revealed that the steam valve was open even though instrument indications showed the valve to be shut. The licensee determined that the failure was caused by an improperly manufactured gasket. The inspectors reviewed the licensee reportability determination and agreed that double contingency had not failed and that the event was not reportable.

The inspectors reviewed the licensee root cause analysis and corrective actions and determined that the licensee had adequately identified the root cause of the event which was inadequate training of maintenance personnel. The inspectors also determined that the licensee had established appropriate corrective actions to resolve other weaknesses identified as a result of the event. No safety concerns were identified.

#### **b. Conclusions**

The licensee investigation and reportability determination for a NCS-related interlock failure in the vaporization area was adequate.

### **4.0 Plant Operations (IP 88015)**

#### **a. Scope and Observations**

The inspectors performed plant walkdowns to review ventilation systems in the general plant and in IFBA. The inspectors interviewed ventilation and NCS engineers both before and during walkdowns. The inspectors reviewed selected aspects of the following documents prior to performing the walkdowns:

Drawing 813F01P03, "IFBA, Air Handler (AH-7103)," Revision C1, dated May 25, 2005

Unnumbered reference drawing, "IFBA Ventilation Layout," Revision 0, dated May 25, 2005

The inspectors performed walkdowns of breathing air handling configurations, dry fissile off-gas configurations and an example wet fissile off-gas configuration. The inspectors also performed a walkdown of all affected IFBA hoods and off-gas ductwork. The inspectors observed filter arrangements involving bag or cartridge filters called torit filters that are employed in-line in front of HEPA filters to remove entrained uranium powder when the licensee expects uranium powder in a dry off-gas system.

The inspectors noted that the off-gas configuration in the IFBA area was unique in the plant in the way that airflows were combined and directed toward the HEPA filters. The inspectors noted that, other than in the IFBA area, NCS controls on ventilation systems were suitably based on analysis and adequate to establish double contingency for the systems.

b. Conclusions

Other than in the IFBA area, plant operations involving fissile materials were conducted safely and in accordance with written procedures.

**5.0 Management Organization and Controls (IP 88005)**

a. Organizational Structure

(1) Inspection Scope and Observations

The inspectors reviewed organizational changes to verify that the licensee had an established organization with defined qualifications, responsibilities and functions to administer the technical programs. Westinghouse recently hired several NCS managers and contractors to supplement and strengthen their NCS program. The inspectors interviewed the recently hired managers, and reviewed the resumes and personnel records for these managers and the contractors to verify that license application requirements were met. The inspectors also reviewed the personnel records for selected long-term employees in the NCS program.

The inspectors noted that the recently hired NCS managers and contractors had very good qualifications and experience for their positions. However, the inspectors noted that the personnel records for some of the new hires did not meet the documentation requirements specified in the license application. The license application requires that the qualification of each NCS Function Engineer be formally documented by the cognizant Regulatory Component Manager and the senior Regulatory Component Manager, prior to the function position being fully assumed, or crucial tasks being independently performed.

The inspectors determined that some crucial tasks were performed (calculations and analyses for new processes) by recently hired contractors who did not have the required formal documentation in place. The licensee stated the cause was that they were in the process of upgrading the qualification and documentation process. The inspectors reviewed the qualification and documentation changes and agreed that the changes were

improvements over the previous system in that the new documentation was more specific to requirements and areas of responsibility. The licensee stated they would complete the missing documentation in a timely manner and prior to allowing the performance of crucial tasks and independent work.

The inspectors concluded that recently hired individuals met the training and educational requirements for performing independent crucial NCS tasks and that these individuals had strong NCS backgrounds. However, the formal documentation of these qualifications was not complete. The inspectors considered the licensee's failure to document the qualifications as required by the license application to be a documentation issue of low safety significance. The inspectors noted that long-term NCS engineers' qualification documentation met the requirements specified in the license application.

(2) Conclusions

Recently hired individuals met the training and educational requirements for performing independent crucial NCS tasks, and these individuals had strong NCS backgrounds. However, the formal documentation of these qualifications was not complete. The inspectors concluded that this documentation issue was an issue of low safety significance. The long-term NCS engineers' qualification documentation met the requirements specified in the license application.

b. Self- Appraisals

(1) Inspection Scope and Observations

At an April 12, 2005, meeting with the NRC, the licensee discussed an ongoing project to minimize the number of administrative safety significant controls (SSCs) at the Columbia site. During this inspection, the inspectors reviewed the licensee's progress and methodology for identifying and prioritizing these controls. This review included interviews with selected area managers, documentation reviews, and observations of activities associated with this project.

The inspectors concentrated their inspection efforts on conversion and URRS areas, the two areas with the highest number of administrative SSCs. This review included review and observation of the Team Manager Shift Report of SSC observations. The shiftly observations by the Team Managers were performed to strengthen the reliability of the administrative SSCs until permanent engineered fixes could be determined and implemented, and to underscore the importance of the administrative controls to the operators performing the actions. The inspectors concluded that the shiftly observations of the administrative SSCs were an effective human performance tool. The inspectors did note that the forms for the observations were informal in format, and that improvements could be made in format, and expectations for performance and review of the form.

The inspectors also reviewed the procedures for identifying and prioritizing administrative SSCs, and the proposals for eliminating high priority administrative SSCs. The inspectors concluded that the methodology to identify and prioritize the controls seemed appropriate. The inspectors noted that this program seemed to be based on a "snapshot" in time of

existing processes, and questioned how the program was going to be institutionalized to prevent the addition of new administrative controls when a process was added or modified in the future. The inspectors did note that the NCS program did discourage the use of administrative controls.

Based on this review, the inspectors concluded that the licensee was progressing in the program to eliminate administrative SSCs. The methodology to identify and prioritize the controls was appropriate. The inspectors also concluded that the elimination of these controls would be a strength when completed.

(2) Conclusions

The licensee was progressing in the program to eliminate administrative SSCs. The methodology to identify and prioritize the controls was appropriate. The elimination of these controls will be a strength when completed.

**6.0 Open Item Followup**

**Violation 70-1151/2004-202-16**

This violation concerned the failure to identify that less than previously documented double contingency protection remained and failure to notify the NRC during a nuclear criticality safety review of a 1998 event involving excess mass accumulation in the incinerator crossover pipe. During this inspection, the inspectors noted that the licensee had conducted briefings for staff regarding review of events for reportability and that the new nuclear criticality safety manager or designee makes all determinations. Because the nuclear criticality safety manager position is not recognized by current procedures, the licensee is reviewing their event procedures to determine how to account for the new review and determination process. This item will remain open.

**Inspector Followup Item 70-1151/2005-201-09**

The licensee provided a written response to Enforcement Action 04-096 which concerned the incinerator mass accumulation event. The licensee response was a summary of the Pre-Enforcement Conference which treated the issue as a single violation. The individual violations were cited separately by the NRC because they identified specific issues for which commitments were required. During a previous inspection, the inspectors were concerned that not linking corrective actions to specific violations might result in some aspect of the event not being corrected as expected. During this inspection, the inspectors reviewed an internal memorandum provided by the licensee which linked corrective actions to specific violations. The inspectors determined that the licensee internal memorandum addresses all corrective actions discussed at the Pre-Enforcement Conference and will be useful in establishing completion of corrective actions. This item is closed.

**EN 40265, (NMED No. 030848), Loss and Recovery of a Fuel Rod**

In October 2003, Westinghouse reported the loss of a fuel rod. The loss was identified through their item transaction system. Searches were conducted, and the rod was located in the controlled area of the facility. The licensee's corrective actions included procedural revisions and physical changes to work areas. The inspectors concluded that the licensee's corrective actions were adequate. Based on this review, EN 40265 (NMED No. 030848) is closed.

**7.0 Exit Meeting**

The inspection scope and results were summarized on June 16, 2005, with the licensee. The inspectors described the areas inspected and discussed in detail the inspection results. Although proprietary documents and processes were reviewed during this inspection, the proprietary nature of these documents or processes is not included in this report. No dissenting comments were received from the licensee.

## ATTACHMENT

### 1. **LIST OF PERSONS CONTACTED**

#### Licensee

C. Aguilar, URRS Manager  
M. Fecteau, Plant Manager  
F. Jackson, Acting Conversion Area Manager  
S. McDonald, EH&S Manager  
M. Rosser, Nuclear Criticality Safety Program Manager  
T. Shannon, EH&S Operations Manager  
R. Winiarski, Nuclear Criticality Safety Engineering Manager

Other licensee employees contacted included engineers, technicians, and production staff, and office personnel.

### 2. **INSPECTION PROCEDURES USED**

IP 88005      Management Organization and Controls  
IP 88015      Headquarters Nuclear Criticality Safety Program

### 3. **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
VIO 70-1151/05-04-01	Opened	Failure to Establish Double Contingency Protection for a Ventilation System (Paragraph 2)
EN 41723	Discussed/ Open	NMED No. 050350, Unexpected Buildup of Material in a Ventilation System (Paragraph 2)
VIO 70-1151/04-202-16	Discussed/ Open	Failure to Identify That less than Previously Documented Double Contingency Protection Remained and to Notify the NRC During for a 1998 Event (Paragraph 6)
IFI 70-1151/05-201-09	Closed	Linking of Specific Corrective Actions to Specific Violations (Paragraph 6)
EN 40265	Closed	NMED No. 030848, Loss and Recovery of a Fuel Rod (Paragraph 6)

4. **LIST OF ACRONYMS USED**

ADAMS	Agency-Wide Document Access and Management System
ADU	Ammonium Diuranate
CFR	Code of Federal Regulations
EN	Event Number
HEPA	High-Efficiency Particulate Air
IFBA	Integral Fuel Burnable Absorber
IFI	Inspector Followup Item
IP	Inspection Procedure
NCS	Nuclear Criticality Safety
SSC	Safety Significant Controls
SL	Severity Level
UF <sub>6</sub>	Uranium Hexafluoride
UO <sub>2</sub>	Uranium oxide
URRS	Uranium Recycle and Recovery System
VIO	Violation