UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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ATLANTA, GEORGIA 30303-8931

February 3, 2000

Global Nuclear Fuel - Americas, L.L.C.
ATTN: Ms. C.A. Reda, Manager
GNF-A Fuel Manufacturing
P. O. Box 780
Wilmington, NC 28402

SUBJECT: NRC INSPECTION REPORT NO. 70-1113/2000-001

Dear Ms. Reda:

This refers to the inspection conducted on January 3 through 7, 2000, 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 cited.

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,

/RA/

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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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-1113
License No.:	SNM-1097
Report No.:	70-1113/2000-001
Licensee:	Global Nuclear Fuel - Americas, L.L.C. Wilmington, NC 28402
Facility Name:	Nuclear Energy Production
Dates:	January 3 - 7, 2000
Inspectors:	D. Ayres, Senior Fuel Facility Inspector D. Morey, Senior Criticality Safety Inspector F. Gee, Criticality Safety Inspector
Approved by:	E. J. McAlpine, Chief Fuel Facilities Branch Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

Global Nuclear Fuel - Americas
NRC Inspection Report 70-1113/2000-001

The primary focus of this routine unannounced inspection was the evaluation of the licensee's conduct of plant operations, management organization and controls, and criticality safety. The report covered a one-week period and included the results of the inspection efforts of one regional fuel facility inspector and two criticality safety inspectors from NRC Headquarters.

Criticality Safety

- Four Criticality Safety Analyses (CSAs) were reviewed that adequately supported the safety basis for the equipment and processes analyzed.

- The inspectors identified two instances where the licensee did not have a scheduled inspection of the integrity of fixed neutron absorbers.

Plant Operations

- The facility was operated safely and in accordance with regulatory and license requirements. Personnel complied with nuclear criticality safety and radiological safety requirements.

- Housekeeping was adequate to ensure routes of egress were clear in case of an emergency.

- The safety controls identified in the Integrated Safety Analysis (ISA) for the gadolinium dry scrap recycle system were available and being adequately implemented.

- The licensee hazard analysis/ISA process effectively characterized the risk significance of items evaluated.

- The revised criticality control strategy involving the High Efficiency Particulate Air (HEPA) filter mass accumulation was determined to adequately demonstrate the safety of the system.

- The licensee's evaluation of, and associated corrective actions for, the double batching of a waste drum were determined to be adequate to prevent recurrence.

Management Organization and Controls

- The licensee external review met license requirements. Findings identified by the review were being resolved appropriately.

Maintenance/Surveillance

- The functional test instructions for equipment in the gadolinium dry scrap recycle system adequately provided guidance for testing safety-related interlocks following maintenance activities.

Training

- The licensee had an adequate training database for monitoring worker training; however, the area management was not always utilizing the database to ensure industrial safety training was kept current. Nuclear criticality safety training was being adequately performed.

REPORT DETAILS

1. Summary of Plant Status

This report covered the efforts of one regional and two headquarters inspectors during a one-week inspection. The calcium fluoride (CaF_2) stored in outdoor lagoons was in the process of being relocated to storage warehouses. Low level waste was being packaged for shipment to Envirocare. Pellet production, rod loading, bundle assembly, and uranium recovery continued operations at near normal levels. There were no unusual plant operational occurrences reported during the onsite inspection.

2. Criticality Safety (O2) (IP 88015)

a. Nuclear Criticality Safety (NCS) Function

(1) Inspection Scope

The inspectors reviewed four Criticality Safety Analyses (CSAs) to determine that operations were adequately analyzed and that limits and controls required by the analysis were implemented in the governing Nuclear Safety Release/Requirements (NSR/R).

(2) Observations and Findings

The inspectors reviewed the following CSAs adequacy and for correlation between controls and NSR/R requirements:

CSA Dry Scrap Recycle CR 99-0221
CSA Primary High Efficiency Particulate Air (HEPA) W/O Prefilter CR 91-0400
CSA Can Storage in 421 Warehouse CR 99-0251
CSA CaF_2 Dewatering Facility CR 98-0402

The inspectors determined that the CSAs contain a process description covering the system under review, a control section which discusses controls required for safe operation, a calculations and a results section, where required, to support determination of controls, and a list of NSR/Rs needed to fully implement the required controls. The inspectors observed that only those controls needed to establish double contingency for the process were listed in the discussion of controls although extensive controls might subsequently be listed in the accompanying NSR/R. The inspectors did not identify any required control in any of the CSAs that was not considered to be implemented. The inspectors determined that the CSAs adequately established the safety basis of the respective equipment and processes.

(3) Conclusions

Four CSAs were reviewed that adequately supported the safety basis for the equipment and processes analyzed.

b. Fixed Neutron Absorbers

(1) Inspection Scope

The inspectors reviewed the use of fixed neutron absorbers to assure that they effectively maintained safety margin.

(2) Observations and Findings

The license requires, in section 6.2.5.5. that the composition of an absorber be established and that periodic verification of the absorber integrity be performed on a scheduled basis. The licensee has established the composition of the stainless steel used as a fixed absorber for a muffler on a fissile material vacuum transport system. The inspectors questioned whether a scheduled verification of the integrity of the fixed absorber was being performed. The licensee agreed to modify the NSR/R for this system to include a periodic verification of the integrity of the fixed neutron absorber.

In September of 1998, the licensee reported an event involving the accumulation of material in the body of a slugger press. The licensee corrective action for the event included placing chlorinated-polyvinylchloride (CPVC) tubes in the cavities of the slugger press to provide neutron absorption and to take up volume in the cavity. The inspectors questioned whether the licensee was periodically verifying the integrity of the CPVC. The licensee agreed to modify the NSR/R for this system to include a periodic verification of the integrity of the CPVC.

(3) Conclusions

The inspectors identified two instances where the licensee did not have a scheduled inspection of the integrity of fixed neutron absorbers. The safety significance of the omission is considered low.

c. Open Items

Inspector Followup Item (IFI) 70-1113/98-203-02

This item concerned licensee action to assure correct flow rate of water through ventilation scrubbers. The ventilation system exhaust scrubber removes uranium from air by passing the air through a water-saturated filter. The exhaust scrubber was covered by analysis for the roof scrubber dated March 21, 1989. The analysis defined two controls, geometry/mass and mass, which were partially met by the two-gallon-per-minute feed and bleed rate, the rate at which the water was introduced into and removed from the scrubber. The rate resulted in a complete change of scrubber water in approximately ten hours, thereby ensuring that a critical mass would not accumulate in the body of the scrubber.

The licensee performed periodic surveillance of the flow rate by draining a measured amount of water into a container in the specified time. The inspectors observed the surveillance and verified that the scrubber flow rate was two gallons per minute at both scrubbers on the roof and inside the controlled area. The inspectors also reviewed two recent sets of work orders in the UF_6 area scrubber. In addition, the inspectors verified that maintenance was performed 12 times a year. This item is closed.

IFI 70-1113/98-203-03

This item concerned the lack of a licensee procedure or policy implementing the license requirement to establish the composition of material used to support NCS limits. The licensee has developed a policy called a “Criticality Safety Guideline” requiring that the composition of materials used in CSAs be verified. The inspectors reviewed the licensee policy and determined that it was adequate to meet license requirements. This item is closed.

3. Plant Operations (O3) (IP 88020)

a. Conduct of Operations (O3.01) and Housekeeping (O3.06)

(1) Inspection Scope

The inspectors made routine tours of the licensee's facilities to observe various operational and work activities to verify the facility was operated safely and in accordance with license and regulatory requirements.

Housekeeping associated with the storage of equipment and materials throughout the facility was also reviewed to assure significant potential hazards did not exist.

The inspectors also reviewed various operational procedures and records, and nuclear safety postings, to verify operations were performed safely and in accordance with approved plant procedures and postings.

(2) Observations and Findings

The licensee performs risk significant activities in the Dry Conversion Process (DCP) area involving very large quantities of Special Nuclear Material (SNM) Uranium Dioxide (UO_2) powder in unfavorable geometry containers. The inspectors observed that the process was engineered to reduce reliance on administrative controls and only a limited number of administrative controls were observed in the area. The licensee had used automation and equipment design to engineer the process for safety. The inspectors reviewed the DCP area during backshift (plant holiday) and normal operations and observed that very limited numbers of operators were in the plant. The inspectors determined that reduced reliance on operators and administrative controls continued to be a program strength.

The inspectors observed operations in the Uranium Recovery Unit (URU) area and conducted interviews with operators and engineering staff. The licensee conducts risk significant operations in the URU area involving large volumes of fissile solutions. The inspectors determined that operations were being performed in accordance with written procedures and that licensee staff was familiar with safety requirements for risk significant operations.

Outside areas were toured and inspected. No conditions that could create an undesirable situation or hazard in the event of adverse weather conditions such as high winds or flooding or blocked evacuation pathways were observed.

During tours of the facility, the inspectors noted radiological signs, postings, and procedures were properly posted or readily available. The inspector observed conditions and determined that equipment and devices used to confine and contain radioactive contamination and airborne radioactivity in fuel processing and other areas were in proper working condition, and that proper personal protective clothing and dosimetry were issued and properly worn.

During process area tours, the inspector noted that emergency egress routes were adequately clear of debris.

(3) Conclusions

The facility was operated safely and in accordance with regulatory and license requirements. Personnel complied with nuclear criticality safety and radiological safety requirements. Housekeeping was adequate to ensure routes of egress were clear in case of an emergency.

b. Implementation of Process Safety Controls (O3.03)

(1) Inspection Scope

Safety controls identified by the licensee for the gadolinium dry scrap recycle system and the URU operations were reviewed to verify that they were available and being adequately implemented.

(2) Observations and Findings

The inspectors reviewed the Integrated Safety Analysis (ISA) and the NSR/R for the recently constructed gadolinium dry scrap recycle system. The inspectors noted numerous criticality safety controls were identified to prevent material accumulations of unfavorable geometry or mass. The inspectors observed selected engineered controls and found that they were available and capable of performing their intended function. The inspectors also observed that the administrative controls for restricting the size and configuration of containers for that process were being adequately implemented.

A licensee contractor had recently completed a hazard evaluation of the URU and incorporated it into the ISA chapter for that area. The hazard evaluation process identified risk on a scale of one to nine with nine being the most risk significant. The inspectors noted that the ISA identified mitigated and unmitigated risk for each upset evaluated. This method allowed the inspectors to quickly identify risk significant sections of the URU ISA and determine the extent of mitigation claimed. Although the document had not been reviewed and approved by the licensee, the inspectors selected for review those items where controls were used to substantially mitigate risk and evaluated the adequacy of the controls.

The inspectors selected controls listed for the Scrap Dissolvers A and B, the Dissolver Filter, and the Head End Concentrator (HEC) Feed Tank. These items were selected because they had been identified as risk significant by the hazard evaluation. During review of the Dissolver Filter area the inspectors noted that there was not a separate sump in the floor as the ISA indicated. The licensee indicated that the sump for the Oberline Filter was actually part of the filter enclosure. The licensee indicated that the wording of the control in the ISA was not accurate. The inspectors noted that, despite the inaccurate wording, the sump would be able to perform its function effectively.

During review of the HEC Feed Tank area, the inspectors questioned an operator regarding sampling of the HEC feed tank. The HEC feed tank collected miscellaneous liquid material for incorporation into larger recovery batches. The ISA indicated that sampling was performed prior to discharge and again on a weekly basis as a control against overbatching. The inspectors found through operator interviews, that this description of the sampling was not accurate. Further discussion with the licensee indicated that the weekly sampling was for accountability purposes, and that no sampling was actually performed prior to discharge. The inspectors noted that the sampling was not necessary to mitigate the risk of the operation, but that the absence of a control relied upon for mitigation would be a safety concern. The licensee indicated that additional review of the safety controls in the URU ISA was to be performed before approval.

(3) Conclusions

The safety controls identified in the ISA for the gadolinium dry scrap recycle system were available and being adequately implemented. The licensee hazard analysis/ISA process effectively characterized the risk significance of items evaluated. The inspectors noted instances where controls listed in the ISA were not available in the plant although safety significance of the omissions was determined to be low.

c. Review of Previous Events (O3.07)

(1) Inspection Scope

A previously reported event involving the HEPA filter mass accumulation was reviewed to verify the adequacy of its revised criticality control strategy. A newly reported event involving the double batching of a waste drum was reviewed to verify the adequacy of the licensee's event evaluation and corrective actions.

(2) Observations and Findings

HEPA Filter Mass Accumulation

On June 2, 1999, the licensee reported that the mass control had been exceeded within a primary HEPA filter in the Dry Scrap Recycle facility. The HEPA filter was on the combined exhaust of a utility hood and oxidation furnace. The licensee determined that approximately 50 kilograms (kgs) of Triuranium Octoxide (U_3O_8) was held up in the filter which exceeded the 25 kg UO_2 mass limit. Licensee corrective actions included replacing the mass limit with a geometry limit. The inspectors reviewed the new limits and associated CSA and determined that the new geometry limit would effectively establish double contingency.

The mass limit in the HEPA was 25 kgs and was established for UO_2 at a differential pressure of four inches. The mass accumulation had occurred at three inches DP and the failure to reach the established DP was determined by the licensee to be primarily due to differences in particle characteristics between UO_2 and U_3O_8 with the latter particles allowing more airflow at a given mass. The licensee eliminated the housing and replaced it with separate housings for the hood and furnace. The new HEPAs use only the primary filter instead of the previous combination of pre and primary. The licensee used a previous analysis to establish that the primary HEPA was geometrically safe. The inspectors reviewed the analysis, CSA CR 91-0400, Primary HEPA w/o Prefilter, and determined that it adequately demonstrated the safety of the system.

Waste Drum Double Batching Event

The licensee reported an event on October 18, 1999, in the uranium residue mixing operation at the CaF_2 warehouse. An operator added three cans of uranium residue to a drum, as authorized in preparation for shipment to a burial site. Prior to closing the drum, the operator left the area for lunch. A second operator later began work and added three additional cans of uranium residue to the drum. This double batching of residues in the drum represented a loss of mass control on the drum. Procedural controls on material queue and loading of the drum were violated. However, the inspectors found that even with double batching, the drum contained only approximately ten percent of the safe mass limit.

The inspectors reviewed the corrective actions taken by the licensee to date on the event. The licensee performed a root cause analysis of the event and revised three procedures associated with the processes. The identified root causes were an incorrect procedure sequence and the lack of a standard turnover process. Procedures were revised to eliminate the introduction of cans until the process was completed and the drum lid closed. The revised procedure also introduced a checklist for restarting operations.

The inspectors reviewed the criticality safety analysis “U-Residue Transfer to 55-Gallon Drums” and the revised Temporary Operating Instructions (TOIs) A-4004, A-4019, and A-3962. The inspectors determined that the documents adequately corrected the deficiency. The inspectors also determined that the concentration and authorized quantity of fissile material authorized per drum were low enough that the double

batching constituted a violation of minor significance and is not subject to formal enforcement action.

(3) Conclusions

The revised criticality control strategy involving the HEPA filter mass accumulation was determined to adequately demonstrate the safety of the system. The licensee's evaluation of, and associated corrective actions for, the double batching of a waste drum were determined to be adequate to prevent recurrence.

4. Management Organization and Controls (O5) (IP 88005)

a. Reviews, Audits and Assessments (O5.03)

(1) Inspection Scope

The inspectors reviewed a completed independent audit report to determine whether the review met license requirements and whether deficiencies identified by the review were being appropriately addressed.

(2) Observations and Findings

The inspectors reviewed an independent audit of the licensee's criticality safety program that had been completed on December 6, 1999, by a team of three contractors. An independent audit of all safety programs was to be performed every two years in accordance with license requirements. The independent audit team identified several findings and issues for which the licensee developed a matrix of responses.

The inspectors observed that the audit had identified a number of issues which required corrective action. The licensee had placed most of these issues into a tracking system with the exception of certain CSA-related concerns. The auditors had identified specific issues about implementing controls identified in the CSA as part of the NSR/Rs. Licensee staff indicated that these issues were captured by the validation issue and the contingency selection issue which were being effectively tracked. The inspectors reviewed this issue separately in the "NCS Function" section of this inspection report.

The inspectors observed a statement by an operator in paragraph 2.3 of the external report concerning Pellets, Rods, and Fuel Bundle Areas, that mass control had been violated on occasion. There was no other information regarding what mass control was being violated. Licensee staff initially indicated that they did not know what was being referred to, but stated that they had not investigated the statement because mass is not actually controlled in the areas mentioned. The inspectors requested an investigation of the comment and were subsequently informed that the statement was made by operators handling pellet trays. Pellets are loaded onto trays and weighed for accountability. Occasionally too many pellets are on a tray and a few pellets must be removed to meet the accountability limit which is what the operator was referring to as a mass control. The inspectors determined that no mass limit had been violated and that there was no safety issue.

(3) Conclusions

The licensee external review met license requirements. Findings identified by the review were being resolved appropriately.

5. Maintenance/Surveillance (F1) (IP 88025)

a. Work Control Procedures (F1.02)

(1) Inspection Scope

The functional test instructions (FTIs) for equipment in the gadolinium dry scrap recycle system were reviewed to verify that they adequately prevented a system failure from going undetected following maintenance activities.

(2) Observations and Findings

The inspector reviewed the FTIs for safety control interlocks associated with the newly installed gadolinium dry scrap recycle system. The inspector observed that each safety-related automatic engineered control had an approved set of FTIs to be performed following maintenance activities. The inspector also observed that interlocks that worked with multiple inputs were tested with every possible combination of input signals. Thus, the inspector found that the FTIs for the gadolinium dry scrap recycle system was comprehensive in its scope.

(3) Conclusions

The functional test instructions for equipment in the gadolinium dry scrap recycle system adequately provided guidance for testing safety-related interlocks following maintenance activities.

6. Training (F2) (IP 88010 and IP 88015)

a. General Nuclear Criticality Safety Training (F2.02)

(1) Inspection Scope

The criticality safety training records of licensee employees were reviewed to insure the implementation of risk significant administrative controls.

(2) Observations and Findings

The inspectors reviewed records of general employee criticality safety training. The licensee stated that there was no procedure for this criticality safety training, but that criticality safety training was an integral part of general site training. The inspectors verified that the radiation worker training program included an adequate section on criticality safety.

During review of training records from the Radiological Data Management System, the inspectors noted that approximately 30 employees from various areas were overdue for retraining. The licensee stated that when an employee was due for retraining, his or her area manager was sent a notice of the retraining ahead of the training date to alert the manager of upcoming training and to allow the manager time to schedule work accordingly. Licensee management had not monitored these areas closely, allowing substantial retraining in the area of industrial safety (hazard communication) to become overdue. The inspectors found no occurrences of overdue criticality safety training, but found that management's lack of attention to reports of overdue safety training could affect all safety disciplines (including criticality safety). The licensee indicated that all overdue safety training was to be presented each month to senior management to minimize the amount of overdue training.

(3) Conclusions

The licensee had an adequate training database for monitoring worker training; however, the area management was not always utilizing the database to ensure industrial safety training was kept current. Nuclear criticality safety training was being adequately performed.

7. Exit Meetings

On January 7, 2000, the inspection scope and results were summarized with licensee representatives. The inspectors discussed, in detail, the routine program areas inspected, and the findings. No dissenting comments were expressed by the licensee. The licensee identified materials provided during the inspection as proprietary, although proprietary information is not contained in this report.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

*D. Brown, Team Leader, Environmental Programs
G. Hazlewood, Project Manager, NFS
R. Keenan, Manager, Site Security and Emergency Preparedness
*J. Kline, Manager, GENE Production
*A. Mabry, Program Manager, Radiation Safety Engineering
*C. Monetta, Manager, GENE, EHS
*L. Paulson, Manager, Nuclear Safety
R. Reda, Manager, Fuel Fabrication

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

* Denotes those present at the exit meeting on January 7, 2000.

INSPECTION PROCEDURES USED

IP 88005	Management Organization and Controls
IP 88010	Operator Training/Retraining
IP 88015	Headquarters Nuclear Criticality Safety Program
IP 88020	Regional Nuclear Criticality Safety Inspection Program
IP 88025	Maintenance and Surveillance
IP 92701	Followup
TI 2600/003	Plant Operations

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

70-1113/98-203-02	IFI	Assure correct flow rate of water through ventilation scrubbers.
70-1113/98-203-03	IFI	Lack of a licensee procedure or policy implementing the license requirement to establish the composition of material used to support NCS limits.

ACRONYMS

CaF_2	Calcium Fluoride
CPVC	Chlorinated Polyvinylchloride
CSAs	Criticality Safety Analyses
DCP	Dry Conversion Process
FTIs	Functional Test Instructions
HEC	Head End Concentrator
HEPA	High Efficiency Particulate Air
IFI	Inspector Follow-up Item
ISA	Integrated Safety Analysis
kg	Kilograms
NCS	Nuclear Criticality Safety
NSR/R	Nuclear Safety Release / Requirements
SNM	Special Nuclear Material
TOIs	Temporary Operating Instructions
UO_2	Uranium Dioxide
U_3O_8	Triuranium Octoxide
URU	Uranium Recovery Unit