



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

[REDACTED]

November 1, 2004

Nuclear Fuel Services, Inc.
ATTN: Mr. Kerry Schutt
President, General Manager
P. O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: NRC INSPECTION REPORT NO. 70-143/2004-09

Dear Mr. Schutt:

This refers to the inspection conducted from August 22, 2004, through October 2, 2004, at your Erwin facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements.

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

Based on the results of this inspection, the NRC has determined that a violation of NRC requirements occurred. The violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.8 of the Enforcement Policy. The NCV is described in Part 1 of the subject inspection report. If you contest the violation or significance of this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to

[REDACTED]

[REDACTED]

[REDACTED]

the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region II, and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at your facility.

By letter dated October 18, 2004, we received your revised reply to our Notice of Violation which was issued on September 20, 2004. The reply met the requirements of 10 CFR 2.201 and your corrective actions will be reviewed during a future inspection.

[REDACTED] Should you have any

questions concerning this letter, please contact us.

Sincerely,

/RA/

David A. Ayres, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

Docket No. 70-143
License No. SNM-124

- Enclosures: 1. NRC Inspection Report (Part 1)
2. NRC Inspection Report (Part 2) [REDACTED]

cc w/encls:
B. Marie Moore
Vice President
Safety and Regulatory Management
Nuclear Fuel Services, Inc.
P. O. Box 337, MS 123
Erwin, TN 37650

Distribution w/encls: (See page 3)

[REDACTED]



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| NAME | DRich* | AGooden* | Osmith* | Ctaylor* | WGloersen* | Classifier* |
| DATE | 5/ /2008 | 5/ /2008 | 5/ /2008 | 10/ /2004 | 5/ /2008 | 5/ /2008 |
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2004-09

Licensee: Nuclear Fuel Services, Inc.

Facility: Erwin Facility

Location: Erwin, TN 37650

Dates: August 22, 2004 - October 2, 2004

Inspectors: D. Rich, Senior Resident Inspector
C. Taylor, Health Physicist
A. Gooden, Senior Fuel Facility Inspector
O. Smith, Physical Security Inspector

Approved by: D. Ayres, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

Enclosure 1

[REDACTED]

[REDACTED]

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Inspection Report 70-143/2004-09 (Part 1)

This inspection included activities conducted by the senior resident inspector and regional inspectors during normal and off normal shifts in the areas of facility operations, fire protection, radiological protection, and emergency preparedness.

Plant Operations

- The plant was operated safely and in accordance with the license. No deficiencies were noted in licensee responses to two equipment failure events (Paragraph 2).

Fire Protection

- Fire protection and detection equipment was adequately maintained. Fire hazards were minimized by appropriate housekeeping (Paragraph 3).

Radiation Protection

- The radiation protection program was implemented in accordance with the license and regulatory requirements (Paragraph 4.a).
- Revisions to radiation protection procedures were made in accordance with the licensee's program including review from appropriate management oversight and training of employees on the revised or new procedures (Paragraph 4.b)
- Based on dosimetry results through September 2004, the maximum assigned external exposures were well below the limits for occupational exposure in 10 CFR 20.1201 (Paragraph 4.c).
- Radiological control practices such as posting, radiation work permits and labeling generally met regulatory requirements. A non-cited violation was identified regarding contamination control of personnel during cleanup of spills and leaks out of containment (Paragraph 4.d).
- Respiratory protection equipment issuance, maintenance, and training had been adequately implemented for the respirator program (Paragraph 4.e).

Emergency Preparedness

- Exercises were conducted in accordance with the Emergency Plan. The scenario details provided a realistic set of conditions for evaluating the onsite response capability and the state of readiness for responding to incidents. The exercise critique was a
- [REDACTED]
- [REDACTED]

[REDACTED]

candid assessment of the response. The licensee planned to conduct a limited scope drill during [REDACTED] to determine the adequacy of corrective actions taken to resolve the areas of poor performance (Paragraph 5).

Attachment:

Partial List of Persons Contacted

Inspection Procedures Used

List of Items Opened, Closed, and Discussed

List of Acronyms

[REDACTED]

[REDACTED]

REPORT DETAILS

1. Summary of Plant Status

The fuel manufacturing and scrap recovery processes operated throughout the reporting period. Operations with low-enriched uranium commenced at the blended low enriched uranium (BLEU) oxide conversion building (OCB), and operations continued at the uranyl nitrate [REDACTED] building (UNB) and BLEU preparation facility (BPF). Efforts continued in decommissioning older facilities on site. The processing, analysis, packaging, and shipments of contaminated soils and debris from the burial grounds continued and construction continued in several areas.

2. Plant Operations (Temporary Instruction (TI) 2600/006)

a. Scope and Observations

The inspector reviewed plant operations in progress during normal and off-normal operating shifts to evaluate plant safety and compliance with the license. The inspector made routine tours of the plant operating areas and determined that equipment and systems were operated safely and in compliance with the license. Some daily operational meetings were observed where production status and issues were discussed. The inspector reviewed selected licensee identified events and corrective actions for previously identified events and found no significant deficiencies in the items reviewed.

On September 10, the inspector observed electrical connection of the new in-line monitor, [REDACTED], to the automatic isolation valves at the inlet to the process waste tanks in the [REDACTED]. The inspector witnessed a functional test of the system, which was performed in accordance with procedure NFS-HS-A-86. The [REDACTED] activity level of the source ensured the system tripped at the required set-point, and the inspector verified the [REDACTED] were shut by the trip signal. The inspector reviewed calibration data on the new system and noted calibration was within the required frequency. No significant deficiencies were noted.

On September 12, the licensee began production of low enriched uranium oxide in the OCB. The facility had been operated during the previous weeks utilizing natural uranium. The inspector observed production operations [REDACTED]. The inspector observed training in progress at the pail loading station and inspected radiological postings and nuclear criticality safety postings. The inspector also observed the radiation levels displayed from the various criticality detectors in the OCB. No significant deficiencies were observed.

[REDACTED]

[REDACTED]

The inspector reviewed two events involving failure of equipment containing special nuclear material. On September 21, the licensee identified a pin-hole in the [REDACTED] in the BPF. The hole was underneath a [REDACTED] which had experienced a failure and the licensee concluded the most likely cause of the hole was electrical arcing. Minor levels of contamination were noted and corrected and the hole was weld-repaired. On September 23, the licensee identified a complete failure of the [REDACTED], which allowed material to spill out. Several personnel were contaminated while attempting to contain the material. The highest level noted was approximately 565,616 disintegrations per minute per 100 square centimeters (dpm/100cm²) on one arm, which was successfully decontaminated, and 10-20 dpm/100cm² in each nostril of same person. Bio-assay samples were collected from personnel in the vicinity and results were noted by the inspector to be below investigation levels. High-volume air samples collected in the area indicated airborne activity levels were below the derived air concentration (DAC) limit for the area. No significant deficiencies were noted in licensee response to either incident.

b. Conclusions

The plant was operated in accordance with approved procedures and license requirements. No deficiencies were noted in licensee response to two equipment failure events.

3. Fire Protection (TI 2600/06)

a. Scope and Observations

The inspector reviewed fire detection and protection systems in accordance with the license and additional licensee commitments. The inspector determined that fire protection and detection equipment were adequately maintained. Portable fire extinguishers were charged to the normal operating zones and no visible damage was noted. Fire hazards were minimized by appropriate housekeeping.

b. Conclusions

Fire protection and detection equipment was adequately maintained. Fire hazards were minimized by appropriate housekeeping.

4. **Radiation Protection (TI 2600/006, IP 83822)**

a. **Radiation Protection Program Implementation**

(1) **Scope and Observations**

The inspector conducted interviews and reviewed licensee documentation to ascertain the status of program implementation.

Audits were performed on a monthly basis by members of the health physics staff to determine if various program elements were being implemented in accordance with license commitments and regulations. Recommendations identified in the audits were entered and tracked in the problem identification, resolution and corrective action system (PIRCS), the licensee's tracking and corrective action database. The audits were effective in the verification of program implementation and included both compliance and performance activity. The following audit documents were reviewed during the inspection:

- Year 2003 in Review Radiological Safety Program Accomplishments (2/2004);
- Monthly Inspection Reports (7/2004, 8/2004, 9/2004, 10/2004);
- Health Physics Training Program Audit (10/2004);
- Quarterly Audit Reports (6/2004);

(2) **Conclusions**

The radiation protection program was implemented in accordance with the license and regulatory requirements.

b. **Radiation Protection Program Procedures**

(1) **Scope and Observations**

The inspector reviewed radiation safety procedures for the process areas to verify that the licensee had established a program for documenting and reviewing old and new procedures.

The licensee continued to develop and revise radiation safety procedures in the [REDACTED] process area, the BPF and the UNB. The inspector reviewed the revisions of several procedures for adherence to the licensee's document standardization and control

procedure dated 8/3/04. The inspector noted that in the UNB a separate set of radiation procedures had been developed to accommodate the different processes in the facility. The following procedures were reviewed.

- External Dosimetry Program (04/16/04)
- Establishing & Posting of Radiologically Controlled Areas (5/10/04)
- Leak Testing BLEU facility (6/30/04)

(2) Conclusions

The inspector noted that revisions to radiation protection procedures were made in accordance with the licensee's program including review from appropriate management oversight and training of employees on the revised or new procedures.

c. External and Internal Exposure Control

(1) Scope and Observations

The inspector reviewed and discussed with licensee representatives personnel exposure data to determine if exposures were in compliance with 10 CFR Part 20.1201 limits, and if controls were in place to maintain occupational doses as low as reasonably achievable (ALARA).

Based on personnel dosimetry results as of September 2004, the maximum assigned Deep Dose Equivalent (DDE) and Committed Effective Dose Equivalent (CEDE) exposure were well below regulatory limits and ALARA goals. The total effective dose equivalent (TEDE) of occupational workers associated with fuel manufacturing activities had decreased in comparison to the previous reporting period. The licensee attributed the decrease to implementation of the ICRP 68 dose methodology, which was implemented in January 2004. However, in the down blending areas, the licensee noted an increase in the DDE. The increase was attributed to the radioactive material inventory and the nature of selective work activities, including interaction with the BLEU material, which had an increased external gamma hazard. The licensee continued to make ongoing improvements in the down blending area to further reduce the external gamma hazard. At the time of this inspection, the licensee used personnel dosimetry badges along with self-reading dosimeters (SRD) in the receipt, check-weighing, movement and operation of the BLEU material. The licensee compared the SRDs to the personnel dosimetry badges (used for final dose record) to evaluate the external exposures for select operations. Most readings with few exceptions were within the monthly established ALARA goal.

(2) Conclusions

Based on dosimetry results through September 2004, the maximum assigned external and internal exposures were well below the licensee's ALARA goals and regulatory limits for occupational exposure specified in 10 CFR 20.1201.

d. Posting, Labeling, and Surveys

(1) Scope and Observations

The inspector reviewed radiation work permits, radiological surveys, radiological precautions, and general work practices in the [REDACTED] fuel process area, BPF, and UNB to verify that work was conducted safely and in compliance with the license.

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

After interviewing the licensee's staff and reviewing the licensee's monthly Health Physics reports and radiation work permits, the inspector determined that the licensee had experienced an unusually high incidence of radiological contamination problems in the BPF. Upon further review of the PIRCS, the inspector determined that eight personnel contamination events were recorded in PIRCS for the month of August 2004. The inspector reviewed several of the events in detail by reviewing the incident logs and interviewing the radiation staff and personnel involved in the incidents. One of these incidents, documented in PIRCS 3175, occurred on August 26, 2004. A licensee operator cleaned up a spill in the BPF facility, wearing latex gloves, safety glasses and coveralls issued by the plant. Chemical gloves and a chemical apron were not utilized. Contamination was detected when the individual was surveyed. A survey of the individual after decontamination showed contamination levels of 40,000 dpm/100 cm² on the lower portion of the individual's arms and both sleeves of the coveralls and 1100 dpm/100 cm² in the operator's hair. A maximum activity of 65,659 dpm/100 cm² was detected on the individual's right arm. Decontamination was successful, and lapel and bioassay results showed minimal activity. SOP-409, General Requirements for the BLEU Preparation Facility, Section 1, Chemical Spills, required individuals to wear, as a minimum, face shields or safety glasses, chemical gloves and chemical apron, when spills were out of containment. Failure to utilize the chemical gloves and chemical apron was a violation of NRC requirements. This non-repetitive, licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VI.A.8 of the NRC Enforcement Policy, (NCV 70-143/2004-09-01). The licensee's corrective actions included requiring radiation work permits (RWPs) for cleanup of future spills and supplemental training for personnel on cleaning up spills.

[REDACTED]

The inspector determined from other PIRCS entries and further discussions with the licensee regarding the incidents that the personal protective equipment (PPE) originally used for general cleanup was inadequate for certain jobs in that the suits tore easily. After further investigation, the licensee switched to more durable equipment. In addition, the licensee stated that operators were not doffing the PPE correctly, and cross contamination had occurred in several incidents. The inspector determined that after the incidents the licensee had incorporated additional training on doffing PPE, cleaning up chemical spills and requiring a radiation work permit for cleaning up spills and leaks.

(2) Conclusions

Radiological control practices such as posting, radiation work permits and labeling generally met regulatory requirements. A non-cited violation was identified regarding contamination control of personnel during cleanup of spills and leaks out of containment.

e. Respiratory Protection Program

(1) Scope and Observations

Respiratory protection equipment issuance, maintenance, and training was examined to determine if equipment was being adequately maintained and obtained by certified users only.

The inspector reviewed the licensee's inventory log for respirators out in the plant and determined that respirators had been checked weekly and monthly per in-house quality assurance procedures and obtained only by certified users. The licensee discussed the equipment issuance process and the demonstrated how a fit test would be performed on an individual before assigning the respirator. The inspector observed the maintenance, cleaning and packaging of respirators by the maintenance personnel. The personnel demonstrated good familiarity with their role and responsibilities as related to equipment maintenance and surveys for contamination.

The licensee's training program provided adequate instructions to respiratory users, and the exam was sufficient to evaluate the comprehension of material. Several names were selected from respirator user tags to verify that user certification was current and appropriate for the type of respirator worn. No problems were noted.

(2) Conclusions

Respiratory protection equipment issuance, maintenance, and training had been adequately implemented.

[REDACTED]

5. **Emergency Preparedness (88050)**

a. **Scope and Observations**

Section 7.3.1 of the Emergency Plan required that an emergency exercise be conducted biennially. The inspector reviewed the exercise scenario and objectives for adequacy in testing the onsite response capability. The inspector also evaluated the licensee's performance in responding to the simulated emergency and the critique to self identify areas of improvement.

The inspector compared the exercise scenario to training exercises conducted by the licensee to ensure that the participants were not trained on similar conditions as those postulated for the NRC evaluated exercise. No problems were noted. The exercise scenario simulated [REDACTED] at the BLEU Complex which resulted [REDACTED]. The scenario was realistic and well planned. The use of props at the incident scene enhanced the experience for responders and observers.

Offsite exercise participants included local fire departments, Quality Care Ambulance Service, Unicoi County Memorial Hospital, and Johnson City Medical Center (that included air transport of a simulated injured victim by helicopter), and Unicoi County Emergency Management. The licensee's response to manage the postulated accident was considered minimally successful. The emergency classification was correctly determined in a timely manner, notifications to offsite authorities were completed within the required time limits, initial protective action recommendations based on accident conditions were correct, and frequent discussions were observed between the licensee and Unicoi County Emergency Management authorities [REDACTED]. However, the inspector noted the following aspects of the licensee's performance was inadequate: poor command and control of activities at the incident scene as related to access control and contamination control; no briefing was provided to offsite response personnel at the incident scene or the Emergency Control Center (ECC); no dosimetry or radiological survey personnel was assigned to the offsite fire brigade for monitoring potential exposures and contamination to personnel and equipment; the response to provide triage to victims was delayed; and the failure to assign radiation protection personnel with survey equipment to accompany the contaminated accident victim to the Unicoi Hospital for assessing and advising medical personnel regarding contamination. The licensee acknowledged the areas of poor performance and attributed the weaknesses to the lack of resources to support the On-Scene Coordinator, and procedural changes necessary to ensure that the appropriate actions were being taken by support groups in the implementation of response activities. The licensee stated that corrective actions would be taken to resolve the weaknesses and a limited scope drill would be conducted the [REDACTED] to determine the adequacy of the corrective actions. The

licensee was informed that the corrective actions to resolve the response weakness would be tracked as an inspector follow-up item (IFI 70-143/2004-09-02). The licensee conducted a critique following the exercise which afforded players, controllers, evaluators, and observers an opportunity to provide comments. The critique was a candid assessment of the response and several items were identified by the licensee for program improvement or corrective actions.

b. Conclusions

The licensee conducted exercises in accordance with the Emergency Plan. The scenario details provided a realistic set of conditions for evaluating the onsite response capability and the state of readiness for responding to incidents. The exercise critique was a candid assessment of the response. The licensee planned to conduct a limited scope drill during the [REDACTED] to determine the adequacy of corrective actions taken to resolve the areas of poor performance.

6. Exit Interview

The inspection scope and results were presented to members of the licensee management at various meetings throughout the inspection period and were summarized on October 13, 2004. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes has been deleted from Enclosure 1 of this report. No dissenting comments were received from the licensee.

[REDACTED]

ATTACHMENT

1. PERSONS CONTACTED

Partial List of Licensee's Persons Contacted

S. Barron, Emergency Preparedness Manager
K. Crutcher, Analytical Services Manager
R. Droke, NFS Licensing & Compliance Director
J. Eidens, [REDACTED] Resident @ NFS
B. Faidley, Maintenance Manager
J. Greene, Environmental Safety Manager
K. Guinn, Vice President & Principal Scientist
J. Kramer, Engineering Section Manager
A. Maxin, Safety Director
M. Moore, Vice President, Safety and Regulatory
J. Schreiber, Senior Project Manager
K.D. Schutt, President & General Manager
R. Shackelford, Nuclear Criticality Safety Manager
T. Sheehan, Senior Project Manager
M. Shope, Quality Assurance Manager

2. INSPECTION PROCEDURES USED

TI 2600/006 Resident Inspection Program for Category I Fuel Cycle Facilities
IP 83822 Radiation Protection
IP 88050 Emergency Preparedness

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

| <u>Item Number</u> | <u>Status</u> | <u>Type</u> | <u>Description</u> |
|--------------------|---------------|-------------|--|
| 70-143/2004-09-01 | Closed | NCV | Failure to wear required personal protective equipment. |
| 70-143/2004-09-02 | Open | IFI | Verify the adequacy of the corrective actions to resolve the areas of poor exercise performance. |

[REDACTED]



4. LIST OF ACRONYMS USED

| | |
|---|---|
| ADAMS | Agencywide Documents Access and Management Systems |
| ALARA | As Low As Reasonably Achievable |
| ADU | Ammonium Diuranate |
| BLEU | Blended Low Enriched Uranium |
| BPF | BLEU Preparation Facility |
| CEDE | Committed Effective Dose Equivalent |
| CFR | Code of Federal Regulations |
| CPM | Counts Per Minute |
| DDE | Deep Dose Equivalent |
| DAC | Derived Air Concentration |
| dpm/100 cm ² | disintegrations per minute per 100 square centimeters |
| ECC | Emergency Control Center |
| gU/l | grams uranium per liter |
| IFI | Inspection Followup Item |
| IP | Inspection Procedures |
| IR | Inspection Report |
| NFS | Nuclear Fuels Services |
| NRC | Nuclear Regulatory Commission |
| OCB | Oxide Conversion Building |
| PARS | Publicly Available Records |
| PIRCS | Problem Identification, Resolution and Corrective Action System |
| PPE | Personal Protective Equipment |
| RWP | Radiation Work Permit |
| SDE | Shallow Dose Extremity |
| SRD | Self Reading Dosimeter |
| TEDE | Total Effective Dose Equivalent |
| TI | Temporary Instruction |
|  |  |
| UNB | Uranyl Nitrate Building |

