



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

January 20, 2016

Mr. Joel W. Duling  
President  
Nuclear Fuel Services, Inc.  
P. O. Box 337, MS 123  
Erwin, TN 37650

**SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT NUMBER 70-143/2015-005**

Dear Mr. Duling:

This letter refers to the inspections conducted from October 1 to December 31, 2015, at the Nuclear Fuel Services, Inc. (NFS) facility in Erwin, TN. The purpose of these inspections was to determine whether activities authorized under the license were conducted safely and in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements. The enclosed report presents the results of the inspections. The findings were discussed with members of your staff at the exit meeting held on January 7, 2016.

During the inspections, NRC staff examined activities conducted under your license, as they related to public health and safety and to confirm compliance with the Commission's rules and regulations and with the conditions of your license. Areas examined during the inspections are identified in the enclosed report. Within these areas, the inspections consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of these inspections, no cited violations or deviations were identified.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter and its enclosures will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

J. Duling

2

Should you have any questions concerning these inspections, please contact David Hartland of my staff at 404-997-4722.

Sincerely,

***/RA/***

Marvin D. Sykes, Chief  
Projects Branch 1  
Division of Fuel Facility Inspection

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

Enclosure:  
Inspection Report 70-143/2015-005  
w/Attachment: Supplementary Information

cc: (See page 3)

J. Duling

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U. S. NUCLEAR REGULATORY COMMISSION  
REGION II

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2015-005

Licensee: Nuclear Fuel Services, Inc.

Facility: Nuclear Fuel Services, Inc.

Location: Erwin, TN 37650

Dates: October 1 through December 31, 2015

Inspector: C. Stancil, Senior Resident Inspector

Approved by: M. Sykes, Chief  
Projects Branch 1  
Division of Fuel Facility Inspection

Enclosure

## **EXECUTIVE SUMMARY**

Nuclear Fuel Services, Inc.  
NRC Integrated Inspection Report 70-143/2015-005  
October 1 – December 31, 2015

Inspections were conducted by the resident during normal and off-normal hours in safety operations, radiological controls, and facility support. The inspector performed a selective examination of licensee activities that was accomplished by direct observation of safety-significant activities and equipment, tours of the facility, interviews and discussions with licensee personnel, and a review of facility records.

### **Safety Operations**

- Plant operations were performed safely and in accordance with license requirements. Items relied on for safety were properly implemented and maintained in order to perform their intended safety function. (Paragraphs A.1 and A.2)
- The Nuclear Criticality Safety program was implemented in accordance with the license application and regulatory requirements. (Paragraphs A.3)
- The Fire Protection program and systems were adequately maintained in accordance with the license application and regulatory requirements. (Paragraph A.4)

### **Radiological Controls**

- The licensee adequately implemented the Radiation Protection program consistent with the license application and regulatory requirements. (Paragraphs B.1)

### **Facility Support**

- The post maintenance testing and surveillance programs were implemented in accordance with the license application and regulatory requirements for work control and safety-related equipment testing. (Paragraphs C.1 and C.2)
- Adverse conditions were adequately identified, evaluated, and entered into the corrective action program. (Paragraph C.3)
- The Configuration Management program was implemented in accordance with license requirements. (Paragraph C.4)

### **Attachment:**

Supplementary Information

## REPORT DETAILS

### **Summary of Plant Status**

The facility began the inspection period with the following process areas operating: Naval fuel manufacturing facility (FMF) and the Blended Low Enriched Uranium (BLEU) Preparation Facility (BPF) which includes the Uranium (U)-Metal, U-Oxide, Solvent Extraction and the down-blending lines. All facility operations were shut down at the end of the inspection period for the winter maintenance outage.

#### **A. Safety Operations**

1. Plant Operations Routine (Inspection Procedures (IPs) 88135 and 88135.02)
  - a. Inspection Scope and Observations

The inspector performed routine tours of plant operating areas housing special nuclear material (SNM) and determined that equipment and systems were operated safely and in compliance with the license. Daily operational and shift turnover meetings were observed throughout the period to gain insights into process safety and operational issues. The inspector reviewed selected licensee-identified issues and corrective actions for previously identified issues. These reviews focused on plant operations, safety-related equipment (SRE) (valves, sensors, instrumentation, in-line monitors, and scales), and items relied on for safety (IROFS) to determine whether the licensee appropriately captured off-normal events and implemented effective corrective actions to prevent recurrence.

The routine tours included walk-downs of the FMF, BPF, commercial development line, miscellaneous storage areas, Building 234, and Building 440. During routine tours, the inspector verified that operators were knowledgeable of their duties and attentive to any alarms or annunciators at their respective stations. The inspector observed activities during normal and upset conditions for compliance with procedures and material station limits. The inspector noted that safety controls, including IROFS, were in place, properly labeled, and functional to ensure proper control of SNM. The inspector verified the adequacy of communications between supervisors and operators within the operating areas. The inspector reviewed operator log books, standard operating procedures (SOPs), maintenance records, and Letters of Authorization (i.e., temporary procedures) to obtain information concerning operating trends and activities. The inspector verified that the licensee actively pursued corrective actions for conditions requiring temporary modifications and compensatory measures.

The inspector performed periodic tours of the outlying facility areas and determined that equipment and systems were operated safely and in compliance with the license. The inspector focused on potential wind-borne missile hazards, potential fire hazards with combustible material storage and fire loading, hazardous chemical storage, the physical condition of bulk chemical storage tanks and piping, storage of compressed gas containers, and potential degradation of plant security features. In addition, the inspector periodically toured or inspected the licensee's emergency response facilities for familiarization and to ensure the facilities were maintained in a readily available status.

The inspector attended various plan-of-the-day meetings and met daily with the Plant Shift Superintendent throughout the inspection period in order to determine the overall status of the plant. The inspector evaluated the adequacy of the licensee's response to significant plant issues as well as their approach to solving various plant problems during these meetings.

b. Conclusion

No findings of significance were identified.

2. Safety System Inspection (IP 88135.04)

a. Inspection Scope and Observations

The inspector performed walk-downs of safety-significant systems involved with the processing of SNM. As part of the walk-downs, the inspector verified as-built configurations matched approved plant drawings. The inspector interviewed operators to confirm that plant personnel were familiar with the assumptions and controls associated with the IROFS systems and instrumentation for maintaining plant safety. The inspector also verified that IROFS assumptions and controls were properly implemented in the field. The inspector reviewed the related Integrated Safety Analyses (ISA) to verify system abilities to perform functions were not affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, or other system-related issues. The inspector also verified that there were no conditions that degraded plant performance and the operability of IROFS, safety-related devices, or other support systems essential to safety system performance. Safety significant ventilation including the Main Off-Gas Stack, 308A Fan House, and the Demister and Venturi scrubbers were specifically inspected.

To determine the correct system alignment, the inspector reviewed procedures, drawings, related ISAs, and regulatory requirements such as Title 10 of the *Code of Federal Regulations* (10 CFR) Section 70.61, "Performance Requirements." During the walk-downs, the inspector verified all or some of the following as appropriate:

- Controls in place for potential criticality, chemical, radiological, and fire safety hazards
- Process vessel configurations maintained in accordance with Nuclear Criticality Safety (NCS) Evaluations
- Correct valve position and potential functional impacts such as leakage
- Electrical power availability
- Major system components correctly aligned, labeled, lubricated, cooled, and ventilated
- Hangers and supports correctly installed and functional
- Lockout/Tag-Out program appropriately implemented
- Cabinets, cable trays, and conduits correctly installed and functional
- Visible cabling in good material condition
- No interference of ancillary equipment or debris with system performance

b. Conclusion

No findings of significance were identified.



3. Nuclear Criticality Safety (IP 88135.02)

a. Inspection Scope and Observations

During daily production area tours, the inspector verified that various criticality controls were in place, that personnel followed criticality station limit cards, and that containers were adequately controlled to minimize potential criticality hazards. The inspector reviewed a number of criticality-related IROFS for operability. The inspector noted that operators were knowledgeable of the requirements associated with IROFS. The inspector performed the tours inside various process areas when restrictions on SNM movements were in effect.

As part of routine day-to-day activities on-site, the inspector reviewed corrective action program entries associated with criticality safety aspects. The inspector evaluated the licensee's response to such entries and, if needed, had discussions with NCS engineers to determine safety significance and compliance with procedures.

b. Conclusion

No findings of significance were identified.

4. Fire Protection Quarterly (IP 88135.05)

a. Inspection Scope and Observations

During routine plant tours, the inspector verified that transient combustibles were being adequately controlled and minimized in selected process areas. Various fire barriers and doors were examined and found to be properly maintained and functional in accordance with site procedures. The inspector reviewed active fire impairments in selected process areas and determined they were implemented per site procedure. Building 234 Pu Tent was specifically inspected.

The inspector conducted a walk-down of the Building 234 Pu Tent and determined that the Pre-Fire plan drawing matched the as-found condition for various fire protection components like extinguishers, sprinkler systems, and postings. The material condition of fire protection components was adequate. The inspector noted the fire water supply to the surrounding area fire hydrants was properly aligned for operational status.

b. Conclusion

No findings of significance were identified.

**B. Radiological Controls**

1. Radiation Protection Quarterly (IP 88135.02)

a. Inspection Scope and Observations

During tours of the production areas, the inspector observed radiation protection controls and practices implemented during various plant activities including the proper use of personnel monitoring equipment, required protective clothing, and frisking methods for detecting radioactive contamination on individuals exiting contamination controlled

areas. The inspector noted that plant workers properly wore dosimetry and used protective clothing in accordance with applicable Special Work Permits (SWPs). The inspector also noted that radiation area postings complied with plant procedures and included radiation maps with up-to-date radiation levels. The inspector monitored the operation of radiation protection instruments and verified calibration due dates.

The inspector performed numerous partial reviews of SWPs during the inspection period in different operational areas, but conducted a more thorough review for the following SWP and posted radiologically controlled area:

- SWP 16242, Evaporator OG01 Heater Element Replacement per Work Order 244606

b. Conclusion

No findings of significance were identified.

**C. Facility Support**

1. Post Maintenance Testing (IP 88135.19)

a. Inspection Scope and Observations

The inspector witnessed and reviewed the post-maintenance tests (PMTs) listed below to verify that procedures and test activities confirmed safety systems and components (SSCs) operability and functional capability following the described maintenance. The inspector reviewed the licensee's completed test procedures to ensure any of the SSC safety function(s) that may have been affected were adequately tested, that the acceptance criteria were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspector also witnessed and/or reviewed the test data to verify that test results adequately demonstrated restoration of the affected safety function(s). The inspector verified that PMT activities were conducted in accordance with applicable work order instructions or licensee procedural requirements. Furthermore, the inspector verified that problems associated with PMTs were identified and entered into the licensee's Problem, Identification, Resolution, and Correction System (PIRCS).

- Work Order 244606, Replace OG01 Heater Element, SRE Test N302XXAREAGHTRS

b. Conclusion

No findings of significance were identified.

2. Surveillance Testing (IP 88135.22)

a. Inspection Scope and Observations

The inspector witnessed portions of and/or reviewed completed test data for the following surveillance tests of risk-significant and/or safety-related systems to verify that the tests met the requirements of the ISA, commitments, and licensee procedures. The

inspector confirmed the testing effectively demonstrated that the SSCs were operationally capable of performing their intended safety functions and fulfilled the intent of the associated SRE test requirement.

The inspector discussed surveillance testing requirements with operators performing the associated tasks and determined that their procedural knowledge was adequate. The inspector verified that any test equipment or standards used to conduct the test were within calibration. The inspector determined that effective communications between personnel performing these tests were used to complete each activity.

- SRE Tests N302VENDRAIN001 and 003, Building 302 Plant Off-Gas, SWP 16175, Confined Space Permit 1806, Work Requests 241832 and 241833

b. Conclusion

No findings of significance were identified.

3. Corrective Action Program (CAP) Review (IP 88135)

a. Inspection Scope and Observations

The inspector reviewed the PIRCS to ensure that items adverse to safety were being identified and tracked to closure in accordance with program procedures. The inspector routinely attended daily PIRCS screening committee meetings and periodic Corrective Action Review Board meetings to evaluate site management's response and assignment of corrective actions or investigations to various issues. The inspector also performed daily screenings of items entered into the CAP to aid in the identification of repetitive equipment failures or specific human performance issues for follow-up.

The inspector reviewed CAP entries that occurred during the inspection period to assess and evaluate the safety significance of issues. For items identified to be more safety significant, the inspector conducted an additional evaluation to verify the licensee was adequately addressing and correcting the issues to prevent recurrence.

Furthermore, the inspector conducted periodic reviews of licensee audits and third-party reviews of safety significant processes to determine their effectiveness and whether the licensee entered results into PIRCS. Specifically the inspector reviewed the following:

- Nuclear Safety Culture Assessment of Nuclear Fuel Services, dated November 11, 2015
- NFS Quarterly Assessment of Radioactive Liquid & Gaseous Effluents, Third Quarter 2015
- Quality Assurance Operations Oversight Program

b. Conclusion

No findings of significance were identified.

#### 4. Permanent Plant Modifications (IP 88135.17)

##### a. Inspection Scope and Observations

The inspector reviewed records, work packages, and supporting documentation associated with a change of operations and a material transition, against system design bases documentation to verify that the changes had not affected system operability or availability. The inspector reviewed licensee procedures NFS-CM-001, Configuration Management, and NFS-WM-001, Control and Execution of Work, and selected ongoing and completed work activities to verify that the change was consistent with the design control documents and requirements. The inspector verified that operational details associated with the changes had been incorporated into appropriate operating procedures. The inspector performed field observations with licensee personnel to verify that the as built configuration was in accordance with design documents. The inspector observed testing activities associated with the change and assessed the impact on interfacing operating systems. The inspector observed the systems in operation and verified control panel displays including process and alarm status. Local and remote instrumentation were verified to be operable and clearly visible to personnel. Licensee personnel demonstrated the operational features of the systems and were knowledgeable of alarm settings and system functions. The inspector verified that training had been provided to operators concerning the purpose and function of the systems and alarm response actions. Specifically, the inspector reviewed the following:

- LOA-2266W-19, FZF-YN1-166 (3MT) Filter Processing Through 301 Calciner & Comprehensive Measures for Degraded Equipment Condition

##### b. Conclusion

No findings of significance were identified.

#### **D. Exit Meeting**

The inspection scope and results were presented to members of the licensee's staff at various meetings throughout the inspection period and were summarized on January 7, 2016, to J. Duling and his staff. No dissenting comments were received from the licensee. Proprietary and classified information was discussed but not included in the report.

## SUPPLEMENTARY INFORMATION

### **1. KEY POINTS OF CONTACT**

<u>Name</u>	<u>Title</u>
S. Barron	Emergency Preparedness Manager
C. Brown	MC&A Department Section Manager
N. Brown	NCS Department Section Manager
R. Dailey	Engineering Director
R. Dotson	Quality Manager
J. Duling	President
T. Evans	Security Section Manager
R. Freudenberger	Safety & Safeguards Director
J. Hagemann	Work Management Section Manager
M. McKinnon	Operations Director
M. Moore	Environmental Protection & Industrial Safety Section Manager
J. Nagy	Nuclear Safety Officer Chief
D Rogers	Waste Management & Decommissioning Section Manager
A. Sabisch	Licensing and ISA Manager
S. Sanders	Training Manager
R. Shackelford	Nuclear Safety & Licensing Section Manager
R. Storey	Configuration Management Unit Manager
M. Tester	Radiation Protection Unit Manager

### **2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

None

### **3. INSPECTION PROCEDURES USED**

88135	Resident Inspection Program For Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	ISA Implementation
88135.05	Fire Protection
88135.17	Permanent Plant Modifications
88135.19	Post Maintenance Testing
88135.22	Surveillance Testing

### **4. DOCUMENTS REVIEWED**

#### Drawings:

005-C0192-D, Plant Layout with Industrial Park Facility Warehouse and BLEU Facility  
306-F0084-D, 300 Complex POG Ventilation Scrubber System P&ID  
306-F0273-D, 300 Complex POG Ventilation Blowdown Tank P&ID  
308A-F0003-D, 308A Stack and Duct Piping & Instrument Diagram Condensate & POG  
308A-F0004-D, 300 Complex POG Ventilation Building 308A Blower P&ID  
308A-F0005-D, 300 Complex POG Ventilation Blower Interlock Narrative

#### Procedures:

ENG-HTG-59, Cold Weather Preparedness to Facilitate Plant-Wide Freeze Protection  
NFS-GH-36, Lockout/Tagout  
NFS-GH-37, Industrial Trucks  
NFS-HS-A-16, Safety Audits, Assessments, and Inspections

NFS-HS-A-68, ISA Risk Assessment Procedure  
 NFS-HS-A-71, Pre-Fire Plan Administration  
 NFS-HS-B-11, Inspection of Emergency Lights  
 NFS-HS-B-35, Daily Personnel Monitor Source and Response Verifications  
 NFS-HS-B-70, Fire Detection  
 NFS-HS-B-85, Portable Fire Extinguishers  
 NFS-HS-B-87, Fire Hose and Hose House Inspection, Testing, and Maintenance  
 NFS-OPS-1, Conduct of Operations  
 NFS Site ISA Summary  
 Special Nuclear Materials License SNM-124  
 SOP 401-03-302, Area 300-302  
 SOP 401-24-302, Area D

Records:

2015 Quality Assurance Audit/Assessment Schedule, Revision 1  
 CARB Agendas dated October 26, November 9, and December 14, 2015  
 Industrial Safety Message, Industrial Truck Safety and GH-37  
 License Amendments and Fundamental Nuclear Material Control (FNMC) Plan Revisions  
 List of PIRCS for Ventilation System  
 LOA-ENG-13-1, Temporary Operation Instructions for Demisting Scrubber  
 LOA-ENG-14-2, Operating the B-306 Scrubber While the Plant Air System is Impaired  
 LOA-FMF-13-3, Transfer Drums of Water to TankXX-T20  
 NFS-SEC-FOF-15-004 Briefing Itinerary  
 Work Management Performance Indicators, Scheduled – Work Package Recalls  
 Work Request (WR) 244751, Electronics Support OG01 Heater Element Replacement

PIRCS Reviewed:

48864, 49894, 50199, 50220, 50242, 50434, 50442, 50497, 50549, 50571, 50650, 50774, 50910

PIRCS Written as a Result of the Inspection:

49065, Area 900 Material Storage  
 50512, Fork Truck Use of Horn and Lights  
 50602, 0D04 Powered On  
 50641, Emergency Light 771 Wiring  
 50837, Courtesy Frisker Multiplier and Alarm Setpoint  
 50854, Logging Ventilation System Readings  
 50855, Courtesy Frisker Minor Violation  
 50858, 306 Building Scrubber Room  
 51083, GH-36 Restoration Position  
 51090, OG01 Fuses Pulled