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

January 25, 2019

Mr. John A. Stewart
President
Nuclear Fuel Services, Inc.
P. O. Box 337, MS 123
Erwin, TN 37650-0337

SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT NUMBER 70-143/2018-005

Dear Mr. Stewart:

This letter refers to the inspections conducted from October 1 through December 31, 2018, at the Nuclear Fuel Services, Inc. (NFS) facility in Erwin, TN. The enclosed report presents the results of the inspections. The findings were discussed with members of your staff at the exit meetings held on November 8, 2018, December 13, 2018, and after the end of the quarter on January 16, 2019.

During the inspections, the Nuclear Regulatory Commission (NRC) staff examined activities conducted under your license, as related to public health and safety and to confirm compliance with the Commission's rules and regulations and with the conditions of your license. 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, the NRC has determined that one Severity Level IV violation of NRC requirements, with three examples, occurred. Because NFS identified and corrected the violation, and because the violation was not repetitive or willful this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to: (1) the Regional Administrator, Region II; and (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

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 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. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the public without redaction.

Should you have any questions concerning these inspections, please contact Leonard Pitts of my staff at 404-997-4708.

Sincerely,

/RA/

Omar R. López-Santiago, Chief
Projects Branch 1
Division of Fuel Facility Inspection

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

Enclosure:
NRC Inspection Report 70-143/2018-005
w/Attachment: Supplemental Information

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SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT NUMBER 70-143/2018-005

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U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	70-143
License No.:	SNM-124
Report No.:	70-143/2018-005
Licensee:	Nuclear Fuel Services, Inc.
Facility:	Nuclear Fuel Services, Inc.
Location:	Erwin, TN 37650
Dates:	October 1 through December 31, 2018
Inspectors:	L. Harris, Senior Resident Inspector R. Gibson, Senior Fuel Facility Inspector (Section D.4) J. Rivera-Ortiz, Senior Project Inspector (Section A.6) K. Womack, Fuel Facility Inspector (Section B.2, D.2, D.6) T. Sippel, Fuel Facility Inspector (Section A.4) K. McCurry, Fuel Facility Inspector (Section A.4) E. Stamm, Senior Projector Inspector (In-Training) (Section A.6)
Approved by:	O. López-Santiago, Chief Projects Branch 1 Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Integrated Inspection Report 70-143/2018-005
October 1 – December 31, 2018

Inspections were conducted by the resident and regional inspectors during normal and off-normal hours in safety operations, radiological controls, effluent control, environmental protection, transportation, as well as other areas. The inspectors 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. With the exception of those identified in the Non-Cited Violation, Items Relied on for Safety (IROFS) were properly implemented and maintained in order to perform their intended safety function. (Paragraphs A.1 and A.2)

- No violations of more than minor significance were identified related to the Nuclear Criticality Safety Program. (Paragraphs A.3 and A.4)

- The inspectors reviewed a sample of Fire Protection Program attributes to verify compliance with the conditions of the license and regulatory requirements. No violations of more than minor significance were identified. (Paragraphs A.5 and A.6)

Radiological Controls

- The Radiation Protection Program was implemented in accordance with the license application and regulatory requirements. (Paragraph B.1)

- Radioactive waste activities were performed in accordance with regulatory requirements and procedures. (Paragraph B.2)

Facility Support

- The Post-Maintenance Testing and Surveillance Programs were implemented in accordance with the license application and regulatory requirements for work control and SRE testing. (Paragraphs C.1 and C.2)

- Adverse conditions were adequately identified, evaluated, and entered into the Corrective Action Program. (Paragraph C.3)

- The Emergency Preparedness Program was implemented in accordance with the Emergency Preparedness Plan and regulatory requirements. (Paragraph C.4)

Other Areas

- One Non-Cited Violation was identified for a licensee identified condition related to failure to maintain administrative IROFs associated with material placement and transfer control. (Paragraph D.1)

- Violation 70-143/2017-004-01, Failure to Comply with applicable Department of Transportation (DOT) requirements for shipping contaminated items via commercial carrier on public highways, was closed. (Paragraph D.2)

- No violations of more than minor significance were identified during Resident Inspector observations of Security Force and Material and Control accounting personnel. (Paragraph D.3)

- Licensee Event Report (LER) Event Notification (EN) 53384*, A Break in the Main Fire Water Loop Due to Construction Activities*, was reviewed by inspectors and closed in this report. (Paragraph D.4)

- LER EN 53502 Spill in Building 333, was reviewed by inspectors and closed in this report. (Paragraph D.5)

- 60 Day Written Report, Shipment to Knolls Laboratory, was reviewed by inspectors and closed in this report. (Paragraph D.6)

Attachment:
Supplemental Information

REPORT DETAILS

Summary of Plant Status

The following facility process areas were operating during the inspection period: 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.

A. Safety Operations

1. Plant Operations Routine (Inspection Procedures (IPs) 88135 and 88135.02)

   a. Inspection Scope

   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, laboratory managers, and process engineering personnel regarding issues with plant equipment and to verify the status of the 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 nuclear criticality safety (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 areas, 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 verified that safety controls, including items relied on for safety (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 (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, as well as potential degradation of plant security features. The inspectors 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 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. Safety System Walkdown Inspection (IP 88135.04)

a. Inspection Scope

The inspectors performed walkdowns of safety-significant systems involved with the processing of SNM. As part of the walkdowns, 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. The inspectors also verified that IROFS assumptions and controls were properly implemented in the field.

The inspectors reviewed the related Integrated Safety Analysis (ISA) to verify that system abilities to perform functions were not affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, or other system-related issues.

The inspectors 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 functions, tests, and inspections to assure operability of the safety systems for Area 800 in the production area were specifically inspected. For Area 800, the inspectors reviewed IROFS and management measures associated with: FA8-1, FA8-2, FA8-4, FA8-6, FA8-9, FA8-14, FA8-15, FA8-16, FA8-18, FA8-20, FA8-21, FA8-30, FA8-39, FIRE8-1, FIRE8-2, FIRE8-3, FIRE8-4, FIRE8-5, FIRE8-7, FAT-6, and FLW-6.

To determine the correct system alignment, the inspectors 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 walkdowns, 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 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
- Functional Lockout/Tag-Out program appropriately implemented
- Cabinets, cable trays, and conduits correctly installed and functional
- Visible cabling in good material condition
- No interference with system performance from ancillary equipment or debris

b. Conclusion

No violations of more than minor significance were identified.

3. Nuclear Criticality Safety (IP 88135.02)

a. Inspection Scope

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. The inspectors interviewed operators to verify that they were knowledgeable of the requirements associated with IROFS. The inspectors performed the tours inside various process areas when SNM movements were taking place within the facility.

As part of routine day-to-day activities on-site, the inspectors reviewed entries in the licensee's Problem, Identification, Resolution, and Correction System (PIRCS) associated with criticality safety aspects. PIRCS is the licensee's Corrective Action Program (CAP). The inspectors evaluated the licensee's response to such entries and held discussions with NCS engineers and production personnel to determine safety significance and compliance with procedures.

b. Conclusion

No violations of more than minor significance were identified.

4. Nuclear Criticality Safety (IP 88015)

a. Inspection Scope

Criticality Analysis

The inspectors reviewed selected Nuclear Criticality Safety Evaluations (NCSEs) to determine whether properly reviewed and approved NCSEs were in place prior to conducting new or changed operations and were of sufficient detail and clarity to permit independent review. The inspectors reviewed the selected NCSEs to determine whether calculations were performed within their validated area of applicability and consistent with the validation report. The inspectors reviewed the selected NCSEs and associated assumptions and calculations to verify that they were consistent with the commitments in the License Application (LA). These commitments included the licensee's commitment to the Double Contingency Principle, assurance of subcriticality under normal and

credible abnormal conditions with the use of subcritical margin, specified technical practices and methodologies, and treatment of NCS parameters. The NCSEs were selected based on factors such as risk-significance, heavy reliance on administrative controls, operating history, and whether they were new or revised. The NCSEs reviewed focused on Areas 300 and 400, as well as the WWTF as listed in Section 4 of the Attachment.

The inspectors reviewed the licensee's generation of accident sequences to determine whether the NCSEs systematically identified normal and credible abnormal conditions in accordance with the commitments and methodologies in the License Application (LA) for the analysis of process upsets. The inspectors reviewed the sequences to ensure proper credit was given to initiating events and failure probabilities of IROFS to demonstrate the accident scenarios were highly unlikely to occur in accordance with the LA, ISA methodology, and various procedures listed in Section 4 of the Attachment.

Criticality Implementation

The inspectors performed walk-downs of the WWTF and Areas 300 through 400 to determine whether existing plant configuration and operations were covered by and were consistent with the process description and safety basis in the selected NCSEs. The inspectors reviewed process and system descriptions, specifications, drawings, control flowdowns, and safety-related equipment (SRE) test records to verify that engineered controls established in the NCSEs were included and being implemented as specified. The engineered controls reviewed and observed in the plant included glovebox drains; backflow prevention valves and overflow lines; and safe geometry piping, columns, as well as tanks. The inspectors also reviewed operating procedures and postings to verify that selected administrative controls established in the NCSEs were included. The administrative controls reviewed included mass limits, spacing requirements, container sizes, and material type. The inspectors interviewed operators and engineers to verify that administrative actions established in the NCSEs were understood and implemented as specified.

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. This review was performed for selected accident sequences and controls, including accident sequences WWTF-C-1B, WWTF-C-1C, WWTF-C-2A2, and IROFS WWTF-1, WWTF-2, WWTF-3, and WWTF-4.

Criticality Operational Oversight

The inspectors reviewed NCS-related training records to determine whether operator training included instruction in criticality hazards and control methods, and whether NCS staff was involved in the development of operator training. Specifically, the inspectors reviewed training for WWTF operators who draw samples, and the revised NCS training associated with the annual NCS audit and PIRCS reports 60855 and 61247, to verify the issues identified and corrective actions taken were timely and effective. Additionally, the inspectors interviewed operations staff in Area 300 and the WWTF to determine whether they were cognizant of NCS hazards and control methods as they relate to their specific job function.

The inspectors reviewed records of NCS audits, interviewed NCS staff concerning audits, and accompanied a licensee NCS engineer on a walk-down of Areas 200 through 500 to determine whether NCS staff were knowledgeable of associated accident sequences and established NCS controls, and routinely assessed field compliance.

Additionally, the inspectors interviewed NCS management and reviewed procedures and schedules to verify that NCS staff performed quarterly audits and weekly inspections of selected site operations as required by Section 5.3.4 of the LA. The records of NCS audits reviewed included 21T-17-1148, "2017 Nuclear Criticality Safety Audit of the Training Program," and NCS audits conducted since June 2018.

The inspectors reviewed the applied management measures for selected NCS controls to determine whether the management measures were sufficient to ensure the availability and reliability of NCS controls. The management measures and NCS controls selected from the NCSEs included functional tests of SRE, set point analyses developed and approved prior to operations, operating procedures, and visual inspections and maintenance.

The inspectors reviewed accident sequences that relate to long-term accumulations and holdup in the WWTF tanks to verify that the licensee has established controls on long-term accumulations. Specifically, the inspectors walked down tanks in the WWTF, waste water storage sumps and tanks in the labs, reviewed non-destructive assay records for selected tanks, and interviewed NCS engineers, lab technicians, and operation staff to verify that the licensee's controls to prevent or mitigate long-term accumulations were being implemented as described in the NCSE.

Criticality Programmatic Oversight

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 selected NCS staff qualification records and conducted interviews to verify that senior NCS engineers were qualified in accordance with license requirements.

Criticality Incident Response and Corrective Action

The inspectors reviewed selected NCS-related PIRCS entries to determine whether anomalous conditions were promptly identified and entered into PIRCS, whether they received the appropriate level of investigation consistent with license commitments and procedures, whether proposed corrective actions were sufficiently broad, whether they were prioritized on a schedule commensurate with their significance, whether they were completed as scheduled, and whether the assigned correctives actions were consistent with program procedures and appropriate to correct the condition. Additionally, the inspectors reviewed NCS-related PIRCS entries to assess whether the licensee followed the regulatory requirements and procedures to report plant conditions to the NRC. The PIRCS entries reviewed included PIRCS 60855, 61247, and those listed in Section 4 of the Attachment, as well as associated documents.

b. Conclusion

No violations of more than minor significance were identified.

5. Fire Protection Quarterly (IP 88135.05)

a. Inspection Scope

During routine plant tours, the inspectors verified that transient combustibles were being adequately controlled and minimized in selected process areas. The inspectors reviewed active fire impairments in selected process areas to determine if they were implemented per site procedures.

The inspectors conducted a walk-down of Building 110 A-D and reviewed the Pre-Fire plan drawing to verify it matched the as-found condition for various fire protection components like extinguishers, and postings. For Building 110, the inspectors reviewed IROFS and management measures associated with FIRE-2 and FIRE-14.

The inspectors reviewed the material condition of fire protection components to verify they were adequately maintained. 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 inspectors observed fire brigade exercises.

b. Conclusion

No violations of more than minor significance were identified.

6. Fire Protection (Annual) (IP 88055)

a. Inspection Scope

The inspectors interviewed licensee staff, reviewed samples of procedures and records, and conducted walk-downs of the NFS facility to verify that the licensee implemented a Fire Protection Program (FPP) in accordance with NRC Requirements, materials license SNM-124; the LA, Chapter 7, “Fire Safety;” and the ISA Summary document. The inspectors focused their activities on fire protection attributes and IROFS for the BPF in Building 333, Laboratory 110B, Fire Water Supply System, and the fire brigade.

For the BPF, the inspectors reviewed procedures and samples of recent inspection/testing records related to combustible controls (IROFS FIRE-2), fire alarm control panel testing, emergency light testing, fire trace suppression system, and fire barrier inspections to verify compliance with the requirements in the license and the LA. The inspectors also conducted a walk-down of the BPF, with focus on the Solvent Extraction Process, to verify that the physical condition of heat and smoke detection devices, fire trace suppression system, fire barriers (including fire doors, firewalls, and fire dampers credited for IROFS BSX-35), dikes underneath solvent extraction columns (IROFS BSX-37/-38), and fire extinguishers were consistent with the FPP specifications. The inspectors also reviewed portions of the Fire Hazard Analysis to verify that fire protection measures were consistent with the analyzed hazards for the area.

For Laboratory 110B, the inspectors observed a sample of local smoke and heat detector testing, as well as visual and audible indications on the main fire alarm panel. The inspectors also toured areas of Laboratory 110B to assess the condition of fire barriers and penetrations credited for IROFS FIRE-22.

For the Fire Water Supply System, the inspectors reviewed procedures and samples of recent records related to the inspection, testing, and maintenance of fire hydrants, fire department connections, and hot boxes. The inspectors directly observed the weekly test of station fire pump #1 to verify that operations staff followed testing procedures and operation of the pump was properly verified. The inspectors also performed a field walk-down of station fire pump #2 to assess the material condition of the pump and supporting components. The inspectors reviewed in-process configuration control changes to the fire pumps and compensatory measures in place related to the operation of the fire pumps. The review included documentation and technical evaluations supporting the licensee's plan to rely on city water as the main water supply for the fire water system without the need of station fire pumps. The inspectors reviewed portions of the calculations to obtain reasonable assurance that the licensee provided adequate technical justification for the change.

For the fire brigade, the inspectors interviewed the brigade's lead and reviewed: qualification records for a sample of individuals assigned to the brigade; brigade roster; training material and attendance records for brigade staff; records demonstrating training opportunities for off-site emergency response agencies; and a sample of staged Pre-Fire Plans to verify that response capability was maintained in accordance with the license requirements. The inspectors conducted a general tour of the facility with focus on the main fire response facility, hose houses, fire response vehicles, and portable fire extinguishers to verify that firefighting equipment and turnout gear were available at designated locations and maintained in proper working condition. During the tour, the inspectors assessed combustible controls, including verification that flammable materials were stored in marked cabinets as specified in approved procedures.

The inspectors also reviewed the licensee's fire protection system impairment records to verify that adequate compensatory measures were in place for out-of-service, degraded, or inoperable fire protection equipment, systems, or features. Additionally, the inspectors reviewed audit reports to ensure that program audits were routinely performed. The inspectors verified that audits identified deviations and captured them in NFS's CAP. The inspectors reviewed selected CAP documents to verify that issues were prioritized and corrected in accordance with program procedures.

b. Conclusion

No violations of more than minor significance were identified

B. Radiological Controls

1. Radiation Protection Quarterly (IP 88135.02)

a. Inspection Scope

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

The inspectors performed partial reviews of select SWPs in effect during the inspection period in different operational areas and conducted a more thorough review for the following SWPs and posted radiologically controlled areas:

- SWP 17082 300CMPLX
- SWP 18-06-007 Area E

b. Conclusion

No violations of more than minor significance were identified.

2. Radioactive Waste Processing, Handling, Storage and Transportation (IP 88035)

a. Inspection Scope and Observations

The inspectors evaluated whether the licensee had established and maintained procedures in accordance with Chapter 11 of the LA in order to ensure compliance with the requirements of 10 CFR Part 20 and 10 CFR Part 61 applicable to low-level radioactive waste form, classification, characterization, and shipping manifests and tracking.

The inspectors reviewed procedures and observed performance of tasks related to radioactive waste in order to verify that requirements in Chapter 11 of the LA were being met. The inspectors observed operators perform their tasks in accordance with facility procedures. The inspectors reviewed changes to licensee's procedures for labeling waste shipments and tracking radioactive waste in order to verify that changes made did not reduce safety and were in compliance with Section 11.4 of the LA.

The inspectors reviewed the quality assurance measures applied to radioactive waste management and verified that the licensee was performing audits as required by Chapter 11 of the LA. The findings from these audits were entered into the licensee's CAP for resolution. The inspectors reviewed training material and records to verify that operators received appropriate job-related training prior to handling radioactive waste as required by Section 11.2 of the LA, Appendix G to 10 CFR Part 20, and 49 CFR 172.204.

The inspectors reviewed the licensee's program for classifying low-level radioactive waste. The inspectors reviewed the procedures for classifying waste as well as records relating to waste. The inspectors reviewed the licensee's program for ensuring that waste was properly packaged to ensure the waste form met the requirements of

10 CFR 61.56. The inspectors performed a review of safety-related events since the previous inspection in order to determine whether the licensee was appropriately evaluating safety-significant events in the area of radioactive waste.

The inspectors performed walk-downs of selected radioactive material storage areas. The storage areas had required postings to ensure that the proper material was being stored in the area and the material was properly labeled to reflect their contents and were in good physical condition.

b. Conclusion

No findings of more than minor significance were identified.

C. Facility Support

1. Post-Maintenance Testing (IP 88135.19)

a. Inspection Scope

The inspectors observed and/or 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 inspectors reviewed the licensee's completed test procedures to verify that 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 observed 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 licensee's PIRCS.

- SRE Test: N302NXXXXTSHOE01
- SRE Test: N306H2DILXX800

b. Conclusion

No violations of more than minor significance were identified.

2. Surveillance Testing (IP 88135.22)

a. Inspection Scope

The inspectors observed 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 observed and reviewed testing to determine if the SSCs were operationally capable of performing their intended safety functions and fulfilling the intent of the associated SRE test requirement. The inspectors discussed surveillance testing requirements with operators performing the associated tasks to determine the adequacy of their procedural knowledge. The inspectors reviewed the calibration of test equipment or standards used to conduct the tests. The inspectors observed the communications between personnel performing these tests during the completion of each activity.

- SRE Test: N302XXXXPDA316
- SRE Test: N306XXXXPDA318

b. Conclusion

No violations of more than minor significance were identified.

3. Corrective Action Program Review (IP 88135)

a. Inspection Scope

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 PIRCS to aid in the identification of repetitive equipment failures or specific human performance issues for follow-up. The inspectors reviewed PIRCS 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.

b. Conclusion

No violations of more than minor significance were identified.

4. Emergency Preparedness Drill (IP 88135)

a. Inspection Scope

On November 1, 2018, the inspectors observed an off-shift safety emergency limited scope training drill to verify adequate response, inter-departmental coordination, and procedural implementation. The inspectors also observed a first responder training session on October 1, 2018.

b. Conclusion

No violations of more than minor significance were identified

D. Other Areas

1. Non-Cited Violation 2018-005-001

During the NRC inspection period, October 1 through December 31, 2018, one Severity Level (SL) IV violation of NRC requirements with three examples was identified. This licensee identified violation involved two instances where posted limits restricting the amount of licensed material were exceeded and one instance of a failure to properly implement administrative controls to ensure a quantity of licensed material was properly verified prior to being transferred to another part of the process area. In accordance with the NRC Enforcement Policy, this violation is dispositioned as a Non-Cited Violation (NCV), the violation is described below:

Title 10 of the *Code of Federal Regulations* (10 CFR) 70.62(d) requires, in part, that the licensee shall establish management measures to ensure that controls identified as IROFS are designed, implemented, and maintained as necessary, to ensure they are available and reliable to perform their function when needed to comply with the performance requirements of 10 CFRR 70.61.

Contrary to this requirement, on October 17, December 1, and December 18, 2018, the licensee identified that the established management measures for three different IROFS failed to ensure that controls identified as IROFS were implemented, and maintained as necessary, to ensure they were available and reliable to perform their function when needed to comply with the performance requirements of 10 CFRR 70.61. Two of these IROFS, identified as IROFS CRF-1 and IROFS 306EW-12, procedurally requires administrative control of the placement of a quantity of licensed material mass by directing the maximum quantities that can be placed in a specific location. In one instance for each of the IROFS, NCS postings and procedural direction concerning the amounts of licensed material that could be placed in a location were exceeded. Both instances were discovered by licensee staff during subsequent reviews and corrected. The third IROFS, identified as IROFS FLW-3, procedurally requires the administrative verification of the quantity of licensed material prior to the material being transferred to another part of the process area. However, on one occasion, licensee staff did not recognize that laboratory analytical results identified that the sampled material exceeded procedural limits prior to transferring the licensed material to another part of the facility. Licensee staff discovered the error and stopped operations in the area. The material was recovered and appropriately dispositioned. The NRC determined that adequate controls remained available to meet the performance requirements of 10 CFR 70.61(b), entries had been made in the corrective action program (PIRCS P69024, P67497, and P70257), and the likelihood of occurrence remained highly unlikely. This is a SL IV violation (Enforcement Policy section 6.2.d.1).

In accordance with Section 2.3.2.b of the Enforcement Policy, this violation is dispositioned as NCV 2018-005-01 because the licensee identified and corrected the violation, and because the violation was not repetitive or willful.

2. Follow-up on Previously Identified Issues

a. (Closed) Violation (VIO) 70-143/2017-004-01: Failure to Comply with Applicable Department of Transportation (DOT) Requirements for Shipping Contaminated Items Via Commercial Carrier on Public Highways

Inspection Scope

In Inspection Report (IR) 2017-004 (ADAMS Accession Number ML17290A763), the NRC identified a SL IV VIO of 10 CFR 71.5(a) for the licensee's failure to comply with DOT requirements when an error in shipment was made when licensed material was packaged and shipped as non-radioactive and non-DOT regulated.

The inspectors reviewed the licensee's corrective actions as outlined in their "Reply to a Notice of Violation (NOV) (VIO 70-143/2017-004-01)" (ADAMS Accession Number ML17331A491), dated November 16, 2017, and the associated apparent cause contained in the licensee's CAP. The inspectors specifically reviewed the changes the licensee made to the Specific Work Instructions applicable to shipments of samples, non-product, and non-waste material shipments. The inspectors also reviewed changes to higher level procedures for shipping of nuclear material as well as new checklists generated for use by staff while preparing shipments. The inspectors also reviewed records where staff responsible for the shipment of material attended additional training regarding radioactive material shipping practices.

b. Conclusion

No issues were noted with the licensee's corrective actions. This violation is considered closed.

3. Quarterly Resident Inspector Observations of Security and Material Control and Accounting (MC&A) Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted observations of security and MC&A personnel and activities to ensure the activities were consistent with applicable license, procedure, and regulatory requirements. These observations took place during normal and off-normal plant working hours.

These quarterly resident inspectors' observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status reviews and inspection activities.

b. Conclusion

No violations of more than minor significance were identified.

4. Event Follow-up (IP 88045)

a. LER EN 53384 Nuclear Fuel Services – Break in the Main Fire Water Loop

On May 8, 2018, a report was made to the Tennessee Department of Environment and Conservation (TDEC) and the NRC regarding an accidental release of city water and soil to the storm water drainage system.

On May 3, 2018, the licensee experienced a break in the main fire water loop due to construction activities. Damage to a fire water pipe occurred as construction personnel were excavating to prepare the area for a concrete pad to be poured. The break caused water and soil to be displaced into the nearby storm drainage system. The water was isolated by closing valves within the licensee's fire water loop system. The licensee estimated the amount of chlorinated water lost was 5,000 to 7,000 gallons and the volume of potentially contaminated soil displaced was approximately one cubic yard. The majority of the water and soil was contained within the storm drainage system, but a discharge did occur to Martins Creek via the South West Stormwater Ditch.

TDEC Johnson City Field Office was made aware of the discharge on May 4, 2018. On May 18, 2018, TDEC issued a NOV to NFS for failure to notify the Division of Water Resources within 24 hours of the discharge in accordance with the licensee's National Pollutant Discharge Elimination System (NPDES) permit TN0002038, Part II Section C.2.a, 24-Hour Reporting.

The inspectors reviewed documents provided by the licensee which indicated that immediately following the fire line break, NFS stopped the flow of water, pumped the water from the excavation and adjacent ditch, began the necessary line repairs, tested the line and placed it back into service two days later.

The inspectors reviewed the analysis of the grab samples collected during and after the event to verify that all results were at background levels for alpha and beta radioactivity. The event was entered into PIRCS. The licensee conducted a General Investigation of the event, this General Investigation was ongoing at the time of this inspection.

b. Conclusion

Based on the determination that the accidental release of city water and soil to the storm water drainage system involved no NRC regulatory limits being exceeded, further actions on this event are not required.

5. Event Follow-up (IP 88135)

a. LER EN 53502 Nuclear Fuel Services – Radiological spill in Building 333

On July 12, 2018, a report was made to the NRC regarding a radiological spill that occurred in Building 333. The radiological spill of approximately 17 liters occurred in Building 333 on July 11, 2018, as a result of a leak in glass column containing licensed materials undergoing processing.

The inspectors confirmed the spill was contained within a radiologically controlled area. The inspectors reviewed the licensee's action taken to contain and clean up the spill and stabilize the glass column. The inspectors reviewed steps taken to account for the

spilled material, replace the glass column, measures taken to prevent release outside the facility, and to control personnel contamination. The event was entered into the PIRCS system and the results of an investigation and corrective actions were reviewed.

b. Conclusion

Based on the determination that were no safety consequences to the public or the environment, that exposure to the workers was monitored and controlled, and the licensed material was accounted for, further actions on this event are not required.

6. Event Follow-up (IP 88035)

a. 60-Day Written Notification of Event (ML18142A240) - Shipment to Knolls Laboratory

On March 13, 2018, the licensee shipped five drums containing radioactive material samples to Knolls Atomic Power Laboratory (KAPL). The samples were shipped in five-gallon Type A Skolnik drums, (United Nations) UN specification 1A2/X60/S. In order to comply with UN specification and DOT requirements, Skolnik closure instructions specify a lock nut be tightened against the unthreaded lug of the drum's lock ring. Upon receipt and inspection of the drums, KAPL reported that the lock nuts were unthreaded one-quarter inch to one-half inch from the lock ring on each of the five drums.

b. Conclusion

10 CFR 71.17(c)(2) states, in part, "that each licensee shall comply with the terms and conditions of the license, certificate, or other approval, as applicable." Contrary to the above, on March 13, 2018, the licensee failed to comply with the Certificate of Compliance for a Type A package by failing to seal the five drums in accordance with their specifications. Throughout shipment, the insert bolt of the lock ring of each drum remained torqued at 55-60ft-lb., as specified and the contents of the radioactive material did not escape the package. The licensee conducted an investigation and determined that the procedure used to seal five-gallon drums was too generic and did not contain the detail necessary to successfully comply with the Certificate of Compliance for Skolnik brand drums. The licensee revised the procedure to include the identification and specific steps necessary for sealing different brand five-gallon drums as well as added an additional inspection of the drums prior to shipment. This failure to comply with 10 CFR 71.17(c)(2) constitutes a minor violation that is not subject to action in accordance with the "NRC Enforcement Policy." This item is considered closed.

E. Exit Meetings

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 November 8, 2018, December 13, 2018, and at the end of the quarter on January 16, 2019, to J. Stewart and staff.

No dissenting comments were received from the licensee. Proprietary and classified information was discussed but not included in the report.

SUPPLEMENTAL INFORMATION

1. KEY POINTS OF CONTACT

Name	Title
N. Auman	Senior Project Manager
D. Bennett	Senior Technical Specialist
N. Brown	NCS Manager
T. Cloyd	Fire Protection Engineer 3
M. Eakin	NCS Engineer
S. Gizzie	NCS/ Fire Brigade
K. Greer	Emergency Services Unit Manager
C. Lewis	NCS Engineer
J. May	TWM Operations Unit Manager
R. Mauer	ISA Manager
A. Morie	Safety & Program Manager

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Open/Closed

70-143/2018-005-01	NCV	Failure to maintain administrative IROFS controls.

Closed

70-0143/2017-004-01	VIO	Failure to comply with applicable DOT requirements for shipping contaminated items via commercial carrier on public highways.

LER EN 53384 Nuclear Fuel Services – Break in the Main Fire Water Loop

LER EN 53502 Nuclear Fuel Services – Radiological spill in Building 333

60-Day Written Notification of Event – Shipment to Knolls Atomic Power Laboratory

3. INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety
88035	Radioactive Waste Processing, Handling, Storage, and Transportation
88135	Resident Inspection Program for Category I Fuel Cycle Facilities
88135.02	Resident Inspection Program Plant Status Activities
88135.04	Resident Inspection Program Operational Safety
88135.05	Resident Inspection Program Fire Protection
88135.17	Permanent Plant Modifications
88135.19	Post Maintenance Testing
88135.22	Surveillance Testing
88055	Fire Protection

4. DOCUMENTS REVIEWED

Records:

2018 Fire Impairment Log
2018, Third Quarter, ISA Audit – BPF and CDL Fire IROFS, dated July 18, 2018
21T-10-0163, Fire Hazards Analysis BLEU Preparation Facility – Building 333, dated February 2, 2018
21T-18-0755/HEA-21/JRB-18-007, NFS Water Supply Evaluation, dated August 23, 2018
27T-18-0167/TRN-17/FB1003-18/FB-QTR3-2018, Emergency Brigade, Third Quarter 2018 Fire Brigade Training
Annual Inspection of Swinging Fire Doors in Building 333 per NFS-HS-B-95, February 2018
Control of Combustibles Monthly Inspection per NFS-GH-62-01, BLEU Preparation Facility-Building 333, Inspection Dates: January 25, 2018; February 27, 2018' March 28, 2018; April 27, 2018; May 29, 2018; June 27, 2018; July 26, 2018, August 30, 2018, and September 25, 2018
Drawing 000-C0106-D, Fire Protection Waterlines with BLEU Facility, dated September 7, 2017
Drawing 013-A1000-D, 300 Complex Fire Safety Layout, dated May 21, 2018
Emergency Lights Monthly Test per NFS-HS-B-11, Test Dates: January 2018, February 2018, April 2018, May 2018, June 2018, July 2018, Aug 2018, and Sept 2018
Fire Alarm Control Panel Test Weekly per NFS-HS-A-21, Inspection Dates: January 2018 through September 2018
Fire Brigade Roster as of September 14, 2018
Fire Damper Operational Test – Bldg 333, Solvent Extraction Process Area, Dampers N333XFRDAMP0001, -02, -03, -04, -05, -06, and -07
Fire Department Connections & Hot Boxes Inspection per NFS-HS-B-58-05, Inspection Dates: January-March 2018, April-June 2018, July-September 2018
Fire Hydrants Annual Inspection per NFS-HS-B-58-01, Inspection Dates: June 25, 2018 and September 18, 2018
Fire Impairment 2018-072, Fire Pumps Out of Service/Not Required, August 27, 2018
Fire Pump #1 Weekly Test Results, dated January-October 2018
Fire Pump #2 Weekly Test Results, dated January-October 2018
Fire Trace Systems Inspection per NFS-HS-B-58-14, Inspection Dates: January through October 2018
Individual Qualification Training List FB-LIVE-FIRE, TVA Live Fire Fighting Class, March 2018
Individual Qualification Training List FB-QTR3-2018, 3rd Quarter 2018 Fire Brigade Training, September 2018
Inspection of Fire Barriers in Building 333 per NFS-HS-B-95, December 2017
Justification for Continued Operation (JCO) – Fire Barrier Integrity, dated June 12, 2013
NFS-GH-57, Fire Brigade Response Log, Attachment D, Event Dates: March 28, 2018; June 25, 2018; July 20, 2018; July 25, 2018
Offsite Agency Orientation & Training – Erwin Fire Department, dated October 1, 2018
Pump Acceptance Test Data for Fire Pump #1, dated April 12, 2018
Pump Acceptance Test Data for Fire Pump #2, dated April 12, 2018
S001025, Service Call Summary Report – AFFF Foam Fire Trace System in Bldg 333 SX, dated April 3, 2018
S001025, Service Call Summary Report – AFFF Foam Fire Trace System in Bldg 333 SX, dated September 12, 2018
SA-Fire-Ext – Fire Extinguisher Training

Procedures:
21T-14-0563, Nuclear Criticality Safety Evaluation/Analysis Writer's Guide, Revision (Rev.) 10, effective April 2, 2014
FB-001, SOG (Standard Operating Guidelines) for Fire Brigade Operations, dated February 8, 2016
FM-WST-021, Shipment Survey Release, Rev. 4
FM-WST-074, Hazardous Material Checklist and Peer Review / Highway and Rail, Rev. 1
FM-WST-075, Hazardous Material Checklist and Peer Review / Air, Rev. 1
NFS SOP 401-21-302, Rev. 023, Area A, Building 302
NFS SOP 409 Section 71, Rev. 25, 301 Receipt Calciner
NFS-GH-62, Control of Combustibles, Rev. 12
NFS-GH-62-01, NFS Monthly Combustible Control Inspections, Rev. 8
NFS-GH-913, Nuclear Criticality Safety Program, Rev. 4, effective January 24, 2018
NFS-HS-A-104, Testing/Inspection of Fire Barrier Systems, Rev. 4
NFS-HS-A-16, Safety Audits, Assessments, and Inspections, Rev. 16, effective June 15, 2018
NFS-HS-A-21, Fire Alarm Control Panel Test Weekly, Rev. 33
NFS-HS-A-58, Nuclear Criticality Safety Evaluations (NCSE), Rev. 14, effective September 8, 2015
NFS-HS-A-62, Implementation of Nuclear Criticality Safety Evaluations, Rev. 6, effective September 8, 2014
NFS-HS-B-11, Emergency Lights Monthly, Rev. 11
NFS-HS-B-58-01, Fire Hydrants – Annual Inspection, Testing and Maintenance, Rev. 1
NFS-HS-B-58-05, Fire Department Connections & Hot Boxes (Quarterly), Rev. 1
NFS-HS-B-58-14, Fire Trace Systems (Monthly), Rev. 1
NFS-HS-B-95, Fire Barrier Inspections (Annual), Rev. 3
NFS-HS-B-95, Testing/Inspection of Fire Barrier Systems, Rev. 4
NFS-HS-CL-04, Nuclear Criticality Safety Configuration Control Requirements, Rev. 12, effective August 31, 2018
NFS-WST-021, NFS Waste Characterization Implementation Plan, Rev. 10
NGS-HS-CL10-00, NCS Buildings 302/303/304/306/307 Miscellaneous Stations
SOP 335-A, General Requirements for Waste Handling/Packaging, Rev. 19
WST-SWI-17-020, Review & Approval of Sample Shipments & Non-Waste/Non-Product Shipments
WST-SWI-17-021, Shipment of Radioactive Material to Bechtel Marine Propulsion Corporation Facilities
WST-SWI-18-024, Review & Approval of Sample Shipments & Non-Waste/Non-Product Shipments

Audits
21T-17-1148, 2017 Nuclear Criticality Safety (NCS) Audit of the Training Program, dated January 3, 2018
Audit QA-17-06, QA Plans for Class A & Class C Wastes (All Disposal Sites)
Audit QA-18-08, QA Plans for Class A & Class C Wastes (All Disposal Sites)
NCS-2018-15, Nuclear Criticality Safety Audit of the Nuclear Criticality Safety Evaluation for Area C of the Uranium Recovery Facility, Rev. 5, dated June 27, 2018

NCSEs
54T-12-0027, Nuclear Criticality Safety Evaluation Waste Water Treatment Facility, Rev. 7, dated August 17, 2012
54X-18-0001, Nuclear Criticality Safety Evaluation for Area 300/400 of the Production Fuel Facility, Rev. 2, dated February 20, 2018
54X-18-0005, Control Flowdown and Field Verifications for Area 300/400 of the Production Fuel Facility, Rev. 3, performed on July 16, 2018

Test Records
SRE Test for Equipment No. N302XMVXXXXA301, completed August 11, 2018
SRE Test for Equipment No. N302XXXXPDAA316, completed October 15, 2018
70X-14-0268, SA-00144 [P003.1], Setpoint Analysis for 300-003, effective October 1, 2014

Other Documents
011-F0044-D, 6000 Gal. Tank P&ID, dated August 2, 2018
105-F0020-D, Building 105 Waste Water Discharge Sump Tank, dated August 14, 2014
2018, First Quarter, ISA Audit Checklist – ISA Fire Protection, dated March 20, 2018
2018, Second Quarter, ISA Audit Checklist – ISA Fire Protection, dated June 29, 2018
2018, Third Quarter, ISA/Fire Protection Audit, NFS-HS-B-103, NFS Flammable Storage Cabinet Inspection, dated September 10, 2018
2018-066, Fire System Impairment, dated July 31, 2018
2018-085, Fire System Impairment, dated October 19, 2019
21T-11-0609, NCS Qualification Program, Rev. 0, dated June 20, 2011
21X-18-0004, Waste Water Treatment Facility Integrated Safety Analysis Summary, Rev. 13, dated January 12, 2018
306-F0046-D, TANKXX-WD01 & TANK-WD02 P&ID, dated August 13, 2018
306-F0273-D, 300 Complex POG Ventilation Blowdown Tank P&ID, dated October 12, 2015
NFS-HS-A-49, Authorized Nuclear Criticality Safety Functions, dated December 17, 1994
OT-WWTF-PROCESS, Waste Water Treatment Facility Operator Training
Triennial Fire Protection Assessment Conducted at Nuclear Fuel Service, Inc., dated November 27, 2017
Work Request 265017, IT&M of all Contracted Systems Plant-Wide, dated March 1, 2018
Work Request 273037, Provide & Install Battery Terminal Covers, dated October 17, 2018
WST-SWI-18-041, Shipment of Radioactive Material to Bechtel Marine Propulsion Corporation Facilities

Work Requests/Work Orders
WR 273037, Fire Pump Building, 10/17/18

PIRCS Written as a Result of the Inspection:

67508, 67782, 67787, 67792, 67794, 67963, 70182, 70191, 70196, 70199, 70200

PIRCS Reviewed:
24254, 24254, 31069, 31560, 31561, 32023, 32024, 60855, 61247, 63655, 63705, 64271, 64487, 65064, 65155, 65168, 65220, 65369, 65485, 65676, 66768, 66780, 66798, 66872, 67161, 67249, 67253, 67378, 67463, 67466, 67491, 67497, 67529, 67583, 67682, 67690, 67727, 67747, 67754, 67757, 67762, 67764, 67776, 67777, 67782, 67823, 67856, 67865, 67878, 67899, 67974, 67979, 69024, 70172, 70210, and 70257