From: Douglas M. Collins (DMC), e2
To: BSM1 - Bruce Mallett, R2
Date: Friday, September 1, 1995 7:18 am
Subject: GE Meeting

I talked to Bob Pierson about changing the date of the GE DCF meeting from 9/27-28, since this was during our Retreat and I now heard that the Ms. Ten Eyk will attend. We would like a Division level person to accompany her. He said that she is going to the meeting (if she goes, on her calendar but something may come up) more as an opportunity to get a good look at the facility in her new capacity. The issues to be discussed are not of such substance that NMSS thought they needed a Division Director to lead the meeting. He said that at this point he really did not want to change the meeting, since he had a difficult time setting a date and we needed to get licensing issues moving. At this point, we will be represented by McAlpine and Troup.

CC: CHB1, GLT, EJM

B/23

MEETING AGENDA

GE/NRC MEETING

SEPTEMBER 27-28, 1995

1. Site and Facility Orientation:

   - general tour of the facility (GE)
   - discuss facility changes due to DCP (GE)

2. License Format & Content:

   - discuss general SRP draft NUREG-1520/Licensee format (GE/NRC)
   - discuss specific SRP areas to be used in GE application (GE)
   - discuss environmental information needs (NRC)
   - discuss possible GE commitments to complete certain parts of application after renewal (GE/NRC)
   - discuss contents of Process Description Document (NRC)

3. License review schedule:

   - discuss NRC's review schedule (NRC)
     - pre-submittal efforts
     - submittal and issuance dates
     - contingency plan for DCP approval
       - AE vs categorical exclusion
     - technical review meetings
   - discuss Region II's construction inspection schedule (RG II)

B124

REVIEW TEAM

FOR

GE WILMINGTON LICENSE APPLICATION

SRP (NUREG 1520) SECTIONS:

1.0 General Information - Keith McDaniel

2.0 Management Organization - Keith McDaniel

3.0 Conduct of Operations - Keith McDaniel

4.0 Integrated Safety Analysis - Keith McDaniel

5.0 Radiation Safety - Elaine Keegan/Ed Flack

6.0 Nuclear Criticality Safety - Marc Klasky

7.0 Chemical Safety - Lidia Roche

8.0 Fire Safety - Amar Datta

9.0 Emergency Management - Ed Flack

10.0 Environmental Protection - Elaine Keegan

11.0 Decommissioning - Keith McDaniel/WM

GE MEETING			TECHNICAL REVIEW MEETING			GE SUBMITS APPL	NRC RECEIPT LETTER		TECHNICAL REVIEW MEETING		INITIAL AMEND EVAL		FINAL AMEND DECISION				APROVE AMEND/ ISSUE RENEWAL
9/95	10/95	11/95	12/95	1/96	2/96	3/96	4/96	5/96	6/96	7/96	8/96	9/96	10/96	11/96	12/96	1/97	2/97
APPLICATION REVIEW MONTHS >>						1	2	3	4	5	6	7	8	9	10	11	12
AMENDMENT REVIEW MONTHS >>														1	2	3	4

September 28, 1995

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/95-08

Gentlemen:

This refers to the inspection conducted by G. L. Troup of this office on September 11-15, 1995. The inspection included a review of activities authorized for your Wilmington facility. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

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

Sincerely,
(original signed by
D. M. Collins)

Douglas M. Collins, Chief
Nuclear Materials Safety and
Safeguards Branch
Division of Radiation Safety
and Safeguards

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See Page 2)

B/25

9510180217 2pp

cc w/encl:
J. F. Klapproth, Manager
Fuels and Facility Licensing
General Electric Company
P. O. Box 780, Mail Code J26
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Dayne H. Brown, Director
Division of Radiation Protection
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C. Cain, RIV
F. Wenslawski, RIV
PUBLIC

Distribution w/o encl:
License Fee Management Branch

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SIGNATURE / NAME	GLTroup	EJMcAlpine				
DATE	09/28/95	09/28/95	09/ /95	09/ /95	09/ /95	09/ /95
COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report No.: 70-1113/95-08

Licensee: General Electric Company
Wilmington, NC 28401

Docket No.: 70-1113 License No.: SNM-1097

Facility Name: Nuclear Energy Production

Inspection Conducted: September 11-15, 1995

Inspector: _____ 9/28/95
G. L. Troup, Sr. Fuel Facility Project Inspector — Date Signed

Approved by: for _____ 9/28/95
E. J. McAlpine, Chief — Date Signed
Radiation Safety Projects Section
Nuclear Materials Safety and Safeguards Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of management and organization, nuclear criticality safety, facility operations, facility changes, training and fire protection. In addition, previous inspection findings were reviewed.

Results:

Within the scope of the inspection, no violations or deviations were identified. One previously identified violation was closed based on the licensee's corrective actions (paragraph 5.a).

Several changes in the organization had been made. Many of these changes do not require license changes. Two changes awaiting internal action are the designation of Area Managers based on current assignments and the designation of the chairman of the WSRC.

Enclosure

REPORT DETAILS

1. Persons Contacted

D. Barbour, Coordinator - Radiation Protection
*D. Brown, Sr. Program Manager, DCP Integration
T. Flaherty, Sr. Process Engineer, DCP
*R. Foleck, Sr. Licensing Specialist
*B. Kaiser, Manager, Chemical Product Line
*J. Klapproth, Manager, Fuels & Facility Licensing
*R. McGowan, Team Leader, URLS/WT
*S. Murray, Manager, Nuclear Safety
*L. Paulson, Program Manager, Criticality Safety
*S. Selby, Team Leader, UO_2 Production
*W. Sependa, Manager, GE-NE EH&S
G. Smith, Team Leader, FMO Maintenance Support
*H. Strickler, Manager, Environmental Protection & Industrial Safety
*J. Taylor, Principal Engineer, Criticality Safety
C. Tarrer, Team Leader, Configuration Management
C. Vaughan, Project Manager, New Facility Licensing/ Safety
F. Welfare, Program Manager, Criticality Safety, DCP

The inspector also interviewed other licensee employees including area coordinators, engineers, operators and technicians.

* Attended exit interview on September 15, 1995.

Acronyms and initialisms used throughout this report are listed in Appendix A.

2. Management Controls and Organization (88005, 88015)

a. On July 24, 1995, the Vice President, GE-NE announced an organization change in that the EH&S & NQA organization was divided into two organizations: Quality and EHS. The former manager of EH&S & NQA was appointed Manager, Quality and the former Manager, Chemical Product Line was appointed Manager, EH&S. Neither of these positions are described in Part I of the license application and can be changed as desired by management.

b. In August, 1994 the Manager, Regulatory Compliance was assigned to the DCP. The Manager, EH&S & NQA issued a memorandum on August 8, 1994 stating that the responsibilities of the Manager, Regulatory Compliance would be carried out by his office. With the organizational change, this was no longer effective. On September 1, 1995, the new Manager, EH&S issued a memorandum stating that the responsibilities of the Manager, Regulatory Compliance would be performed by his office. The inspector determined that the qualifications of the new Manager, EH&S met the qualifications specified in Part I, Chapter 2, Section 2.5.6 of the license application.

c. With the changes in GE-NE management and the DCP, several other management changes, including the assignment of "acting" managers, were made. While these are not defined in the license application, the designation of Area Managers is defined in the license application. P/P 40-16, Nuclear Safety - Area Manager Responsibilities and Assignments, defines the assignment of Area Managers. Specific assignments are made by the Manager, GE-NEP. The inspector reviewed the current memorandum making the assignment and noted that several designated Area Managers are no longer in positions associated with the assignment. The inspector discussed these assignments with two individuals. Both stated that they were aware of the difference and were continuing to carry out the functions of the Area Manager as appropriate. The inspector also reviewed documents which have to be signed/approved by the Area Manager and verified that these individuals had properly signed the documents. Because the qualifications of an Area Manager specify a minimum experience at the facility, changes will be made when the replacements achieve the necessary qualifications. The inspector noted that the documentation included the initials of the prospective Area Manager, indicating that they were involved in current changes. A representative advised the inspector that changes had been identified and were awaiting action on the designating memorandum.

d. Part I, Chapter 2, Section 2.3.1 of the license application defines the membership and responsibilities of the WSRC. WSRC activities are prescribed in P/P 40-1, Wilmington Safety Review Committee. The inspector reviewed the P/P and the minutes of the meetings June 9 and July 28 meetings and determined that the scope was in accordance with the WSRC charter. The membership of the WSRC was changed to include the Manager of the Fuel Examination Technology facility (which is under a State of North Carolina by-product material license rather than the NRC SNM license) because many of the responsibilities of the WSRC concern the FET operation as well. The inspector noted that the chairman of the WSRC was the Manager, EH&S & NQA. With the organization change (paragraph 2.a, above) the Manager, EH&S will assume this position. A change to make this assignment is being incorporated into P/P 40-1 as part of a current revision.

Within the scope of the inspection, violations or deviations were not identified.

3. Nuclear Criticality Safety (88010, 88015, 88025)

a. Part I, Chapter 4, Section 4.2.2.5 of the license application states that calculational methods used in nuclear criticality safety analyses shall include GEKENO and GEMER Monte Carlo codes, and that newly developed codes may also be used when they have been validated and benchmarked. The GEKENO and GEMER codes had been converted for use on personal computers. Review of the

validation of the codes was documented in IRs 70-1113/93-06 and 70-1113/94-09, respectively. The inspector discussed the status of the codes, such as any new codes or major modifications to existing codes, with licensee representatives. They stated that no new codes were being introduced nor were there any changes currently planned for the codes. While no currently used, the mainframe computer is still available to run the codes, but may be removed in the future.

b. The inspector reviewed two Change Requests for the installation and modification of the new dissolver filter in URU. CR 95-003 was approved to install the new filter. Included in this change was a change to the control system logic, which was implemented by an SSR and later verified to have been satisfactorily changed by completion of the FTI. The nuclear criticality safety analysis was confirmed to have been done with approved codes by qualified analysts and demonstrated to meet the license requirements. An interaction analysis was performed for the dissolver room and demonstrated that the license requirements were met under accident conditions. All of the Nuclear Safety requirements were verified to be complete and the CR was released by the Area Manager. Subsequently, another CR was generated to modify the filter after operations problems were encountered. This CR was also reviewed and determined to have been reviewed and approved in accordance with the license requirements.

c. The Criticality Safety group developed a training program for engineers as part of their qualification to use the computer codes (and as a refresher for experienced users). At present the training is being conducted with two sessions per week for approximately 10 weeks. The inspector reviewed the approved training module and the associated materials. These reflect the background information necessary for an individual to become an approved user of the codes. A separate module has been approved for the indoctrination of new employees in Criticality Safety Engineering.

d. The inspector reviewed the monthly source check records for the criticality monitors for the period May - September, 1995 and determined that the monitors were responding as required and the alarms were activated when two detectors in an area reached the alarm point. The monthly records indicated that when a detector did not respond properly, a work order was written and the detector replaced; the replacement detector was verified to have been calibrated and source checked after installation with a two point check. The inspector also reviewed the annual calibration records for the test performed December 5-7, 1994.

Within the scope of the inspection, violations or deviations were not identified.

4. Plant Operations (88015, 88020, 88055)

a. During the inspection, the inspector toured various plant areas to observe conditions and operations in progress. Items observed included storage of materials in authorized locations, enrichment of materials in accordance with posted limits, proper storage containers for flammable liquids, and general plant house keeping. The inspector also observed that fire extinguishers, hoses and emergency kits were unobstructed.

b. The inspector reviewed the following items related to the fire protection program:

(1) monthly test for September and semi-annual test results in June for the diesel fire pump
(2) monthly checks for fire water valves in July and August
(3) monthly fire water flow alarm tests for July and August (some areas were secured during shutdown in July and were not tested but were tested in August.

Because of construction activities for the DCF, water flow tests could not be conducted for some sub-systems (this would discharge water into construction areas). However, other portions of the system were tested which indicated flow in the system. Also, during the August monthly fire inspection, a Factory Mutual Insurers representative accompanied the licensee personnel.

c. During tours of the facility, the inspector observed fire extinguishers and hoses and verified from the inspection tags that the inspection was current. However, the inspector observed one fire extinguisher located in the REDCAP area which had been inspected in January and February but not since, as evidenced by the markings on the inspection tag. When brought to the attention of licensee personnel, action was taken to correct the situation. The issue of how the fire extinguisher was not inspected for six months when it should have showed up in the monthly inspection records as "missed" was being reviewed by licensee representatives.

d. On September 12, 1995, a fire broke out in the motor of a dryer in the laundry. When a operator pulled the handle on the fire call box, nothing happened. The fire was extinguished using portable equipment. An Unusual Incident critique was initiated to discover why the alarm did not sound when pulled. It was determined that the electrical contacts in the box were corroded so no contact could be made. The contacts were cleaned and checked satisfactorily. In addition, the approximately 160 pull stations around the plant site were tested and none failed to activate. As part of the corrective actions, a review of the PM program for the pull stations is being made.

e. On September 14, 1995 the inspector observed five wooden pallets containing cardboard cartons and/or wrapped in plastic stored in the spent solvent warehouse between two sets of solvent drums. The NSR/R for the building allows for the storage of the spent solvent but prohibits "any other flammables." While the wood and plastic are not "flammable", the inspector questioned why "combustibles" were stored in the location, since the material had nothing to do with the solvent. Licensee representatives stated that the pallets had been moved in out of the weather "temporarily" but acknowledged that "temporary" had become too long. The Area Manager directed that the material be moved to another, suitable storage location, which was accomplished that evening.

f. A licensee representative advised the inspector that a problem had been encountered with the liner in one of the waste lagoons. This was discussed further with the Team Leader. The situation was that the inner liner of a double-lined lagoon had apparently been torn by the dredge. This lagoon is used intermittently for temporary storage of calcium fluoride when part of Waste Treatment was shutdown. There had been no evidence of leakage from the lagoon. Two alternatives to correct the situation were being developed. On September 15, the Manager, EH&S informed the inspector that a decision had been made and work would be starting to implement the plan.

Within the scope of the inspection, violations or deviations were not identified.

5. Review of Previous Inspection Findings (88005, 88015, 88025)

a. (Closed) Violation 95-02-01

This violation dealt with the use of trash bags and bag holders which did not comply with the nuclear criticality safety requirement that the bag separate from the holder or fail if a safe batch mass were placed inside. The licensee's response dated April 7, 1995 stated that new trash bags would be procured which have a perforated edge which will tear before the safe batch mass is exceeded.

The inspector reviewed CR 95-0274 and the nuclear safety analysis for the use of the new bags. The CR was approved and released by the Area Manager on June 9, 1995. During tours of plant controlled areas, the inspector observed that new, perforated bags were in use and the holders had been modified to prevent sealing the bag in the holder. Licensee representatives also demonstrated that the bag would tear free when a 25 kilogram weight was placed inside. The inspector had no further questions.

b. (Open) IFI 95-02-02

This IFI dealt with the use of various stamps on drawings to indicate that the drawing was a "controlled copy." There were several different stamps which had been used and drawings in one location had different stamps, creating confusion as to their status.

The licensee initiated the use of a new stamp and replaced the drawings in the control room with a set of drawings all stamped the same. However, in the ECC, the drawing files contained drawings with the different "controlled" stamps and also had some drawings stamped "uncontrolled copy". The cognizant leader stated that the ECC drawing file would be updated by November 1 to contain only controlled drawings. In the meantime, the licensee is developing a method to control drawings not developed or revised by the Configuration Management Center, such as facilities or utilities drawings. This item will be reviewed during subsequent inspections.

6. Exit Interview

On September 15, 1995, the scope of the inspection and the findings were discussed with those persons identified in Paragraph 1.

The inspector informed licensee management representatives that Violation 95-02-01 was closed based on the use of new trash bags. IFI 95-02-02 remained open pending the resolution of "controlled' drawings in the ECC.

While not specifically addressed as IFIs, the inspector stated that the licensee's actions on PM for the fire alarm pull boxes and the repair of the waste lagoon liner would be reviewed during future inspections.

Although proprietary documents were reviewed during the inspection, the proprietary nature of the documents has been deleted from this report.

APPENDIX A

Acronyms and Initialisms

DCP	Dry Conversion Project
ECC	Emergency Control Center
EH&S	Environmental, Health & Safety
FET	Fuel Examination Technology
FMO	Fuel Manufacturing Operation
FTI	Functional Test Instruction
GE-NE	General Electric Nuclear Energy
GE-NEP	General Electric Nuclear Energy Production
IR	Inspection Report
NQA	Nuclear Quality Assurance
PM	Preventive Maintenance
P/P	Policy/Procedure
PROD	Process Requirements and Operator Documents
SNM	Special Nuclear Material
SSR	Software Service Request
URLS/WT	Uranium Recovery from Lagoon Sludge/ Waste Treatment
URU	Uranium Recovery Unit
WSRC	Wilmington Safety Review Committee

May 16, 1996

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/96-05

Dear Mr. Kipp:

This refers to the inspection conducted on April 15-19, 1996, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790, of the NRC's "Rules of Practice," a copy of this letter will be placed in the NRC Public Document Room.

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

Sincerely,

/s/

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See page 2)

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cc w/encl:
Dr. Ralph Reda, Manager
Fuels and Facility Licensing
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P. O. Box 780, Mail Code J26
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G. Troup
R. Bellamy, RI
G. Shear, RIII
C. Cain, RIV
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License Fee Management Branch

OFFICE	RII:DNMS	RII:DNMS					
SIGNATURE	a. B.						
NAME	AGooden	GTroup					
DATE	05 / 06 / 96	05 / 04 / 96	05 / / 96	05 / / 96	05 / / 96	05 / / 96	
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report No.: 70-1113/96-05

Licensee: General Electric Company
Wilmington, NC 28401

Docket No.: 70-1113 License No.: SNM-1097

Facility Name: Nuclear Energy Production

Inspection Conducted: April 15-19, 1996

Inspector: A. Gooden 05/06/96
A. Gooden, Radiation Specialist Date Signed

Approved By: E M° Alpine 5/16/96
E. McAlpine, Chief Date Signed
Fuel Facilities Branch
Division of Nuclear Materials Safety

SUMMARY

Scope:

This routine, announced inspection was conducted to assess the operational readiness of the licensee's emergency preparedness program. Areas reviewed included the coordination and interface with offsite authorities on emergency planning; training for onsite and offsite response personnel; facilities and equipment maintenance; independent audits including the corrective action tracking in response to drills, exercises, audits, and inspection findings; the administrative and procedural program for notification of emergency response personnel; and program changes since the June 1994 inspection.

Results:

Within the areas reviewed, a non-cited violation was identified for failure to certify an Emergency Response Team member was physically able to use respiratory protection equipment (Paragraph 5). An Inspector Followup Item was identified to assure the timely activation and staffing of the licensee's emergency response organization (Paragraph 4). With the exception of the aforementioned items, the licensee's program was adequately maintained. Contact with two of the offsite support agencies disclosed the licensee was maintaining a very effective relationship with frequent contact to discuss matters of a mutual concern.

Enclosure

1/1 P

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Bradberry, Senior Program Manager, Regulatory Team
*R. Foleck, Senior Licensing Specialist
*P. Godwin, Coordinator, Fire Safety and Emergency Response
*J. Harmon, Chief Technologist and Emergency Director
*R. Keena[illegible], Manager, Site Security and Emergency Preparedness
*J. Kline, [illegible], Chemical Production Line
A. Mabry, [illegible] Nuclear Safety Engineer
*S. Murray, Manager, Nuclear Safety
*R. Reda, Manager, Fuels and Facility Licensing
*B. Robinson, Principal Nuclear Safety Engineer
*W. Sependa, Manager, Environment, Health and Safety
*H. Strickler, Manager, Environmental Protection and Industrial Safety
*R. Torres, Auditor, Compliance Auditing
*T. Winslow, Manager, Material Control and Accountability

Other licensee employees contacted during this inspection included engineers, technicians, administrative, and security personnel.

Other Organizations

L. Ray, Director, New Hanover County Emergency Medical Services
D. Summers, Director, New Hanover County Department of Emergency Management

*Attended Exit Interview

An index of abbreviations used throughout this report will be found in the last paragraph.

2. Offsite Support Agencies (88050)

Discussions were held with a member of the licensee's staff regarding the coordination of emergency planning with offsite support agencies. The inspector reviewed the status of agreement letters with offsite support agencies, and noted that with one exception, current agreements were maintained on file by the Site Security and Emergency Preparedness Manager. The exception involved the absence of a current agreement with REACTS. When questioned regarding the availability of an agreement letter, the inspector was informed by the licensee contact that an agreement was no longer on file; however, during the next Plan or agreement letter update, an agreement letter will be executed with REACTS. The absence of an agreement letter was also identified by the licensee during an independent audit conducted in September 1995, and was assigned to the licensee's tracking system for corrective actions. The adequacy of the licensee's interface with offsite support agencies was determined via telephonic discussion with representatives of two

offsite support organizations (see Paragraph 1). The contacts described a very close working relationship with excellent communications between the licensee and county. County representatives cited as examples the licensee's involvement in an offsite planning partnership, and the frequent contact to discuss matters of a mutual concern such as organizational changes, training, and periodic site tours. Section 7.2 of the RC&EP required the licensee to offer periodic training to offsite groups. The inspector reviewed documentation to show that during March 1995, 21 members of the VFD (Castle Haynes, Wrightsboro, and Ogden) participated in a site tour to discuss site changes and planned or future changes. During the period of the inspection, the licensee conducted training at the New Hanover Regional Medical Center.

Based on interviews with offsite contacts and documentation to show periodic training and site familiarization tours, the inspector concluded that the licensee's interface with offsite support agencies was very effective in assuring that the offsite authorities were familiar with their role, responsibilities, and the potential impact of an incident. The interface with the offsite authorities was considered a program strength.

No violations or deviations were identified.

3. Emergency Plan and Implementing Procedures (88050)

The review, approval, and distribution of Plan changes was examined to determine whether significant changes were made since the June 1994 inspection, to assess the impact of any changes on the overall state of emergency preparedness at the facility, and determine if the Plan implementing procedures (referred to as Emergency Procedures) were revised to reflect those changes. Requirements applicable to this area are found in 10 CFR 70.22(i).

Since the June 1994 inspection, two plan changes (Revs. 0 and 1) were submitted for NRC review. The licensee had submitted Rev. 0 (dated December 2, 1994) to the RC&EP, to address numerous concerns that were identified by NRC in a letter dated January 5, 1994, and inconsistencies identified during the June 1994 inspection (see IR 70-1113/94-07). Rev. 1 was merely administrative changes (e.g. page numbers and titles). The aforementioned changes were approved by NRC via letters dated January 10, 1995 (Rev. 0) and March 1, 1995 (Rev. 1). The RC&EP in effect at the time of the inspection was Rev. 1 dated February 1, 1995.

The licensee maintained nine EPs for implementing the requirements of the Plan. All procedures were revised and reissued during March 1996. Current copies of both the RC&EP and EPs were available in the ECC, staging areas, and security. The inspector reviewed documentation to confirm that Rev. 1 to the RC&EP was distributed to both onsite and offsite copyholders in a timely manner. According to the documentation, Rev. 1 changes were issued to copyholders on March 8, 1995.

In addition to the changes regarding the RC&EP and EPs, the emergency preparedness program was in a state of transition. Effective January 4, 1996, a personnel change resulted in the reassignment of the responsibility for emergency preparedness. Previous personnel was assigned responsibility as Manager, Emergency Preparedness, Security, Material Control and Accountability. Recent change resulted in a newly appointed individual with other collateral duties and the title MSSEP. Currently, in addition to emergency preparedness and security, management responsibilities include all other aspects of emergency preparedness such as the ERT (also known as fire brigade), EMT, and fire safety. Previously, the reporting chain for the ERT and fire safety was the Manager, Environmental Health and Safety. There were no changes to the individuals assigned the day to day responsibilities for those additional areas. The inspector determined via interview and documentation that the MSSEP training, and experience in emergency preparedness, was quite extensive due to involvement as a Radiological Planning Officer for New Hanover County, and experience in conducting independent audits of the RC&EP as a member of the licensee's compliance audit staff. Regarding the ERO, the impact of this change should be minimal, with no affect on the licensee's capability to respond in light of the following: no changes were made to personnel performing day-to-day support activities to emergency preparedness; although reassigned, the previous Managers of Emergency Preparedness both remains onsite and are available for assistance/consultation; and the licensee's ERO staff is one of experience and stability with no recent personnel changes in key positions.

No violations or deviations were identified.

4. Emergency Facilities and Equipment (88050)

Facilities and equipment were inspected to determine whether the licensee's ECC, emergency response equipment, instrumentation, and supplies were maintained in a state of operational readiness, and to assess the impact of any changes on the emergency preparedness program. Requirements applicable to this area are found in Section 6 of the RC&EP.

The inspector reviewed the operational readiness status of equipment and facilities via facility walk-down, inventory, and operability checks. With very minor exceptions, equipment, supplies, and instrumentation stored at the ECC and staging areas were not only operational but adequate inventories were available for response personnel. The exceptions involved an inoperable telephone, an outdated phone listing, an inoperable survey instrument, and a bull horn. In response to the inoperable equipment, the licensee took immediate actions to determine the cause and return equipment to an operable status. It was determined that the survey instrument and bull horn batteries were in need of replacement. Instruments were calibrated and responded properly to both battery and radioactive source checks. Air tanks were examined for SCBA units stored onboard the ERT vehicle and determined to be full and ready for use. One additional aspect of assessment equipment observed by the

inspector as operational and within calibration was the onsite meteorological monitoring station located in the ECC. When records were reviewed for equipment surveillance performed in the ECC during the period September 1994 to June 1995, no problems were noted.

The inspector reviewed the licensee's backup power provisions in the event a loss of power occurred. According to Section 5.3.4 of the RC&EP, emergency power is provided for a supervised alarm system and essential equipment. The inspector observed a weekly test of the 150 KW diesel-operated generator which provides an automatic startup of the emergency generator in the event of a power failure. No problems were noted, the diesel was operated for several minutes.

According to the licensee contact, the following facility or equipment changes had been made since the last inspection of this area:

- A new site alarm system was being installed at the time of this inspection. The anticipated date for completion of installation, testing, and turnover to operations is May 6, 1996. An interview with security personnel disclosed that training on the new system was in progress.

- A cellular phone was maintained for use by the On-Scene Incident Commander for communicating details from the scene of the incident to the ECC without influence or cross talk resulting from other response personnel operating on analogous radio frequency.

- Two (2) TV monitors were installed within the ECC and ECC bay area providing the capability to observe activity involving decision-making (ECC) or team deployment (ECC bay area) during an emergency.

- An onsite capability for refilling SCBA equipment was procured during CY 95.

- One staging area was relocated due to access during severe weather, and a new staging area was built to accommodate the FET and DCP buildings.

- The capability for accessing the GE Information System (RDMS, plant drawings, etc.) was recently installed in the ECC.

The licensee's notification system for activating the ERO during off-hours was reviewed for effectiveness in staffing the ECC. During off-hours, ERO personnel are contacted by security personnel via pager and/or telephone. The inspector discussed with the licensee contact and reviewed documentation to show that on a quarterly basis, notification drills were conducted for determining the availability of ERO staff during off-hours. Drills were conducted as follows: 1) security activates group pagers; 2) when paged, the ERO member calls the number listed within 15 minutes and provide their name and the anticipated travel time to arrive onsite; 3) fifteen minutes after

activating pagers, security check the recorded messages for responders providing ETA; 4) in the event no response provided, security phone the member's residence; and 5) if the primary is unavailable, security contacts the backup or alternate. The inspector reviewed records covering the period August 1994 to March 1996, and noted that three of seven tests disclosed poor results. The test dates were August 16, 1994, February 1, 1995, and most recently March 28, 1996. ERO personnel delayed contacting security for more than thirty (30) minutes to provide an estimated time of arrival. During the February drill, 59 minutes elapsed before one individual contacted security with an ETA; and for one position, the primary nor alternate responded to the pager test and security was unable to contact the primary or alternate via telephone. The most recent drill results (March 1996) disclosed from 17 individuals paged, five responded to security page within 34-35 minutes after notification; no response was obtained from three individuals (phone/pager), and nine members of the ERO were not contacted via phone (or pager) by security for almost an hour. Based on the documentation review, the inspector discussed with the licensee contact assigned responsibility in this area, the adequacy of administrative and physical mechanisms to ensure the timely and appropriate staffing of the ECC during off-hours. In response to the inspector's comments and the recent drill results, the licensee conducted an unannounced off-hours pager drill on April 17, 1996 and several problems were noted by the licensee and NRC inspector; several pagers failed to activate; actions by security personnel were not consistent with procedures; and ERO personnel were in some instances not following pager guidelines. In response to the aforementioned observations, the licensee reviewed all aspects of the administrative and physical mechanism for off-hours staffing and activation and took the following immediate actions: 1) pager listing was reviewed and updated with current information; 2) lead security personnel for evening shift was given informal training on activation procedures; and 3) an unannounced remedial drill was conducted on April 18, 1996, during off-hours. The inspector and licensee contact noted significant improvements in the response times during the remedial drill from the previous drill (which the licensee attributed to an outdated pager listing), but problems were again noted in the areas of human errors and procedure (e.g. security personnel entered an incorrect pager signal). Consequently, the licensee discussed the following corrective actions to resolve the various problems in the area of timely staffing and activation of the ERO:

- All personnel assigned to the group pagers were informed of the above problems via memo on April 19, 1996.
- A discussion with site staff regarding pager problems, lessons learned, and pager responsibilities was planned for April 23, 1996.
- Revise and simplify security procedures regarding the implementation of group pager notifications and tests.
- Train all security personnel on revised procedures when completed.

- Rewrite and redistribute pager responsibilities to all ERO personnel.

- Periodically verify as current the computer printout of the group Call list from the paging company.

The inspector informed the licensee that the corrective actions to ensure the timely and effective activation and staffing of the ECC was considered an IFI for review during a subsequent inspection.

IFI 70-1113/96-05-01: Verify the adequacy of corrective actions to ensure timely activation and staffing of the ECC.

During the facility walkdown discussed above, the inspector accompanied by a licensee representative during backshift hours, examined the evacuation routes leading to the new staging area for accessibility during evacuation, the amount and/or condition of lighting, and the operability of equipment in all onsite staging areas. The site tour disclosed no areas of impediment to evacuation. However, in light of construction activity and equipment associated with the DCP facility, areas were noted by the licensee and inspector where the installation of evacuation signs would ensure evacuees travel via the most expedient route to the staging areas. According to the licensee contact, as site characterization changes due to the construction activity, the adequacy of existing signs and evacuation routes to the new staging area will be further evaluated.

Based on the records reviewed, interviews, and facility walkdown, the inspector determined that the licensee was maintaining equipment in a state of readiness.

No violations or deviations were identified.

5. Drills and Training (88050)

Emergency response training was reviewed to determine if the licensee was providing training in accordance with the RC&EP. The requirements for training are found in Table 7.1 of the RC&EP. Section 7.3 of the RC&EP required periodic drills to maintain proficiency in emergency response.

The inspector reviewed Table 7.1 for a description of the training program for Emergency Directors, Emergency Staff Advisors, Site Emergency Support Groups (Building Managers), and the Emergency Response Team. The inspector requested training documentation for randomly selected personnel listed on the emergency notification roster (dated April 1, 1996) and the ERT roster. Based on the review of documentation and interviews with personnel assigned the responsibility for training and/or tracking training, with one exception, selected personnel training was current and up-to-date. The exception involved personnel assigned to the ERT. Ten names were randomly selected from the ERT roster for training verification. Included as part of the training

verification, the inspector also confirmed that the individuals received a medical examination and were respirator qualified as described in procedures P/P 40-22 and NSI 0-1.0. The referenced procedures also implemented the requirements in 10 CFR 20.1703 (a)(3)(iv), and 20.1703 (a)(3)(v). Three of ten names selected had not been medically certified for respirator use. Two of the individuals were recent volunteers to the ERT (late 1995 and early 1996). However, one of the three individuals joined the ERT approximately three years ago. According to documentation and an interview with medical staff, the last medical review and certification was performed during 1993. Further, documentation and an interview with a licensee contact disclosed during the period 1993 to present, the aforementioned individual used SCBA equipment during drills and in response to an actual emergency (non-radioactive) on April 21, 1995, involving a compressor fire in the FCO building. Procedural requirements previously stated that "respirator users must be trained in the proper use of respirators specified for their job assignment; and must have respirator medical clearance reevaluated annually." 10 CFR 20.1703 (a)(3)(v), prior to March 1995, required "determination by a physician prior to initial fitting of respirators, and at least every 12 months thereafter, that the individual user is physically able to use the respiratory protection equipment." Effective March 13, 1995, NRC amended the rules in 10 CFR 20.1703 to require "determination by a physician prior to initial fitting of respirators, and either every 12 months thereafter or periodically at a frequency determined by a physician, that the individual user is medically fit to use the respiratory protection equipment." In response to the amendment, the licensee's procedures and license (Section 3.2.4.5.2) were revised to reflect the reduced frequency. Irrespective of the referenced revisions in calendar year 1995, personnel failed to obtain medical certification for more than two years. The licensee was informed that failure to medically certify ERT members for respiratory protection equipment was a violation of 10 CFR 20.1703(a)(3)(v) and site procedures which implements the respiratory protection program. The licensee acknowledged the finding and indicated that the lack of certification resulted due to the administrative system used for tracking the training of non-radiation workers (e.g. ERT members from Aircraft Engines) in comparison to radiation workers (tracked via RDMS). In response, the licensee took immediate action as follows:

- Responder was administered a vital capacity test and certified as medically fit for respirator use.
- The remaining two ERT members were notified that a vital capacity test was required during their annual physical.
- Medical records for all ERT members were reviewed to verify that members had a vital capacity test and certified as medically fit for respirator use.
- Medical records were compared to the RDMS tracking system data base and the tracking system updated as necessary.

- All ERT members not previously tracked via RDMS, will be added to RDMS under the training requirement of RP-201 to require medical staff perform a vital capacity test during the annual physical.

- Personnel with responsibility for ERT will be granted access to RDMS tracking system to periodically review ERT certification status.

In light of the above actions, this NRC identified violation is not being cited because criteria specified in the NRC Enforcement Policy were satisfied. The licensee was informed that this finding was considered a NCV.

NCV 70-1113/96-05-02: Failure to certify a member of the ERT in accordance with 10 CFR 20.1703 and site implementing procedures that the individual is medically fit to use respiratory protection equipment.

The inspector reviewed documentation to confirm ERO training was provided and attended by key personnel assigned to the ERO. The inspector compared the training attendance roster with the current emergency organization listing dated April 1, 1996, for verification of training. No problems were noted. In addition to the records review, to assess the effectiveness of the licensee's training program, the inspector interviewed two members of the licensee's staff with responsibility in the area of accident assessment and dose calculation. Interviewees were very familiar with their role and responsibility during an event. As a tool for reviewing the performance of interviewees, a postulated accident with offsite consequences was validated by a member of the licensee's staff and presented to interviewees for taking the appropriate actions. Members of the licensee's staff along with the inspector observed the interviewee's performance in manual dose calculation and protective actions. No significant problems were noted. Personnel demonstrated an excellent use of procedures, and understanding of various assumptions and defaults in the procedure for manual dose calculations.

One NCV was identified.

6. Independent Review/Audits

This area was reviewed to determine if the licensee had performed an independent review or audit of the emergency preparedness program.

An independent audit was conducted during September 1995 by personnel from the Nuclear Quality Assurance group, and documented as Compliance Audit No. 36/95-1. The referenced audit included a review of the NRC approved RC&EP (Rev. 0, dated December 2, 1994, and Rev. 1, dated February 1, 1995), and EPs. One concern was identified regarding the adequacy of the RC&EP in addressing the OSHA regulations for Emergency Plans in the non-nuclear buildings onsite. The audit program was

effective in the identification of areas requiring improvements and/or corrective actions. Audits were detailed and compliance oriented to ensure license commitments in the RC&EP were satisfied.

The licensee utilized the plant-wide tracking system (known as Safety Compliance and EHS Activity Items) to monitor open items and issues in emergency preparedness resulting from NRC inspections, independent audits, and actual incidents. A review of the computer print-out showed that the system was appropriately detailed, and indicated for each item the responsible individual and status of completion. The inspector determined that the licensee was effectively using the referenced tracking system as a tool to ensure the completion of corrective action for identified problems in emergency preparedness. In addition to the referenced tracking system, the Training Officer for the ERT was tracking items resulting from ERT activities and providing a weekly status update to plant management.

No violations or deviations were identified.

7. Exit Interview

The inspection scope and results were summarized on April 19, 1996, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

Item Number	Status	Description and Reference
70-1113/96-05-01	Open	IFI - Verify the adequacy of corrective actions to ensure timely activation and staffing of the ECC (Paragraph 4).
70-1113/96-05-02	Closed	NCV - Failure to certify a member of the ERT in accordance with 10 CFR 20.1703 and site implementing procedures that the individual is medically fit to use respiratory protection equipment (Paragraph 5).

8. Index of Abbreviations Used In This Report

CFR	Code of Federal Regulation
DCP	Dry Conversion Process
ECC	Emergency Control Center
ED	Emergency Director
EMA	Emergency Management Agency
EMT	Emergency Medical Team
EP	Emergency Procedure
EPA	Environmental Protection Agency
ERO	Emergency Response Organization

ERT	Emergency Response Team
ETA	Estimated Time of Arrival
FCO	Fuel Components Facility
FET	Fuel Examination Technology
GE	General Electric
IFI	Inspector Followup Item
IR	Inspection Report
KW	Kilowatt
MSSEP	Manager Site Security and Emergency Preparedness
NSI	Nuclear Safety Instruction
OSHA	Occupational Safety and Health Administration
P/P	Practices and Procedures
PAG	Protective Action Guide
PAR	Protective Action Recommendations
RC&EP	Radiological Contingency and Emergency Plan
RDMS	Radiation Data Management System
REACTS	Radiation Emergency Assistance Center Training Site
REV.	Revision
SAE	Site Area Emergency
SCBA	Self Contained Breathing Apparatus
VFD	Volunteer Fire Department

June 13, 1996

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/96-06

Dear Mr. Kipp:

This refers to the inspection conducted on May 20-24, 1996, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790, of the NRC's "Rules of Practice," a copy of this letter will be placed in the NRC Public Document Room.

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

Sincerely,

Original Signed by D. Collins for:

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See page 2)

B/27

9607030211 2pp

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ATLANTA, GEORGIA 30323-0199

Report No.: 70-1113/96-06

Licensee: General Electric Company
Wilmington, NC 28401

Docket No.: 70-1113 License No.: SNM-1097

Facility Name: Nuclear Energy Production

Inspection Conducted: May 20-24, 1996

Inspector: _____ 6/13/96
G. L. Troup, Sr. Fuel Facility Project Inspector Date Signed

Approved by: _____ 6/13/96
for E. J. McAlpine, Chief Date Signed
Fuel Facilities Branch
Division of Nuclear Materials Safety

SUMMARY

Scope:

This unannounced inspection was focused on the inspection of the installation of the final membrane of the roof of the Direct Conversion Facility (DCF), which is intended to be a Moderation Exclusion Area. In addition, the inspection included organization changes, nuclear criticality safety, facility operations and review of the corrective actions for previously identified inspection findings.

Results:

The final stage of roof construction for the DCF was in accordance with the design criteria and associated construction documents. Organization changes and appointment of new managers was in accordance with license requirements. Two previously identified inspector follow-up items (IFIs) were closed. One violation (non-cited) relating to the failure to follow the requirements of approved procedures and nuclear criticality safety requirements was identified (Paragraph 8).

Enclosure

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. Chilton, Manager, Joint Conversion Project
*A. Del Priore, Engineer, Environmental Programs
*D. Dowker, Team Leader, Fuel Support
*R. Foleck, Sr. Licensing Specialist
*T. Hauser, Manager, GE-NE QA
*R. Keenan, Manager, Site Security & Emergency Preparedness
*M. Lamb, Team Leader, Powder Preparation and Packaging
*A. Lehmann, Principal Engineer, URU Team
*A. Mabry, Principal Engineer, Nuclear Safety
*D. McCaughey, Manager, Fuel and ChemMet Lab Quality
*R. McIver, Manager, Facility Construction, JCP
S. Murray, Manager, Nuclear Safety
*R. Pace, Project Manager, Facility Integration
*L. Quintana, Manager, Fabrication Product Line
*R. Reda, Manager, Fuel and Facility Licensing
*S. Selby, Team Leader, UO_2 Production
*W. Sependa, Manager, GE-NE EH&S
*G. Smith, Team Leader, FMO Maintenance Support
*H. Strickler, Manager, Environmental Protection and Industrial Safety
*C. Tarrer, Team Leader, Configuration Management
*J. Taylor, Principal Engineer, Nuclear Criticality Safety
*K. Theriault, Team Leader, URU
*C. Vaughan, Project Manager, New Facility Licensing/ Safety
C. Williams, Team Leader, URLS/WT
*T. Winslow, Manager, Material Control & Accountability

The inspector also interviewed other licensee employees including area coordinators, engineers, operators, and technicians.

*Attended exit interview on May 24, 1996.

Acronyms and initialisms used in this report are listed in Appendix A.

2. Facility Status (88020)

The GE Wilmington site (covering NEP and Aircraft Engine facilities) was designated a STAR facility by North Carolina OSHA, under the OSHA Voluntary Protection Program (VPP). VPP endeavors to promote and recognize effective safety and health management programs. It reduces OSHA inspections and emphasizes the ability of the facility to conduct its safety programs.

3. Organization and Staffing (88005)

Since the last inspection, three changes were made in the management organization. On May 6, 1996, L. Quintana assumed the position of Manager, Fuel Fabrication Product Line. T. Flaherty was appointed as

Start-up Manager for the Direct Conversion Facility. C. Williams became Team Leader for Waste Treatment/URLS. These positions are not specifically described in Part I, Chapter 2 of the license application. No specific qualifications are specified for these positions.

Within the scope of the inspection, violations or deviations were not identified.

4. Direct Conversion Facility Roof Construction (88020)

a. The facility is designed as a "moderation exclusion" area where no moderating materials will be permitted, except under specifically designated conditions, in those areas where UO_2 powder is produced or handled. A principal feature of the "moderator exclusion" principle is the construction of a roof which precludes any leaks of rain into the facility. Details of the roof construction are described in JCC drawings in the A21-ARXX series of drawings and the roofing material supplier project description. The DCF roof is designed to provide multiple barriers to any leakage or seepage of external moisture into the DCF. Details of the roof design and construction are discussed in IR 70-1113/96-02, Paragraph 4.

b. During the inspection, installation of the final (top) roof membrane began. The inspector observed the preparation of the surfaces, installation of the membrane, and preparation of the edges for sealing. The inspector also observed the condition of sealed joints which had already been made. Through direct observation and discussions with personnel performing the installation, the inspector verified that the membrane installation was being performed in accordance with the requirements specified in the E/C roof installation documents. There were several spots in the installed membrane which appeared to be air bubbles or foreign material inclusions. A licensee representative stated that the E/C roof expert would be brought in to inspect the membrane and determine those areas which required repair. Repairs will be in accordance with the E/C requirements.

c The inspector also observed that the "bent plates" had been installed around the facility to hold the lower roof membrane in place. The edge trim, metal eave trim and drain gutter have to be installed.

Within the scope of the inspection, violations or deviations were not identified.

5. DCF Integration (88020)

a. The DCF will produce UO_2 powder, which will then be transferred to existing work stations in FMO/FMOX for the production of pellets. Because the existing ADU lines will remain in production during the DCF start-up and qualification, a plan for the installation of new facilities, changes in equipment and construction of moderation exclusion areas is required.

b. The inspector discussed the plan for accomplishing the change-over while maintaining both existing and new nuclear safety criteria. A plan has been drafted and is currently being reviewed by NEP, DCF, and E/C personnel. Approval of the plan is presently projected for June. Once the plan is approved, a detailed integration schedule will be developed. Licensee personnel stated that the NRC would be kept informed of the status of the integration plan.

c. A staffing plan has been developed for the DCF and candidates have applied for the openings. Based on the persons selected, then positions in other areas, such as Chemical Conversion, URU, or maintenance, will be filled by promotions and new hires. The licensee is including the plan for filling vacant positions and training persons for the new positions in the integration plan. Training of the DCF operators will start after replacements have been trained. Some personnel have already been selected and are in training at the equipment supplier's facility.

The inspector had no further questions at this time.

6. Facility Changes (88020)

a. As discussed in IR 70-1113/96-203, Paragraph 5, the licensee is installing a system to recover uranium from incinerator ash ("ash leacher"). The CSAs for the leacher system and the interaction with surrounding equipment were reviewed in that report and found to be adequate.

b. The inspector reviewed the Change Request (CR #95-371) file for the ash leacher and discussed the schedule with the cognizant engineers. The inspector noted that the leacher system had been "approved for installation at risk" on October 2, 1995, and had been "approved for installation" on March 20, 1996. The Technical Report had been approved by the Area Manager on April 2, 1996. The system tests and the AEC functional tests had not been completed but were being planned. Final release for operations with licensed material will require final approval of the NSR/R.

Within the scope of the inspection, violations or deviations were not identified.

7. Operations (88020)

a. In IR 70-1113/95-08, Paragraph 4.d, a situation was identified when a fire alarm pull box did not operate when required during a small fire in the contaminated clothing laundry. Part of the corrective action was to review the preventive maintenance program for the pull boxes. During the intervening period since that inspection, a new alarm system has been installed. This system includes a circuit which periodically automatically tests the operability of the circuit. While the old pull boxes are still installed in the plant areas, they are covered with adhesive tags

stating they are inoperable. Other signs tell personnel to call a specific telephone number if the box does function. The new system boxes were observed throughout the plant and were observed to have the function lines flashing. The inspector discussed the status of removal of the old pull boxes and alarm system with the cognizant supervisor. As the new system is functional, the issue of a preventive maintenance program for the old system is moot.

b. The inspector toured various plant areas during the inspection to observe operations, plant conditions and general conditions.

During a tour of the construction areas of the DCF, the inspector observed a fire extinguisher which had not been inspected in two months, as evidenced by the inspection tag attached to the handle. When this was brought to the attention of a licensee representative, action was taken immediately to replace the fire extinguisher.

Cleanliness and housekeeping in plant areas toured were good. SNM containers were stored in authorized locations and in approved arrays. Flammable materials were stored in approved containers and there were no accumulations of rags. Construction areas in FMO/FMOX were unclutered and materials staged to prevent tripping hazards. Floors in liquid processing areas were dry with no visible accumulations of dried solids.

Within the scope of the inspection, violations or deviations were not identified.

8. Reportable Event Review (88020)

a. On November 26, 1995, the licensee made an report under the requirements of NRC Bulletin 91-01 (NRC EN 29641) because UO_2 powder had been found under the muffle and on the sides of the muffle in the oxidation furnace in the REDCAP area. A total of 22 kgs. of powder were found. This was determined to be from cracks in the welds in the muffle. The licensee initiated a root cause investigation of the powder spill.

The inspection of the muffle found a "yellow" material, which was presumed to be ADU. ADU processing is not allowed in the REDCAP furnace. X-ray diffraction analysis of the material determined that the material was produced from UNH rather than ADU sludge so moderation control had not been lost.

The investigation determined that the root cause was less than adequate preventive maintenance of the muffle welds, in that the welds had previously failed and had been repaired. Corrective actions included adding periodic inspection/examination of the muffle to the operating procedure and including inspection of all

The licensee was informed that this licensee-identified violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the Enforcement Policy (NCV 70-1113/96-06-01).

9. Review of Previous Inspection Findings (92701)

a. (Closed) IFI 95-06-01

This IFI was opened as the result of an inspection into a reportable event concerning the loss of operability of the in-line monitors in the fluoride waste discharge line in the Chemical Area. As discussed in IR 70-1113/95-06, this IFI was opened to track the licensee's identification of long-term corrective actions and lessons learned which might come from the investigation of this event.

The inspector reviewed the investigation report for this event. Both short-term and long-term actions were identified and responsibility assigned for each action.

This IFI is closed as the long-term actions were identified and assigned for action.

b. (Open) IFI 95-06-02

This IFI was opened to review the completion of the long-term actions identified by the investigation team.

The inspector reviewed the status of the long-term actions. Four of the five action items had been completed and documented. One item regarding up-grading of the detector software and performance of the necessary functional tests following the software changes were not yet complete.

This item remain open until the detector software change is completed.

10. Exit Interview

On May 24, 1996, the scope of the inspection and the findings were discussed with those persons identified in Paragraph 1.

The inspector informed management representatives of the findings:

NCV 96-06-01 - Failure to follow procedures for handling boats in the REDCAP furnace hood.

IFI 95-06-01 - Closed based on the completion of the investigation report.

IFI 95-06-02 - Open pending completion of the software change and functional testing.

No dissenting views or objections were stated.

Although proprietary materials were reviewed during the inspection, the proprietary nature of the documents has been deleted from this report.

APPENDIX A
ACRONYMS AND INITIALISMS

ADU	- Ammonium Diuranate
AEC	- Active Engineering Control
CSA	- (Nuclear) Criticality Safety Analysis
DCF	- Direct Conversion Facility
F[illegible]	- Emergency Control Center
E/C	- Engineer/Constructor
EH&S	- Environment, Health & Safety
EN	- Event Number
FCR	- Facility Change Request
FMO	- Fuel Manufacturing Operation
GE	- General Electric
IFI	- Inspector Follow-up Item
IR	- Inspection Report
KGS.	- Kilogram
JCP	- Joint Conversion Project
NCS	- Nuclear Criticality Safety
NE	- Nuclear Energy
NEP	- Nuclear Energy Production
NRC	- Nuclear Regulatory Commission
NSR/R	- Nuclear Safety Requirement/ Release
OSHA	- Occupational Safety and Health Administration
QA	- Quality Assurance
REDCAP	- Reclaim Enrichment Degradation and Control Prevention
UO_2	- Uranium Dioxide
UNH	- Uranyl Nitrate Hexahydrate
URLS	- Uranium Recovery from Lagoon Sludge
URU	- Uranium Recovery Unit
WT	- Waste Treatment

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

August 23, 1996

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/96-09

Dear Mr. Kipp:

This refers to the inspection conducted on July 22-26, 1996, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790, of the NRC's "Rules of Practice," a copy of this letter will be placed in the NRC Public Document Room.

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

Sincerely,

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See page 2)

B/28

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Not available per J. Roth

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NAME	DKrasnicki	LLessler	JRoth			
DATE	08/27/96	08/ /96	08/23/96	08/ /96	08/ /96	08/ /96
COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

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U.S. NUCLEAR REGULATORY COMMISSION
REGION II

Report No.: 70-1113/96-09

License No.: SNM-1097

Licensee: General Electric Company
Wilmington, NC 28402

Facility Name: Nuclear Energy Production

Inspection Conducted: July 22-26, 1996

Inspectors: D. Kasnicki, Fuel Facility Inspector,
Region II

L. Lessler, Senior Operations Research Analyst,
NMSS, Fuel Cycle Operations Branch

Accompanying Personnel: D. Outlaw, Senior Scientist,
SAIC (NRC Contractor)

Approved by: E J McAlpine 8/23/96
E. J. McAlpine, Chief Date Signed
Fuel Facilities Branch
Division of Nuclear Materials Safety

Inspection Summary

Areas Inspected:

NRC performed a routine, announced criticality safety inspection of General Electric Fuel Fabrication Facility, Wilmington, NC on July 22-26, 1996. This inspection was conducted using staff from NRC Headquarters, Region II, and a contractor. The inspection focussed on the criticality safety program at General Electric and selected areas of the plant that either had recent, updated Criticality Safety Analyses (CSAs), had undergone recent modifications, or otherwise were of special criticality safety interest. The inspection also followed up on the licensee's final corrective actions to address a fire in their incinerator building which occurred on March 27, 1996 [Inspector Followup Item (IFI) 70-1113/96-203-01].

Major programmatic portions of the criticality safety program reviewed included:

- Management and Administrative Practices for Nuclear Criticality Safety
- Recent Nuclear Criticality Safety Evaluations

Enclosure

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- Nuclear Criticality Safety Configuration Control Program
- Maintenance Program for Active Criticality Safety Controls
- Nuclear Criticality Safety Training Program

The inspection was conducted using the objectives of draft Headquarters Inspection Procedure 88015, as well as the existing inspection procedures 88015 and 88020.

Results:

- For the systems the inspectors selected, the licensee's implementation of their overall criticality safety program was good.

- The quality and technical adequacy of the Criticality Safety Analyses (CSAs) was acceptable. The analyses were structured and written so that they could be audited by an external auditor or independent reviewer.

- The analyses identified workable controls. Spot checks indicated they had been implemented through Nuclear Safety Release/Requirements (NSR/Rs) and operational procedures and then functionally tested to ensure that they worked as expected.

- Inspection of the areas of the plant covered by these CSAs indicated that the required criticality controls were being adequately implemented.

- The overall criticality safety configuration management/control system was acceptable.

- The inspectors reviewed portions of the scheduled maintenance and calibration program and no concerns were identified.

- The inspectors reviewed portions of the training program and found that the program ensures that managers, supervisors, and staff were trained in the nature of and responsibility for nuclear criticality safety. The general nuclear criticality safety training curriculum was also reviewed and raised no concerns. One concern was identified regarding the training program for "Qualified Reviewers". This program was used to train staff to judge the need for criticality safety function involvement in reviewing new or modified operating procedures. The licensee's plans to address this concern will be tracked as an Inspector Followup Item (IFI 70-1113/96-09-01; Section 3).

- The licensee's final corrective actions to address the fire which had occurred in their incinerator building on March 27, 1996 were adequate and IFI 70-1113/96-203-01 is closed.

Attachment:

Key Licensee Personnel Contacted, Exit Meeting, and List of Opened and Closed Items

DETAILS

1. MANAGEMENT AND ADMINISTRATIVE PRACTICES FOR NUCLEAR CRITICALITY SAFETY

1.1 Discussion

The inspectors performed a review of management and administrative practices for nuclear criticality safety to determine if they conformed to the requirements of the License and provided for adequate nuclear criticality safety. This inspection was performed based on observation of plant practices, document review, and discussions with criticality safety management, and operations staff. Topics inspected included:

1.1.1 Plant Policy for Nuclear Criticality Safety

Discussions with plant staff indicated that the plant did not have an explicit, written policy that described each employee's authority and responsibility for nuclear criticality safety. However, the License does state that "the GE-Wilmington policy is to maintain a safe work place for its employees..."(Section 2.1). The organizational authorities and responsibilities for criticality safety for the management organizations were clearly defined in the License and in GE Wilmington Practices and Procedures (P/P) 10-10 (Configuration Management), 40-04 (Nuclear Safety Design Criteria), and 40-17 (Nuclear Safety Training). Employees were being taught in the annual training that nuclear safety is the responsibility of each employee. The criticality safety manager indicated that he was aware of the lack of an explicitly written plant policy on criticality safety, has been working on a draft and was committed to get it issued.

1.1.2 Plant Manager's Responsibility for Nuclear Criticality Safety

Discussions with plant staff and review of documentation indicated that the General Manager, GE Nuclear Energy Production (i.e., Plant Manager), had empowered every employee and plant department with the authority and responsibility to ensure nuclear criticality safety. The General Manager was aware of and involved in criticality safety at the plant and reviewed the findings of Wilmington Safety Review Committee and the external audits of the criticality safety program. One stated purpose of the Wilmington Safety Review Committee was to provide the General Manager "with an overview of the safety of operations" (P/P 40-01). He also held his staff accountable for nuclear criticality safety.

1.1.3 Operations Managers' Responsibilities for Nuclear Criticality Safety

Observation of plant operations, discussions with staff, and review of plant Procedures and Practices indicated that the Area Managers accept and carry out their NCS responsibilities, including approval of all operating procedures.

1.1.4 Operations Supervisors' Responsibilities for Nuclear Criticality Safety

Observation of plant operations, discussions with staff, and review of plant Procedures and Practices indicated that the Area Coordinators, Product Coordinators, and Shift Operations Leaders understand, accept, and carry out their NCS responsibilities. These operations supervisors were involved in development of operating procedures, giving on-the-job training, and requiring conformance to NCS specifications.

1.1.5 Nuclear Criticality Safety Function's Responsibilities

Discussions held with nuclear criticality safety, management, and operations staff, as well as observation of operations and review of plant documentation, indicated that management has established an effective nuclear criticality safety function independent of operations management. This function was effectively proceduralized in GE-Wilmington Practices and Procedures documents, including 10-10 (Configuration Management), 40-04 (Nuclear Safety Design Criteria), and 40-17 (Nuclear Safety Training), and in Nuclear Safety Instructions, including E-1.0 (Nuclear Safety Review Records), E-2.0 (Internal Nuclear Safety Audits), E-3.0 (Nuclear Safety Review Requests), and E-4.0 (Criticality Safety Analysis Methods & Verification).

Discussions and review of documentation indicated that the nuclear criticality staff has been involved in and provided technical guidance on all plant changes to SNM operations.

Discussions with nuclear criticality safety staff indicated that they have maintained familiarity with current safety standards, guides, and codes. They have participated in and presented papers at national meetings in their field.

Overall, the inspectors found that the nuclear criticality safety function had been effectively implemented at the plant, met the License requirements, and functioned in accordance with the requirements and expectations of the national consensus standards.

1.1.6 Support Function Management Responsibilities for Nuclear Criticality Safety

Discussions with staff and review of minutes of the Wilmington Safety Review Committee indicated that other support functions, including radiation protection, were aware of and involved in support of criticality safety. All support functions participated in the safety committee meetings.

1.1.7 Management Involvement in Providing Written Administrative and Operating Procedures

Review of plant procedures and discussions with staff indicated that management has established effective administrative procedures that define the interface between operations, nuclear criticality safety, and other operations support functions.

Procedures were in place (P/P 10-10, Configuration Management Program) to ensure that the nuclear criticality safety function would be consulted before a change or new activity that could affect nuclear criticality safety was initiated. All procedure changes would be screened by a "Qualified Reviewer" to determine if further evaluation by the nuclear criticality safety function was needed. (Refer to Section 3, Configuration Control Training, para. 2)

1.1.8 Nuclear Criticality Safety Training

Discussions with staff and review of plant documentation, including P/P 40-17 (Nuclear Safety Training) and criticality-safety related training materials, indicated that nuclear criticality safety training was included as a part of annual nuclear safety training required of all fissile material workers, their supervisors and managers, and support function engineers and managers.

1.1.9 Nuclear Criticality Safety Advisory Committee

Discussions with staff and review of plant documentation, including P/P 40-01 (Wilmington Safety Review Committee) and minutes of recent safety committee meetings, indicated that management had established an effective, functioning safety committee. The responsibilities of the committee included criticality safety. Membership on the committee was required by procedure to include the program manager for criticality safety as well as various operations and support function managers. Action items and recommendations have been documented and tracked in the committee minutes. Based on the discussions and review of meeting minutes, the committee appeared to be functioning effectively.

1.2 Conclusion

Overall, the management and administrative practices for nuclear criticality safety in these areas conformed with the standard requirements and practices identified in national consensus standards.

2. NUCLEAR CRITICALITY SAFETY EVALUATIONS

2.1 Discussion

The detailed criticality safety evaluation documentation packages for several selected plant changes and systems of special criticality safety interest were reviewed for technical adequacy. Each of these systems was selected by the inspectors because they were important from a criticality safety perspective and because they required detailed technical analysis and review to ensure that the processes could be operated safely. The processes reviewed were:

2.1.1 Dry Conversion Process (DCP)

Extensive discussions were held with the criticality and engineering staff on the status and approaches to criticality analyses for the new dry conversion processes. The analyses have progressed significantly from the parametric

studies reviewed during the previous inspection (Inspection Report No. 70-1113/96-203), however, no new analyses had been finalized and therefore only draft DCP analyses were reviewed during this inspection.

Initial draft criticality safety analyses (CSAs) for the DCP vaporization coldtrap and the vaporization autoclave had been completed and were undergoing internal peer review during this inspection. Selected criticality safety controls of these two systems were reviewed by inspection of the draft CSAs, inspection of the systems with a criticality safety engineer, and discussion of the criticality safety issues with the criticality safety staff. The inspectors found no significant issues.

Discussions with the criticality safety staff indicated that CSAs for the other portions of the DCP, particularly those relying principally on moderation control, were progressing well but were still incomplete. Most of the systems had been modeled and initial runs had been made for a number of accident conditions. Based on these initial calculations, the licensee expected that several basic modeling assumptions for process conditions and parameters would be changed in future runs.

Discussions between criticality safety and engineering staff indicated that additional experimental data on powder characteristics during upset conditions were needed. Licensee representatives stated that they planned to generate the needed data. The licensee planned to use this data to verify that the bounding assumptions of powder densities under upset conditions used in the criticality analyses are conservative.

A rough draft CSA for the DCP cooling hopper was also reviewed with the author and no significant issues were identified.

2.1.2 Replacement of the "7B" dump with a "JNF style" dump

The criticality safety documents supporting replacement of the existing powder dump station from the "7B" rotary press with the "JNF style" powder dump station from the "2A" rotary press were reviewed. This change would allow the processing of higher enrichment U-235 powder (5 percent) through the affected process line. The criticality safety analysis supporting these modifications was completed in June, 1996 and the modifications had been made. This modified system was inspected with the criticality safety engineer and criticality safety issues associated with the new equipment were discussed. Final approval to operate the line at the higher enrichment had not been granted at the time of the inspection pending completion of final pre-operational reviews.

2.1.3 Replacement of the 421 drum stacker with a drum conveyor system

The criticality safety documents supporting replacement of the 421 drum stacker with a conveyor system for drum storage were also reviewed. This modification involved the removal of equipment from the drum stacker and installation of arrays of conveyors for the storage of drums in planar arrays. The criticality safety analysis supporting this modification was completed in April 1996. The inspection of this system with the criticality

safety engineer indicated that this modification had not been completed but limited drum storage was occurring on the conveyors that had been installed under interim approvals from the criticality safety group. Criticality safety issues associated with the new equipment were also discussed.

2.1.4 Criticality safety and the Uranium Recovery from Lagoon Sludge (URLS) Facility

Criticality safety files and supporting documentation from the existing URLS facility were also reviewed during this inspection in support of the more detailed field inspection of the implementation of the identified criticality safety controls. The inspectors toured the URLS facility, interviewed URLS operations personnel, and verified the implementation of a sampling of Nuclear Safety Release/Requirements determined by the CSA for URLS. Operations procedures were discussed, records of operator performance of administrative controls and records of the calibration and functional testing of active engineering controls were examined. The control room operator interviewed was very knowledgeable, both of the theoretical and practical aspects of the facility. Implementation of the inspected NSR/Rs at the URLS facility was adequate.

2.2 Conclusion

Each of the analyses listed above had been prepared in accordance with the procedural requirements and, if final, had been independently reviewed and verified by a senior criticality safety engineer. The inspectors found the completed analyses to be technically adequate and no significant issues were raised. In those areas inspected, the implementation of criticality safety requirements determined by the CSAs was adequate.

3. NUCLEAR CRITICALITY SAFETY CONFIGURATION CONTROL PROGRAM

3.1 Discussion

The inspectors reviewed the NCS aspects of the configuration control program to verify conformance with License conditions and determine the adequacy with which it provided for nuclear criticality safety. This inspection was performed based on observation of plant practices, document review, and discussions with criticality safety, configuration management, engineering, program management, and operations staff. Topics inspected included:

3.1.1 Configuration Management Program

The licensee has established a configuration management program that effectively recognizes changes in procedures, maintenance, calibration, facility changes, and preventive maintenance activities with criticality significance and ensures that (1) all such changes are properly documented; and (2) criticality safety approvals are provided and criticality safety analyses are done where necessary. This program was clearly documented in Practices and Procedures 10-10 (Configuration Management Program - Fuel Manufacturing). That procedure clearly specified responsibilities for concurring with and approving controlled changes.

The configuration management program was designed to ensure that controlled documentation would be updated and when necessary, a criticality safety evaluation performed for changes to processes, equipment, or facilities. Included in the system were facility changes other than like kind or identical, procedure changes, drawing changes, and technical report changes. A system was also in place to control the revision and maintenance of these documents.

3.1.2 Configuration Control of Nuclear Criticality Safety Evaluations

The inspectors reviewed the configuration control systems for criticality safety evaluations by retrieving the documentation for several recent facility changes. They were able to locate controlled copies of each of the evaluations and related documents, including Nuclear Safety Release / Requirements (NSR/Rs), for all changes.

3.1.3 Configuration Control Change Procedure

The inspectors reviewed aspects of the configuration management program related to the process of making changes in that program and found the process to be well documented in P/P 10-9 (Operation Procedures - FMO) and P/P 10-10 (Configuration Management Program - Fuel Manufacturing). Those procedures also established a system for retention of records reviewed as a part of the change control process. Spot checks by the inspectors verified that the configuration control program was being followed.

3.1.4 Configuration Control Training

The inspectors also reviewed the configuration control training and found that this training was included in annual training. The content of training in the configuration management and change control process appeared to be adequate.

The training of those performing the screening on whether changes in procedures and other documents required additional review by the criticality safety group was also reviewed. The training program and records for "Qualified Reviewers" who, per P/P 10-09.3.1, are trained to judge the need for additional review by the Environment, Safety & Health department (ES&H) which includes criticality safety, of procedure revisions, temporary changes to operating procedures, and special operating instructions, were specifically reviewed. The training to be a "Qualified Reviewer" consisted of a day's training, including criticality safety, radiological safety, industrial safety, environmental protection, material control and accounting, and quality assurance modules. A written exam was given after each module of the training.

Operating procedures were in the process of being rewritten to incorporate specific criticality safety controls into the procedure itself, rather than have them in separate NSR/Rs, and the importance of having persons knowledgeable in criticality safety performing these initial screens of changes to operating procedures was becoming even more important than in the past when criticality safety requirements were in a separate document, the NSR/Rs. While specific criticality steps were being indicated in the new

procedure format, changes in other procedure steps could also have criticality safety importance that might not be obvious to an untrained reviewer.

Review of the latest training records and exams indicated that on January 10, 1996, 15 candidates took the "Qualified Reviewer" training. The next day, on January 11, all 15 were authorized to serve as "Qualified Reviewers" despite the following: (1) The exams on the criticality safety module taken were apparently not graded, and (2) at least one of those authorized demonstrated a poor knowledge of criticality safety on the exam, leaving several answer spaces blank, and providing incomplete or wrong answers in a number of other instances.

The examination process for this training had written questions but did not require written grading and at least one individual listed as a "Qualified Reviewer" was judged to have performed unsatisfactorily by both the inspectors and the GE criticality safety manager. Immediate investigation indicated that this individual had not performed any duties as a "Qualified Reviewer" and he was removed from the list of those deemed qualified. Also, the investigation indicated that this individual had taken the training for informational purposes only, and it was not intended that he become a qualified reviewer, but the administrative system for this training did not make provisions for this type of attendee at the training course.

During the exit meeting, the manager for GE NE Environment, Health & Safety stated that he:

(1) will make training materials available to attendees for study prior to future "Qualified Reviewer" courses;

(2) will limit the formal qualification training to individuals who meet minimum qualifications to be "Qualified Reviewers";

(3) will require future exams to be graded, with the criticality safety module graded by a criticality safety engineer;

(4) will allow auditing of the course for staff not needing to be qualified; and

(5) will also apply these changes made to the criticality safety module to the other "Qualified Reviewer" training modules which address the other safety disciplines.

The results of these actions will be tracked as an Inspector Followup Item: IFI 70-1113/96-09-01: Follow up on changes to training program for "Qualified Reviewers" of procedure changes.

3.2 Conclusion

Overall, the criticality safety portions of configuration management program appeared adequate with the exception of the concern over the administration of the qualification process for "Qualified Reviewers".

4. MAINTENANCE PROGRAM FOR ACTIVE CRITICALITY SAFETY CONTROLS

The inspectors reviewed portions of the scheduled maintenance and calibration program to verify (1) that maintenance schedules were established, adhered to, and were adequate for active criticality safety control systems; (2) that calibration schedules were established for all NCS control systems; and (3) that these schedules were corsistent with license requirements. Discussions with the maintenance program and criticality safety staff and review of selected documentation raised no concerns with the maintenance and calibration program. That program was designed to assure that functional tests, calibrations, surveillance, etc. required to support the active engineered controls identified in the criticality safety analyses would be performed on time with appropriate approvals. There was no significant backlog of criticality-related maintenance tasks to be performed.

4.2 Conclusion

The licensee's implementation of their scheduled maintenance program for criticality safety controls appeared adequate.

5. GENERAL NUCLEAR CRITICALITY SAFETY TRAINING/RETRAINING PROGRAM

The inspectors reviewed portions of the training program to verify that the program ensures that managers, supervisors, and staff are trained in the nature of and responsibility for nuclear criticality safety, and that the training curriculum is adequate. Review of training materials, including a 40-minute video on criticality and radiation safety presented to general staff, and discussion of the training program with training and nuclear criticality safety staff, indicated that the program met general expectations of the inspectors. The program emphasized the individual's responsibility for safety. A test was given at the end of the training to confirm that the criticality safety principals were understood. Additional training, including on-the-job training had been provided to operations staff on an as-needed basis. The general nuclear criticality safety training curricula was also reviewed by the inspectors and raised no concerns.

5.2 Conclusion

The content and implementation of the licensee's general nuclear criticality safety training/retraining program appeared adequate.

6. MARCH 27, 1996 FIRE AT INCINERATOR BUILDING; FOLLOWUP ON LICENSEE'S FINAL CORRECTIVE ACTIONS

A small fire occurred in the licensee's incinerator building when equipment malfunctioned, causing a box of trash to not be fully inserted into the incinerator's burn chamber from its load chamber. The box caught fire while still partially in the load chamber. Operators detected the problem, opened the load chamber door, and extinguished the burning box with a fire extinguisher. However, the force of the discharge from the fire extinguisher blew a few pieces of burning debris onto a second box which was staged to be burned next, burning a few small holes into the polyethylene wrapping on the

box. Further details of this entire incident are documented in Inspection Report No. 70-1113/96-203. At the time of that inspection, the licensee had performed a thorough investigation of the incident and documented a list of proposed corrective actions, however, from this list, they had not yet had time to choose their final corrective actions and implement them.

During this inspection the inspector determined, through discussions with a cognizant licensee representative, a review of related documentation, and a tour of the incinerator building, that final corrective actions had been chosen and implemented. The licensee's corrective actions taken included the following:

- A fire suppression system was installed in the incinerator's load chamber. If a box were similarly misloaded again, this would eliminate the need to open the load chamber door and manually extinguish the fire.

- The queuing of the next box to be burned was changed so that it no longer sits just below the load chamber door. If somehow, in spite of the load chamber's fire suppression system, it became necessary to open the load chamber door, the next box to be burned would be less vulnerable.

- The box in the load chamber gets pushed into the burn chamber by a hydraulic ram, and a mechanical problem with the position sensing of this ram had caused the misloading of the box in the incident. The position sensing device was changed from mechanical to an infrared reflection/detection device, precluding the same type of mechanical malfunction.

Also, the licensee, unrelated to their incident but rather in response to their assessment associated with an incinerator fire at another licensed facility, increased the capacity of the emergency cooling water to their incinerator.

6.2 Conclusion

The above described corrective actions appeared to adequately correct the causes of the incident, and IFI 70-1113/96-203-01 is closed.

ATTACHMENT

1. KEY LICENSEE PERSONNEL CONTACTED

*M. Chilton, Manager, Joint Conversion Project
*S. Dale, Criticality Safety Engineer
*D. Dowker, Team Leader, Fuel Support
*R. Foleck, Sr. Licensing Specialist
*J. Kline, Manager, Chemical Product Line
*G. Luciano, Environmental Operations Engineer
*D. McCaughey, Manager, Fuel and ChemMet Lab Quality
*L. Paulson, Manager, Criticality Safety Engineering, Acting Manager, Nuclear Safety
*L. Quintana, Manager, Fabrication Product Line
*R. Reda, Manager, Fuel and Facility Licensing
*G. Robinson, Criticality Safety Engineer
*W. Sependa, Manager, GE-NE EH&S
*M. Shea, Criticality Safety Engineer
*G. Smith, Team Leader, FMO Maintenance Support
*S. Smith, Radiation Safety Monitor
*P. Vescovi, Criticality Safety Engineer
*C. Williams, Team Leader, URLS/WT
*T. Winslow, Manager, Material Control & Accountability

*Attended exit meeting

Other licensee personnel contacted included engineers, operators, and technicians.

2. EXIT MEETING

The inspection scope and findings were summarized during a meeting on July 26, 1996 with the licensee personnel indicated above. The inspectors 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. However, one Inspector Followup Item, IFI 70-1113/96-09-01 was opened for further tracking.

3. LIST OF OPENED AND CLOSED ITEMS

Item Number	Status	Description and Reference
70-1113/96-203-01	Closed	IFI - Follow up on final corrective actions for March 27, 1996 incinerator fire. (Section 6)
70-1113/96-09-01	Open	IFI - Follow up on changes to training program for "Qualified Reviewers" of procedure changes. (Section 3)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

August 27, 1996

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/96-08

Dear Mr. Kipp:

This refers to the inspection conducted on July 15-20, and July 29 - August 2, 1996, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

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

Sincerely,

Stephen M Vias

for Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See Page 2)

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cc w/encl:
Dr. Ralph Reda, Manager
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Dayne H. Brown, Director
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N. C. Department of Environment,
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Raleigh, NC 27611-7687

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-1113
License No.:	SNM-1097
Report No.:	70-1113/96-08
Licensee:	General Electric Company
Facility:	Nuclear Energy Production
Location:	Wilmington, North Carclina
Dates:	July 15 - 20, 1996 July 29 - August 2, 1996
Inspector:	G. L. Troup Sr. Fuel Facility Inspector
Approved by:	E. J. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

Enclosure

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EXECUTIVE SUMMARY

General Electric - Nuclear Energy Production
NRC Inspection Report 70-1113/96-08

This inspection included aspects of licensee operations, management controls, maintenance, fire protection, event review, and review of previous inspection findings.

Operations

- Preparations and response to potential impact from Hurricane Bertha were well coordinated and resulted in the safe shutdown of the facility (section 1.1)
- Criticality monitor alarms due to lighting storms have been a recurring problem but replacement of parts in the grounding system are planned to correct the problem (section 1.2)
- The investigation into the failure of the slug press downchute failure was thorough and identified a number of corrective actions to reduce future failures (section 1.3)

Management Controls

- External audits did not identify any major programmatic issues (section 3.1)
- A notice was issued to all employees reminding them of their responsibility to report deviations and non-compliances in accordance with 10 CFR 21 (section 3.1)

Maintenance

- Up-grades to process monitor software were completed and satisfactorily tested (section 4.1.1)
- Functional tests of AECs were satisfactorily conducted (section 4.1.2)

Fire Protection

- Smoke and fire detectors were satisfactorily inspected and tested by a contractor but the test report needs to be improved (section 5.1.1)
- Fire equipment and systems were satisfactorily inspected and tested (section 5.1.2)
- Signs identifying locations of fire alarm pull boxes will be relocated to identify the new pull boxes (section 5.1.4)

DCF

- The Project Integration Plan has been approved and will be reflected in the Integration Schedule (section 6.1.1)
- The test program for the process control system is being developed (section 6.1.2)

Results:

No violations or deviations were identified. Two IFIs were closed.

Report Details

1. OPERATIONS ISSUES (88020)

1.1 Hurricane Bertha

In response to the potential for Hurricane Bertha making landfall in the Wilmington area, the licensee began shutting down operations on July 11. The ECC was staffed for the monitoring of conditions. All fuel production activities, as well as other activities on the site, were suspended at 3:00 pm on July 11. Only volunteers remained on site to operate selected waste systems, monitor equipment which was still being cooled down, and monitor the facilities.

At 11:00 am on July 12, the licensee declared an ALERT in accordance with emergency procedures when sustained winds exceeded specific levels. The NRC Operations Center and Region II were notified. After the hurricane moved further north without making landfall and winds diminished, the licensee declared that the ALERT was terminated at 8:00 pm and notified the NRC Operations Center accordingly. Manning of the ECC was shutdown at 11:00 pm but personnel remained on site to monitor the facilities.

Some minor damage occurred to buildings (such as bent siding) and trees were blown down around the site. The loss of an off-site power transformer resulted in the loss of power to Waste Treatment and ground water pumps. Power was rerouted from another transformer by plant personnel on July 13 and equipment returned to operation.

Fuel production operations resumed on third shift on July 14, consistent with production schedules. The inspector observed portions of the start-up of the chemical conversion lines on July 15.

1.2 Criticality Monitors

On June 25, two criticality monitors alarmed during a thunderstorm. As these detectors were in different plant areas, the plant evacuation alarm did not activate. Personnel manned the ECC until the situation could be evaluated and determined to be false alarms. Coverage of the site areas were monitored by the redundant monitors which did not alarm.

On July 2, two criticality monitors again alarmed during a thunderstorm. These were in outside areas and again were determined to be false alarms.

On July 16, during a thunderstorm, the inspector observed the read-out panel for the criticality monitors. Four monitor sets in outside areas were showing fluctuations in readings but did not reach the alarm setpoint.

A review of the criticality monitoring system by licensee personnel and discussions with the equipment supplier indicated that certain parts (the "power sifter", which is a surge suppressor in the grounding system) may be beyond the recommended lifetime. New power sifters were ordered and will be installed during the up-coming plant shutdown. The power sifters are part of the grounding system and should not effect the detector unit calibration.

1.3 Powder Spill

On June 18, 1996, the licensee made a report under the requirements of NRC Bulletin 91-01 (NRC EN 30638) because on June 17, a hose fitting on the powder transfer hose had failed and approximately 35 kgs. of UO_2 powder had been spilled into the enclosure of the "A" HiE slug press. The UO_2 had an enrichment of 4.95 percent. This event was reported because the two nuclear safety controls for the slug press are moderation control and geometry control. The spill of the powder resulted in the loss of geometry control. The operator noticed the spill and immediately shut down operations and started removal of the powder into favorable geometry containers.

The transfer hose (downchute) is connected to the mill baghouse discharge transition piece at the top and to the powder shuttle at the bottom. The upper flange had separated from the hose, leaving the flange bolting ring attached to the transition piece and the downchute and part of the flange in the enclosure.

An Unusual Incident Report (UIR No. ChPL 9632) was initiated on June 17. The initial investigation identified that the two flanges on the hose had two different designs for the connection of the flanges to the hose nipple fittings. The joint that failed had apparently been welded and then most of the weld machined off, providing a very weak joint. It was also documented that operators had been "manually assisting" (e.g., pounding on the downchute with a mallet to assist the flow of powder which sometimes "sticks" in the downchute). This "assisting" had been in progress when the joint failed. The operation of the slug press shuttle produces vibration in the upper flanged joint. The vibration and pounding apparently caused the failure of the welded joint. The UIR contained seven actions to be taken. The Manager, Chemical Product Line directed that a higher level critique be conducted and assigned this to the Team Leader, Powder Preparation and Packaging.

The critique report concluded that the primary causes of the failure were (1) incomplete and poor quality welds in the flange construction, and (2) operators pounding on the downchute, coupled with the vibration weakened the welds. A review of the maintenance records revealed that these downchutes have to be replaced at an interval of about six months due to breaking of the braided jacket and/or breaks in the liner.

The downchute on the "B" slug press was examined and found to be of a different design than that on the "A" press. Both downchutes were replaced with a new part which has a single-piece flange. To assure

that this design of flange is always used. Shop & Purchasing set up a "single source" vendor and requires inspection for each new downchute when delivered. Operators were instructed that beating directly on the downchute was not an acceptable practice.

Additional actions being evaluated are establishing a mass control limit for the system so that a powder spill does not result in only one nuclear criticality safety control remaining. This control will be evaluated for any adverse impact on the production rate. Additionally, other types of connections are being investigated.

The inspector determined that the amount of powder spilled as less than a minimum critical mass under conditions of optimum moderation and geometry, neither of which existed during the spill. For the actual moderation condition, the mass was about seven percent of the minimum critical mass for a hemisphere with optimum reflection.

2. ORGANIZATION CHANGES (88005)

On June 24, 1996, the former Manager, Nuclear Safety was appointed Team Leader, Chemical Conversion. This team is responsible for UO_2 powder production. An Acting Manager, Nuclear Safety was designated pending the selection of a permanent replacement. The inspector was informed on August 1 that the position would be posted and employees could apply. Final selection of the new manager is pending.

3. MANAGEMENT CONTROLS (88005)

3.1 Discussion

The inspector noted that there was one change in the management organization, as documented in paragraph 2.

The external audit of the nuclear criticality safety program, as required by Chapter 2, Section 2.8.3 of the license application, was conducted December 4-8, 1995. The audit team was approved by the General Manager - NEP, as required. No Corrective Action Requirements were identified but the team made several observations. Corrective action on one observation is on-going; the remainder have been resolved. The report concluded the program is basically sound and that operations are conducted safely from a nuclear criticality safety standpoint.

The licensee's insurance carrier conducted an inspection on February 29, 1996, to assess the insurance risk associated with activities presently being performed. As a result of this inspection, no new recommendations were made.

The WSRC held the two routine quarterly meetings and one special meeting in 1996. Items reviewed during the routine meetings included significant UIRs, PNCs and classified incidents and violations. Additionally, the WSRC reviewed such topics as the ISA program, which is being conducted for the DCF and is proposed for the rest of existing operations.

On August 1, 1996, an "Update" notice was distributed on the site to remind GE-NE employees and anyone conducting business at the Wilmington site, of their responsibility under 10 CFR 21 to report deviations and non-compliances in hardware or software provided to a customer that could create a potential safety hazard or lead to exceeding a Technical Specification Safety Limit. Included with the "Update" was a copy of the 10 CFR 21 posting. This "Update" served as a reminder to licensee employees both at the NEP site and at reactor sites of their legal obligation to report deficiencies.

3.2 Conclusion

The inspector concluded that adequate management oversight of plant operations and problems is being maintained. External evaluations have not identified significant problems in safety programs.

4. MAINTENANCE (88025)

4.1 Discussion

4.1.1 In-Line Uranium Monitors

As the result of a power supply problem and a software problem, the Fluoride Waste uranium monitor did not isolate the discharge when power was lost and then restored to the system (see IR 70-1113/95-06). The last of the long-term corrective actions was to install new software for the monitor system and perform the necessary functional tests. CR 96.0295 and CR 96.0297 were approved to install the software in the URU and ADU computers, respectively. A previous CR, 95.0582 was prepared to install new software but off-line testing revealed that the software was inadequate. The new version of the software was tested [illegible]-line under CR 96.0287. The inspector noted that CR 96.0119 was [illegible]enced in the two CRs as performing the off-line test but, on [illegible] review, the inspector determined that this CR was for the [illegible]tion of an assay meter in another portion of the plant. After [illegible]view, licensee representatives acknowledged that CR 96.0287 [illegible]orrect document. The official copies of CR 96.0295 and 96.0297 were corrected. The inspector verified that 96.0287 satisfactorily performed the off-line test.

A faulty detector in the Fluoride Waste monitor was replaced in conjunction with the up-grade. A full calibration of the monitor was performed on July 30. The calibration involved a total of six uranium solutions, a water blank and the monitor internal sources. The data were reduced using linear regression methods to establish the monitor parameters, which were loaded into the computers.

The inspector observed portions of the calibration activities and discussed the steps with the personnel involved. The inspector determined that the licensee had a written procedure for the energy calibration of the various detectors.

4.1.2 Functional Tests

Following the energy calibration of the Fluoride Waste pipe detector, the licensee conducted the functional test of the detector and associated valves on July 31, 1996. This test was conducted in accordance with OP 1010.77, FTI F2. Several minor problems were noted during the conduct of the test and were properly resolved and approved. Corrections in the FTI were noted, with revision to be completed by a specified date.

During the same period, the HiE skid uranium monitor was tested in accordance with OP 1010.77, FTI F1. This test took longer than anticipated because the prerequisite tests had not been performed before the HiE system had been shutdown for the calibration of the pipe detector. Licensee representatives stated that the FTI would be revised to clearly permit/require these tests to be performed before the system is shutdown.

The inspector observed various portions of the two functional tests and determined that test personnel were using approved procedures, observed the control room computer screens to confirm that actions were occurring as required, and that the tests were properly reviewed and approved.

The inspector also reviewed the record sheets for the daily checks of the parameters for the VOG system. These are defined in OP 1102.08, Exhibit 1, and recorded each day. The inspector reviewed the record for four separate weeks and confirmed that all parameters were within specified limits.

4.1.3 Criticality Monitor Calibrations

Procedure NSI-0.4.0 specifies the requirements for the annual energy calibration of the nuclear criticality monitoring system detectors. The inspector reviewed the records for the calibration performed November 28-29, 1995, and confirmed that all detectors performed within specified limits. Also, all portable units (SRM-100s) responded within specified limits.

The inspector also reviewed the monthly test records for the criticality monitoring system for the period January- May, 1996, and determined that the system responded within specified limits. While problems with alarms were encountered during thunderstorms (paragraph 1.2), the problems were apparently with the grounding system and did not adversely affect the performance of the detectors.

4.2 Conclusions

The inspector determined that required calibrations and functional tests were properly conducted in accordance with approved procedures, results were satisfactory, and test results were properly reviewed.

5. FIRE PROTECTION (88055)

5.1 Discussion

5.1.1 Smoke and Fire Detectors

The inspector reviewed the records for the annual test and inspection of smoke and fire detectors installed in various ventilation ducts. These tests were performed by a contractor on April 29, 1996. The test checked the operation of the detectors, remote monitoring of the detector alarms in the various control rooms, and confirmed that detectors responded to test smoke.

In addition to the tests, the contractor checked wiring, cleaned and tested detectors, and checked the interlock sequence. The inspector noted that the documentation provided by the contractor was not as detailed as in previous years. While the documentation identified all of the tests performed, it only listed a total number for the types of detectors. In previous years, the documentation had listed each detector and described any problems encountered. The cognizant licensee representative agreed that the former documentation provided better information concerning the status of the detectors and stated that, in the future, more detailed documentation would be requested.

5.1.2 Equipment Tests

The inspector reviewed the test results for various tests conducted on fire system equipment. During the annual fire hydrant water flow test conducted on July 18, 1996, two hydrants were reported as "hard to open" or "could not open." Work orders were instituted on August 1 to repair these hydrants.

The inspector reviewed the results for the monthly water flow tests, which include the sounding of water flow alarms in the security office. The test for June was not performed because of a change to a new alarm system was in progress. Remaining tests, including July, were satisfactorily performed although certain streams were not tested because the test fitting discharges into construction areas.

On July 31 the inspector observed the annual fire hose tests, which were performed by a contractor. Six hoses which were tested failed the test, either due to leaks in the hose or failure of the end fitting connection. New hoses were installed in place of the failed hoses. Hoses tested were from non-radiological controlled areas. Hoses from radiological controlled areas are routinely replaced at five year intervals.

The inspector reviewed the records during the period January - July, 1996 and verified that weekly and monthly inspections of fire valve positions were performed and the valves were properly aligned.

5.1.3 Operations

During tours of various plant areas, the inspector observed various factors affecting the fire protection program. Fire extinguishers and fire hose stations were marked, were unobstructed and equipment inspections were current. Flammable liquids were stored in approved containers and there were no accumulations of materials saturated with the liquid. Flammable gas cylinders were capped when stored and oxidizers were stored in separate areas.

In areas where construction activities were in progress, areas were clear of accumulations of combustibles.

5.1.4 Alarm Stations

The licensee is installing a new central alarm system. Most of the new fire alarms are functional but some of the chemical alarms are not complete. The old fire pull boxes are still in place but are covered with paper stickers.

The inspector observed that in many areas of the facility, signs are installed stating "fire alarm" and are set to be visible from some distance, such as in long hallways. The inspector observed that several of these signs are over the old pull boxes and the new box was installed in another location (across the hallway, on the other side of a door, etc.). An individual trying to sound the fire alarm would have to search for the box because the marked box was out of service. In one location (outside of the welding development laboratory), the sign was clearly visible in the hall but the pull box was out of service. No new alarm box is installed in that location. In another location, the old box had been reinstalled on top of the new box, making pulling the alarm lever very difficult.

Licensee representatives stated that the signs would be reviewed and relocated as needed to provide proper identification of the pull box.

5.2 Conclusions

The inspector determined that the licensee had implemented a satisfactory fire protection program and was operating the facility in a fire safe manner.

6. DRY CONVERSION FACILITY (88020, 88025)

6.1 Discussion

6.1.1 DCF Integration

The DCF will produce UO_2 powder, which will then be transferred to existing work stations in FMO/FMOX for the production of fuel pellets. Because the existing ADU lines will remain in operation during the DCF

start-up and product qualification, a plan for the installation of new facilities, changes in equipment and moderation exclusion areas is required.

The inspector discussed the plan for accomplishing the change-over while maintaining both existing and new nuclear safety criteria. A plan was developed for the work and was approved on July 3, 1996. A detailed schedule for accomplishing integration activities will be developed from the plan. The plan and schedule will be used by the NRC in the development of the inspection plan.

6.1.2 Process Control System

The control room for the DCF will include a process control system for the operation of the systems. P/P 120-15 details the steps required to test and approve a new process control systems. Licensee representatives discussed the test process with the inspector and stated that the test program would be developed and approved by October. Testing will be performed as part of the start-up program.

6.1.3 Construction Activities

The first (upper) roof membrane had been installed (IR 70-1113/96-06). Final installation of edge trim, eave trim and drain gutter will be installed in conjunction with the siding. Repairs to the membrane have been identified and will be performed in accordance with the supplier's instructions.

Major components have been received and landed on the foundations. Alignment of systems was observed by the inspector. Piping installation was in progress in various rooms.

Work is continuing of the performance of nuclear criticality safety evaluations for equipment and processes. Drafts of four evaluations are being reviewed by the NSE criticality staff. ISAs using the HazOp methodology are being performed for the operations. ISA findings, conclusions and corrective actions will be reviewed by WSRC. These will be part of the NRC review program.

6.1.4 Staffing

Selected managers, engineers and operators have completed training at the system supplier's facility. Knowledge gained during this training is being applied to writing operating procedures and FTIs.

Operator staffing for the DCF and replacement operators for FMO/FMOX is still on-going. The licensee is resolving a number of personnel issues involving the staffing plan.

6.2 Conclusions

Work on the facility is progressing. Other activities necessary for the start-up and operation of the facility are also progressing. The NRC will continue to monitor progress and establish the inspection program accordingly.

7. PREVIOUS INSPECTION FINDINGS (92701)

7.1 (Closed) IFI 95-06-02

This IFI was opened as the result of an inspection into a reportable event concerning the loss of operability of the in-line uranium monitors in the Fluoride Waste system in the Chemical Area. The investigation report identified a number of long-term corrective actions. Four of the five actions had previously been completed and documented (IR 70-1113/96-06). The last item was the up-grading of the detector software and the performance of the necessary functional tests. As discussed in paragraph 4.1, the new software was installed, functional tests completed and NSR/Rs revised accordingly. This IFI is closed.

7.2 (Closed) IFI 95-09-01

By letter dated July 14, 1995, the licensee transmitted Revision 3 to the Physical Security Plan. Item 5 of the revision addressed a change in the time period that the licensee would use to conduct a trace investigation following the discovery of an apparent lost or unaccounted for shipment, and subsequent notification of the NRC. Item 5 was referred to ONMSS for review, and was identified in IR 70-1113/95-09 as an IFI. By letter dated June 21, 1996, Region II notified the licensee that, based on the ONMSS review, Item 5 was deemed acceptable for inclusion in the Plan. This IFI is closed based on the ONMSS review.

8. EXIT MEETING - SUMMARY

The inspector presented the inspection results to members of the licensee management and staff at the conclusion of the inspection on August 2, 1996. The licensee acknowledged the findings presented.

Proprietary information was reviewed and discussed during the inspection. It has been excluded from the report details.

PARTIAL LIST OF PERSONS CONTACTED

LICENSEE

M. Chilton, Manager, Joint Conversion Project
T. Flaherty, Start-up Manager, JCP
R. Foleck, Sr. Licensing Specialist
C. Kipp, General Manager, GE-NEP
R. Keenan, Manager, Site Security & Emergency Preparedness
J. Kline, Manager, Chemical Product Line
M. Lamb, Team Leader, Powder Production and Packaging
S. Murray, Team Leader, Chemical Conversion
L. Paulson, Acting Manager, Nuclear Safety Engineering
L. Quintana, Manager, Fuel Fabrication Product Line
R. Reda, Manager, Fuels and Facility Licensing
W. Sependa, Manager, GE-NE EH&S
G. Smith, Team Leader, FMO Maintenance Support
C. Tarrer, Team Leader, Configuration Management & ISA
K. Theriault, Team Leader, URU

INSPECTION PROCEDURES USED

IP 88005:	Management Organization & Controls
IP 88020:	Operations Review
IP 88025:	Maintenance/ Surveillance Testing
IP 88055:	Fire Protection
IP 92701:	Follow-up on Inspector Problems

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

70-1113/95-06-02	IFI	Completion of long term actions following power problems to Fluoride Waste syster. monitor
70-1113/95-09-01	IFI	Time period to trace apparent lost fuel shipments

Discussed

None

LIST OF ACRONYMS USED

AEC	Active Engineered Control
ChPL	Chemical Product Line
CR	Change Request
DCF	Dry Conversion Facility
DCP	Dry Conversion Project
E/C	Engineer/Constructor
ECC	Emergency Control Center
EH&S	Environmental, Health & Safety
EN	Event Number
FMO	Fuel Manufacturing Operation
FTI	Functional Test Instruction
GE-NE	General Electric- Nuclear Energy
GE-NEP	General Electric- Nuclear Energy Production
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
ISA	Integrated Safety Analysis
KGS	Kilograms
NRC	Nuclear Regulatory Commission
NSI	Nuclear Safety Instruction
NSR/R	Nuclear Safety Requirements/Release
ONMSS	Office of Nuclear Materials Safety and Safeguards
OP	Operating Procedure
PNC	Potential Non-Compliance
P/P	Practices & Procedures
SNM	Special Nuclear Material
SSR	Software Service Request
UIR	Unusual Incident Report
UO_2	Uranium Dioxide
URU	Uranium Recovery Unit
VOG	Vessel Off-Gas
WSRC	Wilmington Safety Review Council

ONE LINERS FOR SEPTEMBER 6, 1996

1. Research Reactor Status

a. Georgia Institute of Technology

The licensee recently sent a letter to Headquarters informing the NRC that two SROs had left the facility and that a third will be leaving the end of next month. When that individual leaves, the licensee will have 1 RO and 3 SROs remaining on staff. Billy Statham, one of the SROs who is currently serving as the Acting Reactor Supervisor, is available and able to be at the facility about 40% of the time. One of the remaining SROs, Peter Newby, has been appointed as Assistant Reactor Supervisor.

No work is being performed at the facility other than some maintenance in the Hot Cell and High Bay area. The licensee is preparing to paint those areas. The licensee has indicated that no decision will be made about obtaining the new LEU fuel until after the ASLB has made their decision concerning the license renewal.

GE is scheduled to be at the facility the week of September [illegible] to remove the Co-60 sources from the storage casks and remove the casks from the storage pool. The empty casks will then be shipped back to California.

b. North Carolina State University

The licensee continues to operate on a routine schedule of 3 to 4 days per week in support of research and experiments. No reportable events have been noted.

NRR is currently working on the license renewal and will be submitting a "final" set of questions to the licensee by next week. With the proper responses to the questions, the license is expected to be renewed by November.

The reactor was in a shutdown mode on September 5 and 6 during the time when tropical storm Fran passed through the area.

c. University of Florida

The licensee completed their biennial fuel inspection and found no problems or anomalies with the fuel. Two other surveillances were also completed, including control blade worth, and the reactor is again fully operational. No

B/30

reportable events have been noted recently.

The reactor will not be operated as much as this next semester as it has been in the past because the former Reactor Supervisor left to return to graduate school on a full time basis. One of the remaining SROs has been named as the Acting Reactor Supervisor.

d. University of Virginia

The reactor is being operated on a routine schedule of 3 to 4 days per week now. The licensee continues to perform neutron radiography and to irradiate seeds for medical use and topaz for the jewelry industry. No reportable events have occurred during the past two weeks.

The reactor pool leak, discovered after testing the pool gate in December 1995, remains at approximately 50 gallons per day. The 50 gallon total includes the amount of liquid lost due to evaporation as well as to the actual leakage. The licensee let bids for pool repairs and continues to review the schedule.

Recently a "Reactor Review Committee" was appointed by the University of Virginia to review the operation of the research reactor, make an appraisal of the operation, and make a recommendation to the President about the viability of the program and the feasibility of continued operation. The review is scheduled to be completed by the end of October.

The reactor was shutdown during the tropical storm Fran; off-site power has been lost, but the facility is secured.

2. General Electric - Nuclear Energy Production

GE declared an ALERT at 7:20 pm on September 5 in anticipation of hurricane force winds. At the time of the declaration, sustained winds were about 60 mph. The ALERT remained in effect until it was terminated at 1:33 am on September 6, following the passing of the eye of hurricane Fran.

[redacted]

Initial damage assessment at sunrise showed superficial damage to siding on the Aircraft Engine, Emergency Control Center (ECC) and the Fuel Component Operation (FCO) buildings. The exhaust stack on the incinerator was damaged but the incinerator has been down for about two weeks. Numerous trees were blown down or snapped off. Some water was found in a hallway in Fuel Manufacturing Operation (FMO) building where the new Dry Conversion Process (DCP) building

transition seal will be. No SNM was in this area. Some minor damage (over pack lids blown off) was identified to some waste boxes on pad 5 but the integrity of the protective wrapping does not appear to be breached. Inspection of the boxes and radiological surveys of the area will be performed on September 6, 1996.

The licensee did lose a secondary off-site power source, which provides power to some cooling water well pumps and a warehouse. The licensee has the primary off-site source. Prior to the storm, production and processing of uranium were shutdown. The licensee searched and cleared areas outside buildings of material that might become airborne. All routine operations at the site ended at 3 pm on September 5.

A response crew of about 50 people remained onsite covering the various buildings. The gates were locked and security personnel brought to the Emergency Control Center.

3. B&W - NNFD

The forecast is for 5-10 inches of rain in the Lynchburg area as the result of FRAN. The area is under a tornado watch. The licensee is continuing to monitor the level of the James River. Some storm damage has occurred in the surrounding areas including downed trees and some isolated flooding. The road to the plant was closed due to flooding as of 11:30 am on September 6, 1996. No loss of power to the site has been experienced. Flooding could occuring in the Waste Treatment facility. Prior to the storm, the licensee moved material from this area to areas where it could be affected by flood waters.

At 9:00 am on September 6, B&W started a plant shutdown and started sending people home. A crew is being selected to maintain site coverage (security, maintenance, etc.).

The Resident Inspector cannot get to the site due to downed trees in his neighborhood.

4. Nuclear Fuel Services, Inc.

As a result of inspection findings, the licensee confirmed to NRC on September 4, 1996, that actions would be taken to reassess the nuclear criticality safety of vault storage for the Rocky Flats material. This will also include retraining of operators, implementation of revised procedures if necessary, and assurance that vault storage is incorporated into the configuration control program. NRC will acknowledge the

licensee's actions and confirm that analysis of movement of material into and out of the vault will also be analyzed in a letter to the licensee.

NRC has not received a response from NFS on the Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $12,500 that was issued on August xx, 1996 for violations associated with the fire that occurred in the incinerator ducting on April 2, 1996.

5. Westinghouse

At 0900 on September 5, 1996, the licensee held an emergency response meeting and it was determined that all preparations had been completed for minimizing the effects of a possible strike from Hurricane Fran. The preparations included securing all fuel shipping containers stored outside and moving both empty and full 55 gallon low level waste drums to storage locations within the buildings. The licensee was using a lessons-learned approach based on experience gained from Hurricane Hugo in 1989.

On September 6, 1996, the licensee indicated that it was not necessary to shutdown operations and there was no damage to the facility as a result of the storm. The licensee expected to return to normal operations on September 6, 1996.

The Region has followed up on the August 25, 1996, small UF6 leak from the packing in a valve in conversion line 3. This particular valve design has been susceptible to HF corrosion. During the last 2-3 years, the licensee has attempted re-engineering the valve design, using different metals, and during the last attempt, used a teflon coating on the valve stem. On August 25, 1996, the teflon coating also failed. The licensee had checked the valves on the other conversion lines and found no apparent problems.

6. Framatome Cogema Fuels (B&W Fuel Company)

The plant is shutdown with no one on site in anticipation of flooding of Mt. Athos Road and isolation of the site.

7. U. S. Navy

On September 4, 1996, the Navy Radiation Safety Committee reported the loss of 9 μCi of americium-241. The material, in the form of two 4.5 μCi foil sources, was in a laser target designator pod on board an Navy F/A-18 aircraft which crashed into the Atlantic Ocean near Puerto Rico on August 9, 1996.

8. Agreement State Issues

No significant issues were reported by the Agreement States in Region II during the week.

9. Fire on Federal Express Plane

A fire on a Federal Express plane enroute to Boston, MA., occurred on September 5. The plan was carrying radioactive materials, including "spent" radiography sources from Alonso and Caruso, a radiography licensee in Puerto Rico. See attached PN.

10. Applied Radiant Energy Company

Westinghouse Hanford completed the loading of the final nine WESF sources into the shipping cask and has removed the cask from the irradiator pool on September 5, 1996. The cask will be dewatered and dried over the weekend. The shipment of the sources to Hanford is scheduled to take place on September 11, 1996.

September 5, 1996

PRELIMINARY NOTIFICATION OF EVENT OR UNUSUAL OCCURRENCE PNO-I-96-063

A preliminary notification constitutes EARLY notice of events of POSSIBLE safety or public interest significance. The information is as initially received without verification or evaluation, and is basically all that is known by Region I staff (King of Prussia, Pennsylvania)n on this date.

Facility
Stewart Airport
Stewart Airport
Newburgh, New York

Licensee Emergency Classification
Notification of Unusual Event
Alert
Site Area Emergency
General Emergency
X Not Applicable

Subject: FIRE ON FEDERAL EXPRESS AIRPLANE - STEWART AIRPORT, NEWBURGH, NEW YORK

Region I was notified by personnel from the New York State Department of Health Bureau of Environmental Radiation Protection that the cabin of a Federal Express airplane enroute from Memphis to Boston made an emergency landing at Stewart Airport after it caught fire while in flight. The DC-10 plane was transporting hazardous materials and radioactive materials. The Bureau responded with a team of 5 central office (Albany) and regional (New Rochelle) radiological health specialists. Health physicists from Indian Point Units 2 and 3 also responded at the request Orange County emergency management personnel.

Information obtained by the State from the Federal Express radiation safety officer indicates that the airplane carried several radioactive material packages, including three containers of Xenon-133 (total activity 73 Gigabecquerels), Iodine-125 (0.28 GBq), Iodine-131 (21.9 GBq), two industrial radiography cameras, one containing 29 Ci curies and the other 12 curies Iridium-192, C-14 (50 microcuries), P-32 (250 microcuries), H-3 (5 mCi), and S-35 (2 mCi). The fire was reported to have started in a container with hazardous materials only. The radioactive materials were loaded in a separate container close to where the fire started. The type of the hazardous materials involved and condition of their container is not known at this time. The plane was reported to have sustained extensive damage. The flight crew were taken to a local hospital, treated for smoke inhalation and released. Radiation surveys of firefighters showed no evidence of contamination.

Region I Public Affairs Office is prepared to respond to media inquiries.

Contact: CRAIG GORDON
(610)337-5216

9609090132

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

September 9, 1996

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/96-07

Dear Mr. Kipp:

This refers to the inspection conducted on August 5-9, 1996, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

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

Sincerely,

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See page 2)

B131

cc w/encl:
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-1113
License No.:	SNM-1097
Report No.:	70-1113/96-07
Licensee:	General Electric Company Wilmington, NC 28402
Facility Name:	Nuclear Energy Production
Dates:	August 5-9, 1996
Inspectors:	W. Gloersen, Project Inspector A. Gooden, Radiation Specialist
Approved by:	E. J. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

Enclosure

Executive Summary

Radiation Protection

The inspection of the licensee's radiation protection program involved a review of the following health physics program elements: independent radiation safety audit, external and internal exposure controls, organizational change, respiratory protection program, NRC Form 5 reporting, instrument calibrations, and alpha sources leak testing program. Within the areas reviewed, radiation protection management controls and procedures were in place and appeared to be adequate to protect the health and safety of plant workers. Personnel exposures (internal and external) were less than 10 CFR Part 20 requirements and/or GE administrative limits.

Radioactive Solid Waste Management

The licensee's controls, procedures, and waste management program appeared acceptable and capable of accomplishing its safety objectives. The CaF_2 relocation project had progressed ahead of schedule, however, implementation of the Final Status Survey and Release Plan, Revision 2, dated February 28, 1996 had not begun. The present arrangement for the storage of LLRW was less than adequate due to the large volume of waste being stored and due to the fact that the cardboard and wooden waste storage containers were not shielded from the natural elements. Within the Low Level Radioactive Waste management program, the licensee had implemented a waste minimization/prevention program to reduce the amount of solid waste generated onsite. In addition, the licensee was in the process of constructing a waste treatment facility for the decontamination and volume reduction of the waste generated. The radioactive waste management program was managed effectively.

Transportation

The transportation activities were managed effectively and the associated directives and procedures which incorporated and implemented the applicable provisions of both NRC and DOT regulations were technically adequate.

Attachment:

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

1. RADIATION PROTECTION (83822)

1.1 Discussion

10 CFR 20.1101(a) requires each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of §§20.1001-20.2402.

1.1.1 Radiation Protection Organization and Staffing

The inspector discussed with a licensee representative organizational changes specific to the radiation protection program since the last NRC assessment of this area (January 1996 documented in IR No. 70-1113/96-01). The inspector noted that the structure and reporting chain for the RP function had not changed since the previous inspection. However, the previous Manager of Nuclear Safety was reassigned during June 1996. As a result of the vacancy, a Criticality Safety Program Manager was acting as Nuclear Safety Manager until the vacancy was filled. The inspector discussed with the licensee contact the overall impact of this change on the Nuclear Safety organization. No significant adverse effect had been identified by the organization as a result of the temporary change.

1.1.2 Audits and Appraisals

SNM License-1097 requires audits to be performed in accordance with procedures to determine if actual operations conform to criticality and radiation safety requirements. An independent audit of the radiation safety program was performed during the period November 28 to December 1, 1995. The inspector reviewed documentation to show that the Audit Team qualifications were approved by GE management in accordance with license conditions. The audit was detailed and compliance oriented. No potential noncompliances were identified. Items identified during the audit as findings were assigned to the regulatory tracking system for tracking corrective actions. All items opened during the audit had been appropriately addressed and were considered closed. The independent audit was effective in the identification of findings, recommendations, observations, and best practices.

1.1.3 Exposure Controls

10 CFR 20.1201 requires each licensee to control the occupational dose to individual adults to established dose limits. 10 CFR 20.1502(a) and (b) require each licensee to monitor occupational exposure to radiation and to supply and require the use of individual monitoring devices for adults likely to receive an annual dose in excess of 10 percent of the limits in 10 CFR 20.1201. For the period January 1, 1995 to December 31, 1995, the maximum TEDE was 2.47 rem (compared to the NRC limit of 5 rem) and was assigned to an employee working in the powder preparation area. The maximum assigned SDE was 1.11 rem and was assigned to a ceramic worker. The GE Action Limit for SDE was 40 rem/year while the NRC limit is 50 rem/year. The average

SDE exposure for 1995 was 30 mrem/year. During the previous reporting period (1994), the average was 43 mrem/year. The external deep dose maximum exposure was 480 mrem/year, and the 1995 average was 18 mrem/year. The maximum DDE exposure was assigned to a worker in the bundle assembly area. The GE action limit was 4 rem/year while the NRC limit was 5 rem/year. According to an exposure graph and a discussion with a licensee contact, the annual DDE average had continually decreased. During 1992, the average was 44 mrem, 1993 was 29 mrem, 1994 was 27 mrem, and 1995 was 18 mrem. The inspector noted that the maximum internal exposure (CEDE) during 1995 was 2.413 rem. The GE action limit was 4 rem while the NRC limit was 5 rem. The maximum assigned CEDE was to a worker in the powder preparation area. The average internal dose for 1995 was 0.27 rem/year. In addition to exposures for 1995, the inspector reviewed assigned doses current as of August 5, 1996 and noted that the maximum assigned SDE was 0.28 rem, the maximum CEDE assigned was 1.247 rem, and the maximum TEDE was 1.247 rem. The maximum DDE (based on TLD results for the first five months of data in 1996) was 0.28 rem.

The inspector reviewed the licensee's bioassay program which was detailed in two documents: P/P 40-19 "Bioassay Program" and NSI 0-2.0 "Bioassay (Excreta)-Program". The inspector reviewed selected personnel exposure records for individuals assigned work in areas where soluble uranium materials were processed. A review of the urinalysis tracking system printout disclosed that selected workers were providing urine samples for analysis as required by procedures. Further, a review of graphs and summary documentation disclosed a significant reduction from CY 95 to the corresponding months in 1996 in the number of workers failing to submit urine samples at the end of the work week. For example, during March 1995, total missed were 25 compared to March 1996 total of ten. The overall trend during CY 96 thus far was a reduction in the number of missed samples. The inspector further noted that intakes were calculated as required when urinalysis results exceeded established action limits and that no worker had exceeded the licensee's administrative intake limit of 7.5 mg/wk. The inspector reviewed the licensee's cross-check program for sample analysis quality assurance. On a monthly basis, urine samples with known amounts of uranium were submitted to the onsite lab and an offsite vendor for analysis. The inspector reviewed documentation for the period February to June 1996 and noted good agreement in the results that were obtained.

As part of the exposure monitoring program, the inspector verified that the licensee had provided NRC Form-5's for 1995, summarizing the occupational radiation exposure to those workers who required exposure monitoring for the year. Documentation was provided the inspector to show that the Form-5's were provided prior to April 30, 1996. The inspector determined that the licensee had adequately monitored personnel exposures and all of the assigned exposures were within regulatory limits.

1.1.4 Facility Tours

During the inspection, the inspector toured the chemical product line, pellet production and rod load areas, the URU, the CheMet laboratory, the laundry

area, the URU Pump Control Room, and the Conversion Control Room. During the tours, the inspector did not identify any significant weaknesses in the licensee's program to maintain and control radioactive materials, nor with area postings. The inspector did note the presence of candy or gum wrappers in the chemical product line area and the URU. The inspector discussed during the tour and exit interview the presence of such material may indicate employee disregard for area postings and exposure controls. In response to the inspector's comments, a licensee contact informed the inspector that evidence of this sort in a controlled area is considered a serious matter and GE would continue to monitor this incident for taking actions as appropriate. The inspector accompanied and observed a Radiation Control Technician perform smear surveys of the powder transfer area. In addition, the inspector observed personnel performing one minute counts on smear samples for the presence of contamination. No elevated samples or equipment problems were noted. Both the survey technique and method of analysis performance was adequate for detecting the presence of contamination. Based on a random review, where required, personnel were properly wearing respiratory protection and dosimetry.

1.1.5 Instruments and Equipment

Several survey instruments were checked and verified at various locations as operational and within calibration dates. In addition, maintenance and/or calibration records were reviewed for an assortment of instruments to ascertain if calibrations were done in accordance with NSI 0-4.0 "Nuclear Safety Instrumentation." No problems were noted. Administrative controls were in place and appeared to be effective for ensuring that instruments were calibrated at the required frequency.

The inspector discussed with a licensee representative the license requirements for conducting periodic leak testing of radioactive sources. The licensee's performance in this area was verified via a review of the leak testing program for selected alpha sources. No problems were noted. The documentation disclosed that selected sources were calibrated at the frequency as specified in the license.

1.1.6 Respiratory Protection

The inspector reviewed procedures governing the respiratory protection training and maintenance program. In addition, the inspector viewed the respiratory protection portion of the video used for initial and refresher training purposes. Topics included types of mask, donning equipment, proper fit test, rules for use, and checking operability of equipment. No written test specific to respiratory protection was required following training. According to the training contact, for initial respiratory training, a practical demonstration (mask use) is administered at the end of training session. Respiratory protection training records was reviewed for several individuals assigned to the controlled area. No problems were noted.

The inspector reviewed and discussed the respiratory protection maintenance program with the licensee contact assigned responsibility in this program area. The inspector reviewed documentation for monthly surveillance of SCBA equipment for the period January to July 1996. In addition, SCBA equipment was examined by the inspector at the URU Pump Control Room and the Conversion Control Room. No problems were noted. Tanks indicated full, masks appeared to have been cleaned and no visual damage was observed to rubber hosing, valves, or face-piece. The inspector also observed face masks cleaning and laundering by laundry personnel. Although no issues were identified in this program area, the inspector discussed in detail the housekeeping improvements necessary to alleviate unnecessary delays in obtaining SCBA equipment from storage areas. During the tour, the licensee experienced a delay in excess of five minutes attempting to locate equipment as a result of modifications in the area; and in another instance, equipment was improperly stored and impeded access to the SCBA equipment.

1.2 Conclusion

The inspector determined that within the areas selected for review, the licensee's performance in radiation protection complied with regulatory requirements and license conditions, and appeared to be adequate for protecting the health and safety of employees and the public.

2. RADIOACTIVE SOLID WASTE MANAGEMENT (84850)

2.1 Discussion

During the inspection, licensee programs associated with the management of low-level radioactive waste (LLRW) and the Calcium Fluoride (CaF_2) Relocation Project were reviewed and discussed with cognizant licensee representatives.

2.1.1 Decommissioning Activities (CaF_2 Relocation Project)

The inspector reviewed the licensee's progress in removing the CaF_2 from the northwest CaF_2 storage area and relocating the material to an above ground storage facility in the Controlled Access Area (CAA). The licensee planned on storing the material until economic recovery of the uranium in the CaF_2 could be achieved. The northwest storage area consisted of seven shallow trenches located on the high ground in the northwest quadrant of the facility. CaF_2 sludges were placed in the in-ground storage trenches from the time of conversion operation commencement in 1968 to the time of Waste Treatment Facility (WTF) operation in 1972. The seven pits contained approximately 70,000 cubic feet of CaF_2 material. From February 1996 to May 1996, the licensee excavated the northwest storage area and moved approximately 120,000 cubic feet of soil and CaF_2 containing 3255 kilograms of uranium to the storage warehouse. From May to July 1996, the licensee screened approximately 69,000 cubic feet of soil between 30 pCi/gram and 200 Pci/gram so that this material could be shipped to the GSX-Laidlaw Facility (a Resource Conservation Recovery Act (RCRA) hazardous waste burial facility) in Pinewood, South Carolina. The licensee was authorized in the special authorization section of

the license application, Section 1.8.5, Disposal of Industrial Waste Treatment Products) to dispose of waste containing small quantities of LEU in accordance with Option 2 of the 1981 Branch Technical Position (BTP), "Disposal or Onsite Storage of Thorium or Uranium Waste from Past Operations," which basically limited the uranium concentration in the waste material to 250 pCi/gm (insoluble) and 100 pCi/gm (soluble). As of the end of July 1996, the licensee had essentially completed the excavation.

By letter dated April 16, 1996, the NRC had approved the licensee's Final Status Survey and Release Plan for the Northwest CaF_2 Area (FSS Plan), Revision 2, dated February 28, 1996. The purpose of the FSS Plan was to demonstrate that residual radioactivity concentrations at the Northwest CaF_2 Storage Area satisfy the NRC criteria for future use without licensing restrictions and radiological controls. The licensee was in the process of evaluating the residual radioactivity remaining in the burial trenches. The licensee had identified contaminated soils below the groundwater level. As of June 24, 1996, soil concentration remaining in the soil, which included soils below the water table ranged from approximately 0.5 pCi/gram to 129 pCi/gram.

The inspector also reviewed groundwater monitoring data collected from 15 wells (identified as CAF-Series wells) located around the Northwest CaF_2 Storage Area during the period February 1 to June 25, 1996. The licensee analyzed the well samples for gross alpha, gross beta, total uranium and fluoride. During the excavation, a maximum concentration of 3181 pCi/liter total uranium was noted at well location 6A. Well 6A was downgradient from the excavation site. On June 25, 1996, the total uranium concentration at well 6A was 706 Pci/liter. Total uranium concentrations at Well 12A, which was located at the site boundary ranged from 10 pCi/liter to 1613 pCi/liter. The maximum occurred during the excavation activities. On June 25, 1996, the total uranium concentration at Well 12A decreased to 37 pCi/liter. The licensee indicated to the inspector that the groundwater data collected since June 1996 would continue to be reviewed so that any trends could be identified.

2.1.2 Waste Management

As of July 1, 1995, the State of South Carolina was no longer accepting LLRW generated from licensee located in the State of North Carolina for burial at the Barnwell Facility. Thus, at present, the licensee's General Electric Company Nuclear Energy Production facility in Wilmington, NC had no options for the disposal of LLRW.

Various solid wastes were generated from the fuel manufacturing operations (FMO) and field examination technology (FET) operations. FMO solid LLRW ranged in form and type, such as, packaging and construction materials, worn-out tools and equipment, spent process oils and chemicals, uranium sludge, and by-product generated hydrofluoric acid. FET solid LLRW consisted primarily of compactible and non-compactible dry active wastes (DAW) and cuno filters. FET wastes were volume reduced offsite and then stored onsite in 55 gallon drums at the FET radwaste storage warehouse.

At present, the licensee temporarily stored radioactive solid wastes pending authorization to resume shipments to an authorized LLRW disposal facility. The inspector toured the licensee's temporary waste storage locations, which consisted of several outside storage areas or "pads" located in the controlled area. These pads were secured to prevent the unauthorized removal of the LLRW. The licensee had designated Pad Nos. 6 and 8 for waste box storage. As of August 5, 1996, approximately 444 metal (50 cubic feet each) waste boxes containing noncombustible wastes were on the storage pads. The licensee was in the process of consolidating the wastes to reduce the number of boxes on the storage pads. In addition, the licensee was negotiating with a waste disposal facility in Utah to accept the noncombustible waste debris. Contaminated, combustible, solid process wastes were stored on Pad No. 7A. Combustible wastes were stored either in wooden or cardboard boxes. The combustible wastes, such as rags, mops, shop paper, plastic, and worn-out protective clothing, were designated for burning in an onsite incinerator designed for processing uranium contaminated wastes. Incinerator ash containing sufficient uranium to make recovery economical was processed onsite for the recovery of the uranium.

As of August 5, 1996, there were approximately 730 cardboard and/or wooden boxes on storage pad 7A. The licensee's goal was to have an inventory of approximately 600 boxes on storage pad 7A by the end of 1996. The backlog was due to the shutdown of the incinerator on March 27, 1996 due to a waste box in the incinerator load chamber that burned due to a failure of the loader ram limit switch. Extinguishing the waste box resulted in damage to another box queued for incineration on the scissors lift. The incident was a reportable event due to the damage caused by the fire. The licensee resumed incinerator operations in June 1996 after a thorough review of this event and another event which occurred on April 2, 1996 at the Nuclear Fuel Services, Inc. facility which involved a fire in the incinerator ducting. A review of this entire incident was documented in Inspection Report No. 70-1113/96-203 and a review of the licensee's corrective actions was documented in Inspection Report No. 70-1113/96-09.

The inspector observed that the licensee had implemented common sense approaches to waste minimization and prevention. This program consisted of (1) minimizing the introduction of non-contaminated items into the restricted area; (2) segregation of highly contaminated waste items from low contaminated waste for the recovery and recycle of uranium as well as the decontamination of material for reuse where feasible; and (3) localized separation of wastes into combustible and noncombustible categories. The inspector noted throughout the restricted area the placement of combustible and non-combustible waste receptacles. A written list of examples of both types of wastes were placed on each of the receptacles.

2.1.3 Facility Tours

The inspector toured the facility where the Decontamination and Volume Reduction Facility (DVRF) was being constructed. The licensee had allocated funds to refurbish the old GECO (dry conversion) facility to be used for the construction of the DVRF. The licensee estimated that the DVRF would be operational by October 1996. The DVRF was designed to make increased use of available technologies for the decontamination equipment (ultrasonic cleaning, ultra high pressure washing) so that contaminated items could be decontaminated to the unrestricted use limits as specified in Section 1.8.2 of the license application and the use of super compaction equipment for waste volume reduction.

Throughout the rest of the facility, the inspector noted proper use of the combustible and non-combustible waste receptacles. The inspector toured the licensee's temporary waste storage locations, as noted above, which consisted of several outside storage pads located in the controlled area. The present arrangement for the storage of LLRW was less than adequate due to the large volume of waste being stored and due to the fact that the cardboard and wooden waste storage containers were not shielded from the natural elements. However, the restart of the incinerator should reduce the volume of combustible waste stored onsite and a successful negotiation with a waste disposal facility in Utah to accept the noncombustible waste debris should reduce the amount of noncombustible waste presently being stored onsite.

2.2 Conclusion

The inspector concluded that the licensee's controls, procedures, and waste management program appeared acceptable and capable of accomplishing its safety objectives. The CaF_2 relocation project had progressed ahead of schedule, however, implementation of the FSS Plan, Revision 2, dated February 28, 1996 had not begun. In addition, the present arrangement for the storage of LLRW was less than adequate.

3. TRANSPORTATION ACTIVITIES (86740)

3.1 Discussion

10 CFR 71.5(a) requires each licensee who transports licensed material outside the confines of its plant or other place of use, or who delivers licensed material to a carrier for transport, to comply with the applicable requirements of the regulations appropriate to the mode of transport of the Department of Transportation (DOT) in 49 CFR Parts 170-189.

3.1.1 Shipping Activities

During the onsite inspection, licensee transportation activities regarding shipments of unirradiated fuel, UF_6 heels, and of other radioactive materials were reviewed. Selected records for the following consignments were reviewed in detail

- RQ, Radioactive Material Fissile, NOS, 7, UN2918, for selected separate shipments of fissile material containing fuel elements shipped to selected power reactor facilities from January 1996 to July 1996.

- RQ, Radioactive Material Fissile, NOS, 7, UN2977, for selected shipments of fissile material containing heels of enriched uranium hexafluoride in 30A/30B cylinders from January 1996 to June 1996.

- Radioactive Material, NOS, 7, UN2918, for a shipment of 4907 kilograms of uranium dioxide to a fuel facility on March 18, 1996.

The inspector reviewed and discussed in detail the documentation used, and subsequently maintained in the licensee's records for each radioactive material shipment, including, the Bill of Lading, Radioactive Material Shipment Record, Vehicle Inspection Report, Receipt and Loading Verification Checklist, Packing List (Fuel Assemblies/Component Assemblies), Fuel Shipment Information Form, Container Log Sheet, and Health Physics Survey Forms.

In general, the shipping records referenced above were complete and the information supplied on the shipping papers was appropriate. The inspector noted isolated examples of shipping paper inconsistencies, however, these problems were not considered significant issues and were corrected immediately. Another shipping paper inconsistency was noted in which the licensee had incorrectly referenced a shipping container as a IAEA Certificate of Compliance (CoC) USA/9019/AF package when, technically, the container should have been referenced as a NRC CoC package for a shipment of 4907 kilograms of uranium dioxide to a fuel facility in Lynchburg, VA. The licensee acknowledged the inspector's observation and corrected the inconsistency.

3.1.2 Authorized Packages

10 CFR 71.12 (Subpart C) requires, in part, that (a) a general license is issued to any licensee of the Commission to deliver to a carrier for transport, licensed material in a package for which a license, certificate of compliance (CoC), or other approval has been issued by the NRC and; and applies only to a licensee who (c)(1) has a copy of the specific CoC, and other approval of the package and has the drawings and other documents referenced in the approval relating to the use and maintenance of the packaging and to the actions to be taken prior to shipment and (c)(2) complies with the terms and conditions of the license, CoC, or other approval as applicable, and the applicable requirements of Subparts A, G, and H of this Part.

49 CFR 173.471 details additional requirements for the shipment of NRC-approved packages.

During the onsite inspection, licensee activities associated with packaging and shipping of radioactive materials were reviewed in detail. The inspector reviewed and discussed with cognizant licensee representatives selected

aspects of current quality control (QC) program activities associated with packaging and transportation operations for fissile material shipments made between January and July 1996.

The inspector noted that the fuel rod and assembly shipments were shipped using NRC CoC No. 4986, USA/4986/AF, Model Numbers RA-2 and RA-3 packaging. The inspector verified that the licensee maintained the most recent revision of CoC No. 4986 (Revision 33) and referenced documents in accordance with 10 CFR 71.12(c)(1) requirements. In addition, the inspector verified that the licensee was a registered user of the package in accordance with 71.12(c)(3).

The inspector also verified that the licensee was a registered user of the NRC CoC 9196, USA/9196/AF, Model UX-30, which was an UF_6 cylinder overpack. The inspector verified that the licensee maintained the most recent revision of CoC No. 9196 (Revision 9) and referenced documents in accordance with 10 CFR 71.12(c)(1) requirements. The inspector noted that the licensee had purchased 15 Model UX-30 overpacks in 1995 and ten additional UX-30 overpacks in 1996. The inspector verified, with regard to reporting defects and noncompliances, that the procurement documents included the statement that the provisions of 10 CFR 21 apply as required by 10 CFR 21.31. In addition, the inspector verified by record review that the licensee performed inspections of each overpack before the first use as required by 10 CFR 71.85. The inspections ascertained that there were no cracks, pinholes, uncontrolled voids, or other defects that would significantly reduce the effectiveness of the packaging and that the gaskets were in place when the upper half of the package was removed. The licensee also conspicuously and durably marked the packaging with its model number, serial number, gross weight, and a package identification number assigned by the NRC in accordance with 10 CFR 71.85. Before applying the model number, the licensee, through its QA program, verified that the packing had been fabricated in accordance with the designed approved by the NRC.

In addition, the inspector verified that the licensee maintained the most recent revision of NRC CoC No. 9019 (Revision 23) for package Model No. BU-7, which was used once for shipping uranium dioxide powder not to exceed five percent enrichment in the U-235 isotope to a fuel facility in Lynchburg, VA in March 1996. The inspector also verified that the licensee was a registered user of the Model BU-7 package.

The inspector also reviewed the records of three shipments of either powder or pellet samples to various laboratories from April 2 to July 30, 1996. In all cases, the shipping papers indicated that the material was shipped in a strong tight container (DOT 12B30). 49 CFR 173.411 requires the use of industrial packagings. Industrial Packages must meet the requirements of 49 CFR 173.410 and 173.411 and are categorized as follows: (1) Industrial package Type 1 (IP-1); (2) Industrial package Type 2 (IP-2); and (3) Industrial package Type 3 (IP-3). At the time of this inspection, the licensee was unable to determine if the DOT 12B30 met the requirements for an IP-1 package. During the exit meeting, the inspector identified this issue as an unresolved item (URI) (70-1113/96-07-01 (URI): Determine whether or not the strong tight

container identified as DOT 12B30 satisfied the packaging requirements specified in 49 CFR 173.410 and 173.411 for an industrial package Type 1).

3.1.3 Procedural Guidance

During the onsite inspection the procedural guidance specified for the shipment of radioactive materials was reviewed against the selected criteria specified in 49 CFR Parts 171-178. Specifically, the inspector verified that the necessary procedure revisions were made to implement the changes in the DOT regulations which became effective on April 1, 1996. In addition to the shipping paper requirements specified in 49 CFR Subpart C, procedural details were reviewed against requirements established for packaging (49 CFR Part 173), marking and labeling (49 CFR Part 172, subpart D, §§172.400-407 and §§172.436-440), monitoring (49 CFR Part 171, subpart I), and emergency response information (49 CFR, subpart G).

- TI-14, Exclusive Use Shipment, Revision 5, March 29, 1995 and modification dated March 29, 1996
- TI-15, RA Inner Refurbishing, Revision 10, March 23, 1996
- TI-16, Radioactive Material Packaging and Shipment Record, Revision 2, March 13, 1995 and modification dated March 29, 1996
- TI-18, Empty Radioactive Material Shipping, Revision 4, September 14, 1995 and modification dated March 29, 1996
- TI-19, Radioactive Name and Shipping Papers, Revision 5, September 14, 1995 and modification dated March 29, 1996
- TI-20, Radiation Radioactive Packages, Revision 2, June 8, 1995 and modification dated March 29, 1996
- TI-33, Shipment of UF-6 Material and Containers, Revision 0, March 13, 1995

The inspector reviewed the procedures noted above and observed that the procedures incorporated and implemented the applicable provisions of both NRC and DOT regulations.

In addition, the inspector verified that the appropriate personnel in the traffic department had current copies of the applicable DOT regulations. The licensee used a vendor service that provided periodic updates to 40 CFR 106-180. This service provided a well organized version of the DOT regulations with an indexing system that allowed quick access to the appropriate regulation.

3.2 Conclusion

The licensee's performance in this program was acceptable. Transportation activities were managed effectively and the associated directives and procedures which incorporated and implemented the applicable provisions of both NRC and DOT regulations were technically adequate. One unresolved item was identified.

ATTACHMENT

1. PERSONS CONTACTED

1.1 Licensee Personnel

D. Barbour, Coordinator, Radiation Protection
*J. Bradberry, Senior Program Manager, Regulatory Team
D. Brown, Team Leader, Environmental Project
W. Croom, Area Coordinator (Bundle Assembly)
*N. Dookeran, Team Leader, CheMet Lab
D. Dowker, Team Leader, Environmental Process Team
*R. Foleck, Senior Licensing Specialist
*G. Fornasiero, Engineer, Packing and Transportation
*P. Godwin, Coordinator, Fire Safety and Emergency Response
*M. Lamb, Team Leader, Powder Preparation and Packaging
*A. Mabry, Principal Nuclear Safety Engineer
*D. McCaughey, Manager, Fuel and CheMet Lab Quality
G. Mobley, Coordinator, Maintenance
*S. Murray, Team Leader, Chemical Conversion
*L. Paulson, Acting Manager, Nuclear Safety
R. Raynor, Instructor, Training
*R. Reda, Manager, Fuels and Facility Licensing
*B. Robinson, Principal Nuclear Safety Engineer
C. Rochelle, Lab Analyst, CheMet Lab
*E. Rouse, Monitor, Radiation Protection
G. Sbraco, Packaging/Transportation Engineer
K. Toussaint, Specialist, Process Control Engineering
*F. Walker, Manager, Shipping and Traffic
*T. Winslow, Manager, Material Control and Accountability

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

*Denotes those present at the exit meeting on August 9, 1996.

2. Exit Interview

On August 9, 1996, 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 Violation listed below. There were no dissenting comments expressed by the licensee. Licensee management was also informed that an IFI from a previous inspection was reviewed and considered closed.

Item Number	Status	Description and Discussion
70-1113/96-01-01	Closed	IFI - Verify the effectiveness of corrective actions in preventing leaks and contamination to laboratory hoods and/or sink drains.
70-1113/96-07-01	Open	URI - Determine whether or not the strong tight container identified as DOT 12B30 satisfied the packaging requirements specified in 49 CFR 173.410 and 173.411 for an industrial package Type 1

3. List of Acronyms

CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulation
CY	Calendar Year
DDE	Deep Dose Equivalent
GE	General Electric
IFI	Inspector Followup Item
IR	Inspection Report
MG/WK	Milligrams per week
MREM	Millirem
NSI	Nuclear Safety Instruction
P/P	Practices and Procedures
RP	Radiation Protection
R/YR	Rem Per Year
SCBA	Self-Contained Breathing Apparatus
SDE	Shallow Dose Equivalent
SNM	Special Nuclear Material
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
UF6	Uranium Hexafluoride
URI	Unresolved Item
URU	Uranium Recovery Unit
VIO	Violation

Attachment

4. Previously Identified Inspector Followup Item

(Closed) IFI 70-1113/96-01-01: Verify the effectiveness of corrective actions in preventing leaks and contamination to laboratory hoods and/or sink drains.

The licensee had completed corrective actions in accordance with the commitments detailed in Paragraph 5 of IR 70-1113/96-01. The inspector reviewed licensee survey data sheets which documented the drain inspection results for the period January to June 1996. In addition to the records review, the inspector conducted an independent survey and examination of several drain pipe surfaces and directly underneath the drain pipe in each hood located in the CheMet Lab. No problems were noted. According to discussions with a licensee representative assigned responsibility in this area, all sink drain piping was replaced (at a cost of approximately $50,000) with a type of piping known as "kynar". One other aspect of the licensee's corrective actions reviewed by the inspector involved a self assessment of the adequacy of corrective actions taken by the laboratory during the past five years. The referenced audit was very detailed and critical of the laboratory corrective action program; and for those items identified as inadequate, according to documentation the proper corrective actions were being taken. The licensee's actions were considered appropriate for closure of the IFI.

Attachment

ONE LINERS FOR OCTOBER 11, 1996

1. Fuel Facility Status

a. B&W NNFD

Five inspectors from the International Atomic Energy Agency (IAEA), accompanied by a NMSS representative will be on site the week of October 14 to review activities associated with the down blending of Project Sapphire material. This will include the installation and calibration of process monitors, review of data collected by existing instrumentation and collection of material samples.

The processing of Project Sapphire uranium-beryllium metal alloys is progressing in Uranium Recovery. Downblending to low-enriched material has started after several start-up problems (replacing a PVC vent line which overheated, installing a bigger pump after piping system modifications) but converting the liquid to crystals may start October 11.

The licensee expects to receive the laboratory results for the material which caused a visible "flame" in a dissolver early next week. Under the conditions of the CAL, they will discuss the results with Region II.

Naval fuel and research reactor fuel areas are operating normally with no problems. Uranyl nitrate recovered from zero power fuel is being processed into feedstock for the fabrication of fuel for the High Flux Isotope Reactor.

NMSS has drafted a CAL to NNFD confirming their commitment not to ship certain uranium-beryllium materials under the exemption (as fissile) under 10 CFR 71.53. NNFD identified that, under certain circumstances involving super moderators, the regulations were not sufficiently conservative for certain package arrays. NNFD had informed the NRC (NMSS) of this on September 18 and had provided written commitment not to ship on September 20. NNFD also notified the Department of Transportation and the Department of Energy. NMSS has requested RES revise the regulations promptly and is considering an Information Notice.

b. Framatome Cogema Fuels (B&W Fuel Company)

Disassembly of bundles and down-loading of fuel pellets under the Nukem contract is continuing. Some difficulties were encountered with the removal of the outer shroud around the assembly but this appears solved. The pellets from the fuel rods will be sent to Siemens for recycle.

B&W fuel assembly is shutdown based on production schedules.

c. General Electric

The remnants of Hurricane Josephine passed the Wilmington area on October 8. Approximately 5 inches of rain fell at the site but no damage occurred to any of the facilities. All lagoons (chemical and waste water) remained within normal levels.

On October 8, the licensee made a notification under Bulletin 91-01 when they determined that a bulging tank exceeded the nuclear safety specification (see enclosed EN). The criticality safety analysis for the equipment assumed full reflection and an infinite slab (very conservative). The licensee reviewed records of past contents of the tank and could find no instance when the tank contained the concentration limit that was one of the controls. The licensee plans to review the tank supports to determine if additional structural supports are needed.

Testing of the modification to Line 5 has been completed and it is now processing recycle material from Uranium Recovery (UR) up to 5% enrichment. Prior to the modification, the recycle line was limited to 4% although UR could process up to 5%.

ADU lines 1-4 are all operating as needed for production schedules. Pellet production, rod loading and bundle assembly are running on a 5 day schedule with no problems. The waste incinerator is running normally. All systems in UR are functioning normally except for the oxidation furnace. During the 6 month inspection of the muffle area for cracks or powder accumulations (NCS requirement) several heating elements were damaged and have to be replaced.

Selection of personnel to staff the new Direct Conversion Facility is expected next week. The original intention was that the selections would have been done in June and replacements/backfills trained for areas such as ADU, UR and URLS before the staff went to DCF for training. This was not completed for several reasons. However, the start-up date for the DCF has not changed and the training programs will have to be run in the remaining time.

The Team Leader, Ceramic Production (pellet pressing and sintering) resigned to take a position with Kingsford Charcoal. The Team Leader, Powder Preparation left in September. Acting team leaders have been appointed pending selection of new leaders.

d. Nuclear Fuel Services, Inc.

The licensee is continuing to receive shipments of uranyl nitrate (UNH) from Rocky Flats. However, problems with the 11-liter solution cylinders meeting the dimensional requirements of the Certificate of Compliance may delay some future shipments.

The licensee is continuing to conduct equipment check-outs and functional tests of portions of the systems which will be used in the UNH processing. Components are being repaired or replaced as a result of this activity.

During a conference call on October 9, the licensee's progress toward completing all the items specified in their Rocky Flats Operational Readiness Review Plan was discussed. The licensee committed to submit a response concerning their nuclear criticality safety evaluation of the operation on October 10. It now appears that all other "readiness" items, except training, will be completed by October 25. Training is now scheduled for the period from October 28 through November 15. As a result, the start date for the actual processing of Rocky Flats material has been slipped and now is projected for November 18 at the earliest. NMSS and Region II are coordinating a joint inspection which could be conducted the week of November 4.

e. Westinghouse

Conversion line four is shut down for major modifications and upgrades, and will remain shut down for another four to six weeks. UF_6 is currently being run on three conversion lines. A fourth line is running uranyl nitrate recycle material. Other portions of the plant are operating on a normal schedule, i.e. pelleting and bundle assembly, IFBA, and recovery/waste processing.

Since the last report, the licensee has experienced no process upsets or other safety significant events. They are continuing to operate on their new schedule of seven days per week for chemical conversion operations and six days per week for pelleting and recovery.

2. Agreement State Issues

a. Action to Remove Sources at Bankrupt Facility in Tennessee

See attached PN and press release. USDOE/ORNL took possession of the three radiography sources on October 8, 1996, and they were transported by

the State of Tennessee to ORNL for storage until a decision is made on final disposition.

3. Medical Consultant's Report for Dr. Fernandez's Misadministrations

A copy of the medical consultant's report will be transmitted to the Puerto Rico Health Department (PRHD) and Dr. Fernandez. The PRHD will be requested to do follow-up on the patients. In addition, an Order is to be issued this week requiring review of patient records, notification of patients who received misadministrations, and transfer of the sources in 90 days.

4. Herman Strauss Scrap Yard Source

See attached PN and Morning Report. The EPA and EPA contractors opened the container on site on October 10 to identify the radioisotope involved and to initiate actions to ship the sources off site. They found low levels of contamination on the inside of the container (20,000 cpm). They identified the isotope to be radium by portable spectral analysis. They planned to reseal the source, package it for shipment, and ship it to a contractor facility in Tennessee.

5. New Director, Naval Nuclear Propulsion

Admiral Bruce Demars, Director, Naval Nuclear Propulsion, retired on October 1. Vice Admiral Frank Bowman, currently Chief of Naval Personnel, was selected as his replacement.

6. Enforcement Discretion for Reciprocity Cases

On October 7, 1996, enforcement discretion letters were sent to four State of Florida licensees (Okaloosa Asphalt, Inc.; Edward M. Chadbourne, Inc.; Baily Engineering and Testing, Inc.; and Larry M. Jacobs, Inc.) who had used moisture/density gauges in areas of exclusive federal jurisdiction in Florida without filing for reciprocity (thus without an NRC license). These licensees had been unaware of the need to file for reciprocity.

FUEL CYCLE FACILITY

EVENT NUMBER: 31113

CILITY: GE NUCLEAR ENERGY
RXTYPE: URANIUM FUEL FABRICATION
COMMENTS: LEU CONVERSION (UF6 TO UO2)
LEU FABRICATION
LWR COMMERICAL FUEL
CITY: WILMINGTON REGION: 2
COUNTY: NEW HANOVER STATE: NC
LICENSE#: SNM-1097 AGREEMENT: Y
DOCKET: 07001113

NOTIFICATION DATE: 10/08/96
NOTIFICATION TIME: 11:20 [E
EVENT DATE: 10/07/96
EVENT TIME: 16:00[ED
LAST UPDATE DATE: 10/08/96

NOTIFICATIONS

JOHN POTTER RDO
COMBS/TROSKOSKI EO

NRC NOTIFIED BY: PAULSON
HQ OPS OFFICER: CHAUNCEY GOULD

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
NBNL RESPONSE-BULLETIN

EVENT TEXT

THE LICENSEE REPORTED LOSS OF GEOMETRY CONTROL AS THE RESULT OF TANK BULGING.

THE BIENNIAL TANK WIDTH MEASUREMENT EVALUATION SHOWED THAT THE GEOMETRY CONTROL HAD BEEN EXCEEDED ON ONE TANK. THE LARGEST ACTUAL MEASUREMENT IN THE LOCALIZED BOWED AREA WAS 4.86 INCHES EXCEEDING THE ALLOWABLE 4.45 INCHES. THE SECOND CONTROL, CONCENTRATION, REMAINED IN EFFECT. THE MAXIMUM CONCENTRATION WAS LESS THAN 1 PPM U (LIMIT+16,000 PPM U). THUS NO UNSAFE CONDITION EXISTED. TOTAL URANIUM INVOLVED WAS 6 GRAMS.

THE LICENSEE IS REPORTING THIS CONDITION PURSUANT TO NRC BULLETIN 91-01. THIS REPORT IS A 24 HOUR REPORT SINCE GEOMETRY WAS LOST AS AS RESULT OF TANK BULGING. GEOMETRY CONTROL WAS RE-ESTABLISHED WITHIN 4 HOURS BY USING LARGE TIMBERS AND "C" CLAMPS APPLIED TO THE LOWER HALF OF TANK. THE SLAB TANK WILL BE DRAINED AND ADDITIONAL INTERNAL STAYS WILL BE INSTALLED TO PREVENT BOWING ON THE LOWER HALF OF THE VESSEL AS PART OF LONG-TERM CORRECTIVE ACTIONS.

THIS EVENT WAS OF A LOW SIGNIFICANCE SINCE THE CONCENTRATION LIMIT REMAINED INTACT (<1 PPM U IN SCRUBBER WATER INSIDE SLAB TANK). MULTIPLE FAILURE MODES WOULD BE REQUIRED BEFORE A CRITICALITY EXCURSION COULD BE POSSIBLE.

ONE LINERS FOR OCTOBER 25, 1996

1. Fuel Facility Status

a. Nuclear Fuel Services, Inc.

At 12:21 p.m. on October 22, 1996, the licensee notified the NRC of a malfunction of their Uninterruptible Power Supply (UPS) system (EN31190). Maintenance had been performed on the backup power generator to install an oil heater in preparation for cold weather. Upon completion of the maintenance activity, the UPS system was tested to verify its operability. During the testing at 11:42 a.m. that morning, the system failed to properly switch to the backup power generator causing a loss of power to plant safety and security systems for four minutes.

The systems that were affected included security detection, criticality safety alarm and fire protection detection. The criticality safety alarm system provided visual and audible indication of system unavailability. The plant fire safety system, and the security systems (central and secondary alarm stations, perimeter intrusion detection, and security lighting) were also without power during this time. Immediate compensatory actions were taken by the licensee's security staff in response to the event. The criticality alarm and fire protection systems were functionally tested after restoration of power and found to be operating properly.

The licensee stated there were no similar problems during previous tests. The cause of the malfunction is currently under investigation by the licensee. No fuel processing was occurring at the facility at the time of the malfunction. The regional staff will followup on the results of the licensee's investigation during the next inspection, and will verify that corrective actions have been taken.

A team inspection consisting of RII/DNMS and HQ/NMSS representatives will be onsite during the week of November 11-15, 1996 to assess the licensee's operational readiness for the processing Rocky Flats HEUNH. In addition, a senior management meeting at NFS, Inc. to discuss licensee corrective actions after the incinerator incident and the Performance Management Program has been scheduled for November 15, 1996.

B133

Attachment 1

b. B&W Naval Nuclear Fuel Division

Fuel manufacturing operations in Naval fuel (AFP and MFP) and research reactor elements are operating normally. The fuel reclamation system in MFP is shut down because of mechanical problems with filters in the waste line.

The down-blending system for Project Sapphire in Uranium Recovery is shutdown due to a cleanliness problem in the columns. The columns apparently were not adequately cleaned before using them for this operation. Also, a sample valve connection was broken, which drained the column bank, but this has been repaired. This was reported by the licensee on October 15 and discussed in last week's report. Hot functional testing of the product dryer is suspended until a product quality issue is resolved. Dissolution of U-Be metal alloy material is continuing, and will probably run for 1-2 weeks more.

A force-on-force security exercise was conducted on the evening of October 24. This exercise was observed by ONMSS and Region II security personnel.

An article in The Washington Times reported that in excess of 120 pounds of weapons grade uranium was missing from Project Sapphire. This alleged loss is the result of sampling and measurements differences between the shipper and the receiver. See attached chronology and draft memo to the Commissioners for further details.

c. Framatome Cogema Fuel (BW Fuel Company)

The fuel fabrication and bundle assembly lines have been shut down since late August because of schedule requirements. The lines will start back up the week of November 4 and operate on a two-shift schedule.

The down-loading of the Nukem fuel is proceeding slowly. They have developed methods to remove the shrouds from the assemblies and are removing rods. One problem they have encountered is the thin wall of the cladding is easily crimped during rod removal. This has crushed some pellets and also makes pellet removal difficult.

The service equipment facilities (SERF-2,3,4) are operating with no problems.

The licensee determined that the protection factor for respiratory protection equipment used during the down-loading of the Watts Bar fuel was less than previously assumed. This was based on information from the manufacturer. Air sample results are being reevaluated and doses to about 12 workers

recalculated. They will inform Region II of the results in about a week.

d. General Electric Company

Two management changes have occurred. Jack Sependa, Manager, GE-NE Environment, Health & Safety (EH&S), accepted a position in a new business venture under GE Motors. Tom Hauser, Manager, GE-NE Quality is acting as Manager, EH&S, pending selection of a new manager. Sam Armijo, General Manager, Nuclear Fuel, has taken a position in San Jose, reporting to GE Nuclear Energy Vice President. Mark Savoff, formerly President, Reuter-Stokes, replaced Armijo.

All fuel lines, including the recycle line, are operating this week. Only the HiE and recycle lines will run over the week-end. All production lines ran last week-end because the lines were down for two days when the DI water system was down. Pellets, rods and fuel assembly lines are running on a five day schedule. Uranium Recovery, Waste treatment and the incinerator are all running.

Personnel selection for the operating staff of the new production facility (DCP) was announced on October 16. Operator training will begin December 1, 1996. The project schedule is still to start hot functional testing with natural uranium about March 1, 1997.

A GE design review of the program for the process control computer in DCP raised serious questions about the security and integrity of programmed parameters. GE will require that the program be rewritten to assure that it meets their requirements. Because of schedule problems, they plan to do cold and hot testing with the existing program but will require that the new program is in place and tested before enriched uranium is introduced, which is presently scheduled for early May. Region II will inspect this.

The first shipment (1,488 rods) of the second batch of fuel from the Wurgassen reactor facility in Germany has been received for down-loading. A total of 6,448 rods will constitute this batch. The fuel pellets are being removed from the rods and processed through Uranium Recovery for recycle. A third batch is expected in the Spring.

The annual plant evacuation drill for day shift was satisfactorily conducted on October 24. The drill for the remaining shifts will be conducted next week.

e. Westinghouse

Work on Conversion Line 4, which had been shut down for major modifications and upgrades, has been completed and the line is being checked out. The licensee expects to have that line operational by next week. UF_6 is currently being processed through the three other conversion lines and a forth line is processing uranyl nitrate recycle material. Other systems in the plant are operating on a normal schedule, i.e., pelleting and bundle assembly, IFBA, and recovery/waste processing. The licensee is continuing to operate on a new schedule of seven days per week for the conversion area and six days per week for pelleting, bundle assembly, and recovery.

Last week the licensee received a phone call from the State of South Carolina radiation protection personnel concerning some scrap metal that the licensee had sold to a local scrap dealer. The scrap metal consisted of metal grids and skeletons from fuel elements from the Vogtle site that had to be re-worked by the licensee due to over pressurization in the IFBA-type fuel pins. The scrap dealer had in turn sold the scrap metal to a company in Pittsburgh. When the scrap metal arrived in Pittsburgh by rail car, the radiation monitors at the entrance to the site alarmed. The company in Pittsburgh would not accept the shipment and the rail car was shipped back to the scrap dealer in South Carolina. The State and the licensee sent radiation technicians to the scrap dealer's facility to check on the problem. The technicians found that the background in the area read from 10-12 micro-R per hour (μR/hr) and the highest readings at one or two locations around the rail car were 18-20 μR/hr. The licensee checked the scrap metal and found no loose surface contamination. The scrap metal (about two dumpsters full) was taken back to the Westinghouse site.

2. Independent Spent Fuel Storage Installation Status- Surry

Recently, a lightening strike near the Surry site caused a loss of power to the ISFSI; the backup generator at the ISFSI started as designed and carried the load until power was restored. As of October 18, 1996, the licensee had 29 fully loaded dry storage casks (DSCs) for a total inventory of 638 irradiated fuel assemblies (IFAs). 28 DSCs were on Pad #1 and one DSC was on Pad #2. The number of fuel assemblies discharged in the fuel pool was 874. The margin over full core reserve was 2.

Presently, the licensee has one TN-32 DSC onsite which will be used to perform various dry run tests. The licensee was seeking authorization from the SFPO/NRC to use the TN-32 casks. NRC approval of the license for this cask was on hold until questions on certain test results were resolved. Four TN-32 casks were in fabrication

(of the eight on order from Transnuclear) for expected delivery by the end of 1996.

The TN-32 transport dry run was performed on October 21, 1996. The TN-32 loading dry run was scheduled for November 12, 1996. The TN-32 unloading dry run was scheduled for November 18, 1996. The actual loading of TN-32 DSC #1 was scheduled for December 9, 1996 subject to the approval of the TN-32 TSAR and a Surry ISFSI license amendment by the SFPO.

3. Pensacola Testing Laboratories

On October 23, 1996, escalated enforcement action was taken against Pensacola Testing Laboratories, Inc., Pensacola, FL for failure to file for reciprocity with the NRC before working under their Agreement State license in area of exclusive federal jurisdiction. Region II issued a Notice of Violation containing a Severity Level III violation for failure to comply with 10 CFR 30.3 and 10 CFR 150.20. No civil penalty was proposed because Pensacola Testing had not been the subject of escalated enforcement action in the past two years or two inspections and they took extensive corrective action.

4. Dr.Fernandez

Dr. Fernandez received the Order and Press Release, and agreed to preserve and search the patient files of the late Dr. Vazquez, for patients with high risk for intraocular infection resulting from Sr-90 induced scleromalacia. Region II is confirming this in a letter to Dr. Fernandez to be issued October 25, 1996.

Office staff of the Secretary of Health Dept of Puerto Rico confirmed receipt of the NRC/NMSS request to perform followup studies of high risk eye applicator patients, and referred the matter to their legal department for advice on liability and funding issues.

5. Agreement State Status

See attached Event Notification Item No. 31188.

Chronology and History of Sapphire Project

9/27/93	President Clinton announced policy to prevent proliferation of weapons (included purchase of HEU from former Soviet Union).
11/94	DOE acquired approx. 580 kg of HEU from Kazakhstan under code name "Project Sapphire". Material sealed in Kazakhstan by Y-12 personnel.
	Material transported and stored in Y-12 Plant in Oak Ridge.
2/7/95	USEC issued request for bid for downblending material to B&WNNFD and NFS.
	(USEC, as part of Energy Policy Act of 1992 established as responsible for US enrichment activities. Therefore USEC obtained contract with B&W NNFD on behalf of DOE.
7/20/95	NRC held meeting onsite with B&W NNFD to discuss plans for project.
8/95 - 10/31/95	Material received at B&W NNFD facility. Material shipped to B&W NNFD in original containers sealed in Kazakhstan. Upon receipt, B&W NNFD verified seal integrity.
1/10/96	Material received was in 4 main categories (metal, oxides, U/Be rods and U/Be scrap. Processing of material other than scrap started on this date.
4 - 5/96	Characterization of U/Be scrap initiated.
5 - 6/96	Calicining of U/Be scrap conducted.
7 - 8/96	Dissolution processing of U/Be scrap started.
8/22/96	NMSS informed Region II that B&W NNFD discovered difference btwn amount of U/Be scrap detected during processing at site and amount DOE said delivered.
9/26/96	Memo/trip report from individual in DOE-ORO MC&A Branch discussing the bias.
10/24/96	News article in Washington Post

MEMORANDUM FOR: Chairman Jackson
Commissioner Rogers
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: MEDIA ARTICLE ON PROJECT SAPPHIRE DISCREPANCIES

The purpose of this memorandum is to provide clarification to the Commission regarding recent media articles concerning an apparent nuclear material discrepancy at the Babcock and Wilcox (B&W) plant in Lynchburg, Virginia. B&W is in the process of purifying and downblending approximately 580 kilograms of high enriched uranium (HEU) removed from Kazakstan under a U.S./Kazakstan cooperative effort referred to as "Project Sapphire." In the course of this effort, an apparent bias has been identified during the processing of a portion of the material identified as uranium/ beryllium scrap (approximately 232 kilograms). The history of the material, Department of Energy and B&W involvement and NRC oversight are described below.

In view of a concern that the HEU could not be adequately protected in Kazakstan, DOE staff went to Kazakstan to package the material for shipment to the U.S. Material types included uranium metal, homogeneous uranium oxides, uranium/beryllium rods, heterogeneous uranium/beryllium scrap and mixed low level residues in graphite crucibles and lab salvage. Measurements were performed on a best effort basis, and the containers tampersealed. The heterogeneous uranium/beryllium scrap, which could not be representatively sampled and is the source of the apparent referenced bias, was measured by nondestructive assay (NDA). Based on informal input from DOE, the measurement uncertainty on the NDA measurements was large, on the order of plus or minus 100 percent.

The Project Sapphire material was placed in storage by DOE at Y-12 in Oak Ridge, Tenneessee where it remained for approximately a year while final contract arrangements were completed by DOE for processing and recovery of the HEU at B&W. No receipt measurements were performed by DOE on the material at that time. Also during this period, discussions took place between the U.S. and the International Atomic Energy Agency on when the material would be subject to IAEA safeguards as had been agreed with the Kazakstan Government. Due to IAEA resource constraints and the difficulties that would be encountered in applying safeguards at Y-12, it was decided to defer IAEA safeguards until the material was received by B&W. In August 1995, shipments of the material by DOE were initiated. NRC involvement was initiated prior to the receipt of material at B&W to ensure adequate accountability and facilitate the application of IAEA safeguards. B&W receipt activities included tampersafe seal verification, item identification and weight verification on an item basis prior to placing the material in the vault. After processing parameters were established and agreement was reached with the IAEA on where in the process international safeguards would be initiated, B&W commenced sampling of the homogeneous uranium metal and oxides. NRC was present for the sampling and procured a split sample from that taken for the

IAEA for independent verification. Analyses on samples randomly selected from this population by NRC's contractor laboratory were in excellent agreement with B&W's measurements. Recovery results provided further confirmation of the validity of the as-received measurements. NRC also procured samples of the recovery product for independent confirmation and is awaiting results. No samples were taken of the heterogeneous uranium/beryllium scrap due to the aforementioned difficulty in representatively sampling such material. It was agreed that accountability values would be based on samples taken after dissolution which is a routine practice in the industry.

B&W initiated dissolution of the uranium/beryllium scrap in July 1996. To-date approximately 30 percent of the 232 kilograms total have been processed in a number of process batches. There has been a consistent negative bias relative to what was declared on the as-received material. The current estimate of the magnitude of the bias is on the order of 28 percent. Due to a safety concern that developed in processing this particular scrap material not related to the measurement bias, further processing has been delayed.

With regard to implications for IAEA safeguards, the apparent bias will have no impact since the decision was to apply safeguards to the downblending only which is not impacted by shipper-receiver differences. This decision was based on IAEA's position that no statements could be made by the Agency regarding the origin of the material.

Headquarters and Region II staff have reviewed the results of safeguards inspections performed at B&W since the initiation of Project Sapphire material processing and determined that there were no abnormalities to indicate a potential loss or diversion. Staff will continue to monitor the processing of the Project Sapphire material, including the taking of split samples for independent verification and monitoring the magnitude and implications of the apparent bias during the completion of the scrap processing.

TRANSPORTATION EVENT

EVENT NUMBER: 31188

LICENSEE: DUPONT
CITY: MEMPHIS
COUNTY: SHELBY
LICENSE#:
DOCKET:
REGION: 2
STATE: TN
AGREEMENT: Y

NOTIFICATION DATE: 10/22/96
NOTIFICATION TIME: 04:34 [ET]
EVENT DATE: 10/22/96
EVENT TIME: 01:12[EDT]
LAST UPDATE DATE: 10/22/96

NRC NOTIFIED BY: PETTY OFFICER ERIGHT
HQ OPS OFFICER: LEIGH TROCINE

NOTIFICATIONS

CAUDLE JULIAN, REG 2	RDO
JOHN LINEHAN, NMSS	EO
STUART RUBIN, IRD	AEOD
REGGIE JOHNSON	DOE
BLAKE WELLING	R1DO

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
NTRA
TRANSPORTATION EVENT

EVENT TEXT

THE NATIONAL RESPONSE CENTER REPORTED A RELEASE OF 0.02 LITERS OF THALLIUM-201 FROM A FEDERAL EXPRESS PACKAGE IN MEMPHIS, TENNESSEE.

A FEDERAL EXPRESS PACKAGE BEING TRANSPORTED FROM DUPONT IN BILLERICA, MASSACHUSETTS, TO SYNCOR IN PHOENIX, ARIZONA, WAS RUN OVER BY A FEDERAL EXPRESS TRUCK ON A RAMP AT A FEDERAL EXPRESS HUB LOCATED IN MEMPHIS, TENNESSEE. THE BOX WAS BREECHED, AND APPROXIMATELY 0.02 LITERS (19.6 MILLILITERS) OF THALLIUM-201 LEAKED OUT ONTO THE CONCRETE RAMP. THE ACTIVITY OF THE THALLIUM-201 WAS 725 MEGABECQUERELS. THE SPILL WAS CLEANED UP, AND THERE WERE NO PERSONNEL CONTAMINATIONS OR INJURIES ASSOCIATED WITH THE EVENT.

FEDERAL EXPRESS NOTIFIED DUPONT OF THE INCIDENT. THE NATIONAL RESPONSE CENTER NOTIFIED THE ENVIRONMENTAL PROTECTION AGENCY RADIATION DIVISION, THE ENVIRONMENTAL PROTECTION AGENCY REGION 4, AND THE DEPARTMENT OF ENERGY. (REFER TO THE HOO LOG FOR A FEDERAL EXPRESS CONTACT NAME, TELEPHONE NUMBER, AND ADDRESS.)

October 25, 1996

NOTE TO: Bruce Mallett
Doug Collins

FROM: Ed McAlpine

SUBJECT: WEEKLY STATUS REPORT AND ACTIVITIES PLANNED FOR OCTOBER 28 to November 1, 1996

I. Planned Inspections and Significant Licensing Actions for Next Week

Inspector	Licensee	Target Areas

None scheduled

II. Training to be Conducted

None scheduled.

III. Other Significant Activities Planned for Next Week

Continued preparation for B&W NNFD Licensee Performance Review.

Preparation of briefing material to support management meeting at NFS on November 15, 1996. This meeting has been rescheduled from October 29.

Continued effort will be placed on closure of allegation cases.

Conduct performance appraisal discussions with branch staff.

Attend meeting with NMSS on the 1997 f scal year inspection schedule on October 28 in Rockville.

IV. Significant Accomplishments from This Week

Briefing package for Commissioner Rogers' visit to Westinghouse on November 6, 1996 was finalized and submitted to the EDO's office following coordination with NMSS.

Interviews for the Senior Resident Inspector position at Nuclear Fuel Services have been completed and the proposed selection has been submitted to the EDO for approval.

Continued inspection report and allegation followup documentation.

Completed writing of performance appraisals for branch staff.

Input to NMSS on Sapphire material accountability issue was completed.

Revision of the 1997 fiscal year inspection schedule was completed.

Observation of a force-on-force exercise at B&W NNFD.

October 25, 1996

NOTE TO: Bruce Mallett
Doug Collins

FROM: C. Hosey

SUBJECT: MATERIALS LICENSING/INSPECTION BRANCH 1 ACTIVITIES FOR WEEK OF OCTOBER 28-November 1, 1996

I. Planned Inspections for Next Week

Parker Virginia

Newport News General Hospital
Virginia Geotechnical
Bear Island Paper
Froehling & Robertson
Molins Richmond
NS Savannah

Other Inspection Activities

Issue inspection schedules for November and December, 1996.
Complete closeout letter for Veterinary Imaging allegation.
Continue review of materials data in the IFS system and close out items in IFS system that have already been inspected and closed.

II. Significant Licensing Actions for Next Week

Complete review and issue licensing actions for five oldest cases assigned to MLIB1

III. Training

J. Pelchat to attend Effective Communications Course in region II.

IV. Other Significant Activities Planned for Next Week

Complete giving performance appraisals.
Issue materials licensing and inspection status report for September.

V. Significant Accomplishments from This Week

Issued escalated enforcement action for Pensacola Testing.

Events Reported

None

October 25, 1996

NOTE TO: Bruce Mallett

OM: John Potter

SUBJECT: MLIB2 ACTIVITIES FOR OCT 28-NOV 1, 1996

I. Inspection Activities

Inspector	Licensee	Inspection Focus
J. Henson	Abbott Health Products, Vega Alta, PR	Info Noti/Serv Bulletins
J. Diaz-Velez	Baxter HealthCare, Aibonito, PR	Info Noti/Serv Bulletins

II. Training

- Acceptance Review Letter for Licensing Actions (P&G Dir PG 1-22)
- Allegation Processing Forms and Procedures
- IMPEP Followup Items, Licensing Review Documentation, etc.

III. Other

- Finalize Order Prohibiting Involvement to J. Maas, formerly with National Circuits, Inc. in Puerto Rico.
- Continuing license reviews by D. J. Collins, reciprocity work, IMPEP Report, and response on DAITS and DAFFY items.
- Continuing LLWDB BTP closeout survey guide review, terminated site reviews and procedures by J. Henson.
- Finalize letter text with NMSS to resolve VA Med Center Broad Scope fee category issues.
- Followup on licensees who are required to notify & plan for timely decommissioning.

Activities During Previous Week (10/21-25/96)

Inspections	Scope	Results
Princeton Diagnostic Isotopes Princeton, WV	MC2800, Lic Cond	Pending
R.B.S., Inc, White Sulfur Springs, WV	MC2800, Lic Cond	Pending
Galen of WV, Inc Ronceverte, WV	MC2800, Lic Cond	Pending

No significant violations, as of Friday 10/25/96, 11:00 a.m.

- Followup documentation on the escalated cases against Syncor and Diagnostic Photon, Dr. Fernandez, and San Juan Cement.
- Prepared USDOE pickup requests for a 300 mCi Am-241 source that cannot be buried at Barnwell, SC and a 50 mCi Sr-90 source that the Puerto Rico Health Department has stored at our request.
- Prepared another version of replies to certain VA Med Ctrs who are interested in learning how to convert their broad scope licenses into limited scope licenses with a lower annual fee.
- Issued Syncor de Puerto Rico license, closing uncertainty over the controlling interest.
- Prepared letter to Secretary, Puerto Rico Health Dept and Dean of Medicine, University of Puerto Rico requesting that they conduct longterm followup studies of 25 misadministered Sr-90 eye applicator patients.
- Revised AO Report on the Dr. Fernandez misadministrations.
- Discussed more efficient method for broadcasting event reports with Fred Coombs, using existing technology.

s:\drss\mlibwk45.jpp

NOTE TO: Bruce Mallett, Director, DNMS
Doug Collins, Deputy Director, DNMS

FROM: Richard L. Woodruff

SUBJECT: WEEKLY ACTIVITIES FOR OCT 28-NOV 1, 1996

I. Planned Activities for Next Week

* The referrals and close out of allegations will be completed as appropriate.

* The Draft Louisiana IMPEP report will be completed.

* A Tennessee State Inspector will be accompanied in the Nashville Area in preparation for the December 1996 IMPEP review of the Tennessee program.

II. Other Significant Agreement State Issues

* No significant issues were reported by the Agreement States in Region II during the week.

III. Significant Accomplishments from this Week

* Continued work on the referral of allegations to Agreement States.

* Provided technical assistance as needed to Region II States.

* Worked on the Draft Louisiana IMPEP report.

file: DNMS\BR_ACT96.298

November 13, 1996

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/96-11

Dear Mr. Kipp:

This refers to the inspection conducted on October 14-18, 1996, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790, of the NRC's "Rules of Practice," a copy of this letter will be placed in the NRC Public Document Room.

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

Sincerely,

Original signed by:

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See page 2)

B134

DUPE

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cc w/encl:
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Fuels and Facility Licensing
General Electric Company
P. O. Box 780, Mail Code J26
Wilmington, NC 28402

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Distribution w/o encl:
License Fee Management Branch

OFFICE	RII:DNMS					
SIGNATURE						
NAME	GTroup					
DATE	11 / 13 / 96	11 / / 96	11 / / 96	11 / / 96	11 / / 96	11 / / 96
COPY?	(YES) NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: P:\GE96II.GLT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-1113
License No.:	SNM-1097
Report No.:	70-1113/96-11
Licensee:	General Electric Company
Facility:	Nuclear Energy Production
Location:	Wilmington, North Carolina
Dates:	October 14 - 18, 1996
Inspector:	G. L. Troup Sr. Fuel Facility Inspector
Approved by:	E. J. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

General Electric Nuclear Energy Production
NRC Inspection Report 70-1113/96-11

This routine inspection was focused on operations, functional testing, facility changes, status of the new Dry Conversion Facility (DCF) and review of events reported to the NRC. The inspection was focused on the safe operation of the facility.

Plant Operations

- The licensee has completed the modification of Line 5 in accordance with procedural requirements for change control, nuclear safety analysis and functional testing. Controls have implemented for safe operation of the system.

- The licensee had implemented an effective program to control the keys for Active Engineered Controls (AECs), but noted that while the requirement for key control was specified in a Nuclear Safety Requirements/Release (NSR/R), a memo, there was no procedure which specified how the program was to be implemented.

- Declaring the criticality alarm inoperable system based on the failure of the Public Address (PA) system was a conservative but reasonable approach.

- The action to up-date the drawings of the alarm system and place it in the configuration control system is a positive effort.

- Providing technicians performing Nuclear Criticality Safety (NCS) measurements with the out-of-specification conditions for tests for prompt notification of cognizant personnel strengthened the process.

- The bulging of the sump was not adequately addressed when first identified in 1987 or properly reviewed again when identified in 1992.

Management Organization and Control

- Persons appointed to positions described in the license application met the educational and experience requirements. Other persons were qualified for the position.

Maintenance/ Surveillance

- The fixed neutron absorbers were properly evaluated with acceptable results. Test procedures will be revised and approved based on the new techniques.

- New power sifters were installed in the grounding system of outside criticality monitors.

DCF Project

- The major process components of the process systems have been installed. Supporting piping and instrumentation systems have yet to be installed.
- Resolution of identified deficiencies in the process control system software has not been officially confirmed.
- Staffing for the DCF is behind schedule. Completion of classroom training and readiness for testing will have to be satisfactorily completed.

Within the scope of the inspection, one non-cited violation (NCV) and one new Inspector Followup Item (IFI) were identified.

Attachments:

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

REPORT DETAILS

Summary of Plant Status

This report covers a one week period. During the period, fuel production operations were running normally. Powder production was shut down for about two days during the period due to a problem with the water supply to the process systems.

Construction activities for the new powder production facility (DCF) were progressing.

No other NRC inspections occurred during the period.

I. Safety Operations

03 Plant Operations (88020)

03.02 Facility Modifications and Configuration Controls

a. Inspection Scope

The inspector reviewed the documentation and modifications associated with up-grading Line 5 to process HiE materials from the Uranium Conversion (UCON) skid.

b. Observations and Findings

Various plant systems are qualified by Nuclear Safety to process uranium with a nominal maximum enrichment of 4% ("LoE") while others are qualified to process uranium with a nominal maximum enrichment of 5% ("HiE"). Line 5 consists of a defluorinator and associated equipment for processing ammonium diuranate produced by processing uranyl nitrate from Uranium Recovery in the UCON skid and producing Uranium Dioxide (UO_2) powder. Uranium Recovery and UCON were qualified for HiE but the Line 5 system was qualified only for LoE. A project was initiated to up-grade Line 5 to handle HiE material. A change request had been approved to accomplish the up-grade.

The inspector reviewed the documentation for the up-grade of Line 5 and inspected (walked down) various portions of the modifications.

The process description and safety description were incorporated into Technical Report No. 3.10.1, HiE UCON Process, Revision (Rev.) 1, dated September, 1996. New AECs were documented in Technical Report No. ADU-AEC-1, Chemical Area AECs, Rev. 0. The inspector selected 10 AECs from the list and compared the described function with the Technical Report and the Criticality Safety Analysis (CSA). Descriptions and functions were all consistent. The inspector also reviewed the associated Functional Test Instructions (FTIs) and determined that the tests confirmed

proper operation of the controls. The inspector reviewed the completed FTI reports and determined that controls performed as required.

Two uranium monitors have been installed in the system to measure the uranium concentration in the solution and maintain a safe mass in designated tanks. The inspector reviewed the test and calibration records for the monitors and also discussed the modifications made to the sample chamber for uranium concentration measurement.

Using the flow diagram in the Technical Report and the AEC list, the inspector walked down the system and visually confirmed that the equipment had been installed and the flow path was as shown. The inspector also observed that acid flush and drain valves on the monitors were locked in the "closed" position so that positive operator action is required to perform that operation.

c. Conclusions

The licensee has completed the modification of Line 5 in accordance with procedural requirements for change control, nuclear safety analysis, and functional testing. Controls have implemented for safe operation of the system.

03.03 Implementation of Process Safety Controls

a. Inspection Scope

The inspection consisted of a review of the licensee's program for the control of keys and locks which are used to implement positive control of AECs.

b. Observations and Findings

A number of NSR/Rs contain the requirement that valves or equipment be locked and the keys be controlled by Radiation Protection (RP). In Uranium Recovery Unit (URU) and on Line 5, examples are the acid flush valves for uranium monitors. Another example is the lock installed on the timer chamber on pellet presses. The timer require that pellets be removed in a specified period or the press shuts down.

The inspector asked several operators in production areas how to obtain the keys for various locks installed on pieces of equipment designated as AECs. The response in each case was that only the Shift Technical Resource (STR) could obtain the key and unlock the equipment. The inspector discussed the situation with STRs, Area Coordinators (ACs), and RP personnel as to how the keys were controlled. In each case, the individual stated that the STR could obtain the key from the radiation protection office after signing out the key, and unlock the equipment for work, then lock

it again and return the key to the RP office. The STR logs the key in and RP signs the log that the key was returned. In many cases, one key will open several locks in a particular process area, because the locks must be opened to accomplish a particular system alignment. The inspector concluded that this is an acceptable practice so long as control is maintained over the keys.

The inspector also discussed the situation with Nuclear Safety personnel who described the same procedure for obtaining the key. They also discussed the situation for auditing the control of the keys to maintain control. Certain keys can only be obtained by Nuclear Safety personnel or by designated maintenance personnel.

During discussion of the key control program, licensee personnel informed the inspector of a condition which had been identified during an internal audit. Locks had been obtained from stores which were "keyed same" such that the keys with any lock in a carton would open all of the locks in the carton. This case was documented in Unusual Incident Report (UIR) Chemical Product Line (ChPL) 9659. A number of locks were replaced and the procurement policy was changed to permit establishment of control over keys for locks installed on AECs.

c. Conclusions

The inspector determined that the licensee had implemented an effective program to control the keys for AECs, but noted that while the requirement for key control was specified in a NSR/R, a memo, there was no procedure which specified how the program was to be implemented. Licensee personnel acknowledged this comment and stated that the key control program would be formalized in a procedure, such as a Nuclear Safety Instruction (NSI).

03.07 Other Operational Issues

a. Inspection Scope

The inspector reviewed two events which had been reported to the NRC since the last inspection. The inspection included a review of the circumstances of the event and the corrective actions taken. Events reviewed were: (1) inoperable criticality warning system horns (NRC Event Number (EN) 30853), and (2) loss of geometry control in a slab tank (NRC EN 31113).

b. Observations and Findings

(1) Inoperable horns

Numerous horns are located throughout the plant areas which serve both the PA voice system and the criticality alarm system. On August 8, 1996, three of the horns were

determined to be inoperable when a message was announced over the PA system. Operations involving Special Nuclear Material (SNM) were suspended, including movement of material, and personnel were subsequently removed from the affected areas. Subsequent testing showed that three additional horns were inoperable due to the failure of amplifiers in the circuitry. As these horns are part of the criticality alarm system, the licensee declared the system inoperable and reported the condition under the requirement of 10 CFR 70.50(b)(2) when accident mitigation equipment is required and fails, even though the criticality alarm system was checked to determine if the horns responded. The required 30-day written report was submitted on September 4, 1996.

The investigation revealed that in addition to the amplifier failure, three horns were found to be defective or clogged with foreign material. One amplifier was replaced, one repaired and the three horns were replaced. The original incident report, UIR 9649 ChPL, indicated the need for a formal investigation.

The investigation revealed that the schematic drawings for the system was not current. There were horns wired into parts of the system which were under different management teams. There was also a question about the ability to hear horns in adjacent areas if a horn was not functioning. The corrective actions included testing the horns for audibility in adjacent, updating and controlling the system drawings and changing the emergency response procedures to address the loss of horn audibility. These corrective actions are scheduled for completion by January, 1997. IFI 96-11-01 is opened to follow-up on the long term corrective actions.

(2) Loss of geometry control

During the plant shutdown period, various tanks were measured using ultrasound techniques to determine if internal dimensions conformed to NCS requirements as specified in the NSR/R. Test results for the URU Exhaust Scrubber Sump (T-965) showed a bowing or bulging at the bottom, with the dimensions of 4.59 inches up to 4.86 inches, compared to the NCS limit of 4.45 inches. Once this condition was evaluated by Nuclear Safety, it was identified as a loss of geometry control and reported to the NRC in accordance with NRC Bulletin 91-01.

Temporary measures were taken to push the sump walls back to the required dimension and retain that condition. A review of sampling records of the sump showed that the concentration of uranium in the liquid in the sump was

significantly lower than the NCS limit. The limit is 16,000 parts per million (ppm) while the highest sample result in the last thirty months was 0.7 ppm.

The licensee's investigation revealed that when the sump was initially installed in 1987 and filled with water, the sides bulged due to inadequate design (thin walls with no external support). The resolution was the installation two rows of constraints to pull the upper half in and hold it. The dimensions of the resulting space apparently were not documented nor was the dimension of the bottom of the tank checked. In 1992, the sump dimension was measured with ultrasound techniques and shown to exceed the 4.45 inch requirement in several locations but no record could be found that this had been evaluated by Nuclear Safety.

The CSA for the sump was calculated for the actual dimensions of the sump as shown to be safe for up to a five inch dimension. The original CSA had been based on an infinite length rather than the actual length. Even though the CSA determined that the bulges were acceptable, it was decided to maintain the original dimensional requirement. Additional constraints will be installed in the sump to maintain the dimensions. [Record note - this was accomplished by October 30.]

Part I, Chapter 4, Section 4.2.4.3 of the license application states that when criticality control is directly dependent on the integrity of a structure used to retain the geometric form of a fissile material accumulation, the structure shall be designed with an adequate strength factor to assure against failure under foreseeable loads or accident conditions. The design of the sump was inadequate in that it bulged and deformed under normal operating loads and thus did not meet the license criterion or the criterion of NSR/R 02.01.06. While the inadequate design is a violation, the operating conditions were such (all inputs to the exhaust ventilation system had been previously processed resulting in uranium concentrations significantly below the limit) that this is of minor significance and is being treated as an NCV consistent with Section IV of the NRC Enforcement Policy (NCV 96-11-02).

In reviewing the licensee's files on this condition, the inspector noted that over a month passed between the time that the measurements were made (August 28) and the report was evaluated by Nuclear Safety (October 7). The technicians were told which tanks and sumps to measure but were not given an action limit or "go-no go" limit which would require an immediate notification if the measurement exceeded the limit. Consequently, there was nothing which caused any concern until the report was reviewed during the

course of normal work. Licensee representatives acknowledged this comment and stated that in the future, the technicians would be provided with a limit and directed to report immediately if the limit was exceeded.

c. Conclusions

Declaring the criticality alarm system inoperable based on the failure of the PA system was a conservative but reasonable approach.

The action to up-date the drawings of the alarm system and place it in the configuration control system is a positive effort.

Providing technicians performing NCS measurements with the out-of-specification conditions for tests for prompt notification of cognizant personnel strengthened the process.

The bulging of the sump was not adequately addressed when first identified in 1987 or properly reviewed again when identified in 1992.

One IFI and one NCV were identified.

05 Management Organization and Controls (88005)

05.01 Organizational Structure

a. Inspection Scope

The inspector reviewed changes in the organization since the last inspection, especially as they apply to positions described in the license application.

b. Observations and Findings

The former General Manager, Nuclear Fuel moved to a new position reporting to the Vice President and General Manager, General Electric - Nuclear Energy (GE-NE). The former President, Reuter-Stokes was appointed General Manager, Nuclear Fuel.

The former Manager, Environmental Health and Safety (EH&S) was appointed to a position in a different part of GE. The Manager, GE-NE Quality is acting in the Manager, EH&S on a temporary basis pending selection of a replacement.

On October 18, 1996, a new Manager, Nuclear Safety was appointed. This individual had been acting in that position. At the same time, a functional manager for the radiation safety function was appointed, who will report to the Manager, Nuclear Safety. The inspector determined that the Manager, Nuclear Safety meets the qualifications for the criticality safety function and the

functional manager meets the qualifications for the radiation safety function as specified in Part I, Chapter 2, Section 2.5.3 of the license application. The license application permits division of the functional area management.

c. Conclusions

Persons appointed to positions described in the license application met the educational and experience requirements. Other persons were qualified for the position.

IV. Facility Support

F1 Maintenance/Surveillance (88025)

F1.06 Surveillance Testing

a. Inspection Scope

The inspector reviewed the licensee's actions to comply with the license requirement to verify the integrity of fixed neutron absorbers on a periodic schedule. The replacement of power suppresors in the grounding system of criticality monitors was also verified.

b. Observations and Findings

Part I, Chapter 4, Section 4.2.4.4.1 of the license application requires that the integrity of fixed neutron absorber systems must be verified on a periodic schedule. The licensee has determined that a two year cycle is appropriate for the neutron absorber panels associated with tanks in URU and Chemical Conversion. This requirement is specified in the applicable NSR/Rs.

Testing of the fixed neutron absorber systems (poison panels) was performed during the shutdown period in August-September. A contractor had performed the last test and their approved procedure was available. Some changes were necessary because some of the poison panels had been repositioned during structural changes in the external supports and the neutron source used had was stronger than that specified by the contractor. These changes were marked in the procedure as field changes. The licensee also increased the number of standards checks for the source and detector in the field, which made the measurements more reliable than the vendor's method. A licensee representative informed the inspector that these changes would be incorporated into the procedure and approved as a revision.

The final test report was still being prepared during the inspection. The inspector discussed the results and reviewed some of the field data for different tanks. The licensee's test results determined that the effectiveness of the panels had not decreased and all met the minimum safety specifications.

Several of the criticality monitors installed in outside areas had experienced power surges resulting in false alarms during electrical storms (IR 70-1113/96-08, Paragraph 1.2). A review of the system had identified that the surge suppressors ("power sifters") exceeded the vendor's recommended lifetime. During the shutdown period, new power sifters were installed in the six outside units. The inspector reviewed the records in the Maintenance Planning and Control database and verified that new batteries had been installed and the power sifters replaced.

c. Conclusions

The fixed neutron absorbers were properly evaluated with acceptable results. Test procedures will be revised and approved based on the new techniques.

New power sifters were installed in the grounding system of outside criticality monitors.

V. Special Topics

T1 DCF Project (88020)

T1.01 Facility Construction

a. Inspection Scope

The inspector reviewed the installation of process equipment and reviewed the status of the roof construction for the DCF.

b. Observations and Findings

Using the system description in Technical Report S14.1320, Process Description and Design Basis, and various P&IDs, the inspector walked down each process line and confirmed that all major pieces of equipment for the powder production process from the vaporizers (including cold traps) through the homogenizers were installed. Much of the inter-connecting piping and service piping and associated instrumentation had not been installed as yet.

The DCF is designed as a "moderation restricted" facility. As such, the roof of the facility has a significant role in preventing the intrusion of moderating material (water) into the facility. The installation of the roof components through the first (outer) roof membrane had previously been inspected. The final stages of the roof installation is the installation of the

edge seal and trim. The inspector observed that the edge seal and trim had not been installed. Licensee representatives stated that the schedule for the final sealing had not yet been finalized but would be about two months away. Final inspection of the roof seal will be delayed.

Practices and Procedures (P/P) 120-15 requires that a formal design review be conducted for new process control systems. The process control system for the DCF was programmed by a contractor for the primary supplier. The design review by licensee personnel identified problems with the control of AECs and interlocks in that the computer system is able to be changed without the formal change control system required by the licensee. The resolution of this situation has not yet been defined.

c. Conclusion

The major process components of the process systems have been installed. Supporting piping and instrumentation systems have yet to be installed.

Resolution of identified deficiencies in the process control system software has not been officially confirmed.

T1.02 Staffing and Training

a. Inspection Scope

The inspector reviewed the status of staffing the DCF for operation and the status of training of the staff.

b. Observations and Findings

The original plan for designating the staff for the DCF was to be completed by September. However, a number of personnel issues delayed the selection of the staff. During the inspection period, offers were made to applicants to staff the DCF.

Training for the staff has been delayed by the identification and selection of the operating staff. Training will begin about December 1. This is due to the need to select and train personnel to replace persons selected for the DCF. The completion of classroom and on-the-job training required to support functional testing is still being scheduled.

c. Conclusions

Staffing for the DCF is behind schedule. Completion of classroom training and readiness for testing will have to be satisfactorily completed.

VI. Management Meetings

M1 Exit Interview Summary

On October 18, 1996, the inspection scope and findings were summarized with licensee representatives. The inspector discussed in detail the areas inspected, the findings and concerns which had been identified. There were no dissenting comments expressed by licensee representatives.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

*M. Chilton, Manager, Joint Conversion Project
*T. Flaherty, Start-up Manager, JCP
*R. Foleck, Sr. Licensing Specialist
*T. Hauser, Manager, GE-NE Quality and Acting Manager, EH&S
*R. Keenan, Manager, Site Security & Emergency Preparedness
*J. Kline, Manager, Chemical Product Line
D. Landry, Leader, Technology Team
*S. Murray, Team Leader, Chemical Conversion
*L. Paulson, Manager, Nuclear Safety Engineering
*L. Quintana, Manager, Fuel Fabrication Product Line
*R. Reda, Manager, Fuels and Facility Licensing
*G. Smith, Team Leader, Fuel Manufacturing Operation (FMO) Maintenance Support
C. Tarrer, Team Leader, Configuration Management & Integrated Safety Analysis (ISA)
*K. Theriault, Team Leader, URU
*C. Vaughan, Program Manager, Dry Conversion Product (DCP) EH&S and Regulatory
*C. Williams, Team Leader, Waste Treatment
*P. Winslow, Manager, Material Control and Accountability (MC&A)

* Attended exit interview on October 18, 1996.

INSPECTION PROCEDURES USED

IP 88005	Management Organization and Control
IP 88020	Operations Review
IP 88025	Maintenance/ Surveillance Testing

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Item Number	Type	Description and Discussion
96-11-01	IFI	Follow-up on long term corrective actions for criticality system warning horns
96-11-02	NCV	Lack of structural integrity to maintain a nuclear safety limit

Closed

None

Discussed

None

LIST OF ACRONYMS

AC	Area Coordinator
AEC	Active Engineered Control
CFR	Code of Federal Regulations
ChPL	Chemical Product Line
CSA	Criticality Safety Analysis
DCF	Dry Conversion Facility
DCP	Dry Conversion Project
EH&S	Environmental, Health & Safety
EN	Event Number
FMO	Fuel Manufacturing Operation
FTI	Functional Test Instruction
GE-NE	General Electric- Nuclear Energy
IFI	Inspector Follow-up Item
IP	Inspection Procedure
ISA	Integrated Safety Analysis
MC&A	Material Control & Accountability
NCS	Nuclear Criticality Safety
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NSI	Nuclear Safety Instruction
NSR/R	Nuclear Safety Requirements/Release
PA	Public Address
PPM	Parts Per Million
P/P	Practices & Procedures
Rev.	Revision
RP	Radiation Protection
SNM	Special Nuclear Material
STR	Shift Technical Resource
UCON	Uranium Conversion
UIR	Unusual Incident Report
UO_2	Uranium Dioxide
URU	Uranium Recovery Unit

ONE LINERS FOR JANUARY 3, 1997

1. Fuel Facility Status

a. General Electric - Nuclear Energy Production

All calciner units except unit #3 were shut down for the holiday schedule. Maintenance activities including tube flip was completed on calciner unit #5 on December 29. Unit #3 is currently processing virgin material, unit #5 is processing recycle material.

The Uranium Recovery Unit is currently processing waste stream materials. Dissolution and solvent extraction operations are expected to resume the week of January 6. Fuel assembly production is also expected to resume full production during the week of January 6.

Line 1 of the new dry conversion process is expected to be completed and released by the construction contractor the week of January 6. Lines 2 and 3 are expected to be completed in February.

b. B&W Naval Nuclear Fuels Division

Operations have restarted from the recent holiday shutdown. Recovery operations are proceeding in processing the zero power fuel material and should be completed January 14.

The Sapphire material downblending operation is continuing.

Development runs are underway in the Compact Reactor Fuel operations.

UNH conversion operations are proceeding with precipitation and sintering for HIFER.

c. Framatone Cogema Fual Co.

Routine rod loading, fuel assembly and bundling are being accomplished on the day shift only. The licensee anticipates the return of the assembly which was inadvertently shipped to Germany at 10 a.m. this morning to the Lynchburg facility. On December 20, 1996, the licensee furnished ONMSS the route cause analysis of the shipping error, and is under review.

B135

d. Westinghouse

The facility was shutdown from Christmas through New Years but most people were back at work on January 2. Only minor maintenance and some roof repair work was done during the holidays.

The licensee was beginning plant startup on January 2 and will begin processing UF_6 during the evening shift on Lines 2, 3, and 4. No problems were noted or reported during the past two week period.

2. Jose L. Fernández, M.D. (San Juan/Mayagüez, Puerto Rico)

The NRC requested the aid of the Puerto Rico Department of Health (PRDH) in the patient medical followup of misadministrations caused by the licensee. On December 12, 1996, Ms. Feliciano, Secretary of the PRDH, notified the NRC about the Department's openness to discuss the situation and willingness to "help in any way in which we agree is beneficial to the patients and falls under our jurisdiction." Region II is drafting a response to the letter, outlining potential followup actions. A followup telephone call will be conducted next week to further actions with the PRDH, and to suggest a meeting to discuss approaches.

On October 21, 1996, the NRC issued an Order to the licensee to obtain a consultant to identify misadministrations. Dr. Fernández has submitted the credentials of two possible consultants, for NRC review. A followup telephone call will be conducted next week to obtain the final decision by Dr. Fernandez on the consultant selected. Based on the results, the NRC will issue a letter to confirm the selection.

3. Jaca and Sierra Testing Labs (Carraizo Trujillo Alto, PR)

On December 31, 1996, the licensee reported that a car containing a portable moisture density gauge had been stolen. When the car was found, it had been stripped and the gauge was gone. The licensee notified local law enforcement, TV, and radio. The gauge was recovered on December 31 with the source still secured.

4. Agreement State Events

Pu-238 Pacemaker in Florida

On December 28, 1996, Grandview Hospital (Dayton, Ohio) reported that an individual with a Pu-238 pacemaker had died while visiting West Palm Beach, Florida. The family had initially wanted the pacemaker removed by the funeral home before return of the body to Ohio. Eventually, the body was returned to Ohio with the pacemaker, where the pacemaker will be explanted by Grandview Hospital.

ONE LINERS FOR JANUARY 17, 1997

1. Fuel Facility Status

a. General Electric - Nuclear Energy Production

Powder production units 1 through 4 are currently processing virgin material, unit #5 is processing recycle material. Fuel assembly production is already behind schedule for 1997 and will be operating 7 days/week for the near term to reduce backlog. No problems have been noted with operation of the calciner units since the events that occurred in early December 1996.

Approximately 500 3-gallon cans of 3.95% enriched UO_2 is expected to arrive from Kazakstan the week of January 20. Material characterization studies will be performed to develop a processing strategy.

Line 1 of the new integrated dry conversion process (IDP) was completed and released by the construction contractor the week of January 6. The associated warehouse and sand blast/painting facility was also released. Uranium storage in the new warehouse is expected to begin the week of January 20. IDP lines 2 and 3 are expected to be completed in February. Region II will be inspecting the licensee's preoperational testing of these systems in February - March 1997.

Testing of the modifications to the URALS process is proceeding. Two filter cakes have been produced from sludge in the West lagoon and are undergoing analysis. Also, the licensee's new decontamination and volume reduction unit is expected to be operational the week of January 27.

b. Westinghouse

The licensee began plant startup on January 2 after the holiday shutdown and operated through the weekend of January 3 - 4 with lines 2 through 4 processing UF_6. Conversion line #1 was operational after undergoing major refurbishment and started processing uranyl nitrate hexahydrate (UNH). Line 1 was switched to UF_6 processing on January 14. No problems were noted or reported upon startup or during the past two week period.

c. B&W Naval Nuclear Fuels Division

Conventional fuel manufacturing operations are being conducted on a 4 day, 10 hours per day schedule. Testing is being conducted after modifications to Modified Fuel Process (MFP) equipment. MFP personnel are working a 24 hour per day schedule. RTRFE (research reactor fuel production) is operating on a normal 4 day, 10 hour per day schedule.

BB6

The UNH conversion process, used to produce yellow cake (U_3O_8) for use as a RTRFE feed stock (HFIR) is operating normally. Routine development work is being conducted in the Compact Reactor Fuel (CRF) facility.

The dissolution of Sapphire UBe scrap materials remains on hold pending the resolution of process concerns with NRC, DOE and U.S. Enrichment Corporation (USEC). The downblending system is shutdown to complete modifications to the LEU drum dryer.

IAEA inspectors are scheduled to be on site January 18-21 for their routine monthly visit to monitor Sapphire downblending operations. Brian Horn from HQs NMSS will accompany them.

d. Framatome Cogema Fuel Company

Routine fuel loading and production activities are being informed.

Bill Gloersen and Al Gooden were on site this week for a routine inspection of health physics, environmental monitoring and waste management. No significant issues have been identified.

Downloading operations from the NUKEM reactor in Germany remain shutdown pending resolution of shipping issues. A CAL which places restrictions on further processing and receipt of NUKEM fuel remains in effect. An enforcement conference regarding this issue is scheduled for January 27th. The fuel element inadvertently shipped to Germany has been recently received back by the licensee.

e. Nuclear Fuel Services

An inspection team composed of personnel from Region II and Headquarters, and augmented by personnel from the Licensing Branch in Headquarters, has been on site this week to review the status of the licensee's readiness to begin recovery operations of uranyl hexahydrate from Rocky Flats. No problems that would preclude start up have been noted thus far. Critical paths are the approval of the licensee's financial assurance plan modifications and of the licensee's program information submitted in response to License Condition S-2. Phil Ting and Ed McAlpine are also at the site to observe the licensee's preparations review the operation with licensee management, and attend the exit on January 17, 1997.

2. Jose L. Fernández, M.D. (San Juan/Mayaguez, Puerto Rico)

In October 1996 NRC issued an Order to the licensee, which required them to obtain an independent consultant to identify and notify patients who received overexposures due to a miscalibrated Sr-90 eye applicator. The license has 45 days to complete the review. DNMS (Region II) and NMSS

have completed the review of the proposed consultant's credentials, (Mr. Heriberto Torres-Castro). A letter to Dr. Fernández to indicate NRC acceptance of Dr. Torres should be signed on January 17 or January 21, 1997.

3. Roberts Construction

On January 13, 1997, Region II held an enforcement conference with the President of Roberts Construction Company. The Company had an NRC license to operate a moisture/density gauge containing Americium-241 and Cesium-137, but the license expired January 31, 1997. The Company was required to maintain the gauge in storage while pursuing another NRC license. The Conference was held to discuss the findings from a November 1996 NRC inspection at the Company's facilities in West Virginia. The findings included failure of the Company to maintain adequate security for the gauge and failure to perform leak tests of the gauge for a two year period prior to license expiration. The licensee discussed the root causes for the apparent violations and addressed the NRC's question of why the Company should remain an NRC licensee in view of the failure to abide by NRC regulations.

4. Agreement State Events

There were two reportable events, this week as follows:

North Carolina - BASF lost two nickel -63 sources. This was discovered and reported on January 14, 1997.

Florida - Paradyne lost a polonium -210 static eliminator. Reported to NRC on January 16, 1997.

5. Business Process Reengineering (BPR)

Region II and NMSS are conducting a pilot of the BPR design for materials licensing. The pilot will use electronic versions of applications in a Regional Office setting. The pilot is to be conducted in Region II the week of January 27-31, 1997. There are nine confirmed entities that are participating as applicants. Next week, NMSS will conduct training for the pilot in Region II.

6. Integrated Materials Performance Evaluation Program (IMPEP)

The staff will brief the Commission on the status of IMPEP on January 31, 1997. B. Mallett will be presenting the Regional Assessment on IMPEP effectiveness. There is a pre-brief of Hugh Thompson on January 23, 1997.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

January 28, 1997

General Electric Company
ATTN: Mr. C.P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC REGION II SPECIAL INSPECTION TEAM REPORT NO. 70-1113/96-12 AND NOTICE OF VIOLATION

Dear Mr. Kipp:

On December 4-8, 1996, a special NRC team inspection was conducted at the Wilmington plant to review the causes and your corrective actions associated with a failure of the Line 3 calciner tube reported to the NRC on December 3, 1996. During that inspection, the team reviewed the circumstances surrounding the tube failure, precursors to the event, your response to the event, developed an understanding of the root causes, and verified the initial corrective actions that General Electric (GE) implemented to preclude recurrence.

The inspection team was composed of Messrs. E. McAlpine (Team Leader), and D. Ayres of this office; and D. Stout, G. Smith, and C. Tripp of the Office of Nuclear Material Safety and Safeguards (NMSS). The enclosed copy of our report identifies areas examined by the team.

Based on the results of this inspection, the NRC has determined that three violations of NRC requirements occurred. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the report. Although the violations represent problems noted in your program, which contributed to the calciner tube failure, your response to the failure and corrective actions were excellent.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC Public Document Room.

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

Sincerely,

Bruce S. Mallett

Bruce S. Mallett, Director
Division of Nuclear Material Safety

Docket No. 70-1113
License No. SNM-1097

Enclosures: (See page 2)

B137

9702110083 Dupe 3pp.

Enclosures: 1. Notice of Violation
2. NRC Inspection Report
No. 70-1113/96-12

cc w/encls:
Dr. Ralph Reda, Manager
Fuels and Facility Licensing
General Electric Company
P.O. Box 780, Mail Code J26
Wilmington, NC 28402

Dayne H. Brown, Director
Division of Radiation Protection
N.C. Department of Environment,
Health & Natural Resources
P.O. Box 27687
Raleigh, NC 27611-7687

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PUBLIC

Distribution w/o encls:
License Fee Management Branch

*see previous concurrence

OFFICE	RII:DNMS		RII:DNMS		RII:HQ		RII:HQ		RII:HQ			
SIGNATURE												
NAME	DAyres*		EMcAlpine*		DStout*		GSmith*		CTripp*			
DATE	01 / / 97		01 / / 97		01 / / 97		01 / / 97		01 / / 97		01 / / 97	
COPY?	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

OFFICIAL RECORD COPY DOCUMENT NAME: S:\DRSS\GE96-12

NOTICE OF VIOLATION

General Electric Company
Wilmington, NC

Docket No. 70-1113
License No. SNM-1097

During an NRC inspection conducted on December 4-8, 1996, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedures for NRC Enforcement Actions," NUREG-1600, the violations are listed below:

1. License Condition Number (No.) S-1 of Special Nuclear Materials (SNM) License No. SNM-1097 requires that licensed materials be used in accordance with statements, representations, and conditions of Part I of the application dated October 23, 1987, and supplements thereto.

   Part I, Chapter 4, Section 4.2, subsection 4.2.11 of License SNM-1097 requires that, "Engineered controls detect an undesired situation and implement corrective action without requiring human intervention. Engineered controls must be...capable of performing the criticality safety purpose for which they are specified."

   Contrary to the above, on November 30, 1996, the engineered control associated with the Line 3 calciner tube failure did not detect the undesired situation and was not capable of performing the criticality safety purpose specified (i.e., preventing an accumulation of greater than 25 kilograms of uranium). The Active Engineered Control (AEC) in place relied upon the total breakage of the tube and the stoppage of tube rotation at the discharge end. As a result, material accumulation within the annulus of the calciner of 38.77 kilograms exceeded the analyzed safety basis.

This is a Severity Level IV violation (Supplement VI).

2. License Condition No. S-1 of SNM License No. SNM-1097 requires that licensed materials be used in accordance with statements, representations, and conditions of Part I of the application dated October 23, 1987, and supplements thereto.

   Part I, Chapter 4, Section 4.2, subsection 4.2.4, Paragraph 4.2.4.3 of License SNM-1097 requires that, "Whenever criticality control is directly dependent on the integrity of a structure used to retain the geometric form of a fissile material accumulation ... the structure shall be designed with an adequate strength factor to assure against failure under foreseeable loads or accident conditions."

   Contrary to the above, on November 30, 1996, criticality safety in the calciner operations was directly dependent on the integrity of the calciner tubes and the calciner tubes in all units were not designed

Enclosure 1

with an adequate strength factor to assure against failure under a foreseeable load. A contributor to this was that there were no formal provisions (e.g., preventive maintenance) in place to adequately assure against such failures.

This is a Severity Level IV violation (Supplement VI).

3. License Condition No. S-1 of SNM License No. SNM-1097 requires that licensed materials be used in accordance with statements, representations, and conditions of Part I of the application dated October 23, 1987, and supplements thereto.

Part I, Chapter 4, Section 4.2, subsection 4.2.5, Paragraph 4.2.5.1 of License SNM-1097 requires that, "Where control of mass is used to provide criticality safety, the mass of uranium (or U^{235} or U^{238}) is administratively controlled based on measurement by one or more of the following techniques:

- The mass of uranium (or U^{235} or U^{238}) is determined as the product of the volume and the uranium (or U^{235} or U^{238}) concentration as measured by qualified counting methods.
- The mass of uranium (or U^{235} or U^{238}) is determined by qualified counting methods.
- The total mass or change in mass of a system is measured assuming the most reactive credible composition."

Contrary to the above, on November 30, 1996, mass was being administratively controlled to limit input to the calciners upon tube failure and measurements were not being performed as required. The amount of material present in the calciner during a tube breakage was being limited by an administrative control which involved an operator removing the ADU feed tube from the calciner.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, General 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 a copy to the Regional Administrator, Region II, and a copy to the Chief, fuel Facilities Branch, 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 for each violation: (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 a

Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR 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 2.790(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.

Dated at Atlanta, Georgia
this 28th day of January, 1997

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-1113
License No.:	SNM-1097
Report No.:	70-1113/96-12
Licensee:	General Electric Company
Facility:	Nuclear Energy Production
Location:	Wilmington, North Carolina
Dates:	December 4-8, 1996
Inspectors:	C. McAlpine, Team Leader D. Ayres, Senior Radiation Specialist D. Stout, Chemical Engineer G. Smith, Chemical Engineer C. Tripp, Nuclear Criticality Safety Engineer
Approved by:	Bruce S. Mallett, Director Division of Nuclear Materials Safety

Enclosure

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I. EXECUTIVE SUMMARY

On November 30, 1996, the failure of the Line 3 calciner tube caused the shutdown of uranium powder production at the General Electric Nuclear Energy Production facility. The affected equipment was cooled for disassembly in preparation for repairs to begin. When disassembly began on December 3, 1996, an accumulation of special nuclear material was discovered outside its favorable geometry containment. The quantity of material found was in excess of the amount used in the analyzed criticality safety basis of the operation.

The NRC special inspection team concluded that precursors to the event could have alerted the licensee to the deteriorating condition of the calciner tube. Levels of air activity from the calciner exhaust system were above action levels weeks before the total failure of the tube occurred. The licensee's stack sampling program was to have caused the notification of responsible personnel if stack samples exceeded these action levels, but no such notification took place.

The criticality controls in place for the calciner process included the geometry of the calciner tube, and the control of mass in the annular space outside the calciner tube. Both of these controls were defeated with a single event. The fracture of the tube itself is considered a loss of geometry control. The accumulation of material in the annulus in excess of the analyzed amount in the criticality safety basis is considered a loss of the combined mass/geometry control for the annular space in the calciner.

The NRC team concluded that the root cause for the loss of the geometry control (i.e. the calciner tube fracture itself) was primarily due to the lack of a formal preventive maintenance program for rolled Inconel tubes. The team concluded that the root causes for the loss of the combined geometry/mass control failure are the inadequate design of the Active Engineered Control, and the inadequate analysis and control of the design changes made to the system.

Although both criticality controls were defeated with this single event, the calculations performed by the licensee and the NRC inspection team show that there was a wide margin of safety in the as-found condition, provided that internal moderation is minimal. However, the criticality controls credited to the system in the analyzed criticality safety basis were not the reasons why the system remained subcritical. The system remained subcritical due to the limited total amount of material involved (in the tube and the annulus) and the lack of neutron moderators in and around the system. Upon further review, the inspection team concluded that the potential existed for the accumulation of material quantities of up to about 6 times the as-found condition.

The licensee's responsiveness in reporting and reacting to the event was adequate for the scope of the problem. The operators within the control room and on the production floor responded quickly and appropriately based on the information available to them.

The set of short term corrective actions developed by the licensee adequately addressed the causal factors of the event by improving the monitoring, control, and robustness of the calcining operation. The long term corrective actions (once fully implemented) were adequate to provide improved reliability of the criticality safety program for the calciner systems.

II. REPORT DETAILS

1. Purpose and Charter of the Special Inspection Team

This special team inspection was conducted to evaluate the safety significance of an event which resulted in the loss of certain criticality safety controls in the uranium powder product line on November 30, 1996. The NRC was notified of the event on December 3, 1996, when an accumulation of material in excess of the analyzed nuclear criticality safety basis was discovered outside of the favorable geometry process equipment. The special inspection team was established on December 4, 1996. The team was chartered to gather information and make appropriate findings and conclusions by focusing on the following areas:

- Determining the safety margin remaining in the as-found condition,
- Evaluating the potential for the accumulation of U-235 material in excess of the as-found condition,
- Determining the adequacy of the criticality controls in place for the affected process line and the generic implications for the other processing lines with similar equipment and engineered safety controls,
- Determining the root causes for the loss of safety controls, and
- Evaluating the adequacy of the licensee's response.

2. System Description and Process History

The General Electric Nuclear Energy Production facility uses six (6) rotary calciners as part of its operation to produce uranium oxide powder. The calciners consist of a rotating nickel alloy tube inside a cylindrical, refractory-lined heating chamber. The calciner tubes have a nominal inside diameter of 10 inches and are 26 feet long. A 7-inch thick annular space exists inside each calciner between the tube and the heating chamber. A set of agitator flight inserts are placed in each calciner tube to assist the flow of product through the system.

Five of the calciners in this product line can convert ammonium diuranate (ADU) to uranium oxide by heating it to about 750°C (1382°F). The ADU is injected as a paste through a wand inserted 3 feet into one end of the tube. Conversion to uranium oxide occurs as the material moves down the inside of the rotating, heated tube while reacting with steam and hydrogen from dissociated ammonia. The sixth calciner only processes recycled uranium oxide powders.

The annular space outside the tube is heated to the process temperature via combustion of natural gas. The natural gas combustion products are exhausted through a ventilation duct to an outdoor stack that is sampled for radioactivity. Calciner units 1 through 4 have their own exhaust stacks, while units 5 and 6 share a stack.

The operational history of the calciners is such that failures of calciner tubes occasionally occur. These failures involve the circumferential fracturing of the tube at the point where ADU paste is injected, presumably due to stresses created when the cool paste contacted the heated tube. The fractures were normally smooth, complete breaks such that the discharge (non-drive) end of the tube would stop rotating even though the feed (drive) end of the tube continued turning. Based on this failure mechanism, a switch was placed on the discharge end of the tube to detect the stoppage of rotation, and thus a possible tube failure.

Over time, failures were frequent enough that the licensee developed an informal tube replacement schedule based on the total amount of ADU it had processed. The failure rate for the original tubes were established such that they were "flipped" after approximately 340,000 kilograms (kg) of accumulated ADU throughput in order to inject the feed into the end of the tube that had not experienced the thermal stresses. Once a "flipped" tube had reached the prescribed accumulated throughput, it was removed from service and replaced with a new tube.

The licensee also contemplated improving the strength of the tubes. Records of the manufacture of the calciner tubes showed that the original design specified the construction material to be casted T-63 alloy (35% Ni, 35% Fe, 27% Cr, 0.5% C). In 1987 a design specification change was investigated by installing a prototype tube made from rolled and welded Inconel 600 (75% Ni, 9% Fe, 16% Cr, 0.07% C). In order to relieve stresses in the rolled tube created during fabrication, the manufacturer suggested a final annealing step at an elevated temperature which was subsequently performed. The prototype tube was used in the line 3 calciner for five years without failure or "flipping" with an accumulated ADU throughput of more than 922,000 kg. The prototype tube was removed from service for further evaluation, but it had performed so well that several more rolled and welded Inconel tubes were purchased for use in the calciners. However, the original fabricator's suggestion concerning a final annealing step was disregarded for these additional rolled tubes.

The non-annealed rolled tubes were gradually placed in calciner units 3 (1992), 5 (1994), and 1 (1996). Although no replacement schedule had been determined for rolled tubes, the rolled tube in unit 3 was replaced with another rolled tube in 1994 after an accumulated ADU throughput of 541,000 kg. The original prototype was returned to service in calciner unit 4 in 1995.

3. Event Summary and Sequence of Events

At approximately 11:50 a.m. on November 30, 1996, the calciner Wet End (feed end) Operator notified the ADU control room operator that smoke was filling the calciner area and had the smell of burning grease. The operator at the discharge end of the calciner noticed an unusual, erratic tube rotation. At 12:00 noon, the ADU feed tube was removed from the Line 3 calciner to stop the introduction of uranium into the system. At 1:00 p.m., the Line 3 calciner was shut down and began cooling.

At 9:00 a.m. on December 3, 1996, the calciner had cooled enough to remove the top of its refractory-lined shell. A significant accumulation was observed within the annular space between the calciner tube and the bottom refractory. The material was collected and found to be 38.77 kg of uranium oxide enriched to 4.9% uranium-235. The material was removed and placed into criticality safe storage containers. The licensee subsequently reported to the NRC Operations Center within four hours and by 5:45 p.m., all ADU lines were shutdown pending a system-wide investigation.

The tube failure on November 30, 1996, in calciner unit 3 occurred after an accumulated throughput of 569,000 kg ADU. This was the first failure experienced with a rolled Inconel tube.

4. Precursor Events

a. Inspection Scope

The NRC inspection team assembled at the licensee's plant site on December 5, 1997. In order to understand the conditions at the facility, the team reviewed the sequence of events, including the available precursory indicators and the licensee's responses to them.

b. Observations and Findings

According to the licensee's records, the initial indicator that suggested a breach of the calciner tube integrity was the occurrence of elevated and gradually increasing radioactivity measured in the ventilation exhaust for the Line 3 calciner. The calciner ventilation exhaust is sampled weekly and has a concentration action limit of 3×10^{-12} μCi/cc. These measurements were originally intended solely for emissions reporting and have not normally been used to detect calciner tube failures. The radioactivity in the Line 3 calciner exhaust exceeded the licensee's action limit based on samples taken as early as November 14, 1996. Samples taken the following two weeks continued to exceed the action limit and the radioactivity concentration approximately doubled in magnitude with each sample. The licensee's own procedures require that an Action Level Investigation form be completed upon discovery of an elevated

calciner exhaust stack sample. However, no such forms were initiated for any of the three elevated weekly results associated with this event until it was reported to the NRC Operations Center on December 3, 1996.

The next potential indicator of a tube breakage was the presence of a small (approx. 1/2") piece of metal lodged in the Line 3 calciner product discharge rotary valve. This was discovered on November 20, 1996. The calciner was shut down in order to remove the lodged metal. The discharge end of the calciner was disassembled to visually inspect the internal structure of the calciner tube. No damage to the internal structure of the tube was apparent from the discharge end of the calciner, and the decision was made to restart the calciner on November 22, 1996. No obvious slippage of the tube was visible during the restart of the calciner, thus a broken tube was not evident.

c. Conclusions

The precursors to the event could have alerted the licensee to the deteriorating condition of the calciner tube. The licensee's documented stack sampling program and license SNM-1097 both state that personnel responsible for the operation of the exhaust system are notified if a weekly stack sample exceeds a value of 3×10^{-12} μCi/cc. The failure to issue an Action Level Investigation Form upon the discovery of an elevated calciner exhaust stack sample violated the licensee's Environmental Protection Instruction No. O-6.0 and is a violation of the requirements of Chapter 5, Section 5.1, subsection 5.1.1, Paragraph 5.1.1.2 of the SNM-1097 license application. However, this violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the NRC Enforcement Policy. This problem is thus noted as a Non-Cited Violation (NCV).

5. Analysis of the As-Found Condition

a. Scope

The criticality safety margin of the as-found condition of the material in calciner 3 was to be determined by the inspection team. This margin was defined in the team charter as the difference between the actual conditions and the condition necessary to reach criticality. This determination involved review of licensee's calculations and NRC inspection team members independently performing criticality safety calculations. This provided a method to verify that the geometry and material compositions in the calculations were correct and that the results were reproducible.

b. Observations and Findings

The licensee's nuclear criticality safety staff ran a number of Keno calculations immediately after the tube rupture to determine the margin of safety. The licensee's model assumed that the calciner tube and firebox were concentric cylinders composed of Inconel-600 and Oak Ridge concrete respectively. For conservatism in the Keno calculations, the calciner tube was assumed to be half-filled with U_3O_8 along its entire length, and the annulus between the calciner tube and firebox was half-filled with U_3O_8 powder. Calculations were performed such that the material in the annulus was assumed to either run the entire length of the calciner or occupy a section four feet in length. The dimensions used in the calculations were found to correspond to the drawing dimensions for the calciner tube and firebox, with some increase for dimensional tolerances and an allowance for corrosion. Several models were run corresponding to different degrees of moderator in the two regions and different reflection conditions. The geometry and material compositions used in the model were verified by the inspection team.

The calculations in which the deposit ran the whole 24' length of the firebox resulted in only a slightly greater k_{eff} as the calculations where the deposit occupied a four-foot length. The as-found condition was modelled as U_3O_8 with 5% moisture in the calciner tube and dry U_3O_8 the full length of the firebox, with vacuum boundary conditions. This resulted in a k_{eff} of 0.66.

It should be noted this model represents an extremely conservative calculation of the as-found geometry; the calciner tube is normally filled to a depth of 1-2" and the half-filled firebox represents a maximum credible accumulation. The as-found depth of material in the firebox was approximately to the bottom of the calciner tube.

The NRC inspection team also performed independent Keno calculations to verify the results of the licensee's calculations. This independent calculation included constructing a more detailed geometrical model of the calciner and firebox as well as a less conservative and more realistic configuration of fissile material.

A geometrical model which explicitly showed the internal structure of the calciner/firebox assembly was constructed for the independent verification, to determine whether the licensee's calculation was conservative. This more detailed model added an Inconel flange on either side of the calciner tube and included the two internal firebox baffles, or collars of smaller radius that separate the firebox into three sections. These additional

features were found to have negligible effect on the results. The maximum credible accumulation was assumed in this model to involve filling the annulus to the half-way point in the first of three sections, between the aperture to the firebox and the first baffle.

The inspection team attempted to model the as-found condition as realistically as possible. The assumed composition was U_3O_8 with 5% moisture inside the calciner tube (corresponding to 50,000 ppm as an upper bound on the as-found moisture content) and dry U_3O_8 outside the tube. The calciner tube was filled to a depth of 2" and the annulus filled to a depth of 6¾" so that the uranium just reached the bottom of the calciner tube, along the length of the first firebox section. This resulted in a k_{eff} of 0.50. This lower value is indicative of the conservatism found in the licensee's calculations.

c. Conclusions

The calculations performed by the licensee and the NRC inspection team shows that there is a wide margin of safety in the as-found condition. The geometry used by the licensee was found to be correct, reproducible, and the model conservative.

6. Potential for Greater Accumulation

a. Scope

The inspection team reviewed licensee equipment drawings and process parameter specifications to evaluate the potential for accumulation of material in excess of the as-found condition. The inspection team also estimated the maximum possible accumulation of material in the unfavorable geometry configuration.

b. Observations and Findings

In order to evaluate the potential for an accumulation of U-235 material in excess of the as-found condition and to estimate the maximum accumulation of material possible within the calciner shell, the NRC inspection team reviewed operating procedures, equipment specifications, and drawings. The internal dimensions of the calciner refractory-lined shell was found to be a 24" diameter cylinder, 20 feet long, installed at a slope of 1.5° from horizontal. The licensee indicated that the approximate bulk density of the discharged product from the calciner is 2 g/cc.

Since air activity data was not used by the licensee to determine a breach in tube integrity, elevated air activity was not considered in determining a maximum accumulation potential for past events. Also, since the tube began leaking material 2-3 weeks before its catastrophic failure, yet held together enough to continue to operate the tube rotation switch, the Active

Engineered Control was found to be unreliable and was not used by the inspection team in determining the maximum accumulation potential.

c. Conclusions

Based on the event sequence, the process operating procedures and Active Engineered Controls in place at the time of the event, the process equipment configuration, and the product material properties, it can be concluded that the potential existed for the accumulation of U-235 in excess of the as-found condition.

As an extreme case, material could have continued to slowly accumulate in the annulus until the fracture in the tube was effectively blocked by the accumulation. The fracture could not be totally blocked until the annulus was nearly full of material, corresponding to an accumulation of over 1500 kg of material. However, abnormal operating conditions (pressures and temperatures) within the calciner, product quality fluctuations, and deviations in material balances would likely be evident long before such an accumulation would occur.

A more reasonable scenario would involve an accumulation in the annulus underneath and up to the bottom of the calciner tube and axially extending from the ADU injection point to the first baffle in the refractory. This would correspond to an accumulation amount of 230 kg of material, or about six times the amount in the as-found condition.

7. Worst Case Safety Margin

a. Scope

Once the potential for a larger accumulation of material was deemed plausible, the inspection team focused on the criticality safety margin associated with a worst case scenario. This included reviewing calculations performed by the licensee's staff for a worst case scenario, verifying that the results used by the licensee's staff were reproducible, and that the models were conservative.

The inspection team performed several different independent calculations to verify the conservatism of the licensee's calculations. This review involved performing calculations while varying the moisture content, geometry, reflection conditions, material compositions (of both the calciner/firebox and the uranium deposit). The results of these independent NRC calculations were compared to the results of the licensee's calculations for the most reactive credible configuration.

b. Observations and Findings

The licensee attempted to model the worst-case condition by assuming optimal moderation inside the calciner tube (assumed to be 25 w/o moisture) and 5 w/o moisture outside. When the licensee assumed that a four-foot section of the firebox was filled with U_3O_8 and vacuum boundary conditions existed, k_{eff} was found to be 0.92. When the entire length of the firebox was assumed to be filled, k_{eff} was 0.96. When a four-foot section was assumed to be filled and the system assumed to be under full water reflection, k_{eff} was found to be 0.94. Full water reflection was imposed to ensure the calculational model accounted for all reflective and moderating materials outside the firebox.

The inspection team's calculations assumed the same geometry as was used for its as-found condition calculations. The composition of the fissile material was assumed to be a homogeneous mixture of water and U_3O_8 with a 5% U^{235} enrichment. The density of the material was calculated assuming the theoretical densities of water and U_3O_8. The ammonium diuranate ($U_2O_7(NH_4)_2$) feed material was assumed to have 60 w/o moisture and a bulk density of 2.5 g/cm^3. Several iterations were performed with various moisture contents and geometrical configurations.

During normal operating conditions, where the moisture content is essentially zero and there is no tube breakage, the value for k_{eff} was found to be less than 0.27. Since the calciner operates at 750°C and the ADU feed rate is 60 kg/hr, the ammonium diuranate dries almost instantaneously, reacts to form U_3O_8, and then reduces to UO_2. The calciner takes several days to cool to sufficient temperature to remove the top of the firebox, so that significant loss of moderation control is nearly incredible. When only geometry control is lost, the system was still found to have a value for k_{eff} of less than 0.6, despite the conservative assumptions of filling both the calciner tube and the firebox halfway. Thus the system has a wide margin of safety when the moderation is minimal.

The inspection team modelled the effect of moderation by continuously varying the moisture content of the system. The licensee's assumption of optimum moderation at 25 w/o moisture was found to be valid. At optimally moderated conditions, k_{eff} for a half-filled calciner tube was found to be 0.60, and k_{eff} for a completely filled tube was found to be 0.90. The annulus was assumed to have a moisture content of only 5 w/o in these models. The occurrence of this amount of moderator is unlikely; a $U_3O_8 \cdot H_2O$ mixture that contains 5% moisture by weight would equate to an accumulation of water of over 71 liters. The system was found to exceed a k_{eff} value of 0.90 only when the moisture content of the system is between 10 w/o and 55 w/o. This stresses that system reactivity is sensitive to moisture content. Clearly, in the high temperature environment of an operating calciner, this amount of

moisture is unlikely. However, a calciner that has been shut down and cooled with its shell removed may be susceptible to higher moisture levels. It should also be noted that the area external to the firebox is maintained as a moderation control area.

In addition to testing the sensitivity of moisture content of the system to criticality safety, the composition of various fissile and structural materials were varied to determine the conservatism of the materials used in the calculations. Various different Inconel compounds were substituted for Inconel-600 from the SCALE standard materials library, which differed primarily in the amount of nickel, iron, and chromium they contained. This made a difference in the results of no more than 2 percent. Several different standard concrete compositions were substituted for the Oak Ridge concrete and a similar dependence was found. The difference between filling the calciner tube and annulus with U_3O_8 or UO_2 was negligible. If the calciner tube is assumed to be filled with ammonium diuranate, the results are larger to the order of several percent; however, the normal high-temperature environment precludes the existence of ADU except at the extreme feed end.

Finally, the variations in the internal agitator flights and the feed tube assemblies were modelled by replacing them with cylinders composed of Inconel-600 and stainless steel, respectively, of equivalent masses. This was found to result in a slight overall reduction in k_{eff} upon displacement of the fissile material. The geometric model was thus found to be conservative and the addition of structural material inside the tube is not expected to increase the overall k_{eff}.

c. Conclusions

The licensee's calculations were verified independently by modelling the same composition of uranium and moderator mixture as the licensee. The geometry and material compositions of uranium and structural materials used in the problem were found to be conservative, with a wide margin of safety provided that internal moderation is minimal. The licensee's assumption of optimal moderation was found to be valid and conservative.

8. Root Cause Investigation

a. Scope

The NRC inspection team investigated the root causes for the loss of criticality safety controls. The team observed equipment damage resulting from the tube failure. The team reviewed licensee policies for change control. The team discussed with the licensee the formulation of the calculated criticality safety

basis for the calciner operations. The team also reviewed the licensee's Taproot investigation of the causal factors of the event.

b. Observations and Findings

The team observed the tube which had been removed from calciner unit 3 and found the break to be an irregular, jagged, cog-like fracture. The team also observed photographs and reviewed written descriptions of prior fractures of cast tubes. These suggested that a much smoother break was associated with the failure of cast tubes. The team consulted with an NRC metallurgist and found that these two types of failures are consistent with the differences in properties of the cast and rolled tubes due to alloy composition and methods of fabrication. The lack of stress relief on the rolled Inconel tube purchased after the prototype was also found to be a likely contributing factor to the failure in unit 3.

Although the calciner rotational drive mechanism was at the feed end of the tube, the cog-like "teeth" associated with the fracture of the rolled Inconel tube helped enable the discharge end of the tube to continue to rotate after the breakage occurred. This, in turn, helped to defeat the Active Engineered Control which was dependent upon the rotational switch at the discharge end of the calciner. This situation was not considered when the change in tube fabrication was evaluated.

The team observed an agitator flight which spans the length of each tube. These inserts are fabricated in sections which have structural support rings at each end. The inserts are normally installed by tack welding the sections together as they are being placed inside the tube. The agitator flight insert sections for the tube which fractured in calciner unit 3 were found to have been welded together with a continuous bead instead of tack welded. This made the structure of the tube inserts stronger than normal. The stronger internal structure of the tube could have helped the discharge end of the calciner tube to continue rotating after the breakage occurred. The licensee's Taproot investigation states that this welding technique had not been evaluated for its impact on equipment reliability.

c. Conclusions

The cause of the material accumulation in the annulus was the circumferential failure of the calciner tube at the point where relatively cool ADU paste is injected into the heated tube. The failure created a 3/8-1/2" wide gap in the tube wall around its entire circumference through which the spillage occurred.

The root causes for the loss of criticality safety controls stem from the tube failure itself and the material accumulation being greater than the analyzed criticality safety basis. The licensee's Taproot investigation listed three causal factors for the reported event.

1. Failure of active engineered control to prevent accumulation of material in the annulus due to changes in the tube material and design indirectly impacting the integrity of the AEC.

2. Inadequate design control and preventive maintenance for rolled Inconel tubes.

3. Delayed notification of the Line 3 calciner exhaust ventilation stack results.

Since calciner tubes are now known to break regardless of whether they are fabricated via a cast or rolled process, the loss of the geometry safety control can not be traced back to the tube's material of construction or method of fabrication. Instead, the cause of the tube break can be derived from the way it was maintained while in use. An informal preventive maintenance program had been successfully implemented for the cast tubes. The NRC team concluded that the root cause for the calciner tube fracture itself was primarily due to the lack of a formal preventive maintenance program for rolled Inconel tubes.

The root cause for the accumulation of material in excess of the analyzed safety basis is more complex. One cause of this safety system failure is due to the <u>way</u> the tube failure occurred. The unexpected mode of fracture and the strengthened tube inserts kept the discharge end of the tube rotating, even after the catastrophic failure of the tube. Thus, one root cause for this failure is concluded to be the inadequate analysis and control of the design changes made to the system.

However, the loss of this second criticality control could have been prevented if the control had been better designed. The control in place relied upon the total breakage of the tube and the stoppage of its rotation at the discharge end. The tube rotation switch by itself did not and could not ensure that the material accumulation within the annulus of the calciner was limited to less than the analyzed safety basis. Chapter 4, Section 4.2, subsection 4.2.11 of the license application requires that, "Engineered controls detect an undesired situation and implement corrective action without requiring human intervention. Engineered controls must be...capable of performing the criticality safety purpose for which they are specified." Despite

the above requirement, the engineered control did not detect the undesired situation and was not capable of performing its criticality safety purpose under the event scenario, and is thus a violation of the requirements of license SNM-1097.

9. Adequacy of Safety Controls

a. Inspection Scope

The inspection team reviewed the criticality controls in place for the Line 3 calciner process to deduce their adequacy and the generic implications of this event for the other processing lines.

b. Observations and Findings

In addition to the calculated calciner criticality safety basis, the team reviewed the licensee's criticality design specifications and criticality safety requirements for operation. The team observed the operation of the Active Engineered Control (tube rotation switch) on an empty calciner and observed the passive engineered control (tube geometry) for a typical calciner. The team also used the results of their review on the history of the manufacture and maintenance of calciner tubes to assess the adequacy of the licensee's criticality controls, and reviewed the licensee's evaluations performed as a result of previous tube fractures.

The dual criticality controls for the calciner operation consisted of geometry control (based on the dimensions and integrity of the tubes) and a geometry/mass combination control based on limiting the amount of material in the annular space between the calciner tube and the refractory-lined shell.

At the time of the event, the operational and automatic engineered criticality safety requirements included the following:

- material enrichment limits (5.00% on lines 3, 5, and 6; 4.025% on lines 1, 2, and 4);
- termination of the uranium and steam inputs to the calciner upon tube rotation stoppage, low calciner temperature, or pluggage of the discharge end for over 90 minutes;
- the control system was to automatically stop the steam flow if tube rotation stopped or if a low calciner temperature occurred (lines 3, 5, and 6 only), and automatically stop hydrolyzed uranyl fluoride (HUF) flow to the precipitation tank (line 3 only);
- the calciner tube rotation timer switch was set to indicate tube rotation stoppage if the switch was not actuated at least once per 30 seconds.

The Active Engineered Control was observed to be mounted on the discharge end of the calciner adjacent to a rotating portion of the tube. A cam was observed to be welded on the rotating equipment such that when a revolution of the discharge end of the tube was completed, a rocker arm on the switch was actuated by the cam. The licensee informed the team that the actuation of the switch would reset the system's 30-second timer. The passive engineered control (tube geometry) was observed by inspection of new and used calciner tubes, with all tubes being of smooth bore and consistent diameter.

c. Conclusions

The criticality controls in place for the calciner process included the geometry of the calciner tube, and the control of mass in the annular space outside the calciner tube. Both of these controls were defeated with a single event. The fracture of the tube itself is considered a loss of geometry control. The accumulation of material in the annulus in excess of the 25 kg (as analyzed in the criticality safety basis) is considered a loss of the combined mass/geometry control for the annular space in the calciner.

Even though both criticality controls were defeated with this single event, the safety margin in the as-found condition was adequate to ensure the system remained well into the subcritical range. However, the criticality controls credited to the system in the analyzed criticality safety basis are not the reasons why the system remained subcritical. The system remained subcritical due to the limited total amount of material involved (in the tube and the annulus) and the lack of neutron moderators in and around the system. This causes the following concerns to surface relating to the overall philosophy used to assure nuclear criticality safety:

- The criticality safety basis was based on two controls that could be defeated by a single event.

- The philosophy of double contingency requires at least two unlikely, independent, and concurrent changes in process conditions to occur before a criticality accident is possible. The history of tube failures in the calciners is such that this loss of geometry control may not be unlikely, and thus may not be able to be credited toward the double contingency standard.

- Chapter 4, Section 4.2, subsection 4.2.4, Paragraph 4.2.4.3 of the license application states that, "Whenever criticality control is directly dependent on the integrity of a structure used to retain the geometric form of a fissile material accumulation...the structure shall be designed with an adequate strength factor to assure against

failure under foreseeable loads or accident conditions." The design of the calciner tubes was adequate to assure against failure in some cases until they have been used for a certain length of time or for a certain amount of throughput. In the case of the rolled tubes, however, the design was not adequate to assure against failure. For example, the design did not include formal provisions in place to assure against failures. Since a failure could occur and was known to occur under foreseeable loads or accident conditions, and no formal provisions were in place to detect and prevent such failures, this is a violation of License SNM-1097, Chapter 4, Section 4.2, subsection 4.2.4, Paragraph 4.2.4.3 of the license application.

The control system (tube rotation switch) was designed to automatically stop hydrolyzed uranyl fluoride (HUF) flow to the precipitation tank for the Line 3 calciner upon loss of tube rotation or low calciner temperature. However, the output from the precipitation tank consisted of the ADU which was fed into the calciner, and there were no automatic shut offs for this flow. In order to limit the amount of material present in the calciner during a tube breakage, an administrative control was implemented which involved an operator removing the ADU feed tube from the calciner. Since this is an administrative control of mass in support of nuclear criticality safety, the provisions of license SNM-1097, Section 4.2.5 apply. In particular, Paragraph 4.2.5.1 of license SNM-1097 states,

> "Where control of mass is used to provide criticality safety, the mass of uranium (or U^{235} or U^{238}) is administratively controlled based on measurement by one or more of the following techniques:
>
> - The mass of uranium (or U^{235} or U^{238}) is determined as the product of the volume and the uranium (or U^{235} or U^{238}) concentration as measured by qualified counting methods.
>
> - The mass of uranium (or U^{235} or U^{238}) is determined by qualified counting methods.
>
> - The total mass or change in mass of a system is composition."

Since the mass within the calciner was under administrative control within the calciner, and mass control was one of the parameters used in the criticality safety basis, the mass within the calciner was subject to the requirements of

License SNM-1097, Paragraph 4.2.5.1. The required measurements were not being performed and this is a violation of Chapter 4, Section 4.2, subsection 4.2.5, Paragraph 4.2.5.1 of License SNM-1097.

10. Licensee Response to the Event

a. Scope

The inspection team evaluated the adequacy of the licensee's actions during and following the event, including their response to the event and corrective actions implemented. The team reviewed the information available to the licensee to use as future indicators of a tube failure, the timeliness of reporting to the NRC, and the licensee's response to criticality and radiological safety issues.

b. Observations and Findings

The team reviewed documentation of the event and found that the licensee notified NRC within the four hour time limit after discovery of the reportable condition and clearly stated the facts of the situation. The inspection team also found that the licensee clearly understood the magnitude of the situation and responded with the proper amount of management involvement.

Team members interviewed the control room operators that were on duty at the time of the event and found that operations personnel reacted quickly to the report of smoke in the area, found the problem unit, and shut it down. It was also found that the licensee assembled investigatory teams promptly with a mixture of technical expertise in order to fully analyze the event.

The team was provided with a set of licensee corrective actions in response to the event. The team thoroughly discussed the short term and long term corrective actions with licensee management. The short term corrective actions identified were:

- Tighten the tolerance of the timing on the calciner tube rotation indicator switch. The timer setting at the time of the event was nearly twice the tube rotation time. The tightening of the timer tolerance would effectively shut down the calciner if the tube rotation time was more than 2 seconds beyond the normal value. This would help limit the accumulation of material in the annulus in situations where the discharge end of a broken tube continues to turn erratically due to support from the tube's agitator flight.

- Automate the valving of the ADU paste feed pump so that the administrative control of removing the feed tube is not necessary for stopping ADU feed into the calciner. This 3-way valve was manually operated to either allow ADU paste

flow to the calciner or to recirculate the ADU paste in the ADU feed hopper. Automating the valve would cause it to switch to the recirculation mode upon indication of tube rotation stoppage.

- Implement a control system program change to correct weaknesses in the calciner stack monitoring and reporting system. This would include a program change that requires calciner stack information to be input within a certain time frame. If stack results were not entered into the system at a prescribed frequency, the calciners would be automatically shut down. If stack results were above a prescribed limit, an Action Level Investigation would be automatically produced. These programming changes would require this readily available indicator to be used to detect calciner tubes in the process of failing.

- Evaluate and formalize a Preventive Maintenance program for cast and rolled calciner tubes. This program would formalize an accumulated throughput level at which a calciner tube would be "flipped" or replaced.

The long-term corrective actions that were proposed by the licensee were also reviewed by the inspection team and discussed with licensee management. They included:

- Revising the Criticality Safety Analysis for the calciner operation in order to improve on the existing neutronic model of the postulated "tube break" accident condition. This corrective action would analyze the accident condition beyond the 25 kilogram accumulation postulated in the previous analysis. This corrective action would also evaluate adding a new, independent mass/moderation parameter control to the existing basis for safety.

- Revising the vendor specification for Inconel-600 rolled alloy calciner tubes to include annealing (stress relieving) of rolled and welded tube. This would likely improve the strength and lengthen the service life of calciner tubes.

- Revising the licensee's change control process to emphasize the impacts of material property changes of process equipment. This would be followed by sensitivity training to all fuel manufacturing process engineers.

- Evaluating new technology to determine mass accumulation inside the calciner annulus. Gamma scanning techniques are being considered, but their applicability is uncertain.

In order to verify its usefulness as an indicator of material accumulation in the calciner annulus, the inspectors constructed a mathematical model to deduce the mass of material as a function of

the calciner stack radioactivity data. This model assumed that the measured stack activity was directly proportional to the surface area of the uranium deposit and the total air flow, allowing an extrapolation of mass at the times of the previous stack samples.

The uranium was assumed to be in the form of UO_2 with a density of 2 g/cc. The shape of the uranium deposit was assumed to be a normal distribution in the transverse and axial directions. The standard deviation in the transverse direction was taken as the radius of the calciner tube and the standard deviation in the axial direction was taken as one foot. The uncertainties in the actual density of the UO_2 and the distribution shape dominated the model systematics.

The surface area of the deposit in the annulus was computed numerically, and the volume was multiplied by the density to obtain the total mass for different-sized distributions. This resulted in a surface area vs. mass curve that was related to the stack emissions by using the surface area corresponding to the as-found mass. The mass corresponding to the previous three stack emissions was estimated using this curve. The results shown below give the extrapolated accumulated mass for each of the three previous weeks.

Sample Date	Stack Activity (μCi/cc x 10^{-12})	Surface Area (cm^2)	Estimated Mass (kg)
11/27/96	18.90	4600	38.77
11/21/96	7.40	1801	1.25
11/14/96	3.40	828	0.375
11/7/96	0.43	105	0.1

When the short term corrective actions had been initiated, inspection team members observed functional testing of the mechanical and electronic improvements. Team members then observed training of operators on the new procedural requirements stemming from these corrective actions.

c. Conclusions

The licensee's responsiveness in reporting and reacting to the event was adequate for the scope of the problem. The operators within the control room and on the production floor responded quickly and appropriately based on the information available to them.

The set of short term corrective actions adequately addressed the causal factors of the event by improving the monitoring, control, and robustness of the calcining operation. The tighter tolerance on the calciner tube rotational switch would tend to detect nearly any slippage of the tube rotation. The improvements in the calciner exhaust stack monitoring system would help provide early indication of material leakage into the annulus. The preventive maintenance should help minimize the occurrences of tube fractures.

The long term corrective actions (once fully implemented) appear adequate to provide improved reliability of the criticality safety program for the calciner systems. The revising of the Criticality Safety Analysis should provide a more realistic representation of the actual system parameters in place for preventing a criticality accident. The revising of the change control process would provide more insight into the many-faceted considerations which must be reviewed as part of any change to a system with nuclear safety concerns.

From the air activity vs. material accumulation model, it was concluded that stack sampling data could be used as an early warning of impending tube rupture for this mode of failure. Based on limited data, such improvements in reaction to air sampling data could result in detection about two weeks prior to complete tube failure. However the frequency of the stack sampling (weekly) makes it difficult to affirm that a large accumulation would not occur between samples.

III. EXIT MEETING

The team leader presented the inspection results to licensee representatives by phone on January 24, 1997, and summarized the purpose of the team inspection, the inspection team charter, the inspection findings, and the three violations listed in the NOV. The licensee had no dissention to the NOV. The licensee did not indicate that the report would be considered proprietary.

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Kipp, General Manager
*J. Kline, Manager, Chemical Product Line
*L. Paulson, Manager, Nuclear Safety
*S. Murray, Team Leader, Chemical Conversion
*R. Reda, Manager, Licensing
*C. Monetta, Manager, Environmental Health and Safety
T. Hauser, Manager, Quality Assurance

*Denotes personnel present at the exit briefing conducted by phone on January 24, 1997.

NRC

N. Economos, Inspector, Division of Reactor Projects, Region II

INSPECTION PROCEDURES USED

IP 88020 Operations Review

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

70-1113/9612-01 Violation - Failure of an engineered control being capable of performing its specified criticality safety purpose.

70-1113/9612-02 Violation - Failure to provide assurance of the strength of a structure upon which criticality control is directly dependent.

70-1113/9612-03 Violation - Failure to perform required measurement techniques when administratively controlling mass for criticality safety purposes.

LIST OF ACRONYMS USED

ADU	ammonium diuranate
AEC	Active Engineered Control
cm	centimeter
g/cc	grams per cubic centimeter
GE	General Electric
HUF	hydrolyzed uranyl fluoride
kg	kilograms
NCV	Non-Cited Violation
NOV	Notice of Violation
PDR	Public Document Room
µCi/cc	microcuries per cubic centimeter

ONE LINERS FOR FEBRUARY 14, 1997

1. Fuel Facilities Status

a. Babcock and Wilcox (B&W) - NNFD

Routine manufacturing and maintenance activities are being conducted in the Modified Fuel Process (MFP), Advanced Fuel Process (AFP) and the Research and Test Reactor Fuel Element (RTRFE) portions of the plant. The uranyl nitrate hexahydrate (UNH) conversion process, used to produce U_3O_8 for use as RTRFE feedstock, is shut down due to mechanical problems with sintering ovens. Routine development work is being conducted in the Compact Reactor Fuel (CRF) facility.

A routine Naval Reactors recovery campaign is being conducted in the Uranium Recovery Facility. Modifications to Sapphire downblending equipment are nearing completion.

A three person team was onsite February 10-13 from headquarters for a routine inspection of the nuclear criticality safety program. Senior Resident Inspector and a regional inspector coordinated their inspection with the team.

IAEA inspectors are scheduled to be onsite February 15 - 18 for a routine monthly visit to monitor Sapphire downblending activities. They will be accompanied by Bryan Horn from NMSS. The dissolution of Sapphire materials remains on hold.

On February 10, 1997, Region II and NMSS staff completed the first phase of the licensee performance review (LPR) for the licensed activities at the B&W NNFD facility near Lynchburg, Virginia. The LPR was conducted in accordance with NRC Inspection Manual Chapter No. 2604. The results will be presented to the Regional Administrator with a subsequent meeting with the licensee.

b. B&W Fuel Co. (Framatome Cogema Fuel)

Routine rod loading and production activities are being performed. Routine decontamination and refurbishment activities are being conducted in the SERF facilities.

A CAL preventing the further downloading of NUKEM fuel assemblies remains in effect. A second shipment of NUKEM fuel assemblies remains at a port facility. The CAL had to do with the loss of a fuel assembly.

S. Wilkerson has been named as Manufacturing Manager replacing J. Ford.

Three inspectors from ONMSS/FCSS were onsite February 13 and 14 for a routine inspection of the nuclear criticality safety program.

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c. General Electric - Nuclear Energy Production

Several utilities (such as Niagara Mohawk - Nine Mile Point) have slipped outage schedules either to later in 1997 or into 1998. This has pushed the GE production schedules back, with the result that the plant is ahead of schedule rather than behind. Powder production is being slowed as a result. Pellet pressing will be down for 3 days over the week-end.

Two weeks ago approximately 15 tonnes of powder were quarantined because of problems with "inclusions" which resulted from a bad screen in #3 granulator. Approximately one-half of this material (powder) was re-screened and processed with no problems. Some pellets and rods will have to be recycled -- oxidized and then reduced to UO_2 powder.

On February 12, while withdrawing the loading ram on the incinerator, the shaft bent. The incinerator is down until the shaft is replaced. A design review will be conducted because this shaft has bent in the past.

The Dry Conversion Facility (DCF) system check-outs are progressing. Loop checks on the Line 1 instruments and controls will be completed this week. Line 2 checks may start this week. Checks of the HF facility will start next week. Engineers from FBFC and the equipment manufacturer will be on site next week for the first heat-up of the conversion kiln on Line 1. The start of functional testing has been pushed back to mid-March to permi[redacted] completion of reprogramming of the process control system.

d. Nuclear Fuel Services

On February 5, 1997, the Regional Administrator and the Director of the Division of Nuclear Materials Safety visited the site. The purpose of the meeting was for a plant tour, operational overview, and discussion of issues of mutual interest.

On February 12, 1997, A. Maxin, Vice President, Safety and Regulatory Management, was replaced by Dr. Thomas R. Baer. A. Maxin will report to Dr. Baer (see attachment).

The licensee continues to process the HEU material shipped from the DOE facility in Rocky Flats with no significant problems. The licensee is preparing to receive 26 type 5B UF_6 cylinders from the Portsmouth Gaseous Diffusion Plant. The licensee will recover the residual uranium from these cylinders. As of February 14, 1997, the licensee had not received any Type 5B cylinder shipments. Apparently, Portsmouth is awaiting an approval from DOE before the first shipment is made.

e. Westinghouse

This week Line 1 was used to process recycle material. UF_6 was being processed through Lines 2, 3, and 4. Line 5, normally used to process uranyl nitrate recycle material, was shutdown for clean out. Processing on all lines has been shutdown for a limited amount of time due the licensee's new "Time-Based Management" concept. This concept dictates that only a certain amount of powder be produced and then the conversion lines are shutdown until the pelleting area uses what is on hand and needs more. This program is designed to limit the amount of powder inventory on hand. There have been no process upsets or reportable incidents during the past two weeks.

Last week regional inspectors were on site performing a health physics and environmental protection inspection. This week an inspector from headquarters is on site performing a chemical safety inspection.

2. Business Process Reengineering (BPR)

On February 18, 1997, the staff in NMSS and Region II will brief the Commission on the status of the BPR for materials licensing. B. Mallett will be participating in the briefing for Region II. The brief will include the results of the pilot, which was held in Region II during January 27-31, 1997. The pilot tested the receipt of electronic applications from licensees, the use of the new electronic/computer assisted review checklist, the use of the electronic/computer database for all the guidance and the generation of the materials license via the computer assisted database. Participants in the pilot included four licensees, four portable gauge manufacturers, NRC, and representatives from the Agreement States of Georgia, Illinois and Texas.

3. Jose L. Fernandez, M.D.

On October 21, 1996, the NRC issued an Order to the licensee to obtain a consultant to identify and notify patients who received overexposures due to a miscalibrated Sr-90 calibrator. The licensee is progressing with the review, which must be complete by February 7, 1997 (45 days after NRC approval of the consultant on January 21, 1997).

The Order also required the licensee to dispose of the two applicators licensed. The licensee has shipped one of the applicators this week and plans to ship the second to an authorized recipient in New York upon return of the shipping container from the first shipment.

Region II is continuing to pursue the review of records from another physician, Dr. Vazquez, who also used the miscalibrated applicator to treat patients. On February 12, 1997, the Region issued a letter to the corporation who holds the records for the deceased Dr. Vazquez. The plan is to send Region II and Headquarters staff to perform the review during the first week in March.

4. Department of the Army, Rock Island, IL

In response to a request from NMSS, Region II provided copies of Army licenses in Region II along with the results of inspections performed over the last five years. Information regarding inspections of Navy facilities was also provided. This information was requested in preparation for a meeting between the Director, NMSS, and the Department of the Army concerning the control and accountability of radioactive commodities in the possession of the Army. Region III (responsible region for the Army commodity licenses) has identified a number of issues with the Army's control and accountability of radioactive commodities (i.e. compasses, range finders, etc.) and failure to report the loss of commodities. Region II identified similiar problems with the Navy's control and accountability of radioactive commodities in 1996 and the Navy is in the process of fixing their system.

5. Navy

On February 8, 1996, the Navy informed Region II that in December, 1995 and January, 1996, a Marine aircraft expended 1,520 rounds of 25 mm depleted uranium (DU) ammuntion at an Air Force gunnery range on a small, uninhabited island approximately 50 miles from Okinawa. The Navy's license does not authorize the firing of DU munitions at this range. The aircraft had been mistakenly loaded with the DU rounds because of a supply system error. The Air Force is responsible for maintaining control of the island and subsequently had the range surveyed and recovered approximately 192 rounds. In December, 1996, representatives of the NHK, a Japanese television network, contacted Region II and requested information on the incident. Region II staff provided what information they had on the incident and referred the NHK representatives to the Navy's Radiation Safety Committee contact for additional information. On February 10 and 11, 1997, articles about this incident and the reported failure of the U.S. government to officially report this incident to the Japanese government appeared in the Washington Times and Washington Post. Region II staff have provided information regarding this incident to the NRC Office of Public Affairs and Office of International Programs so these offices could respond to inquiries from the Japanese Embassy.

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Dwight B. Ferguson, Jr.
President

NUCLEAR FUEL SERVICES
ERWIN, TENNESSEE

NOTICE TO ALL EMPLOYEES

February 11, 1997

I am pleased to announce the appointment of Dr. Thomas S. Baer to the position of Vice President of Safety and Regulatory, effective February 12, 1997.

Dr. Baer received his B.S. from the U.S. Naval Academy, M.A. at the U.S. Naval War College, and his M.S. and Ph.D. in Nuclear Engineering from the University of Cincinnati.

Dr. Baer's background has been in engineering, research, manufacturing, nuclear waste and hazardous waste industries. His Navy background included duty in nuclear service and he retired as a Captain in the Navy Reserves. He previously held positions such as Chief Operating Officer and Vice President of various companies in the nuclear industry.

Additionally, I wish to also announce the following changes in the Safety and Regulatory organization:

Andrew M. Maxin will assume the position of Director of Safety and Regulatory Compliance, which will encompass responsibilities at the Erwin facility and off-site locations.

James R. Clark will conclude his assignment at NFS as Sr. Vice President of Safety and Regulatory as of February 12, 1997. However, he will continue to be available as a consultant on an as needed basis for various projects.

I know that you will continue to provide your support as each of these employees take on the challenges that face them.

Dwight B. Ferguson

Dwight B. Ferguson
President and Chief Operating Officer

GE Nuclear Energy

General Electric Company
P.O. Box 780, Wilmington, NC 28402
910 675-5000

February 19, 1997

Mr. M. F. Weber, Licensing Branch, NMSS
U.S. Nuclear Regulatory Commission
Mail Stop T 8-D-14
Washington, DC 20555-0001

Subject: License Renewal - ISA for DCP Summary

Reference:
(1) NRC License SNM-1097, Docket 70-1113
(2) License Renewal Application, 4/5/96
(3) Submittal, RJ Reda to ED Flack, 5/6/96
(4) Submittal, RJ Reda to RC Pierson, 5/14/96
(5) Letter, RC Pierson to RJ Reda, 7/18/96
(6) Submittal, RJ Reda to RC Pierson, 8/30/96
(7) Submittal, RJ Reda to ED Flack, 9/26/96
(8) Letter, MA Lamastra to RJ Reda, 10/2/96
(9) Submittal, RJ Reda to MA Lamastra, 11/22/96
(10) Application, RJ Reda to MF Weber, 12/16/96
(11) Letter, MA Lamastra to RJ Reda, 12/17/96
(12) Letter, RJ Reda to MF Weber, 2/5/97
(13) Letter, MA Lamastra to RJ Reda, 2/10/97

Dear Mr. Weber:

As part of our facility modifications for the Dry Conversion Process (DCP), and as part of our site license renewal for NRC license SNM-1097, GE committed to complete an Integrated Safety Analysis (ISA) for the DCP and submit a summary of that work to the NRC. In accord with this commitment, GE has completed the ISA and has summarized the results of this work as an attachment to this letter.

Six copies of this submittal are being provided with a dated tab for insertion into the binders we previously sent.

Please contact Charlie Vaughan on (910) 675-5656 or me on (910) 675-5889, if you have any questions or would like to discuss this matter further.

Sincerely,

GE NUCLEAR ENERGY

Ralph J. Reda

Ralph J. Reda, Manager
Fuels & Facility Licensing

Attachment

cc: RJR-97-014

B139

Dupe.

9702240258 1p.

ATTACHMENT TO LETTER FROM RJ REDA TO MF WEBER
DATED FEBRUARY 19, 1997

ISA SUMMARY
GE WILMINGTON
DRY CONVERSION PROCESS

DATED FEBRUARY 19, 1997

ISA Summary
GE Wilmington
Dry Conversion Process

GE Nuclear Energy
Wilmington, NC
February 19, 1997

Supplemental Information to License Renewal:
SNM-1097, Docket 70-1113

ISA Summary
GE Wilmington
Dry Conversion Process

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Introduction

An integrated safety analysis (ISA) was performed to support the new dry conversion process at the GE Wilmington site. The analysis was conducted in accordance with Chapter 4, Integrated Safety Analysis, of SNM License 1097, submitted April 5, 1996, as amended. The purpose of the analysis was to determine potential accident scenarios and risk, to ensure that controls are in place to prevent and/or mitigate accidents, and to rank the controls in relation to the risks which they mitigate so that the proper level of assurance measures can be applied to each. The broad scope of the analysis included criticality safety, radiological safety, environmental protection and industrial safety, including chemical safety and fire protection. This report summarizes the important results of the safety study for the dry conversion facility. Detailed records are retained on-site.

ISA Teams

The ISA was performed by teams of people of different expertise who systematically analyzed the hazards in a focused meeting environment. Each team included expertise in criticality safety, radiological safety, industrial safety and environmental protection. Also included were process and controls engineers. Because the process had never been operated at the Wilmington site, experts in the operation of existing plants utilizing this technology participated along with GE personnel.

Procedures, Techniques and Tools

The ISA team used the Hazop method and limited use of the What If method to complete the analysis. The hazop analysis was facilitated by and documented in a software package known as HazopPC, developed by Primatech, Inc. This software was customized for GE to specifically capture nuclear hazards. Consultants from Primatech provided training to team participants early in the project, and facilitated the preliminary sessions. Guidance for performing the analysis came from Primatech and from

Guidelines for Hazard Evaluation Procedures[1]. As the project neared completion, an internal procedure, P/P 10-20, Integrated Safety Analysis, was developed to define how future ISAs would be performed and how the results of ISAs would be used to manage risk in the operating factory.

Process Organization

The DCP ISA was broken into the following segments and analyzed using the method shown:

Cylinder Movement - Hazop
Vaporization - Hazop
Conversion - Hazop
Powder Outlet - Hazop
Homogenization - Hazop
Blending, Precompaction, and Granulation and Tumbling - Hazop
HF Treatment - Hazop
Containers / Storage - Hazop
Powder Pack - What If

Methodology

Hazards were identified using historical input from a variety of sources including safety information from other dry conversion facilities and public domain documents from other sites in the fuel cycle. The relationships between the hazards and DCP process deviations were developed through guided brainstorming and event visualization techniques.

Where the hazop methodology was used, each process segment was divided into logical nodes. For each node, the team first considered the intended operating conditions. Next they considered the possible deviations from the design intention using a list of parameters and guidewords. Typical parameters included:

Flow
Temperature
Pressure
Composition
Level
Weight

[1] *Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples*, Center for Chemical Process Safety of the American Institute of Chemical Engineers, New York, 1992.

Guidewords were used to identify possible deviations from normal. Example guidewords included:

No/None	More
Less	As Well as
Part of	Reverse
Other than	

Once possible deviations were identified, possible causes of the deviations were hypothesized. The consequence of the deviation was estimated through experience or technical evaluation. The severity of each consequence was rated on a three-point scale, shown in Exhibit 1. The likelihood of the accident occurring with no controls in place was estimated from experience on a three-point scale, shown in Exhibit 2. Safeguards or controls that prevent or mitigate the consequence were identified. Outside of the team environment, the controls were ranked in importance by the unmitigated risk, where:

$$(\text{Risk})_{\text{unmitigated}} = (\text{Severity}) \times (\text{Likelihood})_{\text{unmitigated}}$$

The level of unmitigated risk was used to determine the level of assurances that would be applied to the controls. Risk ranking is summarized in Exhibit 3.

Finally, the likelihood of the consequence occurring with the controls in place was estimated. Final risk was used by the team to judge the adequacy of the controls, where

$$(\text{Risk})_{\text{final}} = (\text{Severity}) \times (\text{Likelihood})_{\text{mitigated}}$$

If the final risk was judged by the team to be too high, recommendations for improvement were captured and reviewed with management. Recommendations that were adopted were tracked to completion.

Consequences associated with UF_6 and HF were estimated using past experiences of GE Wilmington, FBFC, and other uranium processing facilities and experiences in the chemical industry. Criticality consequences were estimated using standard analytical methods. Radiological consequences were estimated by extrapolating our experience with the existing processes. Environmental, industrial, and chemical consequences, including fire and explosion, were estimated with the aid of material safety data sheets, chemical interaction information, and various modeling techniques, including emission calculations and dispersion models for fence-line concentration.

Exhibit 1
Severity of Consequences

Severity Ranking	Radiological/ Criticality	Environmental/ Industrial/Chemical
3	• exposure to an individual member of the public off-site (5 rem, 30 mg intake of U) • severe exposure to an employee (400 rem internal plus external dose or 230 mg intake of U)	• fatality • medical treatment for a member of the public off-site • permanent disability • off-site contamination above regulatory standards
2	• exceed regulatory limits for employee exposure (5 rem, 10 mg U internal)	• serious injury • exceed permit limits or regulatory limits • lost time injury reportable release
1	• exceed administrative limits on daily air samples, lung counts, bioassays, contamination, TLDs • 10% of annual exposure limit	• OSHA recordable injury • first aid • exceed internal limits • spill inside containment • Unusual Incident (UIR)

Exhibit 2
Likelihood

Level	Frequency	Likelihood
3	more frequent than once every two years	Likely to occur in the immediate future
2	every two to fifty years	Likely to occur during the life of the facility
1	less frequent than once every 50 years.	Not likely to occur during the life of the facility
0	incredible	Likelihood is indistinguishable from zero.

Exhibit 3
Risk Matrix

Consequence / Severity	1	2	3
3	Mid-level Risk	High Risk	High Risk
2	Low Risk	Mid-level Risk	High Risk
1	Low Risk	Low Risk	Mid-level Risk

Likelihood

Building Design Basis

The DCP facility has been designed to meet the relevant building and fire protection standards. The design criteria were taken as bounding assumptions by the ISA teams with respect to external events, of which heavy rain, lightning strikes, and high wind are considered credible. The DCP facility is designed with a structural integrity providing a safety factor of two. It is built to withstand a sustained wind speed of 120 mph. Although the seismic activity is not considered credible, the DCP facility has been designed to meet the lateral acceleration requirements for Wilmington, North Carolina, as contained on the contour maps in *ASCE 7-93*. The electrical classification is Class I, Division. 2, Group B in close proximity of the conversion kilns, where there is some risk of H_2 escape. Elsewhere within DCP, the electrical hazard classification is non-hazardous. The GE Wilmington site is located above the 100 year flood plain and thus is not considered susceptible to storm surge or flash floods.

What follows is a summary of the more significant potential accidents identified and discussion of the controls that are in place to protect against them.

General DCP Areas

PURPOSE: To provide a facility where moderation is restricted, fire or explosion is unlikely, and radiological exposure or contamination is minimized.

ACCIDENT: Loss of moderation control in the DCP Facility due to water ingress.

PROTECTION: The DCP process areas are designated as Moderation Restriction Areas (MRA). The building is designed to be water tight. The roof of the DCP building is designed to prevent water leaks and to provide an early warning of potential degradation. Its special multi-layered construction incorporates a reinforced concrete slab roof deck, an EPDM membrane, a drainage system of extruded polystyrene insulation, a concrete slab over geotextile fabric, and a fully adhered butyl sheet. Degradation of the external barrier is detected by a visual observation of water in the drainage system. Also, there are no penetrations on the roof of the building, and the roof slopes from east to west to convey rain water away to a gutter and downspout system on the west side of the building.

Air handling equipment is designed to minimize the possibility of water entering the Moderation Restricted Areas in DCP. Moisture detectors and alarms are fitted downstream of the last coil on the air intake to DCP. While small amounts of water on the floor do not present a safety problem, the ground floor of the DCP building is raised in relation to the existing FMOX ground floor to prevent in-leakage of water from rising water.

ACCIDENT: Fire / Explosion within the DCP Facility

PROTECTION: The DCP building is designed to comply with relevant fire codes. Interior doors and walls provide fire resistance. A comprehensive fire alarm and detection system includes smoke and heat detectors as well as H_2 and HF detectors. Fire alarm horns annunciate in the DCP building and in the HF building. Alarm signals are relayed to both the DCP control room and to the Site Emergency Control Center.

A CO_2 fire suppression system protects the HVAC ductwork and the HEPA filters. Consistent with the Moderation Restriction Area, only carbon dioxide fire extinguishers are installed within the DCP building. A water sprinkler system protects the HF building. Operating and maintenance personnel receive fire fighting emergency training and are periodically tested by unannounced emergency evacuation exercises.

H_2 is handled and processed within closed systems. Ignitable concentrations of H_2 are prevented by positive mechanical ventilation. Hydrogen sensors are located within each kiln room, and continuously monitor atmosphere for unacceptable concentrations of hydrogen.

The DCP kiln generates a low specific surface area product, which is resistant to spontaneous oxidation in storage. Further protection against oxidation includes powder cooling, nitrogen blankets, and interrupted mixing cycles.

ACCIDENT: Radiological exposure of personnel to airborne uranium.

PROTECTION: A general feature of the design of the DCP facility is the containment and ventilation philosophy to provide defense in depth against the escape of airborne uranium into areas in which personnel would not normally be required to wear personal protective equipment. Specifically, airborne uranium is contained by nitrogen seals at the connections between the processing equipment and storage/transfer containers. Uranium processing activities are housed within ventilated rooms, designed so that the lowest pressure is within the rooms themselves and air flows from outside to inside the rooms. Each room has HEPA filtration to trap particulates within the room, and the air intake and extraction ducts are arranged to draw air downward and away from personnel work areas and provide adequate air changes to avoid static air pockets. Ultimately, the extracted air is filtered through another HEPA filter bank before discharge to the environment. Redundant fan capacity and fan failure alarms are provided on the DCP HVAC system.

Operating procedures require floor operators to inspect the plant areas on a routine basis. Existing GENE practices require operators to clean up visible contamination as soon as it is discovered. Tight fitting connections equipped with inflatable seals are installed at all container filling and dump stations. Where flexibility is required in the powder feed pipework, rubber boots and internal metal sleeves are used to limit powder spillage in the

event of a rubber boot failure. Operating and maintenance personnel are required to wear the designated personal protective equipment when breaking primary containment on uranium processing equipment.

A large powder spill within a containment room are evident when the operator views the operations through a window or enters the room to remove the container.

ACCIDENT: Asphyxiation of a worker from excessive concentration of nitrogen.

PROTECTION: Nitrogen piping systems were designed to exceed the anticipated operating pressures, and are pressure tested during installation. In the event of a leak in a process room, positive ventilation provided by the HVAC system is designed to supply adequate air changes. The HVAC system is equipped with redundant fans to assure reliability. Plant procedures for entering confined spaces protect workers during maintenance of the large vessels such as the homogenization blender.

ACCIDENT: Failure of the distributed process control system

PROTECTION: All valves are designed to fail in a safe position in the event of a total control system outage. Active safety controls are implemented separately from functions that may be needed for normal operating functions and access, resulting in a more robust software operating system. Changes to the software are subject to strict version control per procedure. Important controls are functionally tested before start up and periodically thereafter.

Cylinder Storage and Handling

PURPOSE: Safe movement of UF_6 feed material into and out of the facility.

ACCIDENT: Loss of containment external to DCP leading to release of UF_6 to the environment.

PROTECTION: UF_6 cylinder integrity complies with the 30B type specification defined in USEC 651 Rev. 7, Jan 1995. The process design ensures that cylinders are handled only when the UF_6 inside them is in the solid phase. Cylinder lifting equipment has been designed and tested to handle the load. Operator training in UF_6 cylinder handling includes the use of forklift trucks, cranes and hoists. Cylinders are moved with the cylinder valve cover in place and lifted to the minimum lift height consistent with the terrain. Overpressurization of a cylinder due to fire is prevented by strict control of the inventory of hydrocarbon fuels and combustible materials in the UF_6 cylinder storage area as described in NUREG 1491. Existing administrative controls for the receipt and release

of UF_6 cylinders ensure that overweight cylinders or enrichments greater than 5% ^{235}U are not processed in DCP.

Vaporization

PURPOSE: Supply UF_6 gas to the reactor where it is converted to UO_2 powder.

ACCIDENT: UF_6 release due to a loss of UF_6 cylinder integrity within the autoclave.

PROTECTION: The autoclave has been manufactured to meet the ASME pressure vessel code, and is pressure-tested annually. The rated pressure exceeds the normal operating pressure of the UF_6 cylinders. The integrity of the door seal is tested each time a cylinder is loaded into the autoclave. A door latch proximity switch is interlocked with the cylinder heating cycle. Loss of seal pressure disables the autoclave heating sequence. The internal pressure within each cylinder is verified to be below atmospheric pressure before heating as a safeguard against overpressurization during the heating cycle.

The UF_6 cylinder pressure is controlled at the desired set point by monitoring the UF_6 line pressure downstream of the cylinder, and uses feedback control to regulate the current supplied to the autoclave heaters. Active controls prevent overpressurization of the cylinder by de-energizing the autoclave heaters on high temperature at the cylinder surface, or high temperature inside the autoclave.

UF_6 leak detection is installed as part of each autoclave system, and draws a sample from the autoclave annular space. The annular space is swept with heated dry nitrogen to prevent reaction with air in the event of a UF_6 leak. This nitrogen may be fed at high pressure to suppress potential leakage of UF_6. As a result, a leaking cylinder can continue feeding safely to the reactor until the cylinder is empty and the hazard is reduced.

To protect workers from exposure during cylinder installation, personnel are required to wear appropriate personal protective equipment when connecting and disconnecting the UF_6 line pigtail to the cylinder.

ACCIDENT: UF_6 release to the room due to failure of UF_6 piping.

PROTECTION: The piping integrity is assured by 100% radiographed welds on all UF_6 lines. UF_6-resistant gaskets are used at flanges, and bellows-sealed valves minimize stem leaks. The UF_6 line is further protected against failure due to hydraulic rupture by automatic temperature control of the trace heating with high and low temperature alarms and high temperature interlocks that disable the affected section of trace heating.

UF_6 leak detectors are installed in each autoclave room. In the event of a UF_6 leak in an autoclave room, the ventilation to that room is shutdown to contain the UF_6 inside.

ACCIDENT: Cold trap rupture leading to a release of UF_6.

PROTECTION: The cold trap has been manufactured and tested in compliance with ASME and CODAP pressure vessel codes. The cold trap heaters are disabled on high temperature, high pressure, or high weight. Valve line-ups are interlocked to prevent the inadvertent transfer of UF_6 to unintended destinations, for example, cylinder-to-cylinder or cylinder-to-cold trap during conversion.

ACCIDENT: Criticality due to backflow of steam moderator into the cylinder.

PROTECTION: During operation of the plant, a positive flow of gas is maintained from the UF_6 line to the reactor. Active controls automatically isolate the cylinder from the reactor in the event that positive pressure differential between the cylinder and reactor is lost. The UF_6 cylinder skin temperature must be above a predetermined minimum value before the UF_6 feed valve can be opened.

Conversion

PURPOSE: To convert UF_6 into ceramic-grade UO_2 powder suitable for pelletizing. This process includes the recycle of discrepant UO_2 powder to reduce fluoride content.

ACCIDENT: Loss of hydrogen containment leading to fire or explosion. (Also loss of HF containment leading to worker injury or loss of uranium containment leading to personnel exposure.)

PROTECTION: The primary protection against loss of containment is the kiln itself. The kiln seals are of labyrinth construction with the interspace pressurized with nitrogen.

The kiln is protected from overpressure by an automatic pressure control system. Pluggage of the sintered metal filters at the gas discharge of the kiln could result in a pressure higher than desired. The filters are kept clean by a computer-controlled sequence that blows back the metal filters with nitrogen. During operation the pressure drop across the sintered metal filters is continuously monitored. Deviations from normal result in audible/visual alarms in the control room. Furthermore a high kiln pressure interlock stops the UF_6 feed, followed by an orderly shutdown of the hydrolysis and pyrohydrolysis steam and H_2 feeds.

The kiln and associated vessels are housed inside a ventilated containment area. H_2 detectors in the rooms automatically stop the H_2 and UF_6 feeds to the affected conversion

kiln. HF detectors send audible/visual alarms to the control room, and the operators are trained to manually shutdown the gas feeds to the affected kiln.

ACCIDENT: Loss of moderation control leading to criticality in the kiln and associated reactor and outlet hopper.

PROTECTION: To ensure that the steam fed to the reactor and kiln is dry, saturated steam is superheated using electric heaters equipped with automatic temperature controls regulated by the computer control system. All steam lines are electrically trace heated and insulated. A low temperature condition activates audible/visual alarms in the control room. The heat tracing is equipped with redundant heating circuits. Low steam temperature fed at the superheater or downstream of the superheater is sensed and interlocked to the steam feed control to the reactor. Both hydrolysis steam and pyrohydrolysis steam supplies are protected by these controls.

A low temperature inside the reactor or on the reactor wall is sensed and interlocked to the steam and UF_6 feed control. A low temperature interlock on the exterior of the kiln barrel also stops the steam and UF_6 feeds. Similar alarms and interlocks are activated by thermocouples located inside and on the exterior of the outlet hopper.

ACCIDENT: Criticality in HF area caused by release of particulate uranium to unfavorable geometry liquid system.

PROTECTION: The primary protection against entry of particulate uranium into the offgas system are the sintered metal filters housed in the top of the reactor. Further protection is provided by a back-up sintered metal filter unit installed in the offgas line downstream of the reactor. The integrity of both sets of filters is assured by continuous monitoring of the pressure drop across the filters. The kiln filters are periodically backpurged with nitrogen during operation to minimize powder build up.

Passive and active controls in the HF area that prevent criticality are described in the HF section.

ACCIDENT: Criticality in the HF area caused by a release of unreacted UF_6 aqueous uranium to unsafe geometry.

PROTECTION: An excess of hydrolysis steam (normally a factor of two) is fed to the reactor to provide complete conversion of UF_6 to the intermediate UO_2F_2. Furthermore, sufficient pyrohydrolysis steam is provided to convert all the UF_6 to UO_2F_2 and to UO_2 in the event of loss of the hydrolysis steam flow. A high UF_6 flow interlock closes the UF_6 feed valve and starts sweeping nitrogen to the injector nozzle. Similarly, low steam flow

to the reactor stops UF_6 feed. These controls prevent less than stoichiometric flow of steam to the kiln and thus a loss of UF_6 in the off-gas.

Other potential causes of a loss of steam flow to the reactor, for example, an open manual vent valve in steam line, an open pressure relief valve on steam superheater, are mitigated by the low flow interlock described above, operating and maintenance procedures including a startup checklist, routine inspections, and vendor-recommended periodic maintenance.

Passive and active controls in the HF area that prevent criticality are described in the HF section.

ACCIDENT: Loss of moderation control due to backflow of liquid from the HF area.

PROTECTION: The off-gas flow created by the condenser eductor and exhaust fans prevents backflow. Condensation of HF offgas at the condenser creates an additional favorable draft. A passive barometric leg, by virtue of the height difference between the reactor offgas line and the vapor-liquid separator downstream of the HF condenser, prevents siphoning of liquid to the reactor. Specific engineered controls are summarized in the HF section.

During shutdowns, protection against backflow is afforded by administrative controls which require physical isolation of the reactor from the HF system.

ACCIDENT: Exposure of an operator to HF, steam, or radiological hazards from backflow of reactor contents during recycle operations.

PROTECTION: In the event of a low pressure alarm at the inflatable seal at the recycle feed station, the recycle feed valve closes, preventing airborne contamination at the recycle port. The recycle station is located inside an enclosed kiln room. Operators are required to wear the designated personal protective equipment when making or breaking powder feed connections. A double valve arrangement equipped with a nitrogen purge in between prevents backflow of steam and hydrogen into the recycle container. A low pressure alarm on the recycle feed station alerts the operator to a condition which could result in off-gas flowing to the unicone.

ACCIDENT: Personnel injury caused by moving machinery and rotating parts.

PROTECTION: The kiln drive units, reactor and recycle screw motors are protected adequately by machine guards. The start up checklist includes a step to check that these guards have been refitted following maintenance. A site-wide procedure defines lock-out/tag-out practices.

Powder Outlet

PURPOSE: To cool the UO_2 powder and ensure that it meets moisture criteria applicable to the Moderation Restricted Area, and to transfer the powder into transfer containers.

ACCIDENT: Excess moderator in the cooling hopper.

PROTECTION: Controls in conversion that ensure dry powder in the kiln also limit the availability of moisture to condense on the powder. To keep steam from flowing into the cooling hoppers, a valve lock system is installed at the outlet of the kiln. This lock consists of two valves with a dry nitrogen purge between them. The cooling hoppers are further protected by continuous redundant dew point analyzers which measure the free moisture in the carrier nitrogen gas. A high moisture interlock stops the UF_6 feed to the kiln and initiates a controlled shutdown of the steam flow. The control system automatically isolates the powder in the cooling hopper until the powder can be transferred under conditions favorable to criticality control requirements.

To prevent overfilling of the unicone on discharge from the cooling hopper, the computer system monitors the weight dispensed into the unicone via the process weigh scales, and terminates the sequence when the set weight is reached. In addition, there is a high weight interlock on the scale at the container filling station that will closes the cooling hopper discharge valve.

Homogenization

PURPOSE: To produce a UO2 powder that is physically and chemically uniform for subsequent pressing into pellets and sintering. Homogenization breaks down soft agglomerates, removes hard particulate material, and mixes the sifted powder to produce a uniform batch.

ACCIDENT: Excess moderation by introduction of hydrogenous material such as pore former, die lubricant, water or oil.

PROTECTION: Upstream controls in the conversion area limit the moisture content in the powder. Upstream controls in the recycle area similarly limit the moisture content of the recycled U_3O_8. A high mass interlock closes the powder feed valve and limits the amount of surface-adsorbed water available for redistribution from the surface of the powder to one spot within the homogenizer.

A computer-assisted administrative control prevents the introduction of feed material containing pore former or die lubricant.

The gearbox for the screw and arm assembly inside the homogenizer contains a special non-hydrogenous low moderation oil. The procurement and use of this oil is controlled via the maintenance planning and control system.

ACCIDENT: Radiological exposure of personnel to airborne uranium caused by loss of containment.

PROTECTION: To prevent airborne contamination, the sifter shaft seals are purged with nitrogen. The sifter and homogenizer are housed within a ventilated containment area. For additional protection, a dedicated containment hood surrounds the sifter and magnetic separator. A high powder level alarm is fitted on the oversize line from the sifter to alert the operator that the oversize bottle requires changing. Administrative controls including procedures and operator training ensure that the oversize outlet valve is closed before the bottle is removed.

To prevent overfilling of the unicone on discharge from the homogenizer, the computer system monitors the weight dispensed into the unicone via the process weigh scales, and terminates the sequence when the set weight is reached. In addition, there is a high weight interlock on the scale at the container filling station that will closes the homogenizer discharge valve.

ACCIDENT: Personnel injury caused by rotating parts on the sifter and homogenizer.

PROTECTION: There is an interlock that stops the rotation of the homogenizer screw and arm when the inspection hatches are opened on the top or bottom of the homogenizer. Also, the sifter rotation stops whenever the top inspection cover is opened or the end cover is removed. A site-wide procedure defines lock-out/tag-out practices.

Blending, Slugging, Granulation and Tumbling

PURPOSE: The blending operation creates a powder which is of a specific, uniform enrichment. Additives improve compatibility. Slugging followed by granulation, forms a flowable, pressable, granular solid suitable for high quality pressing and sintering. Tumbling improves flowability of the powder .

ACCIDENT: Excess moderation by introduction of too much hydrogenous material, for example pore former or die lubricant, as a result of errors in weight, additive, or mixing.

PROTECTION: Additives are prepared in separate equipment to prevent mix-ups during processing. Additives are weighed on an accountability scale and labeled. The additive bottle size limits the mass of moderator that can be added at one time. Unique couplings on the additive bottles and the additive ports assist in the control of the addition.

The blend plan defines and documents the quantity and type of additive required for each blend. The computerized traceability system tracks the concentrations of additives and moisture in the powder fed to the blender. Computer systems ensure that each additive addition complies with the blend plan. Additive bottles are barcode labeled, and the computer systems prevent the feed valve from opening if the bottle does not match the expected barcode. The computer system provides a final comparison of blend weight to that expected from the blend plan. Local programmable logic controllers lockout the feed valve on high weight.

Rotation of the blender is assured by a sensor to improve the uniformity and reliability of the additive mixing step.

In the tumbling operation, additive preparation is protected by similar controls. Only one bottle is available in a tumbling room, and that bottle is administratively controlled so that it is assigned to the correct tumbler. The additive bottle size is limited, ensuring the necessary safety margin for criticality safety control.

ACCIDENT: Excess moderation as a result of wet powder.

PROTECTION: Upstream controls in conversion limit moisture content in the powder. Similarly, upstream controls in the recycle area limit moisture in the U_3O_8. A high mass interlock closes the powder feed valve and limits the amount of surface-adsorbed water available for redistribution from the surface of the powder to one spot within the homogenizer.

ACCIDENT: Excess moderation as a result of oil.

PROTECTION: Limited volumes of oils and greases are used on the slug press. The gearbox for the screw and arm assembly inside the blender contains a special non-hydrogenous low moderation oil. The procurement and use of this oil is controlled in the maintenance planning and control system. Grease is external to the granulator and tumbler and is not considered a significant hazard because of its physical separation from the powder and the small quantity used.

ACCIDENT: Radiological exposure of personnel to airborne uranium caused by loss of containment.

PROTECTION: The blend/slug/granulate and tumbling processes are designed to protect workers from radiological exposure with the same protection described in the General DCP Area section of this report. Additional controls prevent overfilling of the unicone at

the blender filling station or the bicone at the granulator filling station: the computer system monitors the weight dispensed into the container via the process weighscales, and terminates the sequence when the set weight is reached. In addition, there is a high weight interlock that closes the appropriate powder filling valve.

ACCIDENT: Personnel injury caused by moving machinery and rotating parts.

PROTECTION: There are interlocks that stop the rotation of the screw and arm when the inspection hatches at the top or bottom of the blender are opened. Containment around the rotating turret of the slug press limits access to the moving parts. The inspection hatch on top of the granulator is fitted with a hard-wired interlock which stops the motor when the hatch is opened. A hard-wired door lock on the tumbler room prevents operation of the tumbler unless the door is locked.

Powder Pack

PURPOSE: To dispense UO_2 powder or granules from DCP storage containers to approved containers for shipment to customers.

ACCIDENT: Radiological exposure of personnel to airborne uranium caused by loss of containment.

PROTECTION: The container integrity is assured administratively by observing the operating procedures and recommended maintenance. Operators are required to wear appropriate personnel protective equipment when connecting or disconnecting powder feed connections. An inflatable seal assembly is fitted at the container feed station. Powder packing operations are carried out within a ventilated hood, so that the operator can handle and seal the packed product through arm slits. The slits have adequate face velocity to reduce the risk of escape of airborne contamination.

ACCIDENT: Personnel injury caused by moving machinery and rotating parts.

PROTECTION: The powder packing facility is housed in a separate room adjacent to the main storage area on the first floor of the DCP building. The powder packing equipment includes machine guards which protect operators from moving parts.

Container Storage And Handling

PURPOSE: To store large containers of powder containing various enrichments and additives until the powder is needed at pellet press operations.

ACCIDENT: Exceed moderation restricted area limits by overfilling storage containers, introduction of too much hydrogenous material, or violating spacing requirements for containers.

PROTECTION: Powder is stored in high-integrity closed containers which are routinely inspected and maintained. Container gross, tare and net weights are tracked on the computerized uranium material accountability system. A significant deviation from the official tare weight triggers a discrepancy alarm and halts any subsequent material transactions involving the affected container.

Upstream process controls provide assurance that the uranium product meets the criteria for hydrogen content within the storage area.

A fixed support grid assists operating personnel to maintain the required minimum spacing between containers. Additional storage is authorized provided it takes place in approved locations.

ACCIDENT: Large powder container falls on a person.

PROTECTION: The use of cranes and hoists for lifting and transporting containers is covered in a site-wide safety procedure that spells out safe practices and periodic inspection requirements. Operators are trained in the safe use of this equipment.

HF Area

PURPOSE: To produce nominal 50% aqueous hydrofluoric acid from the hydrogen fluoride off-gas generated during conversion of UF_6 to UO_2 and load the HF product into tank trucks for shipment to customers. The facility also scrubs the condenser off-gas to remove residual HF fumes before release to the environment. Dilute HF scrubbing liquid is typically loaded into a truck for delivery to the site waste treatment facility to remove the HF before the water is released to the environment.

ACCIDENT: Criticality in HF area caused by excess uranium in the off-gas collected in unfavorable geometry liquid system.

PROTECTION: Dual inline sintered metal filters upstream in the conversion process reduce the risk of uranium carryover to the HF area. In the unlikely event that both filters fail, each conversion line liquid HF stream is equipped with an individual uranium detector. If uranium is detected, the liquid is diverted to a favorable geometry tank known as the polluted tank. If the uranium concentration exceeds a higher trip level, the UF_6 feed is stopped, followed by an orderly shutdown of the steam feeds to the affected kiln. The three HF streams combine in a common stream which passes through another uranium detector. If uranium is detected here, the UF_6 and steam feeds to all three kilns

are stopped, and the HF produced during shutdown is diverted to a favorable geometry tank.

The HF condensers are of favorable geometry, and the cooling capacity of the condensers is great enough to trap the UF_6 in the event of a catastrophic release from the conversion kiln. The chilled water supply is protected by a low flow interlock at the condenser which stops the UF_6 flow to the kiln. The chilled water supply is also protected by a high temperature alarm and administrative controls on the set-up of the system.

Key manual valves that are opened to prepare the system for maintenance are included in pre-startup checklists, operating procedures, and training to prevent inadvertent by-pass of safety controls during operation.

A high liquid level in the vapor liquid separator stops UF_6 feed to the affected kiln, and protects against unanalyzed HF condensate backflowing to the unfavorable geometry washing column. If the high level is coincident with uranium concentration detected by the uranium detector, both UF_6 feed and steam flow to the kiln are stopped. Another protection against uranium in the washing column is a high liquid level interlock on the polluted tank that stops UF_6 flow to all kilns.

There is a high level sump alarm that annunciates locally in the HF building and remotely in the DCP control room. Administrative controls require that any leakage of unanalyzed HF from a piping failure prior to the uranium detectors collected in the dike be sampled and analyzed for uranium. This material is pumped back to the HF storage tanks or out to the mobile tanker only if the uranium concentration meets established release limits.

ACCIDENT: Release of fluorides through the stack to the environment.

PROTECTION: The kiln off-gas is scrubbed to remove fluorides from the off-gas before it is released to the environment. This process equipment is located inside a building, protected from freezing and severe weather. The temperature and pressure at the top and bottom of the wash column are continuously monitored and alarms locally in the HF building and also in the DCP control room. A low flow of water in the wash column stops the UF_6 feed to the kiln(s). In the event of a failure in the water supply, an emergency feed water tank is maintained in a ready state to continue scrubbing until the remaining fluorides in the system are purged from the kiln lines. A high liquid level in the base of the wash column stops UF_6 feed to the kilns. The HF stack emissions are administratively monitored to provide a feedback loop so that corrections can be made if the scrubbing process is insufficient to meet requirements.

ACCIDENT: Employee exposure to excessive HF.

PROTECTION: The HF equipment is designed to maintain integrity. The HF offgas line is PTFE-lined and rated for 250 deg C. Equipment reliability is enhanced by periodic maintenance. The integrity of the air-driven HF pump is protected by a interlock that shuts off the air supply in the event of high discharge pressure. Preventative maintenance of the pump diaphragms is performed in accordance with vendor recommendations.

The building is equipped with safety showers in case of personnel exposure to liquid HF. Use of personal protective equipment is required when making or breaking containment. Operators are trained in safe use of personal protective equipment. Operators are required to wear appropriate personal protective equipment during sampling. This requirement is including in operating procedures and training.

HF fumes in excess of the alarm limit activates an alarm in the control room which is audible in the HF building. Additional warning lights are activated at the entrances to HF building. Periodic inspection of the remote HF building is required by the operators. An emergency HF scrubber is available for scrubbing the room air.

All tanks are vented to the wash column. Tank trucks are vented to the wash column. The tanker loading lines are washed with DI water into the tank truck before the lines are disconnected. A vacuum break valve facilitates complete draining of the tanker feed line before breaking containment and minimizes the potential for spills.

ACCIDENT: Environmental spill of liquid HF.

PROTECTION: The HF storage tanks are installed within a dike designed to contain liquid HF spills. The volume of the diked area is sufficient to contain a spill of the entire contents of the largest tank. The dike comprises two concrete slabs with the top slab coated with an acid resistant medium. A grid is installed between the two concrete slabs which gravity drains to a sample point. Periodic sampling allows for early detection of a breach in the top slab. The tanker loading bay also drains into the main dike and is similarly contained with a concrete slab coated with an acid -resistant coating.

ACCIDENT: Fire or explosion in the HF building or off-gas line.

PROTECTION: The eductor that controls the kiln pressure is operated with nitrogen instead of air. The off-gas from the wash column is diluted to below the lower explosive limit of hydrogen by use of an air blower.

February 27, 1997

General Electric Company
ATTN: Mr. C. P. Kipp, General Manager
GE Nuclear Energy Production
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/97-01

Dear Mr. Kipp:

This refers to the inspection conducted on January 27-31, 1997, at the Wilmington facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

In accordance with 10 CFR 2.790, of the NRC's "Rules of Practice," a copy of this letter will be placed in the NRC Public Document Room.

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

Sincerely,

/S/

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 70-1113
License No. SNM-1097

Enclosure: NRC Inspection Report

cc w/encl: (See page 2)

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