

January 14, 2008

NMED 070726

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

SUBJECT: INSPECTION REPORT NO. 70-1151/2007-204

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 December 17 through 21, 2007. 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 December 21, 2007.

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 Dennis Morey, of my staff, at (301) 492-3112.

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 70-1151/2007-204

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

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

C. Alstadt

-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.: 70-1151/2007-204

Licensee: Westinghouse Electric Company

Location: Columbia, South Carolina

Inspection Dates: December 17 - 21, 2007

Inspectors: Dennis Morey, Senior 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 70-1151/2007-204

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 December 17 through December 21, 2007. 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 the uranium recycle and recovery areas, the solvent extraction process, the contaminated waste incinerator, the ammonium diuranate (ADU) conversion lines, the pelleting process areas, the integrated fuel burnable absorber (IFBA) and Erbium process areas, the wastewater processing areas, the chemical process development (CPD) and metallurgical (MET) and laboratories, the dirty and clean scrap dissolvers, the conversion scrap area, the pellet archive areas, and the UF₆ storage pad.

Results

- A non-cited violation was identified due to the failure to comply with the CPD laboratory mass limit.
- No safety concerns were identified regarding new and changed criticality safety evaluations (CSE).
- No safety concerns were identified regarding the licensee internal auditing system and internal event identification and reporting.
- No safety concerns were identified regarding the criticality alarm system.
- No safety concerns were identified regarding plant operations.

REPORT DETAILS

1.0 Summary of Plant Status

Westinghouse Electric Company manufactures light water reactor fuel at its Columbia, SC, facility including UO₂ powder manufacture, pelletizing, rod and bundle fabrication, uranium recovery, and waste processing. During the inspection, the plant was operating at full capacity in all manufacturing areas.

2.0 NCS Program (IP 88015, IP 88016)

a. Inspection Scope

The inspectors reviewed selected nuclear criticality safety evaluations (NCSEs) to determine that criticality safety of risk-significant operations was assured through engineered and administrative controls with adequate safety margin. The inspectors reviewed selected aspects of the following documents:

- CSE-1-A, "Criticality Safety Evaluation [CSE] for Incinerator Filter Housings," Rev. 1, dated October 31, 2007
- CSE-4-A, "CSE for Safe Geometry Dissolver System," Rev. 4, dated August 28, 2007
- CSE-11-A, "CSE for Uranium Scrap Cage Dissolver," Rev. 0, dated April 27, 2007
- CSE-16-G, "CSE for Archive Pellet Can Storage and Handling," Rev. 0, dated April 9, 2007
- CSE-17-C, "CSE for Final Assembly Operations," Rev. 0, dated December 2007
- CSE-21-A, "CSE for the Columbia Fuel Fabrication Facility Fuel Assembly Storage Area and Boiling Water Reactor Fuel Bundle Inspection Area," Rev. 4, dated August 2007
- CSE-99-C, "CSE for Scrap Cage Oxidation Ovens and Hoods," Rev. 0, dated December 2007

b. Observations and Findings

The inspectors determined that NCS evaluations were prepared by qualified NCS engineers, that 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 criticality program upgrades are ongoing with a target completion date of January 2009 and about half of the work done. Safety condition S-3 of the license requires that the licensee complete the NCS Improvement Project by June 30, 2009. The license condition also requires quarterly status updates to the NRC. During this inspection, the licensee indicated that the first quarterly audit would be

submitted to NRC in January and would include a prioritization of work and a list of the NCSEs that had been completed.

c. Conclusions

No safety concerns were identified regarding new and changed CSE.

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:

- RA-316, "NCS Facility Walkthrough Assessments," Rev. 0, dated May 24, 2007
- NCS-003, "NCS Facility Walkthrough Assessments," Rev. 5, dated November 11, 2007
- RA-107, "Corrective Action Process for Regulatory Events," Rev. 17, dated November 1, 2007
- RA-121, "Redbook Internal Reporting System," Rev. 3, dated August 22, 2006
- RA-102, "Environmental, Health, and Safety Informal Compliance Audits," Rev. 20, dated March 29, 2007

b. Observations and Findings

The inspectors interviewed NCS staff involved in auditing and reviewed reports of completed licensee audits. The inspectors noted that the licensee had implemented a new audit procedure as a result of the recent license renewal. The new licensee procedure requires that Facility Walkthrough Assessments are performed for each fissile area described in the integrated safety analysis (ISA) with a focus on field compliance. Higher risk areas are assessed quarterly and lower risk areas are assessed semi-annually. The inspectors did not have any safety concerns noted with the new procedure or its implementation.

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. The inspectors determined that licensee staff identified appropriate issues during the audits and that the issues were placed into the corrective action system if immediate resolution was not accomplished.

c. Conclusions

No safety concerns were identified regarding the licensee internal auditing system and internal event identification and reporting.

4.0 NCS Event Review and Follow-up (IP 88015)

a. Inspection Scope

The inspectors reviewed licensee follow-up and corrective actions to a recent NCS-related reportable event NMED 070726 (EN 43814). The inspectors reviewed selected aspects of the following documents:

- CSE-18-C, "CSE for Metallurgical Laboratory," Rev. 0, dated November 8, 2007
- CSE-18-D, "CSE for Chemical Development Laboratory," Rev. 0, dated October 16, 2007

b. Observations and Findings

On November 30, 2007, the licensee reported that a fissile material mass limit had been exceeded in its chemical process development (CPD) laboratory. The inspectors determined that the licensee operated several laboratories at the Columbia facility including the CPD and MET laboratory. The licensee determined, during the ISA process, that criticality in the CPD was noncredible because only gram quantities of fissile material were expected in the laboratories. Even though criticality was determined to be noncredible, the licensee, based on historical practices, implemented mass controls in the two laboratories. The laboratory mass limits were designated in grams of UO_2 .

The licensee examines UO_2 pellets in its MET laboratory after first preparing slices of pellets and encasing the slices in plastic pucks. The licensee retains discarded pellets slices in gallon cans pending disposal. The fissile mass contained in each pellet sample storage can was designated in grams of U-235. The licensee had accumulated more of the pellet sample cans than could be stored in the MET laboratory and decided to relocate some of the pellet sample cans to the CPD. Subsequently, licensee NCS auditors observed that the mass on the can labels had been incorrectly recorded as UO_2 mass. This resulted in 39 kilograms of UO_2 being stored in the CPD which was in excess of the 15.9 gram limit. The failure to comply with the CPD mass limit is **Non-Cited Violation (NCV) 70-1151/2007-204-01**.

The licensee moved the pellet sample cans from the CPD to a more suitable location and completed a new CSE for the CPD. The licensee still considers that criticality in the CPD due to inadvertent introduction into the laboratory of small samples or plastic encased pellet fragments is noncredible. The inspectors determined that the licensee criticality analysis resulting in the noncredibility conclusion relied on the normal configuration of fissile material (samples and fragments) and the natural and credible material configurations that could result. The inspectors determined that the licensee corrective actions adequately resolved the violation. Event NMED 070726 (EN 43814) is closed.

c. Conclusions

A NCV was identified due to the failure to comply with the chemical development laboratory mass limit.

5.0 Criticality Alarm System (IP 88017)

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:

- RA-304, "Criticality Accident Alarm System," Rev. 12, dated December 6, 2007
- NSA-TR-06-02, "Westinghouse Criticality Detector Coverage, Part 1," Rev. 0, dated April 2006
- NSA-TR-06-06, "Westinghouse Criticality Detector Coverage, Part 2," Rev. 1, dated May 2006
- NSA-TR-06-09, "Westinghouse Criticality Detector Coverage, Part 2, Supplement," Rev. 0, dated October 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 noted that the criticality alarm system procedure had been revised to incorporate changes to the license. The inspectors did not identify any safety concerns with the revised procedure. The inspectors performed walkdowns of the criticality alarm system and visually inspected detector configuration.

c. Conclusions

No safety concerns were identified regarding the criticality 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:

- Procedure COP-815006, "Scrap Cage Dissolver Operation," Revision 10, dated March 30, 2007
- Sketch 815417-7, "Scrap Uranium Processing," Revision 12, dated November 1, 2007

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 the uranium recycle and recovery areas, the solvent extraction process, the contaminated waste incinerator, the ADU conversion lines, the pelleting process areas, the IFBA and Erbia process areas, the wastewater processing areas, the CPD and MET and laboratories, the dirty and clean scrap dissolvers, the conversion scrap area, the pellet archive areas, and the UF₆ storage pad. The inspectors observed operations were being conducted in accordance with written procedures and that controls identified in CSEs were installed or implemented and were adequate to ensure safety.

c. Conclusions

No safety concerns were identified regarding plant operations.

7.0 Open Item Review

IFI 70-1151/2006-202-03

This item tracks the licensee's commitment to complete and implement a new cleaning and decontamination CSE to clarify the spacing requirements related to containers such as mop buckets. During a previous inspection, the licensee indicated that although a draft CSE had been completed, it had not been implemented because operations was not satisfied with the limited quantity of water available in the modified (i.e., with drilled holes) mop buckets. During this inspection, the licensee indicated that they are still re-evaluating whether to use modified mop buckets or cream cans for decontamination. The inspectors reviewed the licensee's justification of continued operation documented in LTR-EHS-07-179, "Justification for Continued Operation with Current Mop Buckets," dated October 25, 2007. The inspectors determined that the completion and implementation of the CSE will be tracked as part of the ongoing criticality program upgrades which per license safety condition S-3, will be completed by June 30, 2009. This item is closed.

URI 70-1151/2007-202-01

This item tracks the use of calculations based on facility features that might credibly be changed to demonstrate that criticality accident sequences are not credible. This finding is based on the observation that the licensee had determined that criticality in waste drum arrays is not credible while many facilities consider criticality in such arrays to be credible. The licensee relies on controls limiting drum mass in the analysis resulting in the non-credibility conclusion. The inspectors did not identify any immediate safety concerns. This item remains open.

VIO 70-1151/2007-202-02

This item tracks the licensee's failure to comply with a posted limit on moderating materials in a storage array. The inspectors determined that the licensee has implemented new criticality analysis which does not rely on exclusion of moderating materials from the archive drum array. The inspectors observed new NCS postings with which licensee operations complied. The inspectors determined that the licensee had adequately addressed the violation. 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 December 21, 2007. The licensee acknowledged and understood the findings as presented.

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Items Opened

NCV 70-1151/2007-204-01 Failure to comply with the chemical development laboratory mass limit.

Items Closed

IFI 70-1151/2006-202-03 Tracks completion and implementation of the new clean-up and decontamination CSE.

VIO 70-1151/2007-202-02 Failure to comply with posted limit on moderating materials in a storage array.

NCV 70-1151/2007-204-01 Failure to comply with the chemical development laboratory mass limit.

Items Discussed

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.

2.0 Inspection Procedures Used

IP 88015 Nuclear Criticality Safety Program
IP 88016 NCSE and Analyses
IP 88017 Criticality Alarm System

3.0 Partial List of Persons Contacted

Westinghouse Electric Company

R. Winiarski	NCS Manager
D. Graham*	NCS Technician
C. Snyder	NCS Technician
S. Gough*	NCS Engineer
J. Peterson	Maintenance Manager
B. Phillips*	Conversion Manager
G. Couture*	EH&S Engineer
J. Heath	EH&S Engineer
M. Rosser*	EH&S Manager
C. Altstadt*	Plant Manager

NRC

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

* attended the exit meeting on December 21, 2007.

4.0 List of Acronyms

ADAMS	Agencywide Documents Access and Management System
ADU	ammonium diuranate
CFR	Code of Federal Regulations
CPD	chemical process development
CSE	criticality safety evaluation
IFBA	integral fuel burnable absorber
IFI	inspector follow-up item
IP	inspection procedure
ISA	integrated safety analysis
MET	metallurgical
NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluations
NCV	non-cited violation
UF ₆	uranium hexafluoride
UO ₂	uranium dioxide
URI	unresolved item
VIO	violation