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July 21, 2003

Nuclear Fuel Services, Inc.  
ATTN: Mr. Dwight Ferguson  
President  
P. O. Box 337, MS 123  
Erwin, TN 37650

SUBJECT: NRC INSPECTION REPORT NO. 70-143/2003-04

Dear Mr. Ferguson:

This refers to the operational readiness review team inspection conducted from June 2 - 6, 2003, at your Erwin facility. The purpose of the inspection was to determine whether activities requested in your license amendment request dated February 28, 2002, specifically, operation of the Uranyl Nitrate Building (UNB), could be conducted safely and in accordance with NRC requirements. The inspection included a review of your operations, management, and safeguards programs to insure that your UNB facility was ready to operate safely and in compliance with your license request.

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

Based on the results of the inspection, no violations or deviations were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and Enclosure 1 will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room). Enclosure 2 contains sensitive information associated with the Erwin physical protection program and, therefore, in accordance with 10 CFR 2.790(d), will not be made publicly available.

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

Sincerely,

**/RA BY WILLIAM B. GLOERSEN  
ACTING FOR/**

David A. Ayres, Chief  
Fuel Facilities Branch  
Division of Nuclear Materials Safety

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

Enclosures: 1. NRC Inspection Report (Part 1)  
2. NRC Inspection Report (Part 2) 2.790 Information

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2003-04

Licensee: Nuclear Fuel Services, Inc.

Facility: Erwin Facility

Location: Erwin, TN 37650

Dates: June 2 - 6, 2003

Inspectors: D. Rich (Team Leader), Senior Resident Inspector  
F. Gee, Criticality Safety Inspector (NMSS)  
O. Lopez, Nuclear Safety Intern, (RII)  
N. Rivera, Nuclear Safety Intern, (RII)  
O. Smith, Physical Security Inspector, (RII)

Approved by: D. A. Ayres, Chief  
Fuel Facilities Branch  
Division of Nuclear Materials Safety

Enclosure 1

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**NRC Inspection Report 70-143/2003-04 (Part 1)**

**EXECUTIVE SUMMARY**

Nuclear Fuel Services, Inc.

This report is a summary of the special operational readiness review team inspection of the licensee's proposed operation of a low-enriched uranyl nitrate storage facility, which is phase one of the licensee's proposed Blended Low Enriched Uranium (BLEU) Project. The operational readiness review inspection was conducted during the week of June 2-6, 2003, with specialized inspectors from the NRC Office of Nuclear Materials Safety and Safeguards (ONMSS) and Region II (RII). The results of the operational readiness review (ORR) inspection are contained in the Report Details section of this report. The Report Details section has been prepared to exclude the use of information the licensee identified as proprietary and for which the licensee submitted an affidavit pursuant to 10 CFR 2.790. The inspection was conducted through a review of selected records, procedures, interviews with personnel, and direct observation of equipment testing and work activities in the following areas: criticality safety, chemical safety, fire protection, environmental protection, waste management, operator training, emergency preparedness, safety program and integrated safety analysis, physical safeguards, radiation protection, operations, management measures, and maintenance and surveillance.

No safety significant problems were noted during the inspection.

**Safety Program and Integrated Safety Analysis (ISA)**

- The licensee's safety program met regulatory requirements and commitments (paragraph 2).

**Operations**

- The licensee's operating procedures for the Uranyl Nitrate Building (UNB) contained adequate instructions for administrative and active engineered nuclear criticality safety (NCS) controls and for safe operation of UNB systems. Process and instrumentation diagrams (P&IDs) accurately represented UNB equipment and systems (paragraph 3.a).
- Equipment was generally well labeled and in good condition. The UNB was clean and well lit. The inspectors verified installation of various design features, including storage tank instrumentation, special fittings, and spill basins (paragraph 3.b).

**Maintenance and Surveillance**

- Active and passive engineered controls were adequately tested and maintained. Documentation of maintenance activities was accurately maintained (paragraph 4).

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### Radiation Protection

- The radiation protection program for the UNB process met regulatory requirements. The expected maximum radiation dose for any member of the public was within regulatory limits (paragraph 5).

### Nuclear Criticality Safety

- The inspectors verified the flow-down of nuclear criticality safety evaluation safety requirements in facility design and procedures and also verified the installation of the items relied on for safety (IROFS) per as-built drawings (paragraph 6).

### Chemical Process Safety

- The licensee adequately implemented chemical safety controls to ensure that operations will be conducted in a safe manner (paragraph 7).

### Fire Protection

- The licensee had implemented a fire protection program that provided reasonable assurance that workers and the public would be protected (paragraph 8).

### Emergency Preparedness

- The licensee adequately implemented required emergency preparedness measures (paragraph 9).

### Environmental Monitoring and Waste Management

- The licensee's existing environmental protection program was adequate to support operation of the UNB. The UNB has no liquid waste stream, and expected airborne effluents released to the environment were a small fraction of regulatory limits (paragraph 10).

### Management Measures

- Management measures proposed for the UNB met regulatory requirements to maintain the availability of IROFS, and were adequately implemented (paragraph 11).

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Operator Training

- Operators were knowledgeable of safety procedures and familiar with operation of UNB systems. The licensee's training program provided reasonable assurance that the operators were able to operate the system safely (paragraph 12).

Attachment:

Partial Listing of Persons Contacted

Inspection Procedures Used

List of Items Opened, Closed, and Discussed

List of Acronyms

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**REPORT DETAILS**

**1. Summary of Plant Status**

The Uranyl Nitrate Building (UNB) was complete, with all utilities, services, controls, and instrumentation installed. Operations had been performed with water for the purpose of testing, but receipt of uranium bearing material had not commenced.

**2. Safety Program and Integrated Safety Analysis (Inspection Procedure (IP) 88005)**

a. Inspection Scope

The inspectors reviewed the licensee's safety program and integrated safety analysis (ISA).

b. Observations and Findings

10 CFR 70.62 requires the licensee to establish and maintain a safety program, including performance of an ISA. The inspectors reviewed various aspects of the safety program including change management, maintenance of process safety information, information pertaining to the technology and the equipment of the process. The inspectors verified the licensee's documentation demonstrated compliance with License Application Section 2.11.2, regarding documentation of design, configuration, testing, and reliability of items relied on for safety (IROFS). The inspectors observed testing and verified installation of various IROFS as noted in Section 4 of this report. The inspectors also verified seismic design certification for UNB tanks and tank hold-down devices, and documentation of building construction to the 1999 Standard Building Code, including design for wind and seismic resistance as noted in the ISA Summary, Section 3.5. As part of the safety program, the licensee had committed to establish management measures to maintain the reliability of IROFS. These measures were reviewed and are discussed in detail in Section 11 of this report. No significant deficiencies were identified.

c. Conclusions

The licensee's safety program met regulatory requirements and commitments.

**3. Plant Operations (Temporary Instruction (TI) 2600/006, IP 88020)**

a. Operating Procedure Reviews

(1) Inspection Scope

The inspectors verified several of the uranyl nitrate (UN) operating procedures to ensure that the procedures contained clear instructions and covered all operational steps in the process.

(2) Observations and Findings

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A walk down was performed in the process area by using the operating procedures and the process and instrumentation diagrams (P&IDs). The operating procedures covered the tasks that the operator was to perform in the UNB process. The procedures reference the controls required to maintain safety through the process and were written in a logical manner. Based on document review, there were no significant discrepancies identified between the operating procedures, the P&IDs, and the equipment installed in the UNB. Also, the operating procedures included information on safety hazards and precautions, chemical safety (Materials Safety Data Sheets), nuclear criticality safety (NCS) requirements, radiation safety, and abnormal operations. In general, the procedures provided adequate instructions for operating the process equipment safely.

The inspectors reviewed procedures addressing selected administrative and engineered NCS controls including receipt of incoming material, the in-line uranium monitoring system, and the receiver tank density monitoring system. No safety significant findings were identified.

(3) Conclusions

The operating procedures developed by the licensee for the UNB contained adequate instructions for administrative and active engineered NCS controls and for safe operation of UNB systems. P&IDs accurately represented UNB equipment and systems.

b. Process Area Tours

(1) Inspection Scope

The inspectors conducted walk downs of the UNB areas to observe general equipment condition, status, and housekeeping.

(2) Observations and Findings

During numerous tours of the UNB complex the inspectors noted that, in general, equipment condition and housekeeping were adequate. Areas were clean and well lit and equipment was labeled and in good condition. During the system walk down, the inspectors verified selected components against the P&IDs and operating procedures as mentioned in Section 3.a, and found no significant deficiencies.

The inspectors verified that storage tank (TK) -18 and the transfer system for a future proposed Oxide Conversion Building were isolated. The utility storage tank, the receiver tank, and the UN storage tanks were equipped with instrumentation to monitor and measure the density, temperature and volume. The inspectors noted one safety feature that was designed to prevent transfer of material from other than approved containers was the use of unique fittings, which only mated to the radioactive liquid (LR) containers. The inspectors also noted that the UNB was designed with two spill basins as passive spill confinement features, one in the transfer area designed to hold more than 6,500 gallons, and the other in UNB storage area designed to hold more than 14,000 gallons. The inspectors observed that IROFS and the equipment throughout the facility were

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clearly labeled with durable tags. Other than minor inconsistencies on the P&IDs, no issues were identified.

(3) Conclusions

Equipment was generally well labeled and in good condition and the UNB was clean and well lit. The inspectors verified installation of various design features, including storage tank instrumentation, special fittings, and spill basins.

4. **Maintenance and Surveillance (IP 88025)**

a. Inspection Scope

The inspectors reviewed the licensee's program for maintaining the availability and reliability of IROFS.

b. Observations and Findings

The licensee's maintenance program included a system of procedures for periodic maintenance, calibrations, inspections, and functional testing. The inspectors noted that the IROFS designated as Safety Related Equipment (SRE) were added to the licensee's Computerized Maintenance Management System (CMMS) and periodic functional tests were scheduled within the specified frequency. The CMMS would alert the licensee when each test was due to be performed. The inspectors noticed that the licensee kept a controlled list of all the IROFS. The inspectors reviewed functional test records for all the IROFS. The inspectors determined that the IROFS had been adequately tested and calibrated. The inspectors walked down the UNB area to verify that IROFS had been identified and were in acceptable condition for start-up. No problems were identified.

The inspectors observed performance of functional tests on a temperature sensor, density monitor, pH monitor, and on the uninterruptible power supply diesel generator. The inspectors found the functional tests to be well planned and adequate to verify the functionality of the safety controls. The inspectors noted the licensee revised several test procedures during the inspection to include procedural steps to ensure systems were restored properly after testing. Restoration steps included physical configuration and software interlocks and alarms that were manipulated as required steps in the test.

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c. Conclusion

Active and passive engineered controls were adequately tested and maintained. Documentation of maintenance activities was accurately maintained.

**5. Radiation Protection (IP 83822)**

a. Inspection Scope

The status of the implementation of the licensee's radiation protection program was verified to ensure that the necessary equipment and procedures were in place to support operation of the UNB process.

b. Observations and Findings

The radiation protection program for the UNB process was consistent with NFS' program. However, certain additions were included in the program. For example, the inspectors verified that the licensee included a procedure and contamination action level limits to survey empty type B containers prior to closure. The inspectors also reviewed training provided to operators on gamma versus alpha radiation exposure, and about the distance, time, and shielding principles. Posting, boundaries, and a dose rate status map with the results of the survey were placed in the area. No significant issues were identified.

The inspectors verified that stationary air samplers were placed in representative locations and were activated to support the operation. The As Low As Reasonably Achievable (ALARA) goal for Calendar Year (CY) 2003, based on the licensee's calculations, was established to be a maximum of 1000 millirem per year (mrem/yr) whole body Total Effective Dose Equivalent (TEDE) to the workers. This is less than the regulatory limit of 5000 mrem/yr, however, the licensee expected to lower the goal for the next CY.

The regulatory radiation dose limit to a member of the public in 10 CFR 20.1301 is 100 mrem/yr. The licensee's calculation TEDE for the complete operation of the UNB is 93 mrem/yr at the fence line behind the building. The licensee established an action limit for the fence line of 80 mrem/yr for a member of the public. In order to meet this goal, the licensee will limit the amount of material stored in the UNB until additional surveys have been performed in order to refine the model for expected dose from the facility.

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c. Conclusion

The radiation protection program for the UNB process met regulatory requirements. The expected maximum radiation dose for any member of the public was within regulatory limits.

6. **Nuclear Criticality Safety (88015)**

a. Inspection Scope

The inspectors reviewed NCS analysis, 54T-03-0022, "Nuclear Criticality Safety Evaluation for the Blended Low-Enriched Uranium (BLEU) Complex Uranyl Nitrate Building (UNB)," Revision 3, dated May 2003, and verified the flow-down of safety requirements to facility design and procedures. The inspectors conducted walk downs to verify implementation of appropriate procedures and installation and identification of the IROFS per as-built drawings in the following areas:

- Criticality accident alarm system coverage and field installations
- Adequacy of the ventilation system to prevent freezing of UN in the storage tanks
- IROFS Identification Number (ID#) UNB-R to verify the contents of the incoming LR-230 shipping container
- Periodic surveillance and maintenance procedure for the in-line monitor,
- IROFS ID# UNB-F to verify that the heating, ventilation and air conditioning (HVAC) duct work included a liquid drain and was designed to prevent uranium accumulation
- IROFS ID# UNB-I to verify that the storage tanks were sealed to prevent evaporation and the existence of a maintenance procedure to test the integrity of the water seal

b. Observations and Findings

(1) Criticality Accident Alarm System Coverage and Installation

The inspectors reviewed the criticality accident alarm system design document, "Demonstration of Criticality Accident Alarm System (CAAS) Detector Coverage for the UNB (Building 510)," Revision 0, dated March 13, 2003. With the design engineer, the inspectors walked down the system in Building 510. The licensee evaluated seventeen representative accident scenarios, using Monte Carlo N-Particle Code, Version 4C (MCNP4C) to determine the dose rates at the detector location. For this analysis, precipitation was assumed in the storage tanks for all scenarios. This was the most conservative condition. All scenarios resulted in exposure rates at the detector location that would have exceeded the 20 millirads per hour alarm actuation level, thus demonstrating coverage of the minimum criticality of concern for the facility.

In addition, the inspectors reviewed the criticality detection system testing procedure, NFS-HS-A-80, "Operation and Testing of the BLEU Complex Criticality Alarm System," Revision 0, dated June 2, 2003. The inspectors determined that the testing and

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maintenance programs were adequate. Because of the possibility of a loss of power to the criticality alarm system, the inspectors reviewed the adequacy of the power supply to the criticality safety monitors. The alarm system was supplied by 15-minutes of 15 kilovolt-ampere uninterruptible power system, which was supplemented by an emergency diesel generator with a 24-hour fuel supply.

In conclusion, the inspectors determined that the coverage and the installation of the alarm detectors were adequate.

(2) Verification of the Content of the Incoming LR-230 Container Before Transfer to TK-10

As required by IROFS UNB-R, the licensee stated that the operators would not transfer the contents of the LR-230 containers until a review of sample results sent by the Savannah River Site (SRS) confirmed that the supplied material was within license limits and in agreement with the data stated on the shipping manifest accompanying the containers. The verification at SRS was only credited as one control. The inspectors verified other controls, including the in-line monitor and the density monitor. The licensee's procedures and engineered controls verified that the UN received is not greater than 210 grams uranium per liter and not greater than 5.0 weight percent of uranium-235 prior to transfer. The inspectors determined the stated practice implemented NFS 54T-03-0022, "Nuclear Criticality Safety Evaluation for the BLEU Complex Uranyl Nitrate Building," Revision 3, dated May 2003.

(3) UNB-S Inline Canberra Assay IROFS

The inline monitor was installed to further verify that the uranium-235 content of the UN would be below the limiting condition of operation. The inspectors reviewed the calibration procedures for the in-line monitor and noted that the proposed calibration was not typical of standard industry practices in that only one calibration point was to be checked. The licensee committed to a minimum of a three-point calibration to include the region of interest. On June 18, the inspectors observed a calibration procedure on the Canberra in-line monitor and noted the calibration was performed in accordance with procedure and also observed adequate instrument response to the three source levels utilized. The inspectors determined that the revised calibration with three-points provided sufficient confidence in the measurements.

(4) Increase of Uranium Concentration via Freezing

The inspectors reviewed the adequacy of the ventilation system to prevent the increase in uranium concentration via crystallization at low temperatures in the winter months. The licensee estimated in Supplemental Engineering Calculation D that it would take 32 days to cool UN solution from 70 degrees Fahrenheit (°F) to 32 °F in the storage tanks with ambient air at approximately 24 °F. The inspectors reviewed the calculations and determined the calculations were reasonable. The building ventilation was the primary temperature control in the UNB for maintaining the temperature above 35 °F. The inspectors verified that five backup heaters would be energized when the UNB ambient temperature was below 50° F. In case of loss of power, as previously mentioned, the emergency diesel with the 24-hour fuel storage would provide power to

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the heaters. The inspectors determined that there were multiple backups designed to prohibit freezing.

(5) High Uranium Concentration Due to Precipitation

The inspectors verified the functional testing of the in-line pH monitor. An active engineered control was set at pH 9 to shut off the transfer of solution to prevent a precipitating agent from being transferred to the tanks in the UNB. The operators were also trained not to use precipitating agents in UNB. The inspectors verified the criticality safety posting at the entrance door as required, and the proceduralized prohibition of bringing more than 5 gallons of precipitating agent into the UNB. The inspectors determined that the management controls were adequate in preventing high uranium concentration due to precipitation.

(6) Verification of IROFS

The inspectors reviewed Standard Operating Procedure (SOP) 500, Section 8, Revision 3, dated May 2003, for the UNB checklist to verify IROFS, which included the alarms in the central control system; the floor under the heating ventilation; HVAC liquid drains for signs of liquid underneath the air intake for the building exhaust duct; verification that the overflow vent line seal legs of each storage bank maintained a minimum of 4 inches of water; and the presence of the required gaskets.

The inspectors reviewed that the adequacy of training department lesson plans 27T-03-0067, -0068, -0069, and -0070, dated May 2003, and verified that the operators were trained with the aforementioned lesson plans. During plant walk downs of the processes in the BLEU complex, the inspectors observed that the operators were being trained on the operational procedures. Completion of training was addressed in Section 12 of this report.

c. Conclusions

The inspectors verified the flow-down of NCS evaluation safety requirements in facility design and procedures and also verified the installation of the IROFS per as-built drawings.

**7. Chemical Process Safety (IP 88020)**

a. Inspection Scope

The inspectors conducted walk downs of the UNB and reviewed the draft Safety Evaluation Report (SER) to determine whether appropriate safety controls had been implemented in a manner that provided reasonable assurance that equipment can be operated safely.

b. Observations and Findings

The inspectors conducted walk downs and interviewed plant personnel to verify that a leak detection program was in place. The licensee's SOP required weekly visual inspections of the UNB to verify that all equipment and vessels were in a safe and operable condition. As part of the visual inspections, appropriate IROFS were inspected for integrity and operability. The inspectors noted that all the tanks were equipped with level controls and an overflow line to prevent solution from entering the off gas piping. The UN storage area and the load/download area were equipped with spill basins that had liquid detection instrumentation that was monitored by the central control system for the UNB. SOPs were reviewed to verify that they included instructions of how to respond to leaks. The inspectors noted that reviewed SOPs contained a brief description of chemical hazards and referenced the Material Safety and Data Sheets that were located in the supervisor's office. The licensee kept controlled copies of the SOPs at various work stations in the UNB for quick reference.

The inspectors reviewed the licensee's P&IDs to verify that safety controls as described in the integrated safety analysis (ISA) were included in the design of the UNB. The inspectors reviewed P&IDs of the storage tanks, load/download area, and ventilation systems. The drawings contained adequate detail of IROFS installed in these systems. However, the inspectors found that two IROFS of the utility tank and one vent line from the Natural Uranyl Nitrate Storage tank were missing in the P&IDs. By the end of the inspection, all the discrepancies in the P&IDs were adequately corrected.

The inspectors evaluated the installation of the Natural Uranyl Nitrate Storage tank. The inspectors determined that the tank was properly isolated from the rest of the UNB equipment.

c. Conclusions

The licensee adequately implemented chemical safety controls to ensure that operations will be conducted in a safe manner.

**8. Fire Protection (IP 88055)**

a. Inspection Scope

The inspectors reviewed the installation and maintenance of UNB fire detection system, fire suppression system, and process fire barriers. The inspectors also reviewed the licensee's control of combustibles to minimize the occurrence, severity, or spread of a fire in the UNB.

b. Observations and findings

The inspectors conducted walk downs to verify that an automatic sprinkler system and a fire alarm system were installed and in operable condition. Based on observations and documentation reviewed, the inspectors determined that the licensee had adequately installed and maintained the automatic sprinkler system and the fire alarm. The inspectors observed portable extinguishers throughout the plant site. Portable fire extinguishers were charged to the normal operating zones and no visible damage was noted. The inspectors performed a walk down inspection of the fire walls and determined that they were adequately maintained. The inspectors also observed fire doors throughout the facility and found them in proper working condition and noted that housekeeping was adequate to ensure emergency egress pathways were clear of debris.

The licensee had installed two independent combustible gas monitoring systems and two separate interlocks. The monitoring systems would detect possible leaks of natural gas and shut down the supply to prevent the accumulation of natural gas above the lower explosive limit in the mechanical room. The inspectors observed a functional test of the combustible gas monitor system and found the system performed adequately and found the test was adequate to verify the functionality of the system. Maintenance records for selected portions of the fire suppression system were reviewed and no problems were identified.

Walk downs were performed to observe the control of combustibles in the UNB complex and surrounding areas. These areas were kept free of significant amounts of transient combustibles large enough to be a fire exposure hazard. The inspectors determined that the control of combustibles was adequate to minimize potential fire hazards.

c. Conclusion

The licensee had implemented a fire protection program that provided reasonable assurance that workers and the public will be protected.

**9. Emergency Preparedness (IP 88050)**

a. Inspection Scope

The inspectors reviewed the UNB organization, facility, and equipment to determine whether the licensee had implemented the commitments of the Emergency Plan.

b. Observations and Findings

The inspectors reviewed selected emergency procedures and noted that changes in the emergency organization, facility description, emergency equipment, and emergency response, with respect to the UNB, were included. The inspectors conducted walk downs to verify that emergency lights were installed and that evacuation routes were clearly marked. Several emergency equipment storage areas were inspected to determine whether the emergency response equipment, instrumentation, supplies, and personal protective equipment were maintained in a state of operational readiness. The inspectors reviewed inventory and surveillance sheets. Also, the inspectors reviewed equipment calibration records for select radiation detection equipment to assess the reliability of equipment. No problems were identified.

Licensee activities were reviewed in the area of training and agreements with local offsite support groups. The inspectors noted that the licensee conducted a training session with the Erwin Fire Department and South Unicoi County Volunteer Fire Department. The training consisted of classroom sessions and walk downs. Agreement letters with the offsite support group agencies described in the Emergency Plan were current, and the licensee had provided copies of the plan to offsite authorities.

c. Conclusions

The licensee adequately implemented required emergency preparedness measures.

**10. Environmental Monitoring and Waste Management (IPs 88035, 88045)**

a. Inspection Scope

The inspectors verified the ventilation system and the controls in place for the prevention of accidental releases of contaminants to the environment.

b. Observations and Findings

The inspectors verified that the ventilation system in the UNB process was in place to maintain the process area at a negative pressure, ensuring that unmonitored and unfiltered airborne effluent releases from the building would not occur. The room exhaust and the tank vents passed through a high efficiency particulate air filtration prior to discharge to the atmosphere. Effluent samples from the process ventilation stack were analyzed on a daily basis to obtain a radioactivity background base line. The inspectors noted that the airborne radioactivity release from the UNB was expected to be very low. The UNB was incorporated into the NFS' environmental program.

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The inspectors noted there would be no process liquid waste and no direct liquid effluent discharges as the result of UNB operations. Passive engineering controls were in place for the prevention of accidental releases of contaminants to groundwater. The UNB had been designed and constructed to recover and store any spill in the building. Finally, the solid waste that would be generated by the UNB operations will be controlled by the licensee's normal solid waste process.

c. Conclusion

The licensee's existing environmental protection program was adequate to support operation of the UNB. The UNB has no liquid waste stream, and expected airborne effluents released to the environment were predicted to be a small fraction of regulatory limits.

**11. Management Measures (IP 88005)**

a. Inspection Scope

The inspectors reviewed proposed management measures for the UNB to verify compliance with the NFS License Application, the draft SER, and the CFR.

b. Observations and Findings

10 CFR 70.62(d) requires that each licensee establish management measures to ensure compliance with the performance requirements of 10 CFR 70.61. The licensee committed to certain management measures as part of the safety program for the UNB to ensure the availability of IROFS. The scope of the IROFS that were under configuration management, and the management measures that were applied to maintain these safety controls, were contained in the ISA Summary. The inspectors reviewed the management measures to ensure that engineered and administrative controls and control systems that were identified as IROFS in Table 9 of the ISA Summary were designed, implemented, and maintained to ensure they were available and reliable to perform their function when needed. The inspectors reviewed selected IROFS and verified that the management measures specified in Table 8 of the ISA Summary were in fact controlled by approved, written procedures. The following specific areas were reviewed:

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(1) Configuration Management

The inspectors verified selected requirements from the License Application, Sections 2.12.1.1, 2.12.1.5, and 2.12.1.4, and found the licensee had applied the NFS Internally Authorized Change process and the NFS ISA process to configuration management in the UNB. The inspectors noted that requirements for appropriate review and approval as well as requirements to update the necessary supporting safety basis documents (e.g., Nuclear Criticality Safety Evaluations and ISA Summary), were specified in written procedures.

In License Application Section 2.12.1.3, "Document Control," NFS committed to establish a document control system for new facilities to create, control and track documents within the configuration management function. The inspectors verified that the licensee had a process to maintain control of change control documents associated with IROFS, records for failures of IROFS, procedures that included IROFS, and those procedures related to training, quality assurance, maintenance, audits and assessments, emergency operations, and emergency response. Other documents that were maintained under the document control system when relied on for safety included: design requirements, engineering drawings and/or sketches, specifications for IROFS, and the ISA Summary.

(2) Maintenance

The inspectors observed in License Application Section 2.12.2, "Maintenance of IROFS," that NFS included commitments for maintenance of active and passive engineered controls and administrative controls, and committed to incorporate maintenance activities into written procedures. NFS established a program to ensure that active and passive engineered controls designated as IROFS were maintained in a manner so as to ensure the IROFS were capable of performing their intended function when called upon. Hardware was designated and controlled under the licensee's SRE program. An essential element of the maintenance program required that all maintenance activities, including functional testing of IROFS during startup of new process operations, be authorized by written procedures and/or written instructions. The inspectors verified written instructions were used for the functional tests reviewed, and that written procedures were required for future maintenance.

(3) Training and Qualification

In License Application Section 2.12.3, "Training and Qualification," NFS committed to provide a Training and Qualification Program that will provide all personnel on site with the knowledge and skills to safely perform their job function, effectively deal with the hazards of the workplace, and properly respond to emergency situations. The inspectors verified that the NFS training and qualification program addressed operations at the UNB, and that aspects of this program ensured that operations were performed by properly trained personnel. Requirements and methods for the training and qualification programs were approved by site management, who also provided ongoing evaluation of the effectiveness of the programs.

**PROPRIETARY INFORMATION REMOVED**

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(4) Procedures Development and Implementation

In License Application Section 2.12.4, "Procedures," NFS committed to use several systems of operating and safety function procedures, as defined in License Application Section 1.7.4, "Operating Procedures," and Section 1.7.5, "Safety Procedures," to conduct special nuclear material operations and related support functions, including operations related to IROFS and their supporting management measures. The inspectors verified that the NFS procedure systems were in use at the UNB, and addressed required areas. The inspectors reviewed selected procedures, noted the licensee had made some improvements to maintenance procedures as noted in Section 4, but found no significant deficiencies.

(5) Audits and Assessments

In License Application Section 2.12.6, NFS committed to conduct audits and inspections as specified in Section 2.8, "Audits and Inspections." In addition, audits and periodic inspections would be performed to determine that site operations, as well as off-site operations, involving activities related to the IROFS were conducted in compliance with regulatory requirements, license conditions, and written plans and/or procedures. The inspectors reviewed the audit program and schedule and interviewed Quality Assurance personnel. The inspectors noted the audit schedule was comprehensive and required areas were included. The audit program included guidance for the activity to be audited, audit frequency, responsibilities for each phase of the audit and/or inspection, and procedure for recording the results and recommended actions. The program also included requirements for external audits of specified safety functions on a three-year basis.

(6) Incident Investigations and Corrective Actions

The inspectors reviewed the NFS Problem Identification, Reporting, and Correction System (PIRCS), and noted it contained provisions to report, track, and trend abnormal events with corrective actions assigned through the corrective action program. Abnormal events were reviewed frequently by a multi-disciplinary committee to assign the appropriate level of investigation based on the seriousness and risk of the event. The inspectors noted the PIRCS system was already in use for NFS activities and that documentation relating to recorded events was maintained by the system for later review.

PROPRIETARY INFORMATION REMOVED

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(7) Other Quality Assurance Elements

In License Application Section 2.12.8, NFS committed to establish a quality system consisting of the organizational structure, procedures, processes, and resources needed to implement quality management. The system was structured on American Society of Mechanical Engineers NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities," under the overall responsibility of the Quality Assurance function manager. The inspectors interviewed the UNB Safety Manager and noted that various NFS systems were in place to address elements of this program.

c. Conclusions

The management measures proposed for the UNB met regulatory requirements to maintain the availability of IROFS, and were adequately implemented.

**12. Operator Training (IP 88010)**

a. Inspection Scope

The inspectors verified that operators were properly trained and qualified for the UNB process prior to their assignments.

b. Observations and Findings

The inspectors reviewed the operators' materials and tests, and observed on-the-job training (OJT) of the operators. The inspectors observed selected OJT sessions, and noted that operators, supervisor, and radiation protection staff attended the OJT. During the OJT, walk downs were performed and the operators demonstrated adequate knowledge of UNB procedures and demonstrated the ability to operate UNB systems safely. The inspectors noted that although operators were adequately trained on the UNB receipt, storage and transfer systems, the licensee planned to complete operator certification during the supervised initial receipt of material.

c. Conclusion

Operators were knowledgeable of safety procedures and familiar with operation of UNB systems. The licensee's training program provided reasonable assurance that the operators were able to operate the system safely.

**PROPRIETARY INFORMATION REMOVED**

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**13. Exit Meeting**

The operational readiness inspection scope and results were summarized at a publicly attended meeting on June 6, 2003, with those persons indicated in the Attachment. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes has been deleted from this report. No dissenting comments were received from the licensee.

PROPRIETARY INFORMATION REMOVED

ATTACHMENT

1. PARTIAL LISTING OF PERSONS CONTACTED

Licensee Personnel

R. L. Booth, Vice President HEU Programs  
B. Drane, Engineering Manager  
R. Droke, Licensing and Compliance Director  
D. Ferguson, President, NFS  
J. Flaherty, Framatome  
A. Greene, Framatome  
K. Guinn, V.P. Principal Scientist  
J. S. Kirk, Licensing Specialist  
B. M. Moore, Vice President, Safety & Regulatory  
J. Nagy, Technical Assistant  
J. Parker, Industrial Safety Manager  
W. E. Phillips, Safeguards Compliance Manager  
M. Tester, Senior Manager Radiological Control

NRC Personnel

C. Acosta, Nuclear Safety Intern  
D. Ayres, Fuel Facilities Branch Chief  
K. Clark, Senior Public Affairs Officer  
F. Gee, Nuclear Criticality Inspector  
O. Lopez, Nuclear Safety Intern  
L. Plisco, Dep. Regional Administrator  
D. Rich, Senior Resident Inspector  
N. Rivera, Nuclear Safety Intern

Public

Lt. Ron Arnold, Unicoi County Sheriff's Dept.  
R. Campbell, Johnson City Press  
C. Garland, Johnson City Press  
A. Harris  
G. Harris  
M. Hill, Studsvik  
K. Hughes  
B. Jens, Greeneville Sun  
L. Modica, Sierra Club  
J. O'Conner, Impact Plastics  
K. Thornberry, WEMB  
T. Treadway, Creative Energy  
L. Modica, Sierra Club  
M. Moore, WCYB TV  
T. Wilson, Elizabethton Newspapers

PROPRIETARY INFORMATION REMOVED

**2. INSPECTION PROCEDURES USED**

TI 2600/006	Resident Inspection Program for Category I Fuel Cycle Facilities
IP 83822	Radiation Protection
IP 88005	Management Organization and Controls
IP 88010	Operator Training
IP 88015	Criticality Safety
IP 88020	Plant Operations
IP 88025	Maintenance/Surveillance
IP 88035	Waste Management
IP 88045	Environmental Protection
IP 88050	Emergency Preparedness
IP 88055	Fire Protection

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

None

**4. LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonable Achievable
BLEU	Blended Low Enriched Uranium
CFR	Code of Federal Regulations
CMMS	Computerized Maintenance Management System
CY	Calendar Year
°F	Degrees Fahrenheit
FHA	Fire Hazards Analysis
HVAC	Heating, Ventilation and Air Conditioning
ID#	Identification Number
IP	Inspection Procedure
IROFS	Items Relied On For Safety
ISA	Integrated Safety Analysis
mrem/yr	millirem per year
NCS	Nuclear Criticality Safety
NFS	Nuclear Fuel Services
OJT	On-The-Job-Training
P&ID	Process And Instrumentation Diagram
PIRCS	Problem Identification, Reporting, and Correction System
SER	Safety Evaluation Report
SNM	Special Nuclear Material
SOP	Standard Operating Procedure
SRE	Safety Related Equipment
SRS	Savannah River Site

**PROPRIETARY INFORMATION REMOVED**

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TEDE	Total Effective Dose Equivalent
TI	Temporary Instruction
TK	Tank
UN	Uranyl Nitrate
UNB	Uranyl Nitrate Building