

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-1151

License No.: SNM-1107

Report No.: 70-1151/96-04

Licensee: Westinghouse Electric corporation

Facility: Commercial Nuclear Fuel Division

Location: Columbia, SC 29250

Dates: September 23-27, 1996

Inspector: D. A. Kasnicki, Fuel Facility Inspector

Approved By: E. J. McAlpine, Chief  
Fuel Facilities Branch  
Division of Nuclear Materials Safety

ENCLOSURE

## EXECUTIVE SUMMARY

Westinghouse Electric Corporation  
NRC Inspection Report No. 70-1151/96-04

### Safety Operations

- The Criticality Safety Evaluations for two processes, uranium hexafluoride vaporization and the ammonium diuranate centrifuge, define and establish nuclear criticality safety controls so as to adequately meet the intent of the double contingency principle in those processes. (Section 02.01)
- The implementation of a (nuclear) safety significant active-engineered control associated with the operation of the ammonium diuranate centrifuge was found to be adequate. (Section 03.03)
- Two Inspector Followup Items (IFI), one related to the handling and storage of uranium contaminated filters and the other related to the adequacy of operational control at a uranium oxide milling hood, were reviewed and closed. (Section 03.08)

### Attachment:

Persons Contacted and List of Closed Items

## Report Details

### I. Safety Operations

#### 02 Criticality Safety (IP 88015)

##### 02.01 Criticality Safety Evaluations

###### a. Inspection Scope

The inspector reviewed and discussed two Criticality Safety Evaluations (CSE) with licensee representatives. The two CSEs reviewed were for the uranium hexafluoride ( $UF_6$ ) vaporizer and the ammonium diuranate (ADU) centrifuge, two processes which are part of the ADU production process. The CSEs were reviewed for the adequacy with which controls were defined and established so as to satisfy the intent of the double contingency principle. Additionally, the adequacy of the implementation of controls in plant operations for one of these systems, the ADU centrifuge, is addressed in Section 03 below.

###### b. Observations and Findings

###### (1) $UF_6$ Vaporizer for ADU Process

The CSE for the  $UF_6$  vaporizer for the ADU process was reviewed. This vaporizer is a vertical, non-favorable geometry cylinder, which during normal operations contains a pressurized steam atmosphere, but accumulates neither fissile material or moderator. The CSE defines and establishes a series of active-engineered, administrative, and process controls applied to mass (i.e. mass of possible accumulation of fissile material) and geometry (i.e. geometry of possible accumulation of moderator). The mass controls preclude the uncontrolled discharge of  $UF_6$  into the vaporizer either through a catastrophic rupture or slow undetected leak. The geometry controls preclude the accumulation of a sufficient amount (i.e. slab thickness) of moderator to support a criticality. Discussion and review of the CSE, and the fault tree contained therein, indicated that controls were adequately defined and established so as to satisfy the intent of the double contingency principle.

###### (2) ADU Centrifuge

The CSE for the ADU centrifuge in the ADU process was reviewed. This centrifuge dewateres the ADU slurry, which also contains a normally small concentration of uranium oxide ( $UO_2$ ) via a recycling process. The CSE defines and establishes a series of active-engineered, administrative, and process controls applied to preclude the excess

accumulation of fissile material in the centrifuge bowl and the space between this bowl and the centrifuge housing. Discussion and review of the CSE, and the fault tree contained therein, indicated that controls were adequately defined and established so as to satisfy the intent of the double contingency principle.

c. Conclusions

In the two CSEs reviewed, for the uranium hexafluoride (UF<sub>6</sub>) vaporizer and the ammonium diuranate (ADU) centrifuge, two processes which are part of the ADU production process, controls were adequately defined and established so as to satisfy the intent of the double contingency principle.

03 Plant Operations (IP 88020)

03.03 Implementation of Nuclear Criticality Safety (NCS) Controls

a. Inspection Scope

The inspector reviewed the implementation of selected nuclear criticality safety (NCS) controls for the ADU centrifuge discussed in Section 02.01.b(2) above.

b. Observations and Findings

As discussed above, the CSE defines and establishes a series of active-engineered, administrative, and process controls applied to preclude the excess accumulation of fissile material in the centrifuge bowl and the space between this bowl and the centrifuge housing. Of these controls, one is defined as an active-engineered control (AEC) because of its function and its functional testability. The centrifuge bowl is hydraulically driven, and this AEC control is related to the detection of an increase in hydraulic fluid pressure which, in turn, would be caused by the increase in torque that would be experienced by the driving system if an excessive mass of material began to accumulate in the centrifuge bowl and the space between this bowl and the centrifuge housing. This increase in pressure would be detected by a pressure sensor which is interlocked with controls which would automatically stop the feed of material to the centrifuge.

The inspector discussed in detail the functional testing procedure for this AEC with the cognizant process engineer. This discussion satisfied the inspector that the testing discussed indeed constituted a functional test of the system. The inspector toured a related plant area and observed that this AEC was physically in place on one of the ADU production lines. The calibration of the pressure sensor itself was discussed in detail with a technician who performs the calibration. Routine functional testing of this

AEC is required annually by the licensee's maintenance procedures. The inspector reviewed maintenance records which demonstrated that these AECs on all ADU production lines had been routinely functionally tested annually as required. No concerns were identified during any of the above described observations.

c. Conclusions

From the above discussed functional testing and calibration, and observation of this pressure sensing AEC system, the inspector concluded that this AEC for nuclear criticality safety is adequately implemented.

03.08 Miscellaneous Operations Issues

a. IFI 95-08-02 (Closed)

(1). Inspection Scope

The inspector reviewed the licensee's actions concerning this Inspector Followup Item (IFI). The issue involved the licensee's actions to develop additional procedure(s) for the proper handling of potentially contaminated bag filters in various plant areas.

(2). Observations and Findings

The inspector discussed this issue with the cognizant Regulatory Engineer and reviewed related documentation. The licensee had issued a new Maintenance and Calibration Operating Procedure for maintenance personnel: Procedure No. MCP-108115, "Changing Bag Filters in Air Handling & Furnace Ventilation Units", Rev. 1, dated March 14, 1996. The licensee had also revised a Regulatory Operations Procedure for performing radiological surveys of filters for the purposed of determining their uranium (U-235) content: Procedure No. ROP-05-008, "Surveying Filtration Devices for U-235", Rev. 4, dated February 15, 1996. The cognizant Regulatory Engineer had also issued a letter to his manager (Letter No. NMS&S-DWW-96-007, "Filters-Closeout of NRC IFI", dated March 19, 1996) which discussed this issue and documented that these procedural enhancements completed actions to respond to concerns related to the proper handling and temporary storage of used filters. The letter also documented the training of all affected manufacturing and maintenance personnel. The inspector discussed and reviewed the above procedures with the cognizant Regulatory Engineer and concurred that they appeared adequate.

(3). Conclusions

The inspector concluded that the licensee's actions to address concerns related to this IFI appeared adequate. This item is considered closed.

b. IFI 95-09-01 (Closed)

(1). Inspection Scope

The inspector reviewed the licensee's actions concerning this Inspector Followup Item (IFI). The issue involved the licensee's actions to evaluate whether additional control at the ADU process fitzmill hood would be appropriate. This additional control would be related to the observation of when a polypack has become full of uranium oxide ( $UO_2$ ) powder.

(2). Observations and Findings

The inspector discussed this issue with the cognizant Regulatory Engineering manager and reviewed related documentation. The manager stated that this issue had been evaluated and a decision was made that the introduction of additional controls, either administrative or process interlocks, would neither be practicable or appropriate. The related procedure already instructs the operator to check the filling status of a polypack, but does not specify a time frequency for doing so. The manager said it was decided that specifying such a time frequency would be inappropriate because the filling frequency was variable with process conditions. Regarding interlocks, the process already has a level probe which is designed to detect when a polypack is full, shut off the fitzmill, and turn on an alerting light; consideration of additional interlocks was decided inappropriate. The manager also pointed out that their recently completed Criticality Safety Evaluation of the fitzmill hood resulted in a mass limit of 125 Kg  $UO_2$  (7 to 8 polypacks of  $UO_2$ ). The inspector also reviewed the related Criticality Safety Evaluation fault tree which illustrates the Double Contingency protection for this operation and it appeared adequate. Although no new controls were deemed appropriate or practicable, the manager stated that training was conducted to sensitize operators to the need to maintain an awareness of when a polypack should likely be getting full, being sure to check them routinely and periodically, and making sure that polypacks are sealed properly under discharge chutes and that powder is not leaking or blowing into the fitzmill hoods. This training was documented in training document No. 96ADU-TR08, dated February 26, 1996.

(3). Conclusions

The inspector concluded that the licensee's actions to address concerns related to this IFI appeared adequate. This item is considered closed.

VI. Management Meetings

M1. Exit Meeting

The inspection scope and findings were summarized during a meeting on September 26, 1996 with the licensee personnel indicated above. The inspector discussed the likely informational content of the inspection report with regard to documents and processes reviewed during the inspection. Although proprietary information was reviewed during this inspection, this information was not included in this report. Within the scope of this inspection, no violations or deviations were identified. Two Inspector Followup Items, IFI Nos. 70-1151/95-08-02 and 70-1151/95-09-01 were closed.



## ATTACHMENT

### PERSONS CONTACTED

#### Licensee Personnel

\*J. Bush, Manager, Manufacturing  
S. Cheung, Process Engineer  
\*J. Fici, Plant Manager  
\*W. Goodwin, Manager, Regulatory Affairs  
N. Kent, Sr. Nuclear Criticality Safety (NCS) Engineer, NMS&S  
M. Lindler, Team Manager, ADU Conversion Operations  
R. Montgomery, Sr. NCS Engineer, NMS&S  
C. Sanders, Manager, Nuclear Materials Safety & Safeguards (NMS&S)  
\*T. Shannon, NCS Technician, NMS&S  
\*W. Ward, Manager, Chemical Operations  
D. Williams, Sr. NCS Engineer, NMS&S  
\*R. Williams, Advisory Engineer, Regulatory Affairs  
D. Young, Maintenance Engineer

Other licensee employees contacted during the inspection included supervisors, operators, maintenance personnel, security personnel and office personnel.

#### NRC Personnel

\*A. Gooden, Region II  
\*W. Gloersen, Region II

\* Denotes those present at Exit Meeting

### LIST OF CLOSED ITEMS

#### Closed

70-1151/95-08-02	IFI	Follow up on licensee's actions to develop other procedures regarding handling of contaminated bag filters. (Section 03.08.a)
70-1151/95-09-01	IFI	Follow up on licensee's actions for determining if addition control is appropriate at the fitzmill hood. (Section 03.08.b)