



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET SW SUITE 23T85  
ATLANTA, GEORGIA 30303-8931**

August 27, 2004

NMED Nos. 040225 and 040440

Global Nuclear Fuel - Americas, L.L.C.  
ATTN: Mr. J. D. Fuller, Chief Executive Officer  
and Facility Manager  
Global Nuclear Fuel - Americas, L.L.C.  
P. O. Box 780  
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/2004-05

Dear Mr. Fuller:

This report refers to the inspection conducted from July 12 -16 and July 26 - 30, 2004, at your Wilmington facility. The purpose of the inspection was to determine whether activities authorized by your license were conducted safely and in accordance with United States Nuclear Regulatory Commission (NRC) requirements. At the conclusion of the inspection, the findings were discussed with the members of your staff who are identified in the enclosed report.

The 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 plant.

Based on the results of the inspection, no violations or deviations were identified. Your conduct of activities at the Wilmington facility was generally characterized by safety-conscious operations.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room (PDR) or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> the Public Electronic Reading Room.

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

Sincerely,

*/RA/*

Jay L. Henson, Chief  
Fuel Facility Inspection Branch 2  
Division of Fuel Facility Inspection

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

Enclosure: NRC Inspection Report

cc w/encl:  
Charles M. Vaughan, Manager  
Facility Licensing  
Global Nuclear Fuel - Americas, L.L.C.  
P. O. Box 780, Mail Code J26  
Wilmington, NC 28402

Beverly Hall, Director  
Division of Radiation Protection  
N. C. Department of Environmental  
Health & Natural Resources  
Electronic Mail Distribution

Distribution w/encl:

J. Henson, RII  
D. Seymour, RII  
W. Gloersen, RII  
C. Noelke, RII  
K. Ramsey, NMSS  
R. Cesaro, NMSS  
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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-1113

License No.: SNM-1097

Report No.: 70-1113/2004-05

Licensee: Global Nuclear Fuel - Americas, L.L.C.

Location: Wilmington, NC 28402

Dates: July 12 - 16, 2004  
July 26 - 30, 2004

Inspector: W. Gloersen, Sr. Fuel Facility Inspector  
O. López, Fuel Facility Inspector  
R. Gibson, Health Physicist

Accompanying  
Personnel: D. Collins, Director, Division of Fuel Facility Inspection

Approved By: J. Henson, Chief  
Fuel Facility Inspection Branch 2  
Division of Fuel Facility Inspection

Enclosure

## EXECUTIVE SUMMARY

Global Nuclear Fuel - Americas, L.L.C.  
NRC Inspection Report 70-1113/2004-05

This routine, announced inspection involved observation and evaluation of the licensee's programs in the following areas: (1) management controls, (2) maintenance and surveillance, (3) plant operations, (4) operator training, (5) transportation, (6) low-level radioactive waste storage, and (7) radioactive waste generator requirements. The inspection identified the following aspects of the licensee's programs:

### **Management Controls**

- The maintenance organization was reorganized to allow for improved human performance and efficiencies (Paragraph 2.a).
- The process for approving procedures complied with the license application requirements (Paragraph 2.b).
- The Wilmington Safety Review Committee was formally appointed and chartered, committee membership met the terms and conditions stipulated in the license, and the meetings were held at the frequencies specified in the license application and procedures (Paragraph 2.c).
- A good system was established for promptly reporting incidents and deficiencies to management, tracking corrective actions to completion, and for conducting self-appraisals of performance (Paragraph 2.d).

### **Maintenance and Surveillance**

- The observed maintenance activities were properly performed according to maintenance authorizations, work control procedures, and radiation work permits. Planned work orders were properly authorized and signed. The change control process for maintenance work was implemented in accordance with practices and procedures. Appropriate functional testing instructions were established for the hydrofluoric acid piping that was replaced (Paragraph 3.a).
- Maintenance personnel were experienced and demonstrated adequate knowledge of the process equipment safety controls (Paragraph 3.b).
- Functional testing of selected safety and active engineered controls was performed safely, within required frequency specifications, and in accordance with approved procedures (Paragraph 3.c).
- The source checks for the criticality detectors were performed at the specified frequencies and in accordance with approved procedures (Paragraph 3.d).

### **Plant Operations**

- The safety controls for the dry conversion process (DCP) and radioactive waste areas provided for double contingency and adequately controlled safety parameters. Functional tests of safety controls were performed in accordance with written and approved procedures (Paragraph 4.a).
- Plant activities were performed safely and in accordance with license requirements. Housekeeping was adequate to not adversely affect the radiological safety or the facility emergency egress (Paragraph 4.b).
- The configuration control system for facility modifications ensured that safety significant modifications were properly reviewed, approved, and documented (Paragraph 4.c).
- Fuel manufacturing operations were conducted safely with appropriate operating procedures and operators were qualified to perform their work. The licensee adequately applied lessons learned in response to a flash fire in the Fuel Components Operations building and took the appropriate compensatory measures in the Fuel Manufacture Operations building to prevent a similar event (Paragraph 4.d).
- Safety audits were performed in accordance with license requirements (Paragraph 4.e).

### **Operator Training**

- The licensee's training program for initial and refresher training in the nuclear criticality safety (NCS) and radiation protection areas was effective. Training material and examinations were adequate to measure the knowledge level of the workers, and were current. Lessons learned from past facility events were appropriately captured into the refresher training to improve worker safety (Paragraph 5.a).
- The general employee "Red Bar" training provided by the licensee to all employees and visitors was adequate to instruct personnel on the proper response to site safety and operations (Paragraph 5.a).
- Operating procedure and facility change control training was effective. Operators were knowledgeable of their operating processes and pending changes. Changes to nuclear material processing requirements were readily identified to the operators who had to acknowledge their understanding before processing operations could continue (Paragraph 5.b).

### **Transportation**

- Records pertaining to shipments of special nuclear material and waste containing special nuclear material (SNM) was appropriately completed and maintained. The licensee provided a summary of the shipment of SNM for the last 12 months (Paragraph 6.a).

- The licensee's preparation and delivery of completed New Powder Container (NPC) packages and lift liners containing calcium fluoride (CaF<sub>2</sub>) was performed in a safe manner and in accordance with operating procedures (Paragraph 6.b).
- The licensee's system for promptly reporting transportation incidents and deficiencies to management, and for tracking corrective actions to completion, was effective. The fuel assemblies in a shipping container damaged during a highway accident were still blocked and braced and the container integrity was maintained (Paragraph 6.c.).

### **Radioactive Waste Generator Requirements**

- The waste shipping manifests were complete and provided an acceptable level of information in the shipping papers to determine the quantities of individual radionuclides shipped. The licensee's waste shipping tracking system records were complete and well organized (Paragraph 7).

### **Low-level Radioactive Waste Storage**

- The waste storage management program was adequately implemented and provided the information needed to ensure proper storage, safe shipment and disposal of waste. Low-level radioactive waste and non-recoverable and recoverable scrap containers stored on the outside storage pads were in an acceptable condition to contain the licensed material. The licensee's tracking system for low level radioactive waste was adequate to track waste from generation to shipment for disposal. Phase 1 of the CaF<sub>2</sub> relocation and waste disposal activities were complete. The licensee plans to start Phase 2 of that project in the next six months (Paragraph 8).

### **Attachment:**

Persons Contacted

Inspection Procedures

List of Items Opened, Closed, and Discussed

List of Acronyms

## REPORT DETAILS

### 1. **Summary of Plant Status**

This report covered two five-day periods. During the July 12 - 16 inspection period, the facility was in a planned maintenance outage. During the July 26 - 30 inspection period, pellet production and fuel assembly proceeded at normal rates. Early in the week of July 26, Dry Conversion Processes (DCP) line 2 was temporarily shutdown for repairs. On Thursday, July 29, 2004, the DCP process was temporarily shutdown due to problems with the Provox control system.

### 2. **Management Controls (Inspection Procedure (IP) 88005) (O5)**

#### a. Organizational Structure

##### (1) Inspection Scope

The inspector reviewed changes in personnel responsibilities and organizational functions that had occurred during the last 12 months.

##### (2) Observations and Findings

The inspector discussed with the licensee the organizational changes and changes in personnel responsibilities, specifically in the maintenance area, that occurred during the past 12 months. Effective on June 28, 2004, the licensee's maintenance organization was transferred from the Facilities Maintenance group to the Fuel Manufacturing Organization (FMO) with a direct report to the FMO Manager. This reorganization was intended to improve human performance and inefficiencies in the previous organization.

##### (3) Conclusion

The maintenance organization was reorganized to allow for improved human performance and efficiencies.

#### b. Procedural Controls

##### (1) Inspection Scope

The inspector reviewed the licensee's process for approving procedures, including a review of selected procedures pertaining to maintenance and instrumentation.

##### (2) Observations and Findings

The inspector reviewed selected maintenance, functional testing, and calibration procedures. The inspector verified that these procedures complied with the licensee's process for approving procedures and with license application requirements. In addition, the inspector verified that the procedure control process required review and approvals by the appropriate organizational unit for significant changes made to the procedures. The inspector also verified that maintenance personnel were trained on the changes made to the selected procedures.

(3) Conclusion

The process for approving procedures complied with the license application requirements.

c. Safety Committees

(1) Inspection Scope

The inspector reviewed the licensee's onsite safety committees to verify that they were organized and conducted in accordance with the license application.

(2) Observations and Findings

The inspector reviewed the organizational structure and membership of the Wilmington Safety Review Committee (WSRC) and verified that it was in accordance with the requirements of Section 2.3.1 of the license application. The inspector verified that the WSRC met at the frequency specified by the license and procedures and that the required number of committee members was present for each meeting. The inspector reviewed the meeting minutes for selected WSRC meetings conducted in 2003 and 2004. The meeting minutes were well organized and documented. The WSRC reviews of unusual incident reports (UIRs) were acceptable.

(3) Conclusion

The WSRC was formally appointed and chartered, committee membership met the terms and conditions stipulated in the license, and the meetings were held at the required frequencies specified in the license application and procedures.

d. Unusual Incident Reports and Event Follow-up

(1) Inspection Scope

The inspector interviewed plant personnel and reviewed selected UIRs to verify that safety problems were identified, effectively communicated to management and reported in a timely manner. The inspector also reviewed NRC Event Number 40633 (NMED # 040225) pertaining to the failure of the Criticality Warning System after system maintenance.

(2) Observations and Findings

The inspector reviewed the circumstances associated with Event Number 40633 reported to the NRC Operations Center on April 2, 2004. At approximately 1:00 p.m. on April 1, 2004, the licensee discovered that a Criticality Warning System (CWS) horn in an unoccupied remote outdoor area rendered inoperable due to maintenance conducted on the system on March 31, 2004. The maintenance was conducted on the system to remove a tree that had fallen across the communication line to a Data Acquisition Module (DAM #25) that provided coverage for the outdoor process lagoon area.

During maintenance activities to remove the tree, a temporary system was installed and the permanently installed system horn was disconnected. Following completion of the maintenance, the restoration effort failed to reinstall the local horn relay. Throughout the maintenance, the DAM remained operable and indications of normal conditions were available. With the exception of the local horn at the remote outdoor area, all other systems functions remained operable. Upon discovery of the local horn being disabled, the horn relay was promptly restored and tested, confirming restoration to full system operability.

This condition was reported pursuant to 10 CFR 70.50(b)(2) as an event in which equipment designed to mitigate the effects of an incident is disabled or fails to function as designed. The licensee conducted an incident investigation and identified several root causes. When DAM #25 was disabled, both the horn cable and relay were disconnected. The licensee noted that preventive maintenance for equipment was less than adequate. There was no procedural guidance to document control of work on CWS equipment. Moreover, design and operation of the CWS was not well understood, documented, or communicated to maintenance personnel. In addition, the licensee identified that procedural controls were less than adequate in that there was no checklist provided to verify CWS operability following outage maintenance activities.

The inspector verified that the licensee took the appropriate corrective actions as indicated in the incident investigation report dated April 13, 2004. Documentation of the incident and the root causes were thorough and allowed for the conduct of self-appraisals to improve performance. The licensee's incident investigation reports and an internal technical report on CWS design and operation was still pending at the time of this inspection.

During this inspection, the following UIRs were reviewed:

<u>Event Date</u>	<u>UIR Number</u>	<u>Description of Incident</u>
07/06/04	DCP-0404	While investigating questions about the failure mode and conditions of the Provox control system, the licensee determined that there was a loss of input/output driver communications mode of failure where the system would not be assured of being able to command a process shutdown under certain conditions.
07/10/04	DCP-0406	A small hole was discovered in the hydrofluoric (HF) acid off gas piping on Line #1 located between dry conversion process building and the HF building (see Section 3 of this inspection report).
07/11/04	FAC-0408	During the licensee's annual power outage evolution (normally performed as part of the facility's maintenance outage), the 500 kilowatt (KW) diesel generator failed due to an over heated condition.

The inspector reviewed the UIR (DCP-0404) related to the Provox control system failure mode that would result in the control system holding their last command instead of failing to the defined failsafe condition. As part of the corrective actions the licensee installed an over-ride system, independent of Provox, to assure that the systems can be forced into the shutdown condition upon controller failure or operator command. Also, a manual shutdown button was installed to allow manual actuation of this system. The inspector verified that the licensee had required the Provox control system work order to be completed in the facility restart list (which is generated during facility maintenance outages).

The inspector also reviewed the UIR (DCP-0406) regarding the hole in one section of the HF piping that was found while replacing the piping as part of the annual maintenance shutdown activities. During this inspection, the licensee had contacted the pipe manufacturer to determine the cause of the pipe breach. The manufacturer speculated that an impurity in the Teflon™ lining of the piping may have reacted with the HF acid. The licensee was preparing to send the section of the damaged pipe back to the manufacturer for analysis so a failure mode could be determined. As part of the corrective actions the licensee replaced the HF piping and performed a pressure leak check on the new piping. The licensee was also implementing a semi-annual visual inspection and an annual pressure leak check.

The inspector reviewed UIR (FAC-0408) pertaining to the failure of the 500 KW diesel generator due to an over heated condition. During the annual maintenance outage, the licensee takes the normal power off line and operates critical systems by the use of diesel generators. During this evolution, one of the cooling hoses to the 500 KW diesel generator failed causing the diesel engine to overheat and fail. The generator shut down and all essential personnel were notified. A back up 500 KW diesel generator was brought on the site and placed into service. At the time of this inspection, the licensee was evaluating preventive maintenance measures and the generator and an emergency power configuration to determine potential modifications to make the system more robust.

The inspector verified that the licensee identified the appropriate causes of the incidents. In addition, the inspector verified that the licensee took the appropriate corrective actions and had identified acceptable additional measures and preventive measures and actions. The licensee's system for tracking corrective actions to completion was good.

(3) Conclusions

The licensee had a good system and process established for promptly reporting incidents and deficiencies to management and when required, to regulatory authorities; tracking corrective actions to completion; and for conducting self-appraisals of performance.

### 3. Maintenance and Surveillance (IP 88025) (F1)

#### a. Conduct of Maintenance Work Control Procedures Work Control Authorization

##### (1) Inspection Scope

The inspector observed selected maintenance activities being performed in the Dry Conversion Process (DCP) process area and HF building to verify that maintenance authorizations, work control procedures, and radiation work permits (RWPs) were being followed.

##### (2) Observations and Findings

The inspector observed selected aspects of the HF off gas pipe removal and replacement on all three lines during the facility's planned maintenance outage. Additionally, the inspector observed several plan-of-the-day maintenance meetings that provided the operations, maintenance, and safety staff the status of the maintenance work performed or scheduled. The daily meetings assured that the planned maintenance activities were conducted safely.

The inspector reviewed the change control process as it pertained to the HF off gas pipe replacement project. This specific maintenance activity was an example of a minor change control process. The inspector reviewed the following: (1) Practices and Procedure (P/P) 10-10, Configuration Management Program - Fuel Manufacturing, (2) Change Initiation Requests (CIRs), (3) Change Request Reports (CRRs), and (4) Maintenance Work Orders (MWOs). For the maintenance work noted above, the inspector verified that the authorizations from the appropriate safety disciplines were provided on the CIRs. The inspector verified that the licensee had flushed the HF off gas lines, locked out and tagged out the appropriate equipment, and isolated the lines before initiating the pipe removal. Since the HF off gas pipe replacement involved a "like kind" replacement, the inspector noted that revisions to operating procedures, drawings, or technical reports were not required.

The licensee relied on contractors to remove and replace the HF off gas piping. The inspector verified that contractor personnel received the appropriate pre-job briefings and were familiar with the work requests and procedural guidance for replacement of the piping. The inspector also verified that the Job Hazard Analysis (JHA) was completed before the work was started. The inspector observed that contractor personnel adhered to the applicable work control procedures, RWPs, and Nuclear Safety Release Requirements (NSR/Rs). The inspector also verified that the licensee had established functional testing instructions that were to be used to perform pre-start-up pipe pressurization tests of the replaced equipment.

##### (3) Conclusion

The observed maintenance activities were properly performed according to maintenance authorizations, work control procedures, and radiation work permits. Planned work orders were properly authorized and signed. The change control process for maintenance work

was implemented in accordance with practices and procedures. Appropriate functional testing instructions were established for the replaced HF piping.

b. Qualifications of Maintenance Personnel

(1) Inspection Scope

The inspector reviewed maintenance personnel qualifications regarding work experience to verify their qualification for the jobs performed.

(2) Observations and Findings

The inspector selected six individuals from the maintenance organization, including, FMO planners, instrumentation specialists, mechanical specialists, electronics specialists, and heating, ventilation, and air conditioning (HVAC) mechanics. The inspector noted that the licensee had established a skill inventory data base. The inspector verified that the selected individuals performing various maintenance activities were qualified to perform the tasks. The inspector noted that the licensee's maintenance staff was experienced with approximately 15 years of experience at the facility and that the licensee relied on the skill of the maintenance craft to perform various maintenance activities.

(3) Conclusion

Maintenance personnel were experienced and demonstrated adequate knowledge of safety controls of the process equipment.

c. Surveillance and Functional Testing

(1) Inspection Scope

The inspector observed functional testing activities involving safety controls to verify the use of written and approved procedures for the tests.

(2) Observations and Findings

The inspector reviewed PRI 5-05, Functional Test Instructions, July 17, 2002. The inspector noted that all special nuclear material movement is controlled via a computerized data base. Consequently, all functional test interlocks (FTIs) are controlled via this data base. If an operator moves SNM, the FTI-data base system checks to see if the active engineered control (AEC) was functionally tested. If the AEC was not functionally tested, SNM movement is restricted. Exceptions to this control system include essential utilities needed for the safe operation of the plant (DI water system, radioactive waste system, HF system).

The inspector verified selected 2004 functional test records of safety-significant controls including: reactor hotbox and outlet hotbox temperature interlocks, steam temperature interlocks, kiln outlet lock valve interlock, and quarantine tanks pipe and in-line detectors. The inspector also observed licensee personnel perform a functional test of the uranium dioxide (UO<sub>2</sub>) pellet grinder. The inspector also reviewed the functional test instruction and noted the appropriate amount of detail to perform the test. Though the test failed, the

inspector noted that the licensee personnel followed the proper line of communication to address the issue.

(3) Conclusion

Functional testing of selected safety and active engineered controls was performed safely, within required frequency specifications, and in accordance with approved procedures.

d. Calibrations of Equipment

(1) Inspection Scope

The inspector reviewed the annual external source check records for the criticality detectors located throughout the facility to verify that they were performed in accordance with approved procedures and at the frequency specified by the procedures.

(2) Observations and Findings

The inspector reviewed selected records for external source checks performed in 2003 and 2004 of the criticality detector system for detectors located in various areas of the plant. The inspector verified that the criticality detectors were source checked at the 10 milliRoentgen per hour and 100 milliRoentgen per hour levels and at an annual frequency.

(3) Conclusion

The licensee performed the source checks for the criticality detectors at the specified frequencies and in accordance with approved procedures.

**4. Plant Operations (IP 88020) (O3)**

a. Safety Function  
Maintenance of Nuclear Criticality Safety Systems

(1) Inspection Scope

The inspector toured and discussed the radioactive waste process area with the nuclear safety manager to verify that controls were identified, and double contingency was provided. The inspector also reviewed the safety analysis for the DCP to verify that safety controls were identified and provided for double contingency.

(2) Observations and Findings

The inspector noted no issues with regard to the radioactive waste operations. Safety controls in the area were present and provided for double contingency. The licensee performed functional tests of safety controls according to written and approved procedures. The inspector concluded that the DCP safety analysis adequately addressed double contingency and specified parameters for use in the processes. The inspector verified that administrative controls and AECs referenced in the safety analysis were present and implemented adequately. No safety issues were identified.

(3) Conclusions

The licensee's safety controls for the DCP and radioactive waste areas provided for double contingency and adequately controlled safety parameters. The licensee performed functional tests of safety controls according to written and approved procedures.

b. Plant Activities

(1) Inspection Scope

The inspector observed activities and housekeeping in the DCP, UO<sub>2</sub> and Gadolinium ceramic areas, radioactive waste area, and CHEMET Laboratory to assess whether they were performed safely and in accordance with license requirements.

(2) Observations and Findings

The inspector noted that criticality posting, radiological signs, and procedures were properly posted or available to the operators. The inspector did not observe any issue where the housekeeping could affect the radiological safety or emergency egress of the facility. The inspector observed that plant personnel working in radiological control areas wore dosimetry and the proper personal protective equipment. The inspector also observed proper spacing practices and controls in storage locations.

The inspector interviewed the operators in the control room. The operators demonstrated detailed knowledge of the safety systems involved in the operation of the DCP area. The inspector also observed operations and interviewed DCP and ceramics operators. The inspector noted that operators complied with approved Nuclear Safety Release\Requirements (NSR\Rs) limits and controls.

(3) Conclusions

The plant activities reviewed were performed safely and in accordance with license requirements. Housekeeping was adequate to not adversely affect the radiological safety or the facility emergency egress.

c. Configuration Control  
Nuclear Criticality Safety Change Control

(1) Inspection Scope

The inspector reviewed the licensee's configuration control system for recent facility modifications to verify that safety significant modifications were reviewed, approved, and documented according to their procedures.

(2) Observations and Findings

The inspector discussed and reviewed with the cognizant engineer and nuclear safety manager the change request report related to the installation of an over-ride system to assure that the Provox control systems can be forced into the shutdown condition upon controller failure or operator command and the installation of a manual shutdown button to allow manual actuation of this system. The inspector verified that the safety controls were incorporated in the operating procedure and that control room operators were aware of the changes. The inspector also verified that the safety controls were tested before they were put in use. The inspector confirmed that modifications to safety systems were adequately controlled, and sufficient reviews were performed before and after installation. The change request records adequately detailed the extent of the modifications.

(3) Conclusions

The licensee's configuration control system for facility modifications ensured that safety significant modifications were properly reviewed, approved, and documented.

d. Operating Procedures  
Follow up on Previously Identified Issues and Events(1) Inspection Scope

The inspector observed operations throughout the facility and reviewed selected operating procedures to verify that appropriate procedures were being used. The inspector reviewed compensatory measures taken by the licensee in response to a vacuum cleaner explosion and a flash fire involving zirconium powder in the Fuel Components Operations (FCO) building.

(2) Observations and Findings

The inspector observed DCP and ceramics operators to verify that they complied with operating procedures. The inspector noted that operators were knowledgeable of the operating procedures, and nuclear criticality safety requirements in their process areas. The inspector noted that reviewed procedures adequately identified safety significant controls, and addressed process parameters and steps to mitigate unusual events.

On July 16, 2004, in the FCO building (an area that neither processes nor stores NRC licensed material) an employee was cleaning a sample polisher drain system that contained zirconium dust. During the cleaning process a fire started in the vacuum cleaner hose causing the vacuum cleaner to explode, resulting in a flash fire and injury to the employee. The inspector reviewed the compensatory measures taken in the Fuel Manufacturing Operations (FMO) building in response to the event. The licensee implemented a temporary operating procedure (TOP) which provided instructions for safely handling the zirconium scrap generated during operations. The TOP required the equipment to be cleaned after every use and reiterated that vacuum cleaners will not be used to clean zirconium shavings, chips, particles, or dust. Also, a housekeeping inspection was established once per shift for each zirconium handling operation. In addition, weekly and monthly checks of zirconium housekeeping by supervisors and managers were established. The inspector toured all areas in FMO where zirconium is

handled and interviewed operators and supervisors. The inspector noted that licensee personnel were aware of the TOP and the event itself.

(3) Conclusions

Fuel manufacturing operations were conducted with appropriate operating procedures and operators were qualified to perform their work. The licensee adequately applied lessons learned in response to a flash fire in the FCO building and took the appropriate compensatory measures in the FMO building to prevent a similar event.

e. Nuclear Criticality Safety Inspections, Audits, and Investigation

(1) Inspection Scope

The inspector reviewed safety audits' results for first and second quarter of 2004 to verify compliance with license application requirements.

(2) Observations and Findings

The audit reports described any observation about the program and provided the status of the corrective actions. The inspector considered the audit findings and corrective actions to be adequate. The inspector confirmed that the corrective actions were tracked using the licensee's corrective actions program. Also, the licensee stated that every week safety and operations personnel had a meeting where they discussed audit findings and corrective actions.

The inspector accompanied safety personnel when they were conducting a safety audit of the radioactive waste area, the Dry Scrap Recovery process, and the shut down ammonium diuranate process. The inspector noted that safety personnel were detail oriented and identified good findings. No problems were identified.

(3) Conclusions

Safety audits were performed in accordance with license requirements.

**5. Operator Training (IP 88010) (F2)**

a. General Nuclear Criticality Safety (NCS) Training and General Radiological Safety Training

(1) Inspection Scope

Initial and refresher radiation worker training and NCS training were reviewed by the inspector to assess the effectiveness of the licensee's training program. Training material was compared with the test content and test records were reviewed to identify the level of worker knowledge. Several test examinations were reviewed to verify proper implementation of the training program and the knowledge level of the employees in the radiation safety area. The inspector discussed "lessons learned" information with the employees to determine that it was incorporated into their training program.

(2) Observations and Findings

The inspector reviewed the licensee's initial radiation safety training ("Red Bar" training) and verified it met the requirements listed in 10 CFR 19.12, "Instructions to Workers." The inspector observed an initial "Red Bar" training that was provided to new employees and determined that the training was adequate and effective. The inspector determined that the test content was consistent with the potential radiation safety risk at the facility. Several radiation worker training examinations were reviewed and appeared to be properly administered, and documented that the worker's knowledge level was consistent for the facility hazards. Annual nuclear safety refresher training for both criticality safety and radiation protection was implemented properly. The test indicated that worker safety knowledge was appropriate.

Lessons learned from events that occurred at the facility in the last year were added to the radiation worker training to improve worker safety. The lessons learned included information on process operational problems and any other changes at the facility. The inspector noted that the lessons learned appropriately and effectively communicated necessary improvements in worker safety.

(3) Conclusion

The licensee's training program for initial "Red Bar" and refresher training in the NCS and radiation protection areas was effective. Training examinations were adequate to measure the knowledge level of the workers. Test records and examinations were current. Lessons learned from past facility events were appropriately captured into the refresher training to improve worker safety.

b. Operating Procedure and Facility Change Control Training

(1) Inspection Scope

Operating procedure training and facility change control training were reviewed to assess the licensee's training effectiveness of workers during normal operations and following process or facility changes.

(2) Observations and Findings

The inspector reviewed several recent changes in the DCP and the ceramic area of the FMO facility and discussed the changes with the process operators. The changes included both process and NCS changes. The operators were current with the existing operation and could identify the most recent changes to the operating procedure and nuclear safety requirements. In addition, an electronic tracking system was used to inform the operators of pending process or nuclear safety changes. The system required the operator's review to continue operation. The inspector discussed the training program with several operators and supervisors. The operators indicated that they were content with the training methods used and knowledgeable of their process operating requirements.

(3) Conclusion

Operating procedure and facility change control training was effective. Operators were knowledgeable of their operating processes and pending changes. Changes to nuclear material process requirements were readily identified to the operators who had to acknowledge their understanding before the processing operation could continue.

**6. Transportation (IP 86740) (R4)**a. Records of Completed Packages for Shipment(1) Inspection Scope

Shipment records related to the preparation and delivery of completed packages for shipment of SNM (in cylinder heels, pellets, UO<sub>2</sub> powder, uranium hexafluoride (UF<sub>6</sub>), etc.) and waste were reviewed to verify proper shipping requirements. The inspector reviewed the licensee's program for routine radioactive material shipments to determine whether the licensee had established and was maintaining an effective program, to ensure radiological and nuclear safety in the packaging and delivery to a carrier of licensed radioactive materials, and to determine whether transportation activities were in compliance with the applicable NRC and the Department of Transportation (DOT) transport regulations.

(2) Observations and Findings

The inspector reviewed the documentation used for SNM shipments of UO<sub>2</sub> powder, UF<sub>6</sub>, and radioactive waste (e.g., calcium fluoride (CaF<sub>2</sub>) and non-combustible waste), including: the Bill of Lading, Radioactive Material Shipment Record, Vehicle Inspection Report, Receipt and Loading Verification Checklist, Fuel Shipment Information Form, Container Log Sheet, and Health Physics Survey Forms. The inspector noted that the shipping records were properly maintained, and the information supplied on the shipping papers was appropriate.

A summary of the licensee's SNM shipments for the last 12 months was as follows:

- 40,000,000 pounds of CaF<sub>2</sub> soil containing uranium for proper disposal
- 632 boxes of non-combustible waste (the licensee expects to ship approximately 300 more boxes before the end of 2004)
- 116,000 kilograms of net weight material for uranium recovery.

The licensee received 90,000 kilograms of UO<sub>2</sub> powder from reprocessing, and there are approximately 98,000 to 99,000 kilograms of net weight material on the storage pads at the facility.

(3) Conclusions

The licensee's records pertaining to shipments of SNM were appropriately completed and maintained.

b. Preparation and Delivery of Completed Packages for Shipment

(1) Inspection Scope

The inspector examined the licensee's written procedures relating to the preparation and delivery of completed packages for shipment of fissile material.

(2) Observations and Findings

The inspector verified that the licensee had acceptable procedures for the preparation of shipping packages and delivery of the packages to the carrier for shipment. For NRC certified packaging, the package preparation and loading procedures incorporated the requirements of the applicable Certificate of Compliance (CoC). The inspector also verified that the appropriate personnel in the shipping and traffic department had current copies of the applicable DOT regulations and the changes that will be effective October 1, 2004.

The inspector reviewed new powder containers (NPC) loading activities. The inspector observed powder loading operations, reviewed the procedure and noted that the operators loaded the powder in a safe manner and in accordance with the operating procedure. In addition, the inspector observed the licensee prepare lift liners containing soil and CaF<sub>2</sub> for proper shipment to a disposal site.

(3) Conclusion

The licensee's preparation and delivery of completed NPC packages and lift liners were performed in a safe manner and in accordance with the operating procedure.

c. Review of Transportation Unusual Incidents

(1) Inspection Scope

The inspector reviewed UIRs, as applicable to 10 CFR 71.95, involving a trailer released from the licensee's controlled access area without performance of a radiation/contamination survey. The inspector also reviewed recent events with licensee representatives and discussed the appropriate corrective actions taken.

(2) Observations and Findings

The inspector reviewed a UIR (S&T-0403; June 9, 2004) involving a trailer released from the licensee's controlled access area on June 9, 2004, without being surveyed for radioactive contamination. According to the UIR, the trailer had been stored onsite from 2001, and had been used to transport CaF<sub>2</sub> sludge and etch acid sludge from the licensee's site to waste sites in 1997 and 2001. The trailer, which left the site on June 9, was returned to GNF the same day for a survey. No contamination was found. The inspector verified that the licensee completed the actions specified in the UIR and no further issues were noted.

In addition, the inspector discussed with licensee representatives and reviewed records of an incident that occurred on June 8, 2004, where a tractor-trailer containing a shipment of

nuclear fuel assemblies from the licensee's facility was involved in an accident in Utah. The shipment was being transported to Oakland, California for shipment to Japan. After the accident, the nuclear fuel assemblies were inspected by the State of Utah and a licensee representative, prior to returning the shipment to GNF on June 12, 2004. Further inspection at the facility revealed that the shipping container for the assemblies was slightly damaged and that some rods from one assembly were slightly bent. The fuel assemblies were still blocked and braced in their shipping container, and the container's integrity was still maintained. The UO<sub>2</sub> pellets were recycled through the processing facility and the fuel rods were scraped. The NMED Item No. is 040440, dated June 22, 2004.

(3) Conclusion

The licensee's system for promptly reporting incidents and deficiencies to management and regulatory authorities, and for tracking corrective actions to completion was effective. The fuel assemblies in a shipping container damaged during a highway accident were still blocked and braced and the container integrity was maintained. There were no concerns noted.

7. **Waste Generator Requirements (IP 84850) (R6)**

a. Inspection Scope

The inspector reviewed the licensee's program for preparing waste shipping manifests, and tracking waste shipments.

b. Observations and Findings

From a review of selected records and a discussion with a licensee representative for solid waste disposals, the inspector determined that the licensee had shipped non-combustible, soil mixture waste, scrap waste containing radioactive material and CaF<sub>2</sub> soil containing trace amounts of uranium to a licensed waste burial facility between July 2003 and July 2004. The inspector verified that the licensee provided an acceptable level of information in the shipping papers to determine the quantities of individual radionuclides shipped. The inspector reviewed selected shipping manifests and associated paper work for radioactive waste shipped between July 2003 and July 2004. The manifests were complete and met the applicable requirements of Appendix G to 10 CFR Part 20. The inspector also verified that the licensee had a procedure and program in place to track waste shipments. The inspector reviewed the licensee's waste shipment tracking log and verified that the licensee received an acknowledgment of receipt of the waste.

c. Conclusion

The waste shipping manifests were complete and provided an acceptable level of information in the shipping papers to determine the quantities of individual radionuclides shipped. The licensee's waste shipping tracking records were complete and well organized.

8. **Low Level Radioactive Waste Storage (IP 84900) (R5)**

a. Inspection Scope

The licensee's waste storage management program of low-level radioactive waste (LLRW) was reviewed for adequacy of proper storage area, waste container integrity and the safe shipment, processing and disposal of LLRW. The licensee's waste tracking system was also reviewed for completeness and adequacy.

b. Observations and Findings

During a tour of the radioactive material and waste storage areas, the inspector observed that the licensee had stored material containing recoverable uranium in five gallon canisters on storage pads, non-combustible material in metal containers, and combustible material in wooden incinerator boxes (to be incinerated on site). The recoverable uranium material was stored in a controlled locked fenced area with security cameras and motion detectors. The LLRW was stored in metal and wooden boxes in the outside storage area until it was either shipped to a disposal site or incinerated. From discussions with licensee representatives and a review of records, the inspector determined that the volume of radioactive waste had decreased since the last inspection. The CaF<sub>2</sub> soil waste from the Phase 1 Project had been shipped for disposal. The licensee plans to start Phase 2 of the CaF<sub>2</sub> Soil Project in lagoon 4 within the next six months. The licensee had shipped 632 boxes of non-combustible waste in 2004, and plans to ship 300 more boxes before the end of the year. The licensee continues to incinerate wooden boxes containing radioactive waste.

c. Conclusion

The waste storage management program was adequately implemented and provided the information needed to ensure proper storage, safe shipment, and disposal of waste. The licensee's LLRW, non-recoverable and recoverable scrap containers stored on the outside storage pad were in an acceptable condition to contain the licensed material. The licensee's tracking system for LLRW was adequate to track waste from generation to shipment for disposal. Phase 1 of the CaF<sub>2</sub> relocation and waste disposal activities were complete, and the licensee plans to start Phase 2 of that project in the next six months. There were no concerns noted in this area.

9. Exit Meeting

The inspection's results were summarized on July 16 and 30, 2004 with licensee management representatives. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes has been deleted from this report. No dissenting comments were received from the licensee.

**1. PARTIAL LIST OF PERSONS CONTACTED**

Licensee

- \*M. Allen, Program Manager, Emergency Preparedness and Site Security
- +Q. AO, Principal Criticality Safety Engineer
- +J. Ball, Manager, Global Supply Chain
  - D. Barbour, Leader, Radiation Protection
- \*F. Beaty, Principle Engineer
- \*+K. Clark, DCP Engineer
  - S. Coleman, Material Control and Accounting Engineer
- \*+R. Crate, Manager, Fuel Manufacturing Operations
- +G. Dickman, Nuclear Material Control & Accounting Engineer
- \*+R. Foleck, Program Manager, Facility Licensing
- +R Haughton, Principal Engineer, FMO Technology
- \*B. Hines, Black Belt, Fuel Manufacturing Operations
  - A. Mabry, Program Manager, Radiological Engineering
- +R. Martyn, Manager, Material Control and Accounting
  - M. May, Black Belt/Fuel Manufacturing Operations (FMO)
- \*H. Knight, Manager, Logistics
- \*+L. Paulson, Manager, Nuclear Safety
  - R. Roessler, Manager, Facilities
- +H. Strickler, Manager, Site Environment, Health, and Safety
- \*+R. Stevens, Technical Leader, FMO Maintenance Support Team
  - B. Stokes, Maintenance Coordinator
- \*+C. Vaughan, Manager, Facility Licensing

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

- \*Attended exit meeting on July 16, 2004
- +Attended exit meeting on July 30, 2004:

**2. INSPECTION PROCEDURES (IP) USED**

- IP 86740      Transportation
- IP 84850      Waste Generator Requirements
- IP 84900      Low Level Rad Waste Storage
- IP 88010      Operator Training/Retraining
- IP 88005      Management and Organization Controls
- IP 88020      Regional Criticality Safety Inspection Program
- IP 88025      Maintenance and Surveillance Testing

### 3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item	Status	Description
NMED #040225	Closed	Event #40633: Inoperable criticality warning system due to system maintenance (Section 2)
NMED #040440	Closed	Event #040440: Tractor-trailer containing a shipment of nuclear fuel assemblies was involved in an accident (Section 6).

### 4. LIST OF ACRONYMS USED

AEC	Active Engineer Control
CaF <sub>2</sub>	Calcium Fluoride
CoC	Certificate of Compliance
CIRs	Change Initiation Requests
CRRs	Change Request Reports
CWS	Criticality Warning System
DAMs	Data Acquisition Modules
DCP	Dry Conversion Process
DOT	Department of Transportation
FCO	Fuel Component Operations
FMO	Fuel Manufacturing Operations
FMOX	Fuel Manufacturing Operations Expansion
FTI	Functional Test Interlock
GNF-A	Global Nuclear Fuel - Americas
H <sub>2</sub>	Hydrogen
HF	Hydrofluoric Acid
HVAC	Heating, Ventilation, and Air Conditioning
IP	Inspection Procedure
IR	Inspection Report
JHA	Job Hazard Analysis
KW	Kilowatt
LLRW	Low Level Radioactive Waste
MWO	Maintenance Work Order
NCS	Nuclear Criticality Safety
NPC	New Powder Container
NRC	Nuclear Regulatory Commission
NSR\R	Nuclear Safety Release\Requirement
P/P	Practices and Procedures
RWPs	Radiation Work Permits
SNM	Special Nuclear Material
TOP	Temporary Operating Procedure
UF <sub>6</sub>	Uranium Hexafluoride
UIR	Unusual Incident Report
UO <sub>2</sub>	Uranium Dioxide
WSRC	Wilmington Safety Review Committee