U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Report No.:	70-1113/97-08
Licensee:	General Electric Company Wilmington, NC 28402
Facility Name:	Nuclear Energy Production
Dates:	December 8-12, 1997
Inspectors:	D. Ayres, Senior Fuel Facility Inspector
Approved by:	E. J. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

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Enclosure

Executive Summary

General Electric Nuclear Energy Production
NRC Inspection Report 70-1113/97-08

The primary focus of this routine unannounced inspection was the evaluation of the licensee's conduct of plant operations and maintenance. The report covered a one week period and included the results of inspection efforts of one regional fuel facility inspector.

Plant Operations

- The licensee's conduct of operations was being performed according to area safety requirements. Passive engineered controls for assuring proper control of uranium enrichments were in place and functional (Section 2.a).

- The licensee responded promptly to safety-related events and incidents, properly characterized them, and took appropriate corrective actions. Follow up of recommendations made by corrective action implementation teams need to be tracked to closure. One Non-Cited Violation was noted for deviations from the approved configuration control system, the final corrective actions of which will be tracked as Inspector Followup Item 97-08-02 (Section 2.b).

Maintenance/Surveillance

- The licensee's system for controlling maintenance of safety controls in the Dry Conversion Process areas was adequate for assuring the operability of Automatic Engineered Controls. Maintenance was being performed as identified by the Integrated Safety Analysis through the use of adequate work control procedures, and included appropriate post-maintenance functional testing (Section 3.a).

- The licensee was adequately controlling work authorizations for maintenance activities. The licensee took quick action to identify and correct an occurrence where the system for controlling work authorizations was bypassed (Section 3.b).

Attachment:
Persons Contacted and Exit Interview
List of Items Opened, Closed, and Discussed
List of Acronyms

REPORT DETAILS

1. Summary of Plant Status

This report covered a one week period. Plant activities included normal powder production in the Ammonium Diuranate (ADU) facility, routine pellet and assembly production, and normal uranium recovery operations. The Dry Conversion Process (DCP) was operating with line #1 producing enriched powder, line #2 producing natural powder, and line #3 was undergoing construction/qualification. The new gadolinia shop and dry recycle system associated with DCP were being prepared for initial startup.

2. Plant Operations (88020) (03)

a. Conduct of Operations (03.01)

(1) Inspection Scope

The inspector conducted a facility tour to observe conduct of operations, and to confirm that material storage, process operations, and process related activities were being performed in accordance with written safety requirements.

(2) Observations and Findings

The inspector observed operations in the ADU process area, the pellet production area, the gadolinia shop, the DCP facility, and the Uranium Recovery (UR) area. The inspector compared the operations in each of these areas with the requirements listed in the Nuclear Safety Release/ Requirements (NSR/Rs) for selected areas. The inspector observed pressure readings on ventilation systems and HEPA filters throughout the facilities. The inspector found that all operating systems were within the required pressure ranges.

The inspector observed the storage of Special Nuclear Material (SNM) throughout the facilities. These observations included storage of UF_6 cylinders, 3 gallon and 5 gallon powder cans, pellet trays, and DCP facility bulk powder containers. The inspector found that all observed SNM storage was being conducted in accordance with local safety requirements.

The licensee identified that an annular tank in the UR area had been slowly leaking uranium waste solution into a diked area, and that insulation had been found inserted into the annular space between the solution reservoir and the borated stainless steel plate used for neutron absorption. The licensee identified that this was a concern due to the potential for accumulations of SNM immediately adjacent to the favorable geometry solution reservoir inside the neutron

absorbing barrier. The inspector observed that the licensee removed the insulation material, found that it did not contain significant quantities of SNM, and found that the licensee verified that all other vessels of similar design did not have insulation (or other foreign materials) lodged between the solution reservoir and the neutron absorber. The inspector found that the licensee reacted to an unexpected potential safety problem, and repaired the leaking annular tank in an expeditious but careful manner in order to assure nuclear and radiological safety.

(3) Conclusions

The licensee's conduct of operations was being performed according to area safety requirements. Passive engineered controls for assuring proper control of SNM enrichments were in place and functional. The licensee reacted well to an unexpected potential safety problem.

b. Review of Previous Events (03.07)

(1) Inspection Scope

Operational events occurring since the last inspection were reviewed for adequacy of licensee responses.

(2) Observations and Findings

(a) Uranium Release from HF Recovery Building

The inspector reviewed the licensee findings associated with the event involving a radiological release from the DCP HF Recovery Building. This event was reported to the NRC Operations Center and was documented as Event Notice No. 32874. The inspector reviewed the Unusual Incident Report (UIR) generated by the licensee and found that two higher level investigations were performed as a result of the UIR's findings. One of these investigations focused on the actual release mechanism of contamination to the environment. The other investigation focused on the development of the source term that led to the release.

The inspector found that the two investigations uncovered the root causes of the event and proposed short and long-term corrective actions. The inspector found that the short term corrective actions were completed prior to restart of the process. The inspector found that the short term corrective actions included modifications to procedural and engineered controls, and a corresponding license amendment

submittal; evaluation of process dynamics to identify maximum credible uranium holdups and stack releases; updating safety basis documentation; and review of lessons learned with entire DCP team. The inspector found that the long term corrective actions included evaluations of operating philosophy for improved equipment performance; improved operator training and communication tools; and improved control room ergonomics and information flow.

The inspector observed that the evaluation of the maximum potential stack release determined that a much larger release may be possible due to common cause failures of safety controls. The inspector observed that the evaluation report estimated the probability of such a common cause failure to be roughly 2% per month, but that this probability could be reduced by increasing the frequency and rigor of valve inspections and repair. The inspector found that the licensee was developing a valve testing procedure to effectively reduce the probability of common cause failures. The inspector also observed that a more detailed investigation of common failure mechanisms was recommended in the evaluation report. The inspector found that the licensee's summary of corrective actions showed that the evaluation of the maximum potential stack release had been completed. However, no new items were added to the summary as a result of the evaluation report recommendations. The inspector found that followup corrective actions needed to be tracked until closed. The licensee indicated that the follow-up actions would be tracked and completed in a timely manner.

(b) Liquid Hydrogen Tank Leak

The inspector reviewed the release of hydrogen from a pressure control system at a liquid hydrogen tank. The inspector found that the hydrogen release occurred inside the gas vendor's equipment boundary and was thus well removed from SNM access areas. The inspector found that the licensee reacted to the situation properly by shutting down the hydrogen delivery system and notifying the gas vendor of the need for repairs.

(c) Unusual Incident Reports

The inspector reviewed the remaining UIRs (about 25) opened since July 1997. Although all but one of these UIRs did not lead to higher level investigations, the inspector found that they were appropriately evaluated

for seriousness, urgency, and potential growth into larger problems. The inspector found that each UIR adequately addressed the causes and corrective actions taken.

(d) Unanalyzed Pellet Boats

The inspector reviewed a licensee internal memorandum declaring a Licensee Identified Violation (LIV) for the purchase of pellet boats that were of an alternate design that was not approved through the configuration management process. The alternate boat design was discovered when tare weights of the boats were rejected by the production system software for being out of the allowable range. A licensee investigation of the tare weight rejections led to the discovery of the alternate boat design that was added to the part drawing in January 1994. The altered design was a concern since it had not been analyzed for its effects on the nuclear safety of the pellet production process. The inspector found that this item was identified to NRC by the licensee, was not expected to be prevented by corrective actions implemented in the past two years, would be corrected within a reasonable time by a specific commitment of corrective action, and was not a willful violation. Therefore, this licensee identified violation was not cited because criteria specified in Section VII.B of the NRC Enforcement Policy were satisfied and will be considered Non-Cited Violation (NCV) 70-1113/97-08-01. Additionally, a separate UIR was to be generated to identify the near term and long term corrective actions, the completion of which will be tracked as Inspector Followup Item (IFI) 70-1113/97-08-02.

(3) Conclusions

The licensee responded promptly to safety-related events and incidents, properly characterized them, and took appropriate corrective actions. Follow up of recommendations made by corrective action implementation teams need to be tracked to closure. One Licensee-Identified Violation (NCV 97-08-01) was noted for deviations from the approved configuration control system, the final corrective actions of which will be tracked as IFI 97-08-02.

c. Follow-up on Previously Identified Issues

(1) Inspection Scope

The progress of corrective actions for five previously identified Inspector Follow-up Items (IFIs) were reviewed for possible closure.

(2) Observations and Findings

The inspector reviewed the corrective actions taken in response to IFI 96-11-01 concerning inoperable and inaudible criticality horns. Previously inspected corrective actions included replacing deteriorated equipment and audibility testing. The inspector found that the licensee had developed new drawings of the criticality horn circuits to more easily identify which horns would be affected by a loop failure. The inspector found that the new drawings were placed in the licensee's configuration control system to prevent undocumented changes to the system. The inspector also observed that placards had been affixed near eye level below each horn so that any horn found inoperable would be easily identified. The inspector found that these improvements to the criticality horn system was sufficient to close IFI 96-11-01.

The inspector reviewed licensee actions taken in response to IFI 97-07-01 for improving the identification of entrances and prevention of unauthorized or accidental access to controlled areas. This IFI was opened when inspectors found doorways to controlled areas that were easily accessible from uncontrolled areas without passing through change rooms. The inspector found that the licensee took action to remove the door handles from the uncontrolled side of the doors of primary concern so that they could only be opened from within the controlled area for emergency egress. The inspector also found that door alarms with stop signs were installed on other doorways that led into controlled areas where it was deemed necessary to leave the outside door handles in place for emergency response access. The inspector found that these actions were adequate to close IFI 97-07-01.

The inspector reviewed a license amendment submittal made to NRC in response to IFI 97-07-03. The license amendment attempted to resolve discrepancies between plant practices and the license application concerning not requiring contamination surveys at certain step off pads. The inspector found that the amendment application was still under review by NRC licensing staff and was thus not yet approved. Therefore, the inspector found that the discrepancy still existed and IFI 97-07-03 remained open.

The inspector reviewed the licensee's corrective actions resulting from a root cause investigation concerning the scalding of a maintenance worker in the uranium recovery area. The inspector found that corrective actions included additional training of the maintenance workers on the equipment involved and an improved operational procedure. The inspector observed that a corrective action remained open for testing a pressure relief device on one of the pumps involved in the incident. However, the inspector found that this device was an experimental enhancement to the system and that the corrective actions already taken were adequate to prevent recurrence. Therefore, the inspector found that IFI 97-07-04 could be considered closed.

The inspector reviewed the licensee's corrective actions resulting from a LIV concerning a temporary modification to a ventilation system in the DCP. As stated in the LIV, a maintenance worker had modified the DCP ventilation system by installing a temporary flexible line to capture the small amount of UF_6 expected to be released upon disconnecting of a process line. The modification was performed without approval through the configuration management system and without a Radiation Work Permit. The licensee's investigation results and corrective actions were being tracked as IFI 97-07-06. The inspector observed that adjustments were made to the licensee's maintenance control and configuration management procedures, and that a portable ventilation unit was fabricated and in place for the future needs of the DCP. The inspector found that these corrective actions and the retraining of the maintenance worker were adequate responses. Therefore, the inspector found that IFI 97-07-06 could be considered closed.

(3) Conclusions

The licensee's implementation of corrective actions in response to previously identified issues were adequate in four of the five issues reviewed, and these four IFIs can be closed. The determination of the adequacy of the remaining issue (IFI 97-07-03) was pending the completion of the NRC review of the associated license amendment request.

3. Maintenance/Surveillance (88025) (F1)

a. Conduct of Maintenance (F1.01)
Work Control Procedures (F1.02)
Surveillance Testing (F1.06)

(1) Inspection Scope

The maintenance database for DCP safety controls was reviewed to verify that maintenance was being conducted via work control procedures, including post-maintenance surveillance testing, on required items identified in the Integrated Safety Analysis (ISA).

(2) Observations and Findings

The inspector reviewed the ISA for the DCP and chose a sampling of the Automatic Engineered Controls (AECs) used in line #1 of the process to be reviewed. The sampling consisted of a wide variety of instruments and sensors to cover the measurement and control of most of the process variable types important to safety. The inspector observed the licensee's Maintenance Planning and Control (MPAC) database and found that each of the items chosen for the sample was included therein. The inspector also observed that for each safety-related AEC in the sample, the MPAC system included item descriptions, locations, a record of maintenance activities, spare parts lists, instructions for conducting routine and preventive maintenance (R&PM), a list of the next twelve scheduled R&PM dates, and instructions for post-maintenance testing (PMT).

The inspector found that the frequencies established for R&PM (ranging from monthly to annually) was adequate and that all maintenance on AECs had been performed as scheduled or prior to being placed into operation. The inspector also found that the instructions provided to the maintenance workers were adequate to locate the proper AEC device on the production floor and to perform the required R&PM. The inspector observed that PMT was performed on each AEC by issuance of a work order separate from the original R&PM work order. The inspector found that in all cases, PMT was completed before returning the safety control to service.

(3) Conclusions

The licensee's system for controlling maintenance of safety controls in the DCP areas was adequate for assuring the operability of AECs. Maintenance was being performed as identified by the ISA through the use of adequate work control procedures, and included appropriate post-maintenance functional testing.

b. Work Control Authorizations (F1.03)

(1) Inspection Scope

Changes to safety control systems were reviewed to verify they are specifically approved under the configuration management program requirements.

(2) Observations and Findings

The inspector observed selected changes made to the DCP safety controls as part of the corrective actions for the HF Building release discussed in section 2(b) of this report. The inspector found that in each case, changes were initiated by completing a Change Request form and routing it through the proper approval circuit. The inspector found that the change requests were reviewed by appropriate licensee management. The inspector also found that the potential need for changes to process instructions and documentation (NSR/Rs, Criticality Safety Evaluations, Operating Procedures, Piping and Instrumentation Diagrams, etc.) were being adequately reviewed by licensee management per the Configuration Management Control procedure requirements. In spite of the adequacy of these recent changes in the DCP, the inspector noted that the LIV discussed in section 2(c) of this report was an incident involving the unauthorized change to a process safety system to facilitate maintenance activities.

(3) Conclusions

The licensee was adequately controlling work authorizations for maintenance activities. The licensee took quick action to identify and correct the occurrence where the system for controlling work authorizations was bypassed.

4. Exit Interview

The inspection scope and results were summarized on December 12, 1997, with those persons indicated in the Attachment. The inspector described the areas inspected and discussed the inspection results, including the non-cited violation, and the likely informational content of the inspection report with regard to documents and/or processes reviewed during the inspection. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes has been deleted from this report. Dissenting comments were not received from the licensee.

ATTACHMENT

Licensee

*R. Bragg, Team Leader, Powder Preparation & Packaging
*D. Brown, Team Leader, Environmental Programs
*D. Dowker, Team Leader, Fuel Support
*T. Flaherty, Manager, Dry Conversion Project
*R. Foleck, Senior Licensing Specialist
*R. Keenan, Manager, Site Security and Emergency Preparedness
*J. Kline, Powder Production Line Manager
*A. Mabry, Program Manager, Radiation Safety Engineering
*S. Murray, Team Leader, Chemical Conversion
*W. Ogden, Facilities Manager
*L. Paulson, Manager, Nuclear Safety
*J. Reyes, URU Area Coordinator
*B. Robinson, Principal Nuclear Safety Engineer
*E. Rouse, Radiation Protection
*H. Shaver, Nuclear Safety Engineer
*G. Smith, Team Leader, FMO Maintenance
*S. Smith, Radiation Safety Monitor
*H. Strickler, Manager, Site Environmental, Health & Safety
*C. Tarrer, Leader, Configuration Management
*D. Turner, Environmental Engineer
*C. Vaughan, Acting Manager, Facility Licensing
*P. Vescovi, Nuclear Safety Engineer
*C. Williams, ADU Engineer

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

*Denotes those present at the exit meeting on December 12, 1997.

INSPECTION PROCEDURES USED

IP 88020 Plant Operations
IP 88025 Maintenance and Surveillance Testing

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Description
70-1113/96-11-01	Closed	IFI - Verify the completion of corrective actions in response to finding inoperable criticality horns.

70-1113/97-07-01	Closed	IFI - Review improvements in identifying entrances to controlled areas.
70-1113/97-07-03	Open	IFI - Review corrective actions to correct discrepancies between plant practices and License Application concerning step-off pads.
70-1113/97-07-04	Closed	IFI - Review Taproot investigation findings and corrective actions concerning the scalding of a maintenance worker in Uranium Recovery.
70-1113/97-07-06	Closed	IFI - Review licensee's investigation of the configuration management procedure violation involving a temporary modification to a ventilation system in the DCP area.
70-1113/97-08-01	Closed	NCV - Change made to fabrication drawing and subsequent procurement of pellet boats without proper approvals.
70-1113/97-08-02	Open	IFI - Review and verify completion of corrective actions taken in response to NCV 97-08-01.

LIST OF ACRONYMS USED

AEC	Automatic Engineered Control
ADU	Ammonium Diuranate
DCP	Dry Conversion Process
FMO	Fuel Manufacturing Operations
GE	General Electric
HEPA	High Efficiency Particulate Air
IFI	Inspector Follow-up Item
IP	Inspection Procedure
LIV	Licensee-Identified Violation
MPAC	Maintenance Planning and Control
NCV	Non-Cited Violation
NSR/R	Nuclear Safety Release/Requirement
PMT	Post-Maintenance Testing

SNM	Special Nuclear Material
UF_6	Uranium Hexafluoride
UIR	Unusual Incident Report
URU	Uranium Recovery Unit