



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

April 27, 2017

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 70-143/2017-002

Dear Mr. Duling:

This letter refers to the inspections conducted from January 1 to March 31, 2017, 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 meetings held on February 9, 2017, February 16, 2017, and April 12, 2017.

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. The inspections covered the following areas; safety operations, radiological controls, facility support, and other areas.

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 enclosure 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 (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

J. Duling

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Should you have any questions concerning these inspections, please contact Carmen Rivera of my staff at 404-997-4515.

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 70-143/2017-002
w/Attachment: Supplementary Information

cc: (See page 3)

cc:

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SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY
 COMMISSION INTEGRATED INSPECTION REPORT NUMBER 70-143/2017-002

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No: 70-143

License No.: SNM-124

Report No: 70-143/2017-002

Licensee: Nuclear Fuel Services, Inc.

Facility: Nuclear Fuel Services, Inc.

Location: Erwin, TN 37650

Dates: January 1 through March 31, 2017

Inspectors: D. Anderson, Acting Senior Resident Inspector
B. Adkins, Acting Senior Resident Inspector
T. Sippel, Acting Senior Resident Inspector
N. Peterka, Acting Senior Resident Inspector
J. Munson, Fuel Facility Inspector
P. Startz, Fuel Facility Inspector
M. Crespo, Senior Fuel Facility Inspector
K. Kirchbaum, Acting 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 70-143/2017-002

January 1 - March 31, 2017

Inspections were conducted by the acting resident inspectors, and regional inspectors during normal and off-normal hours in the areas of safety operations, radiological controls, facility support, and other areas. The inspectors performed a selective examination of licensee activities that were 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

- The items relied on for safety (IROFS) reviewed during this period were properly maintained in order to perform their intended safety function in accordance with the license application and regulatory requirements. (Sections A.1, A.2 and A.3)
- The Nuclear Criticality Safety (NCS) program was properly implemented and maintained in order to assure that normal and credible abnormal conditions remained subcritical as required by license and regulatory requirements. Criticality analysis demonstrated double contingency and adequate control of NCS parameters. (Paragraphs A.4 and A.5)
- For the areas reviewed, fire protection systems and area housekeeping were maintained in accordance with fire safety requirements for special nuclear material processing areas and storage areas. (Section A.6)

Radiological Controls

- The Radiation Protection program elements reviewed were implemented in accordance with the license and regulatory requirements. (Sections B.1)

Facility Support

- The post maintenance testing, preventive maintenance and surveillance testing observed for IROFS and other safety controls were implemented in accordance with the license and applicable procedure requirements. (Sections C.1 and C.2)
- Reports for tracking and resolution of safety-related issues included corrective actions to prevent recurrence. Extent of condition and extent of cause reviews were conducted when required by the governing corrective action program procedure. (Section C.3)
- The Emergency Preparedness program was implemented in accordance with the Emergency Plan and regulatory requirements. (Paragraph C.4)

Other Areas

- License Event Report (LER) 2016-006, Event Notification (EN) 52404, Office Area Alarm Audibility Disabled was reviewed by the inspectors and closed in this inspection report. (Paragraph D.1)

- Violation 70-143/2016-002, Failure to Perform Functional Testing on Two Non-Configuration Management (CM) Controlled Isolation Valves Following the Connection to a CM Controlled Operating System was evaluated by the inspectors and closed in this inspection report. (Paragraph D.1)

Attachment

Supplementary Information

REPORT DETAILS

Summary of Plant Status

The facility began and continued through 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. Inventory cleanout operations were also performed during the inspection period.

A. Safety Operations

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

The inspectors performed routine tours of the fuel manufacturing areas housing special nuclear material (SNM), reviewed log sheets, and interviewed operators, front-line managers, maintenance mechanics, radiation protection (RP) staff, and process engineering personnel regarding issues with plant equipment and to verify the status of the process operations. The inspectors observed operational and shift turnover meetings throughout the inspection period to gain insight into safety and operational issues.

During the inspection period, the inspectors interviewed operators, front-line managers, maintenance technicians, engineers, RP technicians, and nuclear materials control technicians to verify that each of the individuals demonstrated adequate knowledge of the NCS posting requirements, hazards, and the operations procedures associated with their assigned duties.

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

The inspectors performed periodic tours of the outlying facility areas to determine that equipment and systems were operated safely and in compliance with the license. The inspectors 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 inspectors toured the licensee's temporary emergency response facilities for familiarization and to ensure the facilities were maintained in a readily available status.

The inspectors attended various plan-of-the-day meetings and met routinely with the Plant Shift Superintendent throughout the inspection period in order to monitor the overall status of the plant. The inspectors 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 violations of more than minor significance were identified.

2. Operational Safety (IP 88020)

a. Inspection Scope and Observations

The inspectors focused on the operations of the WWTF, the WD and WF storage tanks, the 105 Laboratory sumps, and the operation of the inline uranium monitors for the WD and WF storage tanks. The inspectors reviewed the licensee's integrated safety analysis (ISA) and selected several criticality safety accident sequences and the various IROFS designed to prevent the accident sequence. The inspectors reviewed accident sequences identified in the WWTF ISA. In addition, the inspectors reviewed the IROFS in place for accident sequences involving transfers from favorable to unfavorable geometry tanks and sumps throughout most of the plant. The inspectors reviewed the implementation of management measures for the selected IROFS to verify that they were being adequately conducted to meet the requirements of 10 CFR 70.62. The review consisted of walk-downs of process equipment, review of runsheets for administrative controls, and discussions with engineers in charge of the areas. The inspectors also reviewed the setpoint calculations for the inline monitor used for the WD and WF storage tanks. The inspectors reviewed the list of operators for the WWTF to verify that they were trained and in compliance with training requirements of Section 11.3 of the license application.

The inspectors reviewed several condition reports to verify that the licensee is appropriately addressing and correcting safety-significant conditions. The inspectors also reviewed the list of safety-related equipment (SRE) test failures for 2016 to determine the licensee's compliance with the recordkeeping requirements of 10 CFR 70.62(a)(3).

The inspectors reviewed the results of the majority of the 2016 management measures audits of "Quality Assurance elements for IROFS," as required biennially by Section 11.5.1 of the license application. The inspectors also reviewed the most recent triennial assessment of the Licensing and Integrated Safety Analysis Functional areas, as required by Section 11.5.2 of the license application.

The inspectors reviewed various operating procedures for WWTF and the Lab to verify that modifications to existing and generation of new procedures were implemented according to the licensee's configuration control program. The inspectors reviewed the operations organization to verify that any changes to the organization maintained compliance with the qualification requirements of Chapter 2 of the license application.

The inspectors evaluated the housekeeping of the facility to assess if there would be a negative impact on safety.

b. Conclusion

No violations of more than minor significance were identified.

3. Safety System Walk-down (IP 88135.04)

a. Inspection Scope and Observations

The inspectors performed a walk-down of a safety-significant system involved with the processing of SNM. As part of the walk-downs, the inspectors verified as-built configurations matched approved plant drawings. The inspectors 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. As part of the walk-down, inspectors reviewed the NCS postings associated with the handling of SNM. The inspectors verified that IROFS were available and reliable to perform their intended functions when needed to comply with the performance requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 70.61, "Performance Requirements." The inspectors reviewed the related ISA to verify that the system abilities to perform functions were not affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, or other system-related issues. Specifically, the inspection covered Areas A, B, and C in uranium recovery, as well as the WWTF.

To determine the correct system alignment, the inspectors reviewed procedures, drawings, related ISAs, and regulatory requirements including, 10 CFR 70.61. During walk-downs, the inspectors 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 Evaluations (NCSEs)
- Correct valve position and potential functional impacts such as leakage
- Electrical power availability
- Major system components correctly aligned, labeled, lubricated, cooled, and ventilated
- 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 violations of more than minor significance were identified.

4. Nuclear Criticality Safety (IP 88135.02)

a. Inspection Scope and Observations

During daily production area tours, the inspectors 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 inspectors reviewed a number of criticality-related IROFS for operability. During these observations, the inspectors verified that selected IROFS were properly implemented and that operators were knowledgeable of the requirements associated with IROFS.

As part of routine day-to-day activities on-site, the inspectors reviewed corrective action program (CAP) entries associated with criticality safety aspects. The inspectors 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 violations of more than minor significance were identified.

5. Nuclear Criticality Safety (IP 88015)

a. Inspection Scope and Observations

The inspectors reviewed selected NCSEs to verify the approved NCSEs were in place prior to conducting new or changed operations and they contained sufficient detail and clarity to permit independent review. Selected NCSEs were reviewed to verify whether calculations performed were applicable and consistent with the validation report. The inspectors reviewed the associated assumptions and calculations to verify they were consistent with the commitments in the Chapter 5 of the license application. This verification included the consideration of the Double Contingency Principle, assurance of subcriticality under normal and credible abnormal conditions with the use of subcritical margin, technical practices and methodologies, and treatment of NCS parameters. The NCSEs were selected based on factors such as risk-significance, new and/or revised evaluations, and operating history. The NCSE review focused on cart and rack use in the Commercial Development Line (CDL) and the WWTF.

The inspectors reviewed the licensee's accident sequences in the above NCSEs to determine whether normal and credible abnormal conditions were identified in accordance with the commitments and methodologies in the License application for the analysis of process upsets. This included the review of accident sequences that the licensee determined to be not credible to determine whether the bases for incredibility were consistent with the commitments, definitions, and methodologies in the License application, and were documented in sufficient detail to permit an independent assessment.

The inspectors reviewed the licensee's validation report and verified that no changes were made since the last NCS inspection. The inspectors interviewed licensee staff and reviewed verification reports (such as 54T-14-0007) to verify that the licensee performed verifications of the neutronics codes used for NCS (SCALE 6.1 and 4.4a), in accordance with written and approved procedures (NFS-HS-A-63). Specifically, the inspectors verified that the licensee performed code verifications before first use and after major system updates or code changes that may affect the functionality of the codes.

The inspectors performed walk-downs in Areas 200 – 900, Area LA, the BPF, the CDL, the 105 Lab, and the WWTF to determine whether existing plant configuration and operations were covered by, and consistent with the process description and safety basis in the NCSEs. The inspectors verified that selected engineered controls established in the NCSEs, including physical barriers, spacing controls, and safety related valves, were appropriately included in process and system descriptions, drawings, as appropriate. The inspectors reviewed operating procedures and postings to verify that selected administrative controls established in the NCSEs were included. The inspectors interviewed operators and laboratory analysts to verify that selected administrative controls established in the NCSEs, especially those related to concentration control and sampling, were understood and implemented as intended.

The inspectors reviewed the ISA Summary and supporting ISA documentation to determine whether the controls identified in the ISA were supported by technical basis in the NCSEs. The inspectors reviewed the licensee's implementation of NCS-related procedures and controls to verify that the licensee had appropriately considered sources of common cause failures such that the controls remained sufficiently reliable to meet the performance requirements of 10 CFR 70.61. The inspectors also reviewed control flowdowns to verify that selected passive engineered controls that were relied on in the NCSE were identified and tracked as Configuration Controlled Equipment in accordance with IROFS NFS-1.

The inspectors accompanied an NCS engineer on a walk-down of Areas 200 - 900 to determine whether the NCS function assesses field compliance with established NCS controls as required by Section 5.3.4 of the license application. The inspectors conducted interviews and reviewed records to determine whether NCS staff reviewed new and/or revised fissile material operations and procedures, including maintenance plans, consistent with program procedures and at a level commensurate with their significance.

The inspectors reviewed the selected NCSEs listed above to verify that they were performed in accordance with NCS program procedures and received appropriate independent review and approval. The inspectors reviewed the NCS program audits to verify that they were conducted at a frequency consistent with license requirements and with appropriate thoroughness. The inspectors reviewed the licensee's PIRCS system through review of NCS-related entries to verify that audit observations and findings were communicated to licensee management and were appropriately followed up on.

The inspectors observed an audibility test of the Criticality Accident Alarm System (CAAS) and reviewed audibility testing records. The licensee has been conducting more frequent and more detailed audibility tests as a result of recent events (EN52358). This event is discussed in more detail in NRC Inspection Report (IR) 70-143/2016-005. The inspectors performed interviews with the licensee to discuss the testing, maintenance,

and reliability of the CAAS. The inspectors reviewed recent detector placement calculations (21T-16-0555) and performed interviews with the licensee to discuss the licensee's methodology for determining detector placement and coverage.

b. Conclusion

No violations of more than minor significance were identified.

6. Fire Protection Quarterly (IP 88135.05)

a. Inspection Scope and Observations

During routine plant tours, the inspectors verified that transient combustibles were being controlled and minimized in the observed process areas. The inspectors conducted specific fire safety tours in Building 333, the BPF and reviewed the fire detection and suppression capabilities in those areas. Various fire barriers and doors were examined and found to be properly maintained and functional in accordance with site procedures (NFS-HS-B-95). The inspectors reviewed active fire impairments in BPF and 105 Lab to verify that they were implemented per site procedure.

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

The inspectors reviewed a sampling of fire-related PIRCS entries to verify that corrective actions were appropriate and that appropriate compensatory actions were implemented as applicable. The following PIRCS were reviewed: #56754, 56755, and #57578. The inspectors attended a pre-job brief for LOA-HS-17-003 involving a transfer of potentially flammable solution from polycarbonate to stainless steel drums (PIRCS #56578). The inspectors verified that the pre-job briefing contained the necessary information to complete the evolution in a safe and controlled manner including a discussion of pertinent safety/fire hazards, staging of equipment and personnel, personnel protective equipment (PPE) requirements, and required actions by the fire brigade personnel in the event of a spill or fire. The inspectors observed the completion of pre-requisite work activities including donning of PPE, signing on to the Special Safety Work Permit, posting the area as a radiological controlled area, and staging of fire hoses and spill collection materials. The inspectors observed a portion of the drum transfer operation to verify that it was performed in accordance with the requirements of the LOA. Actual work activities were performed by members of the NFS fire brigade due to the flammable nature of the material involved. Fire brigade personnel were fully dressed out in fire protection gear and were equipped with a self-contained breathing apparatus (SCBA). Fire brigade personnel were also staged outside the building entrance at the truck to provide fire suppression capability (foam) in the event of a chemical fire.

b. Conclusion

No violations of more than minor 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 inspectors verified that radiological signs and postings accurately reflected radiological conditions within the posted areas. The inspectors observed RP controls and practices implemented during various plant activities including the proper use of personnel monitoring equipment, required protective clothing, bagging of contaminated trash, and frisking methods for detecting radioactive contamination on individuals exiting contamination controlled areas. The inspectors observed plant personnel as they removed protective clothing at controlled area step-off pads. The inspectors observed plant personnel as they performed various tasks in different areas of the facility and verified that the proper protective equipment was used to prevent contamination. The inspectors monitored the operation of RP instruments and verified calibration due dates.

The inspectors performed numerous partial reviews of Special Work Permits (SWPs) during the inspection period in different operational areas. The inspectors verified that these SWPs contained appropriate work instructions, were posted in the work areas for employees' review, and that workers signed the SWP. The inspectors noted that for the portions of work activities observed, pre job briefs were performed, plant workers performed tasks in accordance with the SWP requirements including, proper use of dosimetry and protective clothing. The inspectors conducted a more thorough review for the following SWPs and posted radiologically controlled areas:

- SWP 16566, 302-FRNCOV 0D01; Replace retort 0D01; Replace FW-0D37 and Spool Piece per PM instruction,
- SWP 17-02-04,
- SWP 17-03-04,
- SWP 17-09-05, Fix/replace valve BA-0244,
- SWP 17-21-06.

b. Conclusion

No violations of more than minor significance were identified.

C. Facility Support

1. Post Maintenance Testing (IP 88135.19)

a. Inspection Scope and Observations

The inspectors witnessed and reviewed the post maintenance testing (PMT) listed below to verify that procedures and test activities confirmed safety systems and components (SSCs) operability and functional capability following the described maintenance. The inspectors 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 inspectors also witnessed and/or reviewed the test data to verify that test results adequately demonstrated restoration of the affected safety function(s). The inspectors verified that PMT activities were conducted in accordance with applicable work order instructions or licensee procedural requirements. Furthermore, the inspectors verified that problems associated with PMTs were identified and entered into the PIRCS system.

- WR 261425, Fix/replace valve BA-0244.
- WR 249755, Replace PY-CWS-90, SRE Test N302PSLCWSCWS02

b. Conclusion

No violations of more than minor significance were identified.

2. Surveillance Testing (IP 88135.22)

a. Inspection Scope and Observations

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

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

- SRE Test N302XOVRFLO0101, IROFS 302-100-200, Overflow Check
- SRE Test N302XAIRGAP0J11, IROFS 300 – GENERAL AIRGAP Verification
- SRE Test N302XAIRGAP00412, IROFS 300 – GENERAL AIRGAP Verification
- SRE Test N333VALVHV5A01A, INLET VALVE, CONDENSATE TANK
- SRE Test N333VALVHV5A01B, INLET VALVE, CONDENSATE TANK

b. Conclusion

No violations of more than minor significance were identified.

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

a. Inspection Scope and Observations

The inspectors reviewed the PIRCS to ensure that items adverse to safety were being identified and tracked to closure in accordance with program procedures. The inspectors 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 inspectors 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 inspectors 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 inspectors conducted an additional evaluation to verify the licensee was adequately addressing and correcting the issues to prevent recurrence.

Furthermore, the inspectors 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.

b. Conclusion

No violations of more than minor significance were identified.

4. Emergency Preparedness (IP 88050)

a. Inspection Scope and Observations

The inspectors interviewed staff, reviewed samples of records and changes made to the Emergency Plan and implementing procedures, or changes within the facility to evaluate compliance with Chapter 8.0, "Emergency Management," of the SNM-124 License, and NFS-GH-903, "Emergency Plan," Revision (Rev.) 20, and subordinate procedures. The inspectors reviewed samples of implementing procedures with significant revisions since the last emergency preparedness (EP) inspection to verify the procedures remained in compliance with NFS-GH-903. The inspectors discussed the licensee emergency call list and reviewed samples of testing records to determine if the list was current, and that telephones and radios were tested in accordance with NFS-HS-E-10, "Emergency Communications," Rev. 28, and NFS-HS-A-24, "Inspection of Emergency Supplies" rev. 11. Inspectors reviewed sample licensee inspection and inventory forms completed in 2016 to evaluate compliance with NFS-HS-B-40, "Inspecting Emergency Equipment and Supplies," Rev. 27; BLEU-HS-B-40, "Emergency Equipment and Supplies," Rev. 2; NFS-HS-B-08, "Inspection of Fire Brigade Response Equipment," Rev. 9 and; NFS-HS-B-91, "Self-Contained Breathing Apparatus Inspection," Rev. 3.

The inspectors reviewed samples of written agreements with the off-site agencies to determine if emergency response organizations required by NFS-GH-903 were up-to-date. The inspectors interviewed representatives from the Johnson City Medical Center and the Erwin Fire Department to assess their knowledge and understanding of the written agreements, both dated August 11, 2014. In addition, inspectors reviewed records to evaluate if the licensee invited offsite organizations for training as required by NFS-GH-903, that the training given was appropriate, and to assess feedback from their interactions with the licensee. The inspectors reviewed a sample of records to verify that the licensee performed a quarterly communication check with the off-site organizations as required by the Emergency Plan in accordance with NFS-HS-A-24.

The inspectors observed the storage of emergency equipment in NFS medical clinic, NFS assembly area equipment building, Fire Brigade Equipment Building, Emergency Response Vehicle (truck), various emergency supply locations within and around the NFS facility site to evaluate that the inventory levels were maintained as required by the NFS-GH-903, NFS-HS-A-24, NFS-HS-B-08, and NFS-HS-B-40. The inspectors toured the Emergency Control Center currently being renovated. Inspectors evaluated communication-related equipment located in the various staging areas to determine if the equipment was functional and was being maintained in accordance with the manufacturer's instructions. The inspectors reviewed the automated personnel system, the manual backup accountability procedures, and surveyed the accountability staging area to evaluate compliance with NFS-GH-903 and NFS-HS-A-24.

The inspectors reviewed documentation of past events since the previous EP inspection, which required the implementation of the Emergency Plan to verify that any problems or deficiencies associated with the Emergency Plan or implementing procedures were corrected in a timely manner. The inspectors reviewed self-assessments generated since the last inspection to verify that a system was in place for tracking and resolving self-assessment findings.

The inspectors reviewed training provided to emergency response personnel covering their roles and responsibilities and use of emergency equipment as required by the Emergency Plan to verify that the individuals responsible for utilizing the equipment were qualified. The inspectors reviewed the licensee-provided training for hypothetical emergency situations to verify the training was effective and consistent with the frequency and performance objectives required in the Emergency Plan. The inspectors interviewed production personnel to evaluate their intended evacuation response upon building evacuation alarms to evaluate compliance with NFS-HS-E-02, "Emergency Criticality Evacuation," Rev. 43. Inspectors reviewed the 2016 Emergency Preparedness Audit QA-16-22 to evaluate compliance with SNM-124, Section 11.5.1, Audits, which requires an annual audit, identified in the Emergency Plan.

b. Conclusion

No violations of more than minor significance were identified.

D. Other Areas

1. Event Follow-up

a. LER 2016-006: EN 52404 Office Area Alarm Audibility Disabled

On December 1, 2016, at 1014, a trouble alarm activated on the fire alarm control panel. This panel monitors the sites public address and alarm system, including the CAAS. Licensee staff trouble shooting the alarm determined that the speakers on the first floor of an office building were not functioning. The affected area was evacuated and compensatory measures put in place to prevent personnel from entering the area. Within an hour of the evacuation, the licensee restored the system and tested it to ensure proper system operation. This issue was entered into the licensee's corrective action system as PIRCS 55794 and 55795. The licensee determined that the speakers had been inadvertently disconnected by workers removing abandoned electrical wiring.

This was an isolated incident with very low safety impact. The self-monitoring feature of the CAAS immediately detected the condition and activated a trouble alarm that enabled the licensee to identify and impose compensatory measures within a very short time period. Additionally, the affected area was not an area where fissile material was handled, used, or stored. Although this issue must be corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with section 2.3.1 of the "NRC Enforcement Policy." Therefore, this item is considered closed.

- b. Violation 70-143/2016-002: Failure to Perform Functional Testing on Two Non-Configuration Management (CM) Controlled Isolation Valves Following the Connection to a CM Controlled Operating System.

The inspectors reviewed the status of the longer term corrective actions that were identified as part of PIRCS investigation 20001 (Corrective Actions 26062 through 26070). The inspectors verified that additional training and operating experience for the applicable personnel and modifications to the CM program were implemented. The inspectors also verified that the quality assurance organization had incorporated the verification of compliance of the CM program into its routine reviews. This item is considered closed.

E. Exit Meeting

On February 9, 2017, February 17, 2017, and April 12, 2017, the inspectors presented the inspection results to J. Duling and members of the licensee staff. No dissenting comments were received from the licensee. Proprietary information was discussed but not included in the report.

SUPPLEMENTARY INFORMATION

1. KEY POINTS OF CONTACT

<u>Name</u>	<u>Title</u>
D. Bailey	Erwin Fire Department Chief
S. Barron	Emergency Preparedness Manager
N. Brown	NCS Department Section Manager
T. Cloyd	Fire Protection Engineer
J. Duling	President
M. Eakin	Senior NCS Engineer
T. Evans	Security Section Manager
R. Freudenberger	Safety & Safeguards Director
K. Greer	Emergency Services Unit Manager
J. Hagemann	Work Management Section Manager
R. Maurer	ISA Manager
M. McKinnon	Operations Director
P. McNutt	Johnson City Medical Center
M. Moore	Environmental Protection & Industrial Safety Section Manager
A. Morie	Licensing Manager
J. Nagy	Nuclear Safety Officer Chief
B. Norton	Emergency Control Director (ECD)
R. Ratner	Senior Health Physicist
B. Rice	NCS Engineer
R. Rice	Radiation Protection Unit Manager
S. Sanders	Training Manager
L. Scott	Radiation Monitoring Manager
R. Shackelford	Nuclear Safety & Licensing Section Manager
S. Skiles	NCS Engineer

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

70-143/2016-002	VIO	Failure to Perform Functional Testing (Paragraph D.1)
70-143/2016-006	LER	EN 52404 Office Area Alarm Audibility Disabled (Paragraph D.2)

3. LIST OF INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety
88020	Operational Safety
88050	Emergency Preparedness
88135	Resident Inspection Program For Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	ISA Implementation
88135.05	Fire Protection
88135.19	Post Maintenance Testing
88135.22	Surveillance Testing

4. DOCUMENTS REVIEWED

Records:

- 21G-17-0054, Biannual Effluent Monitoring Report July to December 2016, dated February 20, 2017
- 21T-15-2285, Occupational/Environmental Chemical Accident Consequence Evaluation Recovery, Rev. 5
- 21T-15-2501, Recovery Radiological Accident Consequence Evaluation, Rev. 3
- 21T-16-0744, Justification for Deleting LOA-HS-16-003, dated August 19, 2016
- 21X-16-0016, Items Relied On For Safety (IROFS) and Safety-Related Equipment (SRE) – Building 302 Uranium Recovery Facility Area A, B, and C, Rev. 10
- 54T-12-0027, Nuclear Criticality Safety Evaluation Waste Water Treatment Facility, Rev. 7
- 54X-12-0002, Nuclear Criticality Safety Evaluation for Area A of the Uranium Recovery Facility, Rev. 1
- 54X-14-0007, Nuclear Criticality Safety Evaluation for Area B (Buildings 302 and 303) of the Production Fuel Facility, Rev. 5
- SA-00012, Setpoint Analysis for FAF-021, Rev. 7
- SA-00125, Setpoint Analysis for FPV-005, FMF-026, Rev. 4
- Fire System Impairment Permit Number 2017-010
- SRE N333PRSLEEVE004, Rev. 2, completed February 22, 2017
- SRE N333PRSLEEVE005, Rev. 3, completed February 23, 2017
- SRE N333PRSLEEVE006, Rev. 2, completed February 23, 2017
- SRE N333PRSLEEVE009, Rev. 2, completed February 22, 2017
- 21G-16-0217, 30-day Written Notification of Event (NRC Event No. 52404), dated December 22, 2016
- 21T-16-0555, Demonstration of Criticality Accident Alarm System Coverage for Waste Water Treatment Facility, Rev. 0
- 54T-11-0008, Nuclear Criticality Safety Evaluation for the CDL ADU Precipitation System and Calciner Furnace, Rev. 1
- 54T-14-0007, Verification of Computer Codes for NCS for Uranium Systems with Enrichments up to 100 wt. % ^{235}U : SCALE 6.1 with the V7-238 Library from ENDF/B-VII, and SCALE 4.4a with the 27GROUPNDF4 Library from ENDF/B-IV, Rev. 0
- NCS-2017-04, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for the Dissolution of Uranium and High Enriched Uranium Storage Columns, dated January 26, 2017
- NCS-2017-01, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for ENCLOS-6902 in Area 900 of the Production Fuel Facility, dated January 10, 2017
- NCS-2016-35, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for Area D of the Uranium Recovery System, dated December 19, 2016
- NCS-2016-34, 2016 Nuclear Criticality Safety (NCS) Audit of the Training Program, dated January 2, 2017
- NCS-2016-33, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for ENCLOS-8901 of Area 900 of the Production Fuel Facility, dated December 15, 2016
- NCS-2016-32, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for ENCLOS-5901 of Area 900 of the Production Fuel Facility, dated December 19, 2016
- NCS-2016-31, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for the Blended Low Enriched Uranium U-Aluminum Dissolution, dated December 8, 2016
- NCS-2016-30, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for the Blended Low Enriched Uranium Preparation Facility Solvent Extraction, dated December 5, 2016

NCS-2016-29, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for the Can Cleaning System, dated December 6, 2016
 NCS-2016-28, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for Area A of the Uranium Recovery Facility, dated November 28, 2016
 NCS-2016-27, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for the QC Vault, dated November 21, 2016
 NCSE for Cart and Rack Use in the Commercial Development Line (CDL), Rev. 6
 NCSE for Wastewater Treatment Facility, Rev 7
 Validation of Computer Codes for NCS for Uranium Systems with Enrichments up to 100 wt. % ²³⁵U: SCALE 6.1 with the V7-238 Library from ENDF/B-VII, and SCALE 4.4a with the 27GROUPNDF4 Library from ENDF/B-IV, Rev 0
 Alarm Testing Records for the 100 Laundry Building, dated February 6, 2017
 Criticality Alarm Speaker Function Record, dated February 7, 2017
 WR261405, WR261422, WR261929, Build/Disassemble Scaffold for Support of Maintenance”
 21T-15-1145, Initial Emergency Control Director (ECD) Qualification for R. Freudenberger, dated April 23, 2015
 21T-15-2156, Initial Emergency Control Director (ECD) Qualification for T. Nelson, dated August 14, 2015
 21T-13-1250, Initial Emergency Control Director (ECD) Qualification for M. Wilson, dated September 12, 2013
 Memo, B. M. Moore, dated April 22, 2016, Initial ERO Qualification for M. McKinnon
 HS-ERO, Safety Emergency Response Organization Training Records, 2/6/2017
 NFS-HS-B-91 Attachment A, Self-Contained Breathing Apparatus Inspection Form, Rev. 4, completed January 16, 2017 (equipment inspection and inventory)
 NFS-HS-B-08-01 Attachment D, Inspection for Fire Brigade Response Equipment Form, Rev. 2, completed February 5, 2016, and January 12, 2016 (equipment inspection and inventory)
 NFS-HS-A-24 Attachment A, Inspection of Emergency Supplies, Rev. 11, completed December 15, 2016, and December 22, 2016 (equipment inspection and inventory)
 NFS-HS-A-24 Attachment C, Monthly Emergency Communication Checklist, Rev. 11, completed December 22, 2016
 NFS-HS-B-40 Attachment D, Emergency Response Vehicle Equipment Checklist, Rev. 27, completed November 8, 2016 (equipment inspection and inventory)
 “Triennial Assessment of the Licensing Program at Nuclear Fuel Services, Inc. (NFS), for 2015,” dated December 9, 2015
 “Independent Triennial Integrated Safety Analysis Program Audit for Nuclear Fuel Services, Inc. Erwin, Tennessee,” Rev. 0, dated June 2015
 SA-00228 [P002.1] [3], “Setpoint Analysis for FLW-004 (U)”, dated March 5, 2015

Procedures:

LOA-2289X-056
 LOA-2293Y-001
 LOA-HS-17-003
 NFS-ACC-033, Shipping Procedure for Nuclear Material, Rev. 43
 NFS-GH-01, Contamination Control, Rev. 34
 NFS-GH-03, Safety Work Permits, Rev. 19
 NFS-GH-27, Impairments to Fire Protection Systems, Rev. 11
 NFS-HS-B-70, Fire Detection, Rev. 9
 NFS-HS-B-85, Portable Fire Extinguishers, Rev. 5
 NFS-HS-B-95, Testing/Inspection of Fire Barrier Systems, Rev. 3

NFS-HS-A-53-06, BLEU Complex Fire Protection Program Summary of Routine Inspections,
 Testing and Maintenance, Rev. 1
 SOP 401-21-302, Area A Bldg 302, Rev. 22
 SOP 401-22-303, Area B-303, Rev. 17
 SRE Test N302XPOGVNT0B03, Rev. 3
 SRE Test N302 VALVETW0C81, Rev. 0
 SRE Test N302VALVETW0B82, Rev. 0
 SRE Test N303PRSLEEVE004, Rev. 0
 SRE Test N333VALVHV5A01A, Rev. 2, completed March 3, 2017
 SRE Test N333VALVHV5A01B, Rev. 1, completed March 3, 2017
 21T-12-0664, Nuclear Criticality Safety Design Considerations, Rev. 3
 ENG-EPS-A-005, Engineering Practices and Standards – Baseline Design Criteria for
 IROFS, Rev. 2
 NFS-A-7, Rev. 22
 NFS-HS-A-63, Verification and Validation of Nuclear Criticality Safety Analysis Codes,
 Rev. 7
 SOP 409, Section 22, Rev. 24
 BLEU-HS-B-40, Inspecting Emergency Equipment and Supplies, Rev. 2
 NFS-GH-903, Emergency Plan, Rev. 20
 NFS-HS-A-24, Inspection of Emergency Supplies, Rev. 11
 NFS-HS-B-40, Inspecting Emergency Supplies, Rev. 27
 NFS-HS-E-02, Emergency Criticality Evacuation, Rev. 43
 NFS-HS-E-03, Emergency Response Organization, Rev. 29
 NFS-HS-E-04, Fire Reporting and Response, Rev. 38
 NFS-HS-E-05, Spill Response and Reporting, Rev. 35
 NFS-HS-E-06, Electrical Power Failure, Rev. 27
 NFS-HS-E-07, On-Site Radiological Emergency Assessment, Rev. 32
 NFS-HS-E-08, Off-Site Radiological Emergency Assessment, Rev. 27
 NFS-HS-E-09, Off-Site Dose Projection for Radiological Emergency, Rev. 28
 NFS-HS-E-10, Emergency Communications, Rev. 28
 NFS-HS-E-12, 24-Hour Emergency Response for Hazardous Material Transportation,
 Rev. 21
 NFS-HS-E-13, Emergency Take Cover, Rev. 7
 NFS-HS-E-14, CO2 Evacuation Alarm Response and Responsibilities, Rev. 13
 NFS-HS-E-15, Emergency Medical Response, Rev. 15
 NFS-HS-B-08, Inspection of Fire Brigade Response Equipment, Rev. 9
 NFS-HS-B-91, Self-Contained Breathing Apparatus Inspection, Rev. 3
 NFS-HS-CL-15, "Nuclear Criticality Safety Building 330 WWTF," Rev. 21
 NFS-HS-CL-15-01, "Nuclear Criticality Safety Building 330 WWTF," Rev. 7
 NFS-HS-CL-16, "Nuclear Criticality Safety 105/302/303 Laboratory," Rev. 17
 SOP 299, "Waste Water Treatment Facility," Rev. 20
 SOP 402, "6000 Gallon Waste Tanks," Rev. 12
 SOP 404, "Inspection and Solids Removal for Laboratory 300 Gallon Sump Tank," Rev. 3
 SOP 408, "Fenton Waste Water Treatment Process," Rev. 13
 SOP 415, "Standard Operating Procedure for Sampling and Transferring Laboratory Waste
 Solutions to WWTF," Rev. 7
 SOP 424, "WWTF Waste Stabilization Procedure," Rev. 0

Other Documents:

21T-16-1014, Return to Work from Winter Outage, dated January 2017
 Critique 55794

Drawing 333-M4163-D

Corrective Action Review Board (CARB), January 25, 2017 Agenda

Corrective Action Review Board (CARB), February 27, 2017 Agenda

Drawing No. 302-F0048-D, dated March 24, 2016

Drawing No. 302-F0049-D, dated April 19, 2019

Drawing No. 302-F0054-D, dated June 3, 2015

Drawing No. 302-F0055-D, dated July 26, 2016

Drawing No. 302-F0060-D, dated March 17, 2015

Drawing No. 302-F0330-D, dated June 7, 2016

Drawing No. 302-F0332-D, dated March 26, 2015

Drawing No. 302-F0337-D, dated April 19, 2016

Drawing No. 303-F0043-D, dated April 24, 2014

Drawing No. 303-F0044-D, dated October 5, 2016

Investigation 21787, Small Team TapRoot® Investigation PIRCS 55447

NFS Plans of the Week (Various Dates)

Emergency Preparedness – Quality Assurance Audit QA-16-22, 556T-16-0137, dated December 13, 2016

Letter of Agreement – Radiation Emergency assistance Center/Training Site (REAC/TS) Support, dated October 19, 2015

Letter of Agreement between the Erwin Fire Department and Nuclear Fuel Services, Inc. (NFS), dated August 12, 2014

Letter of Agreement Between the South Unicoi County Volunteer Fire Department and Nuclear Fuel Services, Inc. (NFS), dated September 10, 2014

Letter of Agreement Between MedicOne Response and Nuclear Fuel services, Inc. (NFS), dated August 11, 2014

Letter of Agreement Between Unicoi County Memorial Hospital and Nuclear Fuel Services, Inc. (NFS), dated October 14, 2016

Letter of Agreement Between Johnson City Medical Center Hospital (JCMCH) and Nuclear Fuel services, Inc. (NFS), dated September 15, 2014

Letter of Agreement Between the Town of Erwin and Nuclear Fuel Services, Inc. (NFS), dated November 19, 2013

Condition Reports Reviewed:

55794, 55795, 55809, 55810, 55840, 56010, 56100, 56161, 56439, 56496, 56497, 56371, 56381, 56390, 56424, 56508, 56523, 56524, 56554, 56575, 56605, 56607, 56754, 56755, 56758, 55917, 55919, 21858, 53181, 53167, 52577, 54948, 56088, 51676, 55697, 55653, 52755, 55777, 55186, 55529, 52160, 50160