U.S. NUCLEAR REGULATORY COMMISSION
REGION II

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License No.:	SNM-1107
Report No.:	70-1151/97-02
Licensee:	Westinghouse Electric Corporation
Facility:	Commercial Nuclear Fuel Division Columbia, SC 29250
Inspection Conducted:	February 24-28, 1997
Inspectors:	C. Bassett, Senior Radiation Specialist D. Ayres, Fuel Facilities Inspector
Approved by:	E. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

Commercial Nuclear Fuel Division
NRC Inspection Report 70-1151/97-02

The primary focus of this inspection was the observation and evaluation of the licensee's programs for operational safety, configuration management, and maintenance of safety controls. The report includes inspection efforts of two regional inspectors. The inspection identified the following aspects of the licensee programs as outlined below:

PLANT OPERATIONS

- Criticality safety postings were properly issued and operations were being performed in accordance with them. Postings of production instructions were widely issued without an indication as to management approval and may be susceptible to producing conflicts with approved procedures. Calciner operations were being performed in accordance with approved procedures.

- The changes associated with the major modification to the Line #1 calciner system were found to be adequately reviewed and evaluated with regard to process safety.

- The licensee's configuration control program provided detailed guidance on initiating a modification or change but lacked specificity on documenting the completion of a project. No formal written documentation of the completion of all aspects of a modification project were required by the current configuration control program.

- The licensee's system for programmed maintenance does not include all safety-related systems and components and will not do so until the results of the Integrated Safety Assessments are completed. The results of these assessments will not be avaliable for several more years.

- Items identified by the Criticality Safety Evaluation (CSE) as being relied upon for criticality safety for the calciner system were found to be in place and functional. A non-cited violation was noted by the inspectors for failure to have a proper facility testing procedure for a CSE-identified control on the boiler system.

- The overall general housekeeping of the controlled areas was found to be adequate for preserving worker safety.

Attachment:

Partial List of Persons Contacted
Inspection Procedures Used
List of Items Opened, Closed, and Discussed
List of Acronyms

Report Details

I. Safety Operations

A. Plant Operations (03) (88020)

1. Conduct of Operations (03.01)

a. Inspection Scope

The inspectors conducted a general plant tour to confirm that operations were being performed as described in written procedures and posted instructions.

b. Observations and Findings

The inspectors reviewed numerous area postings in the powder production, pellet production, rod loading, and various storage areas. All criticality safety postings observed by the inspectors had been properly issued by the Criticality Safety Function and were being followed correctly by the Production staff. Numerous other production-related postings (mainly signs used for administrative product flow contol) were also observed. Only a small percentage of the production-related postings had any indication as to the responsible issuer.

Operation of the calciner systems in the powder production area was observed and compared to the established operating procedures. No deviations from the approved procedures were found in the operation of the calciner.

c. Conclusions

Based on the review of documentation and tours of the controlled area, the inspectors determined that the criticality safety postings were properly issued and that operations were being performed in accordance with these postings. Postings of production instructions were widely issued without an indication as to management approval. This is a practice that is susceptible to producing conflicts with approved procedures and is considered a potential system weakness. Calciner operations were being performed in accordance with approved procedures.

2. Facility Modifications and Configuration Controls (03.02)

a. Inspection Scope

The inspectors reviewed a recent facility modification and the related configuration control procedures to ensure that the modification was completed in accordance with the procedures and reflected the safety bases stipulated in the nuclear criticality safety evaluation.

b. Observations and Findings

The inspectors reviewed selected procedures detailing the facility configuration control program and the implementation of the program. Procedures reviewed included:

- TA-500, "Columbia Manufacturing Plant Configuration Control," Revision (Rev.) 6, dated February 6, 1997, and related controlled forms and sketches.

- RA-104, "Regulatory Review of Configuration Change Request," Rev. 8, dated September 1, 1994, and related controlled forms, sketches, guidelines, and check lists.

- RA-312, "Nuclear Criticality Safety Impact Determination for Proposed System Modifications," Rev. 0, dated July 25, 1996, and the associated controlled form.

The procedures contained various definitions including ones for such phrases as "identical," "like kind," "substitution," "modifications," and "major projects," and also stipulated the licensee's requirements for using the procedures. TA-500 provided detailed instructions concerning the responsibilities of the those involved with a project involving change or modification of the facility and instructions concerning what forms to fill out and what approvals were required. RA-104 specified what information was required to be submitted for review when the modification project involved changes to nuclear criticality safety, radiological and environmental protection, occupational health and safety, or safeguards programs or requirements. RA-312 contained instructions for the Nuclear Criticality Safety function to determine whether a proposed modification to an existing operation would require a change to the existing nuclear criticality safety approval documentation for that system. The procedures specified what was needed prior to beginning a project and also contained guidance on how to use and update the various drawings that would be used in such a project.

The inspectors noted that the procedures gave detailed guidance on how to initiate a project but appeared to lack detailed information on how to close out and fully document completion of a modification project. TA-500 gave the following guidance in Section 7.2.10:

> "[The] project engineer completes and assures that all configuration documentation has been updated, assures that training is completed, and implements the change or substitution in accordance with plant procedures, TA-500, and RA-104 if applicable."

The inspectors also noted that TA-500 did not require the project engineer to obtain written documentation that items such as training, procedure upgrades, and needed changes to the preventive maintenance (PM) program had been completed. Nor did the procedure stipulate a time frame for documenting the completion of a modification. In discussing these issues with licensee representatives, the inspectors were told that there usually was nothing written but that the verification was "word-of-mouth" in nature. Also, a project engineer could not start a new project until the documentation for the previous one was completed.

The inspectors reviewed a recently completed modification project dealing with changes to the calciner on Conversion Line #1. (The project and the documentation thereof had not been "closed out" but was similar to the modifications that had been completed on Conversion Lines #2 and #4.) It was noted that the project engineer for the Conversion Line #1 project had in his possession all the red-lined drawings to be submitted to drafting for updating the "as-built," official drawings of the system. The project engineer also had documentation that had been prepared for updating the "spare parts lists" with those items that were new and needed to be added to the Store Room inventory. The project engineer did not have documentation concerning the training that had been conducted, the procedures that had been updated, nor changes/updates to the PM program. When the inspectors talked to the process engineer, who had cognizance for the Conversion Line #1 calciner, the process engineer indicated that the training had been conducted and that the procedures had been updated as required. A review of the training records and the procedures demonstrated that the training and procedure updates had been completed.

The inspectors then reviewed the PM program for the Conversion Line #1 calciner (and for the Conversion Line #4 calciner which had undergone the same modifications several months ago). It was noted that the PM "on file" in the computer for these calciners was still the "old" or previous PM, which had been required before the modifications were completed. The licensee was informed that the program for ensuring that the PM program was changed for modified equipment was not functioning as designed. The licensee acknowledged this finding and indicated that the issue would be reviewed.

The inspectors also reviewed Chapter 3 of the license application concerning programmed maintenance of safety-related systems and components. Chapter 3 listed various systems and components that would receive programmed maintenance but did not include the calciners. It was noted that additional safety-related systems and components would be placed under programmed maintenance but

only after the results of the licensee's Integrated Safety Assessments were completed. The licensee indicated that the results of these assessments would not be avaliable for several more years.

c. Conclusions

The licensee's configuration control program provided detailed guidance on initiating a modification or change but lacked specificity on documenting the completion of a project. No formal written documentation of the completion of all aspects of a modification project were required by the current configuration control program.

The licensee's system for programmed maintenance does not include all safety-related systems and components and will not do so until the results of the Integrated Safety Assessments are completed. The results of these assessments will not be avaliable for several more years.

3. Implementation of Process Safety Controls (03.03)

a. Inspection Scope

The nuclear criticality safety items associated with the calciner operation were reviewed to confirm the NCS limits and controls were implemented and maintained.

b. Observations and Findings

The licensee's nuclear criticality safety evaluations (CSEs) identify certain defense elements for ensuring that $k_{eff} \leq 0.95$ for any single expected process upset. The CSE for the calciner operation was reviewed to derive a list of criticality safety controls identified as defense elements to the initiating events associated with these credible process upsets. The calciner CSE identified twenty (20) possible initiating events (IEs), each having a number of defenses to guard against its occurrence. Some of the identified defenses (e.g., defenses referring to equipment dimensions and ruggedness of system design) were considered by the inspector to be passive controls with a very low probability of deviation. Other defenses which were determined by the inspector to be active criticality safety controls were deemed more susceptible to human error or mechanical failure and were pursued in more detail.

The active criticality safety controls were categorized by the inspector as being either procedural controls, computerized controls, or physical controls. The inspector reviewed procedural controls by first confirming that the associated procedures for operation of process equipment, ventilation equipment, and radiological monitoring equipment, contained instructions for the

actions credited in the CSE. The inspector then reviewed documentation in the calciner process area and the health physics laboratory. The inspector confirmed, through this documentation review, that the actions specified in the written procedures for controlling criticality safety were being performed.

Safety significant computerized controls consisted of a number of electronic interlocks which initiated responses to process upsets. The inspector reviewed documentation which showed that interlocks associated with the Line #1 calciner CSE were all tested and verified as operational (including subsequent actuation of appropriate mechanical devices) before line restart in January 1997 following shutdown for major modifications. The inspector determined that this functional testing was adequate to demonstrate functionality.

Physical criticality safety controls mainly involve process parameter sensors and switches. The inspector observed the devices installed in the production area and found those items identified by the CSE to be present. The inspector also reviewed the preventive maintenance records for these devices to confirm their continued reliability. All but one of the devices were found to be specified in the licensee's preventive maintenance procedure or included as part of the testing of the electronic interlocks. The remaining unspecified item was a high-level float switch in the boiler system which prevented water from entering the calciner through the steam piping. The inspectors reviewed documentation showing that preventive maintenance and testing of the safety devices on the boiler system were performed annually by an outside contractor. Although testing of the high-level water switch was found not to be specifically required in the contract for boiler testing, the contractor provided the inspectors with documentation that this criticality safety control was indeed tested annually.

The lack of a detailed facility procedure for the testing of a CSE-identified control was identified as a violation of the license application. However, since testing of the high level water switch was shown to have been anually performed by a qualified expert, the safety significance of not having a detailed procedure was considered to be minimal. Therefore, this NRC-identified violation is not being cited because criteria specified in Section VII.B of the NRC Enforcement Policy were satisfied (NCV 70-1151/97-02-01).

The licensee indicated that written instructions will be developed for the boiler contractor which would specify the testing of the boiler's high level water switch and would require the contractor to verify the switch's acceptability. The implementation of the corrective action will be followed by the NRC as an Inspector Follow-up Item and reviewed during a subsequent inspection (IFI 70-1151/97-02-02).

c. Conclusions

The inspector determined that items identified by the CSE as being relied upon for criticality safety for the calciner system were in place and functional. Actions constituting administrative controls were documented at prescribed frequencies. Engineered controls were found to be periodically tested for reliability. Testing procedures were found to be in place for all but one of the engineered controls.

4. Housekeeping (03.06)

a. Inspection Scope

The controlled areas were inspected for buildup of licensed material in process equipment, general accumulations of debris, and storage of contaminated process containers, equipment, and supplies designated for decontamination and/or disposal.

b. Observations and Findings

The inspectors observed various uranium powder and pellet processing gloveboxes and equipment for accumulations and found no excessive amounts present. The production areas were found to have no significant amounts of combustible refuse, with work pathways clear from obstructions.

The inspectors observed storage areas for contaminated plastic containers "poly packs" previously used for in-plant confinement and transport of uranium powder. Although several hundred of these containers were being stored for future decontamination and disposal, the storage area had limited access and was enveloped by a locked cage. The inspectors observed that the containers were mostly stored on the same type of racks that are used to hold filled containers. The inspectors found the empty poly packs to be stored in an orderly manner.

The inspectors observed the uranium recovery area and the amount of used process equipment parts awaiting decontamination prior to disposal. Although a considerable amount of debris was found to be present, egress pathways were not significantly affected.

c. Conclusions

The overall general housekeeping of the controlled areas was found to be adequate for preserving worker safety.

5. Follow-up on Previously Identified Issues (03.08)

IFI 70-1151/95-02-01

a. Inspection Scope

The inspectors reviewed the licensee's corrective actions regarding the failure to perform adequate nuclear criticality safety evaluations of three reported safety-significant events, which resulted in the failure to notify the NRC as required by procedure.

b. Observations and Findings

The licensee met with NRC representatives on April 19, 20, and May 3, 1995, to more clearly define the requirements for NRC notification. Based on those meetings, the requirements were specified in the license that was renewed on November 30, 1995. The implementation of those reporting requirements was inspected during inspections in March and December 1996. As a result, an Inspector Follow-up Item (IFI 70-1151/96-204-07) was identified for further review by Headquarters.

c. Conclusions

The reporting requirements were incorporated into the license that was renewed in November 1995. This item is closed.

II. Facility Support

B. Maintenance/Surveillance (F1) (88025)

1. Follow-up on Previously Identified Issues (F1.08)

VIO 70-1151/96-05-01

a. Inspection Scope

The inspectors reviewed the licensee's actions regarding the failure to perform a three month PM on the #1 North American Boiler.

b. Observations and Findings

The licensee had performed a self-assessment on July 16, 1996, and determined that there was a lack of focus on and inadequate assigned responsibility for completing safety-related PM requirements in accordance with the procedure. As a result, the licensee assigned a specific individual within the maintenance organization the responsibility of tracking and reporting on scheduled PM activities that were about to exceed the specified

frequency requirements. A second person within the maintenance organization was assigned responsibility for closure of PM work orders to assure accuracy and timeliness. The licensee also made the commitment that, beginning in 1997, the maintenance organization would direct or conduct an annual management audit to assure continuing compliance with the requirements for safety-related preventive maintenance.

The inspectors noted that, since the aforementioned actions were taken, no examples of failure to perform a scheduled PM on safety-related equipment have been identified. With respect to the audit of the maintenance program, the inspectors were provided a memorandum that indicated that the audit would become part of the Energy System Business Unit (ESBU) Internal Audit Program. The initial audit has been scheduled for September 1997. The completion of this audit will be reviewed during a subsequent inspection and will be tracked by the NRC as an Inspector Follow-up Item (IFI 70-1151/97-02-03).

In the NRC Inspection Report (IR) that identified the problem with the failure to complete the PM on the #1 boiler, IR No. 70-1151/96-05, it was also noted that safety-related preventive maintenance was apparently allowed to be overdue for two weeks before any administrative action was begun. As a result of this comment, the licensee revised the affected procedure, MCP-108000, "Preventive Maintenance," Rev. 3, dated January 30, 1997, to require notification of the cognizant management be made on the first scheduled work day of the week after the PM was due. This reduced the time between noting that a maintenance activity was overdue and the initiation of some administrative action. The inspectors determined that this was a positive step.

c. Conclusions

No further examples of failure to perform a scheduled PM on safety-related equipment within the time frame specified have been identified. This item is closed.

III. Management Meetings

A. Exit Interview (M1)

On February 28, 1997, the inspection scope and results were summarized with licensee representatives. The inspectors discussed in detail the routine program areas inspected, and the findings, including the non-cited violation for failure to have a procedure or checklist for checking the high level alarm for the boilers. No dissenting comments were expressed by the licensee.

The licensee did not identify any of the materials provided during the inspection as proprietary.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

*C. Alstadt, Manager, Maintenance
*J. Bush, Manager, Manufacturing
*R. Close, Team Manager, Maintenance
*J. Fici, Plant Manager
*R. Fuller, Fellow Engineer, Plant Systems Engineering
*D. Goldbach, Manager, IFBA and ADU Rod Manufacturing
*W. Goodwin, Manager, Regulatory Affairs
*R. Jacobs, Team Manager, Chemical Conversion
*N. Kent, Criticality Safety Engineer, Regulatory Affairs
*R. Lacy, Manager, Plant Systems Engineering
*K. Larson, Team Manager, Chemical Conversion
*S. McDonald, Manager, Technical Services
*N. Parr, Manager, Chemical Process Engineering
*E. Reitler, Engineer, Regulatory Engineering and Operations
*M. Ruhl, Team Manager, Maintenance
*T. Shannon, Technician, Regulatory Affairs
*W. Ward, Manager, Chemical Manufacturing
*R. Williams, Advisory Engineer, Regulatory Affairs

*Denotes those present at the exit meeting on February 28, 1997.

Other Personnel

Other licensee employees contacted included engineers, technicians, mechanics, operators, and security and office personnel.

INSPECTION PROCEDURE USED

Procedure Number	Title
IP 88020	Regional Nuclear Criticality Safety Inspection Program

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Item Number	Type	Description and Discussion
70-1151/97-02-01	NCV	Failure to have a procedure or checklist for performing preventive maintenance on the high level alarm for the boilers.
70-1151/97-02-02	IFI	Follow up on the development of a procedure or checklist to be used by a contractor to test and verify the operability of the high level switch in the boilers.

Opened (Cont'd)

Item Number	Type	Description and Discussion
70-1151/97-02-03	IFI	Review of the initial audit of the maintenance program to be performed by the Energy System Business Unit (ESBU) in September 1997.

Closed

Item Number	Type	Description and Discussion
70-1151/95-02-01	VIO	Three examples of failure to perform an adequate nuclear criticality safety evaluation of a reported safety-significant event, which resulted in the failure to notify the NRC as required by NCS procedure, RA-107, "Internal Reporting, and NRC Notification of Unusual Occurrences," Rev.6, dated March 17, 1994.
70-1151/96-05-01	VIO	Failure to perform preventive maintenance of the #1 North American Boiler within the frequency specified by Section 3.2.1 of the License Application.
70-1151/97-02-01	NCV	Failure to have a procedure or checklist for performing preventive maintenance on the high level alarm for the boilers.

LIST OF ACRONYMS

ADU	Ammonium diuranate
CFR	Code of Federal Regulations
CSE	Criticality Safety Evaluation
DNMS	Division of Nuclear Materials Safety
ESBU	Energy System Business Unit
IE	Initiating event
IFBA	Integrated Fuel Burnable Absorber
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
MCP	Maintenance and Calibration Procedure
NCV	Non-cited violation
NCS	Nuclear Criticality Safety
NMSS	Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
PM	Preventive maintenance
SNM	Special nuclear material
VIO	Violation
WEC	Westinghouse Electric Corporation