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

[redacted]

September 20, 2004

NRC Event No. 40901

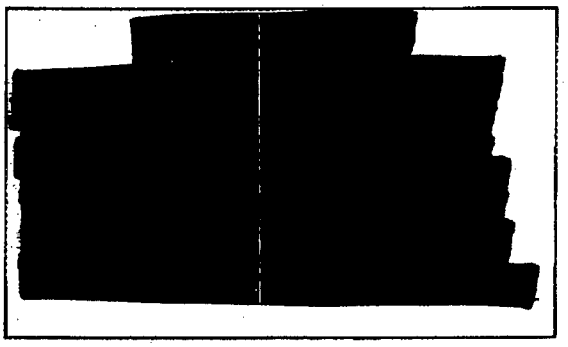
Nuclear Fuel Services, Inc.
ATTN: Mr. Kerry Schutt
President, General Manager
P. O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: NRC INSPECTION REPORT NO. 70-143/2004-08 AND NOTICE OF VIOLATION

Dear Mr. Schutt:

This refers to the inspection conducted from July 11, 2004, through August 21, 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.



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Based on the results of this inspection, the NRC has determined that two violations of NRC requirements occurred. The first violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.8 of the Enforcement Policy. 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 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. The second violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report. The violation was noted in the area of safety related equipment testing.

[redacted]

Sincerely,

[redacted]

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

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

Enclosures: 1. Notice of Violation
2. NRC Inspection Report (Part 1)
3. 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

[redacted]

[redacted]

NOTICE OF VIOLATION

Nuclear Fuel Services, Inc.
Erwin, Tennessee

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

During an NRC inspection conducted on July 23 through July 27, 2004, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedures for NRC Enforcement Actions - May 1, 2000," NUREG-1600, the violation is listed below:

> Safety Condition S-1 of Special Nuclear Materials License No. SNM-124 authorizes the use of licensed materials in accordance with the statements, representations, and conditions in the license Application and Supplements thereto.
>
> Section 2.7 of the License Application, Procedures, states "SNM operations and safety function activities are conducted in accordance with written procedures as defined in Section 1.7.4 and 1.7.5."
>
> Contrary to the above, on July 26, 2004, the licensee failed to perform an SNM operation in accordance with written procedures as defined in Section 1.7.4 and 1.7.5. Specifically, a safety related equipment (SRE) test was not performed as written in the work order procedure. The SRE test required that air flow be established on the SRE filters prior to obtaining a differential pressure reading on the Magnehelic gauge. However, the licensee failed to establish air flow and recorded the inaccurate readings on the gauge. The resulting values [redacted] were below the minimum expected value for the differential pressure across the individual filters [redacted] Operations continued to use the filters since the filters were newly installed.

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

Pursuant to the provisions of 10 CFR 2.201, Nuclear Fuel Services, Inc. is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the

[redacted]

[redacted]

results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

[redacted]

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 20th day of September, 2004

[redacted]

[redacted]

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-143
License No.:	SNM-124
Report No.:	70-143/2004-08
Licensee:	Nuclear Fuel Services, Inc.
Facility:	Erwin Facility
Location:	Erwin, TN 37650
Dates:	July 11, 2004 - August 21, 2004
Inspectors:	D. Rich, Senior Resident Inspector N. Baker, Senior Fuel Facility Inspector M. Crespo, Fuel Facility Inspector W. Gloersen, Senior Fuel Facility Project Inspector M. Thomas, Resident Inspector (USEC GDP Paducah site)
Approved by:	D. Ayres, Chief Fuel Facility Inspection Branch 1 Division of Fuel Facility Inspection

Enclosure 2

[redacted]

[redacted]

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Inspection Report 70-143/2004-08 (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, management controls, maintenance, transportation, and radiological protection.

Plant Operations

- The plant was operated safely and in accordance with the license (Paragraph 2.a).
- Operations in the blended low enriched uranium preparation facility were conducted safely and in accordance with procedures, although areas for improvement were noted in personnel safety precautions. Items relied on for safety were in satisfactory condition and operable (Paragraph 2.b).
- A non-cited violation was identified for failure to follow the licensee's nuclear criticality safety procedure for the uranyl nitrate building (Paragraph 2.c).
- The licensee experienced several inadvertent criticality accident alarms and an unresolved item was identified to review actions taken during one alarm (Paragraph 2.d).

Management Organization and Controls

- The system for revising and issuing procedures adequately ensured that safety significant procedures were properly controlled and approved (Paragraph 3.a).
- Audits were performed in a timely fashion and indicated an adequate review of the audited programs. (Paragraph 3.b).

Maintenance/Surveillance

- Approvals for major maintenance work were obtained before beginning the work (Paragraph 4.a).
- A fire [redacted] damaged equipment [redacted] and a URI was opened to track the licensee's investigation (NRC Event No. 40901) (Paragraph 4.b).

[redacted]

[redacted]

- A violation was identified for failing to perform an SRE test in accordance with procedures (Paragraph 4.b).

Fire Protection

- Fire protection and detection equipment were adequately maintained. Fire hazards were minimized by appropriate housekeeping (Paragraph 5a).

- Fire fighting actions and investigations as a result of a lighting fixture fire [redacted] were adequate, but an inspector follow-up item to track the removal of lamps was noted (Paragraph 5.b).

Radiation Protection

- Radiological control practices met regulatory requirements (Paragraph 6a).

- The licensee took adequate corrective action to ensure that personnel working within the plant restricted area were issued badges with an embedded strip of indium foil for criticality accident triage purposes. (Paragraph 6.b).

Transportation

- Employees involved with transportation were knowledgeable of the regulations and procedures. (Paragraph 7.a).

- The licensee was adequately generating the receipt and shipment records for radioactive shipments (Paragraph 7.b).

- Personnel were adequately trained and knowledgeable of the requirements for transportation of radioactive materials. Supervisors were not required to complete assigned training (Paragraph 7.c).

Waste Management

- The licensee adequately met the performance and release criteria requirements for liquid effluents in 10 CFR Part 20 and SNM-124 (Paragraph 8.a).

- The licensee had implemented the airborne effluents monitoring program in accordance with license SNM-124 requirements. The semi-annual ALARA reports were thorough, detailed and of good quality. The sample delivery lines, equipment, and collection apparatus were in good mechanical and material condition. Airborne concentrations at the off-site locations were significantly less than the concentrations reported at the stacks due to the atmospheric dispersion that occurs before the effluent exits the site and well below the effluent concentration limits (ECL) specified in 10 CFR 20, Appendix B (Paragraph 8.b).

[redacted]

[redacted]

- The total effective dose equivalent (TEDE) to the maximum exposed individual (MEI) for 2003, which was the sum of MEI doses attributable to airborne effluents, liquid effluents, and ambient radiation, regardless of location, was 5.46 mrem. This estimate was below the licensee's ALARA goal of 10 mrem/year for doses to offsite members of the public and the applicable regulatory limits specified in 40 CFR Part 190 and 10 CFR 20.1301 (Paragraph 8.c).

Low Level Radioactive Waste Storage

- The present short term warehouse and/or building storage arrangements for radioactive solid waste were adequate. The waste was secure, properly labeled, and stored in appropriate containers that were in good material condition. The licensee had made progress in reducing the waste inventory stored onsite (Paragraph 9).

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 continued at the uranyl nitrate [redacted] building and the blended low enriched uranium (BLEU) preparation facility (BPF). Construction of the other BLEU facilities continued. 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. Routine Observations

(1) 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 verified the Emergency Control Center (ECC) and associated equipment were maintained in a state of readiness. The inspector reviewed selected licensee identified events and corrective actions for previously identified events and found no significant deficiencies in the items reviewed.

(2) Conclusions

The plant was operated safely and in accordance with the license.

b. BLEU Project Operations

(1) Scope and Observations

The inspector reviewed operations in the BLEU complex and the BPF including the introduction of licensed material into the Uranium [redacted] process. During the inspection period, the licensee continued to receive, unload, sample and store uranyl nitrate solution at the Uranyl Nitrate Building (UNB). Housekeeping was satisfactory and radiological control practices (postings, boundaries, step-off pads, etc.) were applied

[redacted]

[redacted]

adequately for controlling the spread of contamination to within regulatory requirements. The inspector performed a comprehensive tour of both inside and outside areas of the Oxide Conversion Building (OCB). Construction at the OCB was nearing completion and testing was in progress. Housekeeping was satisfactory and radiological control practices (postings, boundaries, step-off pads, etc.) applied in anticipation of operations with licensed material were applied adequately. No significant deficiencies were noted.

The inspector observed operations in the BPF, including [redacted] operations. The inspector confirmed that the supervisor logs and "night orders" were documented in a satisfactory manner. The inspector walked down several procedures and the installation of a selection of items relied on for safety (IROFS). IROFS were appropriately identified within the BPF procedures. The inspector confirmed that IROFS inspected were satisfactorily installed and operable.

The inspector made several observations of operation of the [redacted] process. Inspector noted the licensee worked on numerous system problems, including [redacted] The inspector observed several maintenance actions and reviewed system operations during abnormal operating modes and noted no significant deficiencies.

The inspector witnessed non-radioactive solution testing of the BPF [redacted] in accordance with SOP 409, Section 10 and letter of authorization 1832H-03-011. Operation of the [redacted] process with licensed material began on August 10, and inspector subsequently observed process operation, maintenance actions and operator training, and interviewed operators, process engineers, and supervisors. No significant deficiencies were identified.

On July 14, 2004, the inspector observed a spray release of water and dilute sodium hydroxide solution from a flange in the feed piping [redacted] while the flange was being disassembled for maintenance. This maintenance action occurred prior to introduction of special nuclear material into the system. The solution sprayed the supervisor in the chin and neck area below the face shield. The supervisor doffed the chemical resistant suit while the standby operator re-tightened the flange bolts. The supervisor then rinsed the affected area under the nearby eyewash station. No additional medical attention was necessary. The event was entered into the Problem, Identification, Resolution, and Corrective Action System (PIRCS) . Investigation revealed the precautions taken to depressurize the system were inadequate, and also that the chemical resistant suit should have been closed at the neck. The licensee emphasized to supervisors the need for thorough work planning and also for correct wearing of personal protective equipment.

[redacted]

(2) Conclusions

Operations in the BPF were generally conducted safely and in accordance with procedures, although areas for improvement were noted in personnel safety precautions. Items relied on for safety were in satisfactory condition and operable.

c. Operational Event Followup

(1) Scope and Observations

The inspector reviewed the circumstances and licensee follow-up actions regarding a licensee identified event. On August 8, 2004, the licensee identified in PIRCS report 3050 that an NFS supervisor failed to perform a daily nuclear safety inspection in accordance with procedure NFS-HS-CL-25, Revision 2, Nuclear Criticality Safety, [redacted] UNB, step 4.12.2, Supervisory Inspections. This inspection was to be performed daily while the facility was manned by operations personnel. On August 8, the licensee was unloading a truck containing uranyl nitrate. The supervisor, normally assigned to the oxide conversion building (OCB), was filling in for the UNB supervisor on that day. It was the third time he had filled in as the UNB supervisor. He had been trained on CL-25, but forgot to perform the procedurally required inspection. Licensee corrective actions included refresher training on procedural requirements. Failure to perform the daily supervisor nuclear criticality inspection, when operations personnel were in the building, prior to receiving a shipment of uranyl nitrate, 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 70-143/2004-08-01), failure to perform nuclear criticality safety inspection.

(2) Conclusions

The inspector identified a non-cited violation for failure to follow the licensee's nuclear criticality safety procedure for the Uranyl Nitrate Building.

d. Inadvertent Criticality Alarms

(1) Scope and Observations

Inspector observed licensee response and followup actions to several inadvertent criticality alarms received on July 14, July 24, and August 2. Evacuation of the main NFS site [redacted] and radiological control actions during recovery were

prompt and effective for each criticality alarm annunciated over public address speakers.

On July 14, a lightning strike affected the site [redacted] criticality alarm system and caused an inadvertent criticality alarm and evacuation. The inspector noted that although the alarm was audible, it was not loud enough in the [redacted] of the BPF. The licensee identified and corrected other areas where additional volume was necessary. Appropriate compensatory measures were taken until the systems were restored to their full function. The inspector witnessed post-event testing of the public address and criticality alarm systems utilizing an external radioactive source. Testing of the public address system and criticality alarm systems was conducted in a satisfactory manner.

On July 24, a power interruption during [redacted] esting caused an inadvertent criticality alarm. Evacuation and recovery actions were adequate.

On August 2, a criticality alarm occurred due to momentary high readings on the [redacted] detector pair. The cause for the spike in readings was unknown at the time. Subsequently, the licensee determined electrical interference from a malfunctioning circuit was the cause and was engineering a solution. The Inspector observed evacuation and recovery actions, noted the licensee diligently analyzed radiation levels with local surveys to ensure a criticality had not occurred, and noted no significant deficiencies. The licensee identified that later on August 2, at approximately 12:15 pm, troubleshooting was in progress with the speaker amplifiers off in accordance with procedure NFS-HS-A-21. A system alarm occurred and, contrary to NFS-HS-A-21, supervisors analyzed criticality monitor readings, concluded no criticality had occurred, and did not energize the speaker amplifiers to sound an evacuation alarm. Thus, a criticality accident alarm occurred but no site evacuation occurred. Pending further NRC review of this event, this issue will be tracked as unresolved item (URI) 70-143/2004-08-02, Improper Actions During Criticality Alarm.

(2) Conclusions

The licensee experienced several inadvertent criticality accident alarms and inspector identified a URI to review actions taken during one alarm.

[redacted]

3. Management Organization and Controls (IP 88005)

a. Procedure Controls

(1) Inspection Scope and Observations

The licensee's system for revising and issuing procedures was reviewed to verify that they were reviewed in the appropriate time frame and approved by the appropriate management. The inspector reviewed several procedures for operations related to transportation, fuel processing, and implementation of safety management systems. The inspector found that the procedures were properly reviewed and updated at the required biennial frequency. The inspector also found that the appropriate safety management was included in the review and approval of procedure changes. The inspector found no instances of outdated procedures available for use by the licensee's staff.

(2) Conclusions

The system for revising and issuing procedures adequately ensured that safety significant procedures were properly controlled and approved.

b. Internal Reviews and Audits
Quality Assurance (QA) Programs
Qualifications of Maintenance Personnel
Management Audit of Maintenance

(1) Inspection Scope and Observations

The inspector reviewed the licensee's QA department's audits of the transportation, maintenance, and configuration management programs to verify that the audits were performed appropriately and that corrective actions were properly implemented for findings. The inspector noted that the licensee's audit of the transportation program was performed on an annual frequency and was performed using an approved checklist of items. The inspector also noted that the findings and observations found using the checklist were properly tracked in the PIRCS. No issues were noted with the transportation audit.

For the maintenance audit, the inspector noted that various work orders were reviewed by the QA department. The inspector interviewed the auditor of the maintenance program and noted no issues with how the audit was being conducted. The inspector

[redacted]

also noted that the training qualifications for the workers and supervisors in the Maintenance department were up-to-date.

During the review of the configuration management audit, the inspector noted that findings regarding conduct of operations (which consisted mostly of labeling issues on non-safety related equipment (SRE) items, outside the scope of the audit) were not captured in the PIRCS. The inspector reviewed the items in the field and found that they had not been addressed. Once this observation was brought to the licensee's attention, the licensee created several PIRCS entries to address the fact that items identified to be improved/corrected were not acted upon. Except for this observation, the configuration management audit was performed adequately with no issues.

(2) Conclusions

Audits were performed in a timely fashion and indicated an adequate review of the audited programs.

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

a. Work Control Procedures

(1) Inspection Scope and Observations

The inspector reviewed work control and system maintenance records to verify that requirements were in place for maintenance personnel to obtain approval before performing maintenance activities. The inspector determined that requirements were in place for maintenance personnel to obtain approval before performing maintenance activities. The inspector noted that the major work requests reviewed contained the requisite administrative approvals from the appropriate departments. The inspector noted no problems with that maintenance work performed in the [redacted] area. The inspector also observed that maintenance work requiring immediate scheduling received the proper approvals before the work was performed.

(2) Conclusions

Approvals for major maintenance work were properly obtained before beginning the work.

[redacted]

b. Work Control Authorizations
Surveillance Testing
Calibrations of Equipment

(1) Inspection Scope and Observations

The inspector reviewed the licensee response to a fire event that occurred [redacted] to verify that the licensee adequately ensured that any necessary safety controls were adequately tested. On July 26, 2004, a fire occurred [redacted], which was reported to the NRC and tracked as NRC event 40901. No one was injured and only minor damage occurred [redacted] enclosures. The cause of the fire was determined to be [redacted] which was introduced into [redacted] line through a temporary manifold on [redacted] Based on document reviews and interviews with the system engineer, the unit had been placed under configuration control, and the licensee had properly authorized the installation of the temporary manifold [redacted] The purpose of the manifold was to facilitate purging and gage calibration [redacted] However, the reason for failing to remove or isolate the manifold prior to tying in the [redacted] was being reviewed by the licensee's root cause investigation into the event. Pending NRC review of the results of this investigation and subsequent corrective actions, this issue will be tracked as URI 70-143/2004-08-03, Fire in the 800 Area.

In response to the fire event [redacted] the licensee replaced damaged lexan panels and high efficiency particulate air (HEPA) filters (which were SRE) and performed SRE tests to verify their ability to perform their safety function. The inspector reviewed the records of the tests and noted that the values obtained for the differential pressure across the filters fell below the minimum expected value. However, operation of the equipment continued due to the filters being newly installed. Also, the test did not clearly state what the acceptable operating values were and also did not clearly state required action if values outside the expected values were obtained. This observation was brought to the attention of the supervisor. After reviewing the test and the equipment, it was determined that the SRE test was conducted without air flow through the filter, which was a procedural requirement of the test. The tests were then re-performed and the expected values were obtained. The inspector noted the SRE test required that air flow be established on the SRE filters prior to obtaining a differential reading on the Magnehelic gauge. However, the licensee failed to establish air flow and recorded the inaccurate readings from the gauge. The resulting values [redacted] were below the minimum expected value for the differential pressure across the individual filters [redacted] Failure to perform the SRE test in accordance with procedure was a violation of NRC requirements (VIO) 70-143/2004-08-04, Failure

[redacted]

[redacted]

to Follow an SRE Test Procedure. The licensee planned to rewrite the SRE test to clearly set acceptable operating values for filters.

(2) Conclusions

A fire [redacted] damaged equipment [redacted] URI was opened to track the licensee's investigation . A violation was identified for failing to perform an SRE test in accordance with procedures.

5. Fire Protection (TI 2600/06)

a. Routine Observations

(1) Scope and Observations

The inspector reviewed fire detection and protection systems in accordance with the license and licensee commitments. The inspector determined that fire protection and detection equipment was 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. Aside from deficiencies noted in report sections 4.b and 5.b, no significant deficiencies were noted.

(2) Conclusions

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

b. Fire [redacted]

(1) Scope and Observations (TI 2600/006)

The inspector responded to a fire [redacted] and reviewed licensee actions and investigations. On August 3, a ceiling light fixture [redacted] caught fire and burned for less than a minute. The event was tracked in PIRCS report 2975. The fire was the result of the failure of the lamp element inside the light fixture causing the acrylic reflector to catch fire and melt. The fire was extinguished immediately with a portable fire extinguisher by plant personnel in the area. NRC inspector responded during the same shift, inspected the area and interviewed licensee personnel. No issues of significance were identified in the area of fire fighting.

[redacted]

[redacted]

During followup reviews, the inspector discussed the root cause and proposed corrective actions as a result of the fire with licensee staff. PIRCS report 2975 stated that the investigation would be completed in one week's time. The licensee had performed an apparent cause investigation. However, due to competing issues and communications problems among licensee staff, the investigation took two weeks to complete. The light fixture was removed on August 18, 2004. The licensee continues to work on this issue to determine the extent of condition of an apparent fire hazard with the old style lamp and availability of a different style lamp, which would not produce molten metal fragments upon failure. However, at the time of this inspection, the licensee had not established a project to replace the lamps which were a fire hazard. Since no project had been established to replace the lamps, this issue will be tracked as inspection follow-up item, (IFI) 70-143/2004-08-05, removal of lamps which were an apparent fire hazard.

(2) Conclusions

Fire fighting actions and investigations as a result of a lighting fixture fire [redacted] were adequate, but an inspector follow-up item to track the removal of lamps was noted.

c. Review of Previously Identified Items

(Closed) VIO 70-143/2004-03-03: Failure to comply with written procedures impacting fire safety. This violation concerned identified three (3) examples of failure to conduct fire safety function activities in accordance with written procedures. The inspector interviewed the site fire protection engineer and examined the documents which had been revised as a corrective action to prevent recurrence of the violation. Revisions to the documents were found to be acceptable. This item is closed.

6. Radiation Protection (TI 2600/006)

a. Routine Observations

(1) Scope and Observations

The inspector reviewed radiation work permits (RWPs), radiological surveys, radiological precautions, and general work practices in the process area and in decommissioning and construction areas to verify that work was conducted safely and in compliance with the license. During tours of the facility, the inspector noted that radiological signs, postings, and procedures were properly posted or readily available. The inspector determined that equipment and devices used to confine and contain radioactive

[redacted]

contamination and airborne radioactivity were in proper working condition and that proper personal protective clothing and dosimetry were issued and properly worn. Radiological controls in process and decommissioning areas were adequate. During process area tours, the inspector noted that housekeeping was adequate and emergency egress routes were sufficiently clear of debris. The inspector observed response to off-normal events and noted the use of conservative radiological controls practices to confine contamination and to prevent unnecessary personnel exposure.

(2) Conclusions

Radiological control practices met regulatory requirements.

b. Use of Indium Foil for Criticality Accident Triage Purposes

(1) Scope and Observations

The inspector followed up on PIRCS reports 2934 and 2935 in which the licensee identified and corrected situations when individuals did not have badges with an embedded strip of indium foil used for criticality accident triage purposes. The inspector reviewed the following documents:

- NFS-GH-39, "Radiological Safety Training," Revision 2;
- NFS-GH-903, "Emergency Plan," Revision 8;
- NFS-HS-E-07, "On-Site Radiological Emergency Assessment, " Revision 21;
- PIRCS-2934, Individual did not have Safety Access Card; and
- PIRCS-2935, Regulators exempted from having Safety Access Card.

PIRCS report 2934 identified and corrected a situation when an individual did not have a safety access card behind his security badge that would have had an embedded strip of indium foil for criticality accident triage purposes as described in procedure NFS-HS-E-07. In the event of a criticality accident, procedure NFS-HS-E-07 required that all NFS plant personnel evacuate the site and that radiation protection staff monitor the indium foil on the back of the individual's safety access badge.

10 CFR 70.24(b)(1) required that the licensee provide the means for identifying quickly which individuals had received doses of 10 rads or more. The licensee used indium foil for this purpose. In addition, NFS license condition 3.2.5.2, "External Exposure

[redacted]

[redacted]

Assessment stated in part that "All personnel, employees, and visitors may be required to wear a personnel monitoring device and badge containing a strip of indium foil when entering Plant restricted areas as required by 10 CFR 20. ... The indium foil will be evaluated in the event of an emergency." This latter condition was flowed down to procedure NFS-HS-E-07 as stated in the above paragraph. However, PIRCS report 2935 discussed PIRCS report 2934 further, pointing out that regulatory personnel were exempt from wearing a safety access card because they were not required to have NFS general employee training or NFS radiation worker training as stated in procedure NFS-GH-39. Therefore, regulatory personnel were not issued any device with an embedded strip of indium foil for criticality accident triage purposes.

The issue of regulatory personnel not having any badge with an embedded strip of indium foil for criticality accident triage purposes and for licensee personnel to have safety access badges with an embedded strip of indium foil resulted from the licensee having changed their security badge making hardware over two years ago. The previous security badge, issued to all individuals who worked in the plant restricted area, had an embedded strip of indium foil. The new security badge was printed on pre-fabricated plastic card stock, and the licensee chose to not obtain card stock with embedded indium foil strips. This issue was corrected by issuing regulatory personnel a separate laminated card with an embedded strip of indium foil, as stated in a memorandum from the Health Physicist in charge of dosimetry, dated July 14, 2004.

The inspector discussed an additional aspect of this issue with respect to the need to issue all personnel within the site boundary a badge embedded with a strip of indium foil with licensee staff. The inspector based this discussion on the licensee's table of criticality accident dose data at the site boundary as presented in the emergency plan, NFS-GH-903. The inspector had a concern that personnel in the [redacted] office building could be in the path of a criticality accident based on data from this table as the table did not include an indication of specific points on the site boundary that the dose values would have occurred. The licensee staff provided the inspector a map indicating the straight-line paths of the most likely places that a criticality accident could occur and the positions on the site boundary with the respective doses. In addition, the licensee staff evaluated the dose to the [redacted] building from a criticality [redacted]. The preliminary evaluation indicated that the dose to the northwest corner of the [redacted] building would be 9.49 rads, below the 10 rad requirement for criticality accident exposure indicating devices in 10 CFR 70.24(b)(1), such as a badge with an embedded strip of indium foil.

[redacted]

[redacted]

(2) Conclusions

The licensee took adequate corrective action to ensure that personnel working within the plant restricted area were issued badges with an embedded strip of indium foil for criticality accident triage purposes.

7. Transportation (86740)

a. Receipt of Packages

(1) Inspection Scope and Observations

The inspector interviewed several licensee personnel to verify their training and knowledge of transportation requirements. The inspector discussed with the employees involved in transportation the requirements for the shipping and receiving of material and noted they were familiar with and knowledgeable of requirements and procedures for unloading vehicles and receiving radioactive packages.

(2) Conclusions

Employees involved with transportation were knowledgeable of the regulations and procedures.

b. Records and Reports

(1) Inspection Scope and Observations

The inspector reviewed the records for the last receipt shipment of material to verify that the forms were properly completed. The inspector noted that the receipt forms were properly completed. The inspector also verified that the licensee's procedure for receipt of shipment was performed. No issues were noted.

The inspector also reviewed the shipping manifest for the last outgoing shipment to verify that the material was properly surveyed and categorized. The inspector verified that the hazard category, surface contamination, UN number, label name, and transport index number for the last outgoing shipment were consistent and agreed with the transportation regulations. No issues were noted.

[redacted]

[redacted]

(2) Conclusions

The licensee adequately generated the receipt and shipment records for radioactive shipments.

c. Management Controls

(1) Inspection Scope and Observations

The inspector interviewed licensee's personnel involved with transportation to determine if they were knowledgeable and qualified for their position. The inspector interviewed some of the transportation supervisors and noted that they were knowledgeable of the transportation requirements, as well as the site's procedural requirements. The inspector also discussed with transportation personnel the changes in the regulations that will become effective October 1, 2004. The licensee adequately demonstrated how they were on schedule to meet those requirements. No issues were noted.

The inspector reviewed the training records for the transportation supervisors currently performing their duties. The inspector noted that one of new supervisors was missing a training course that their Training and Qualification (T&Q) system stated was required for the position. The inspector noted that the licensee had no requirement for supervisors to complete assigned training and therefore this was not an NRC violation. The licensee had recently upgraded training requirements for supervisors and had started using the T&Q system to document and track assigned training courses. The licensee had not implemented any requirements that supervisors and managers must complete the training courses outlined in the T&Q system. The inspector noticed no performance issues by either supervisors or managers.

(2) Conclusions

The personnel were adequately trained and knowledgeable of the requirements for transportation of radioactive materials. A weakness in the T & Q system was identified where by supervisors were not required to complete training assigned through the T & Q system prior to performing their supervisory duties.

d. Follow up on Previously Identified Issues

(Closed) (URI) 70-143/2004-02-01: Contaminated Intermodals Returned to Vendor. This issue concerned contaminated intermodal shipping containers which had been released to the vendor. The investigation detailed that Envirocare was obligated by the Army Corps of Engineers contract (which governed the activities involving the

[redacted]

[redacted]

intermodals between Envirocare and NFS) to clean and release the intermodals after use. Early this year, excessive beta surface contamination was discovered on the inside of intermodals that had been free released. Due to the nature of beta radiation and the fact that the contamination was only found on the inside of the intermodals, the safety significance of the event was very low. Since the discovery, Envirocare has improved their cleaning methods for releasing the intermodals. Based on these findings, the issue is now considered closed.

8. Waste Management (IP 88035) (R3)

a. Liquid Effluent Monitoring Controls Procedures, and Results

(1) Inspection Scope and Observations

The inspector reviewed the licensee's liquid effluent monitoring program and effluent data to verify that the program was implemented in accordance with SNM-124 license requirements and to insure that liquid radiological releases met the requirements of 10 CFR Part 20 criteria.

Specifically, the inspector reviewed selected liquid effluent release data for the period January 2003 - December 2003. The inspector also reviewed the liquid effluent release data as reported in both the January-June and July-December 2003 semi-annual effluent release reports required by 10 CFR 70.59. Radioactivity in liquid effluents was monitored in the Banner Spring Branch, sewer, and discharges from the Waste Water Treatment Facility (WWTF). The inspector noted that the radioactivity concentrations in liquid effluent released in the three pathways noted above were below the effluent concentration values specified in 10 CFR 20, Appendix B. The inspector also noted that the concentrations in the Banner Spring Branch effluents were slightly less than previous reporting periods due to the completion of the remediation work on Banner Spring Branch during the latter half of 2003. The inspector verified that the licensee's liquid effluent control processes had not changed significantly since the last inspection of this program area.

(2) Conclusions

The licensee adequately met the performance and release criteria requirements for liquid effluents specified in 10 CFR Part 20 and SNM-124.

[redacted]

[redacted]

b. Airborne Effluents Controls, Procedures, and Results

(1) Inspection Scope and Observations

The inspector reviewed the licensee's airborne effluents monitoring program and effluent data to verify that the program was implemented in accordance with license requirements and to verify that airborne radiological releases met the requirements of 10 CFR Part 20 criteria. The inspector reviewed selected activity concentrations and total quantities of radioactive materials in airborne effluents released for the period January 1, 2003 to August 4, 2004. The data reviewed were reported in daily and weekly stack reports, semi-annual as low as reasonably achievable (ALARA) reports as required by Chapter 5 of license SNM-124, and from the semi-annual effluent release reports as required by 10 CFR 70.59. The inspector observed that the licensee's semi-annual ALARA reports were thorough, detailed and of good quality. The inspector noted that stacks [redacted] accounted for greater than 90% of the airborne radioactive material released from the facility during the time period noted above. As of December 31, 2003, the licensee's facility consisted of 16 airborne release stacks. The inspector also compared the effluent concentration values from each stack with the effluent concentration limits (ECL) specified in 10 CFR Part 20, Appendix B, Table 2, Column 1. The inspector observed that air emissions from the various stacks remained relatively unchanged. The inspector noted that although stacks [redacted] were reported as having air emissions greater than the ECL specified in 10 CFR Part 20, the concentrations at the off-site locations were significantly less than the concentrations reported at the stack due to the atmospheric dispersion that occurs before the effluent exits the site.

The inspector also reviewed selected airborne effluent data covering the time period noted above to determine if appropriate actions were taken for sample results that exceeded licensee established action points. The inspector noted that from August 2003 to April 2004, stack [redacted] had frequently exceeded licensee established action points. In each case, the licensee took appropriate action and issued a Notification and Investigation of Elevated Stack Effluent Concentration for stack [redacted] to the responsible building manager in accordance with health and safety procedure NFS-HS-A-54, Effluent Control and Environmental Monitoring Action Levels and MDC Requirements, Revision 4, April 15, 2003. The licensee recognized that the action levels were lowered in May 2003 to accommodate the ALARA goal for radioactive airborne emissions. Upon a review of the action levels, the licensee determined that they appeared to be set at unnecessarily low levels, since when the action levels were exceeded, it would result in a negligible individual dose. The licensee indicated that a re-evaluation of the technical basis for the action levels

[redacted]

[redacted]

specified in NFS-HS-GH-40 be completed to determine if the action levels should be increased.

In addition, the inspector walked down the stack air sampling equipment with licensee representatives. The sample delivery lines, equipment, and collection apparatus were in good mechanical and material condition. The inspector noted that stack [redacted] had an unnecessarily long sample delivery line that may lead to sample loss errors. The licensee acknowledged the inspector's observation and indicated that the observation would be taken into consideration for evaluation.

(2) Conclusions

The licensee had implemented the airborne effluents monitoring program in accordance with license SNM-124 requirements. The licensee's semi-annual ALARA reports were thorough, detailed and of good quality. The sample delivery lines, equipment, and collection apparatus were in good mechanical and material condition. Airborne concentrations at the off-site locations were significantly less than the concentrations reported at the stacks due to the atmospheric dispersion that occurs before the effluent exits the site and well below the effluent concentration limits specified in 10 CFR Part 20, Appendix B.

c. Offsite Dose Impacts due to Radioactivity in Effluents

(1) Inspection Scope and Observations

The inspector reviewed the licensee's estimates of offsite dose to the maximally exposed individual from airborne effluents, liquid effluents, and ambient radiation for 2003.

Chapter 5 of license SNM-124 required the licensee to estimate the offsite dose to the maximally exposed individual (MEI) from airborne effluents for each calendar quarter. Since 1998, the licensee's method for estimating offsite doses due to airborne releases involved entering stack measurement results and five year average meteorological data into the Department of Energy's CAP88-PC computer code. SNM License No. 124 allows the licensee to demonstrate compliance of WWTF discharges on the basis of regulatory dose limits rather than the effluent concentration limits specified in 10 CFR Part 20, Appendix B. Beginning in 2001, the licensee calculated the offsite dose to the MEI from the WWTF's liquid effluents once per quarter.

The inspector reviewed the total effective dose equivalent (TEDE) quarterly results due to airborne effluents for 2003. The TEDE and maximum organ committed dose

[redacted]

[redacted]

equivalent (CDE) due to airborne effluents for the offsite MEI was 0.02 mrem which was well below the applicable airborne regulatory limits (40 Part CFR 190: 25 mrem/year; 10 CFR 20.1301: 100 mrem/year); regulatory constraints (10 CFR 20.1101: 10 mrem/year); and NFS's ALARA goal for airborne effluents (2 mrem/year). Since the first quarter of 2001, the TEDE to an offsite receptor in a calendar quarter from plant airborne effluents had been well below 0.05 mrem.

For 2003, the TEDE due to liquid effluents for the offsite receptor was 0.01 mrem which was well below the applicable equivalent regulatory limits (40 CFR Part 190: 25 mrem/year; 10CFR 20.1301: 100 mrem/year); and NFS' ALARA goal for liquid effluents (2 mrem/year). Since the first quarter of 2001, the TEDE to an offsite receptor in a calendar quarter from plant liquid effluents was well below 0.025 mrem.

The licensee began estimating offsite doses to the MEI from ambient radiation for each calender quarter in 2003. The offsite doses to the MEI were calculated by using an appropriate occupancy factor. The dose from external sources of radiation (ambient radiation) to offsite members of the public in 2003 was 5.43 mrem which was below the applicable equivalent regulatory limits (40 CFR 190: 25 mrem/year; 10CFR 20.1301: 100 mrem/year); and NFS's ALARA goal for doses to offsite members of the public from external radiation (10 mrem/year). The location of the dosimeter associated with this dose estimate was on the west property boundary near the middle of the 310 building, which stored low level radioactive waste items.

Also in 2003, the licensee began estimating the off-site dose to the MEI from all effluent pathways once per quarter. This calculated dose was the sum of MEI doses attributable to airborne effluents, liquid effluents, and ambient radiation, regardless of location. This was considered a conservative calculation, since the MEI locations for each of these pathways are normally different from each other, such that a single individual could never receive all of the estimated dose. The licensee's data indicated that the annual TEDE to the MEI for 2003 was 5.46 mrem, which was still below the applicable regulatory limits as noted above.

(2) Conclusions

The annual TEDE to the MEI for 2003, which was the sum of MEI doses attributable to airborne effluents, liquid effluents, and ambient radiation, regardless of location, was 5.46 mrem, which was below the licensee's ALARA goal of 10 mrem/year for doses to offsite members of the public and the applicable regulatory limits specified in 40 CFR Part 190: and 10 CFR 20.1301.

[redacted]

[redacted]

9. **Low-Level Radioactive Waste Storage (84900)**

a. Inspection Scope and Observations

The licensee's onsite storage of low-level radioactive waste (LLRW) was reviewed. The review included management controls, accountability, adequacy of the storage area, and waste container integrity. The inspector observed that the licensee had stored various quantities of waste in the following locations:

- Various outdoor areas around the plant site - burial boxes of decommissioning waste and debris.
- [redacted] warehouse [redacted]
- [redacted] area

The inspector observed that the outdoor storage areas for waste items, including decommissioning waste and debris were intended as short term staging areas and would not be adequate for the long term storage of the waste material, primarily due to the storage conditions and exposure to the environmental effects. During tours of the facility, the inspector observed that the volume of LLRW staged in outside areas around the facility had been significantly reduced since the last inspection of this program. The [redacted] warehouse provided a secure and acceptable means to store LLRW on a short term basis. However, during a tour of the [redacted] facility, the inspector noted that there was evidence of water intrusion problems from the roof of the facility. The inspector observed that the volume of waste stored in the warehouse was high relative to the availability of storage space. With regard to container integrity, the inspector observed that the licensee had repackaged most of the waste items that had been stored in B-25 metal burial boxes to 27 cubic foot (ft^3) super-sacks. This repackaging was necessary due to the poor material condition of the burial boxes rendering them unsuitable for shipment to a disposal facility.

The inspector also noted that the licensee was storing quantities of both Class C and transuranic or greater than Class C (GTCC) waste in a combination of 55 gallon drums, high integrity containers, and B-25/B-12 metal burial boxes [redacted]
The following table provides a summary of the Class C and transuranic waste inventory:

[redacted]

[redacted]

Container Type	Number of Containers of Class C Waste	Number of Containers of Transuranic Waste
55 gallon drums	5	161
High Integrity Containers	18	13
B-12/B-25 Burial Boxes	4	21

Upon inspection of the facilities and the containers of the Class C and transuranic waste, the inspector noted that the waste was secure, properly labeled, and stored in appropriate containers that were in good material condition. The inspector noted that the burial boxes were lined with heavy duty liners before the waste items were placed in the container.

The inspector reviewed the licensee's waste storage management program. The inspector observed that the licensee had implemented a Waste Inventory Management System (WIMS). This system provided an improved means to manage waste storage inventories on site. The WIMS was electronically linked to the licensee's [redacted] database system. The inspector noted that the licensee was able to use portions of the WIMS to determine year end waste volume totals and waste shipments associated with the decommissioning projects at the facility. The inspector noted that the licensee had shipped the following volumes of waste to Envirocare of Utah:

a. 2002- 24,774 ft^3
b. 2003- 20,299 ft^3
c. 2004- 29,917 ft^3 (as of August 4, 2004)

As noted from the data above, the licensee has made some progress in reducing the waste inventory stored onsite.

b. Conclusions

The present short term warehouse and/or building storage arrangements for radioactive solid waste were adequate. The waste was secure, properly labeled, and stored in appropriate containers that were in good material condition. The licensee had made progress in reducing the waste inventory stored onsite.

[redacted]

[redacted]

10. 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 August 20, 2004. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes has been deleted from part one of this report. The licensee acknowledged comments during the exit meeting but a building manager disagreed with the violation concerning failure to follow procedure during an SRE test.

[redacted]

[redacted]

ATTACHMENT

1. **PERSONS CONTACTED**

Partial List of Licensee's Persons Contacted

D. Buck, Vice President, Human Resources
K. Crutcher, Analytical Services Manager
B. Drane, Director, Engineering
R. Droke, NFS Licensing & Compliance Director
B. Faidley, Maintenance Supervisor
J. Greene, Environmental Safety Manager
K. Guinn, Vice President, Principal Scientist
D. Harrison, Murray Guard Facility Manager
D. Hopson, BLEU Safety & Regulatory Manager
N. Kenner, Training Manager
F. Kerns, Plant Superintendent Manager
S. Kirk, Licensing Specialist
P. Koppel, Project Director
A. Maxin, Safety Director
M. Moore, Vice President, Safety and Regulatory
J. Nagy, Senior License & Regulatory Compliance Officer
J. Parker, Industrial Safety Manager
W. Phillips, Security Compliance Manager
J. Pugh, Transportation and Waste Manager
R. Rice, Radiation Monitoring Manager
K. Schutt, President and General Manager
R. Shackelford, Nuclear Criticality Safety Manager
M. Shope, Quality Engineering Supervisor
J. Stout, Security Director
M. Tester, Senior Manager, Radiation Control
G. Tipton, Director, Plant Facilities
A. Vaughn, Director, Fuel Production
K. Weir, Security Operations Manager
J. Wheeler, ISA Manager

Other Organizations

J. Eidens, Knolls Atomic Power Laboratory (KAPL), Resident

[redacted]

[redacted]

2. INSPECTION PROCEDURES USED

TI 2600/006	Safety Operations, Safeguards, Radiological Controls & Facility Support
IP 84900	Low-Level Radioactive Waste Storage
IP 86740	Transportation
IP 88005	Management Organization and Controls
IP 88025	Maintenance/Surveillance
IP 88035	Waste Management

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Type	Description
70-143/2004-08-01	Closed	NCV	Failure to perform nuclear criticality safety inspection
70-143/2004-08-02	Open	URI	Improper Actions During Criticality Alarm
70-143/2004-08-03	Open	URI	Fire [redacted]
70-143/2004-08-04	Open	VIO	Failure to Follow an SRE Test Procedure
70-143/2004-08-05	Open	IFI	Removal of lamps which are a fire Hazard
70-143/2004-03-03	Closed	VIO	Failure to comply with written procedures impacting fire safety.
70-143/2004-02-01	Closed	URI	Contaminated Intermodals Returned to Vendor

4. LIST OF ACRONYMS USED

ADAMS	Agency-wide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
BLEU	Blended Low Enriched Uranium
BPF	BLEU Preparation Facility

[redacted]

[redacted]

CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
ECL	Effluent Concentration Limit
ECC	Emergency Control Center
GTCC	Greater than Class C
IFI	Inspection Followup Item
IP	Inspection Procedures
IROFS	Item Relied On For Safety
IR	Inspection Report
KAPL	Knolls Atomic Power Laboratory
LLRW	Low Level Radioactive Waste
MDC	Minimal Detectable Concentration
MEI	Maximally Exposed Individual
NCV	Non-cited Violation
NFS	Nuclear Fuels Services
NRC	Nuclear Regulatory Commission
[redacted]	[redacted]
OCB	Oxide Conversion Building
PARS	Publicly Available Records
PIRCS	Problem Identification, Resolution and Corrective Action System
QA	Quality Assurance
RWP	Radiation Work Permit
SNM	Special Nuclear Material
SRE	Safety Related Equipment
T&Q	Training and Qualification
TEDE	Total Effective Dose Equivalent
TI	Temporary Instruction
U	Uranium
U-235	Uranium-235
UNB	Uranyl Nitrate Building
UPS	Uninterruptible Power Supply
URI	Unresolved Item
VAGAS	Versatile Automated Gamma Assay System
VIO	Violation
WIMS	Waste Inventory Management System
WWTF	Waste Water Treatment Facility

[redacted]