



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

October 23, 2015

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

SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT NUMBER 70-143/2015-004

Dear Mr. Duling:

This letter refers to the inspections conducted from July 1 to September 30, 2015, at the Nuclear Fuel Services, Inc. (NFS) facility in Erwin, TN. The purpose of these inspections was to determine whether activities authorized under the license were conducted safely and in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements. The enclosed report presents the results of the inspections. The findings were discussed with members of your staff at exit meetings held on September 3 and 24, and October 8, 2015.

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

Based on the results of this inspection, the NRC staff has identified one issue as having very low safety significance. The NRC staff has also determined that a violation is associated with this issue. This violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the NRC Enforcement Policy. This 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to: (1) the Regional Administrator, Region II; (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) Charlie Stancil at NFS.

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

J. Duling

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

Sincerely,

***/RA/***

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

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

Enclosure:  
Inspection Report 70-143/2015-004  
w/Attachment: Supplementary Information

cc: (See page 3)

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Sincerely,

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- N. Baker, NMSS
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cc:

Michael McKinnon  
Director, Operations  
Nuclear Fuel Services, Inc.  
Electronic Mail Distribution

Richard A. Freudenberger  
Safety & Safeguards Director  
Nuclear Fuel Services, Inc.  
Electronic Mail Distribution

Debra G. Shults  
Director, TN Dept. of Environment & Conservation  
Electronic Mail Distribution

Doris D. Hensley  
Mayor, Town of Erwin  
211 N. Main Avenue  
P.O. Box 59  
Erwin, TN 37650

Gregg Lynch  
Mayor, Unicoi County  
P.O. Box 169  
Erwin, TN 37650

Johnny Lynch  
Mayor, Town of Unicoi  
P.O. Box 169  
Unicoi, TN 37692

George Aprahamian  
Manager, Program Field Office – NFS  
Knolls Atomic Power Laboratory  
1205 Banner Hill Rd  
Erwin, TN 37650

U. S. NUCLEAR REGULATORY COMMISSION  
REGION II

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2015-004

Licensee: Nuclear Fuel Services, Inc.

Facility: Nuclear Fuel Services, Inc.

Location: Erwin, TN 37650

Dates: July 1 through September 30, 2015

Inspectors: C. Stancil, Senior Resident Inspector  
M. Toth, Acting Senior Resident Inspector  
D. Hartland, Senior Fuel Facility Project Inspector  
B. Adkins, Senior Fuel Facility Inspector  
N. Peterka, Fuel Facility Inspector  
C. Read, Fuel Facility Inspector  
P. Startz, Fuel Facility Inspector

Accompanying  
Personal: N. Morgan, Fuel Facility Inspector

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

Enclosure

## **EXECUTIVE SUMMARY**

Nuclear Fuel Services, Inc.  
NRC Integrated Inspection Report 70-143/2015-004  
July 1 – September 30, 2015

Inspections were conducted by the resident and regional inspectors during normal and off-normal hours in 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. One Non-Cited Violation (NCV) of Nuclear Regulatory Commission (NRC) requirements was identified.

### **Safety Operations**

- Plant operations were performed safely and in accordance with license requirements. Items relied on for safety were properly implemented and maintained in order to perform their intended safety function. (Paragraphs A.1 and A.2)
- The Nuclear Criticality Safety program was implemented in accordance with the license application and regulatory requirements. (Paragraphs A.3 and A.4)
- The Fire Protection program and systems were adequately maintained in accordance with the license application and regulatory requirements. (Paragraph A.5)

### **Radiological Controls**

- The licensee adequately implemented the Radiation Protection program consistent with the license application and regulatory requirements. (Paragraphs B.1 and B.2)
- The Environmental Protection program was implemented in accordance with the license application and regulatory requirements. (Paragraph B.3)

### **Facility Support**

- The post maintenance testing and surveillance programs were implemented in accordance with the license application and regulatory requirements for work control and safety-related equipment testing. (Paragraphs C.1 and C.2)
- Adverse conditions were adequately identified, evaluated, and entered into the corrective action program. (Paragraph C.3)
- The Emergency Preparedness program was implemented in accordance with the Emergency Plan and regulatory requirements. (Paragraph C.4)
- One NCV of NRC requirements was identified in the area of transportation of radioactive material. (Paragraph C.5)

**Other Areas**

- Violation 07000143/2015-003-01, “Inadequate Procedural Guidance for the Proper Handling of Potentially Contaminated Waste,” and Licensee Event Report 70-143/2015-503-0, “Unplanned Medical Treatment,” were closed. (Paragraph D)

**Attachment:**

Supplementary Information

## REPORT DETAILS

### **Summary of Plant Status**

The facility began the inspection period with the following process areas operating: Naval fuel manufacturing facility (FMF) and the Blended Low Enriched Uranium (BLEU) Preparation Facility (BPF) which includes the Uranium (U)-Metal, U-Oxide, Solvent Extraction and the down-blending lines. Preparatory construction activities associated with the 302 roof upgrade project were occurring throughout 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 plant operating areas housing special nuclear material (SNM) and determined that equipment and systems were operated safely and in compliance with the license. Daily operational and shift turnover meetings were observed throughout the period to gain insights into process safety and operational issues. The inspectors reviewed selected licensee-identified issues and corrective actions for previously identified issues. These reviews focused on plant operations, safety-related equipment (valves, sensors, instrumentation, in-line monitors, and scales), and items relied on for safety (IROFS) to determine whether the licensee appropriately captured off-normal events and implemented effective corrective actions to prevent recurrence.

The routine tours included walk-downs of the FMF, BPF, commercial development line, miscellaneous storage areas, Building 234, and Building 440. During routine tours, 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 for compliance 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 (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 and determined that equipment and systems were operated safely and in compliance with the license. 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, inspectors periodically toured or inspected the licensee's emergency response facilities for familiarization and to ensure the facilities were maintained in a readily available status.



The inspectors attended various plan-of-the-day meetings 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.

2. Safety System Inspection (IP 88135.04)

a. Inspection Scope and Observations

The inspectors performed walk-downs of safety-significant systems involved with the processing of SNM. As part of the walk-downs, 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 Analyses (ISA) to verify system abilities to perform functions were not affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, or other system-related issues. The 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. The BPF Solvent Extraction process area was specifically inspected.

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 walk-downs, the inspectors verified all or some of the following as appropriate:

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

b. Conclusion

No findings of significance were identified.

3. Nuclear Criticality Safety (IP 88135.02)

a. Inspection Scope and Observations

During daily production area tours, the 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 noted that operators were knowledgeable of the requirements associated with IROFS, specifically for the BPF Solvent Extraction process area. The inspectors performed the tours inside various process areas when restrictions on SNM movements were in effect.

As part of routine day-to-day activities on-site, inspectors reviewed corrective action program 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 findings of significance were identified.

4. Nuclear Criticality Safety (IP 88015)

a. Inspection Scope and Observations

The inspectors evaluated the adequacy of the licensee's NCS program and analyses to assure the safety of fissile material operations. The inspectors reviewed selected NCS documents (listed in Section 4.0 of the Attachment) to verify that criticality safety of risk-significant operations was assured with adequate safety margin. The inspectors verified that NCS documents were prepared and reviewed by qualified staff. The inspectors verified that NCS analyses demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits through appropriate limits on controlled parameters. The inspectors noted that no changes to the licensee's validation report were made since the last NCS inspection.

The inspectors accompanied a licensee NCS engineer on an audit of the FMF Area 300. The inspectors reviewed the results of the most recent NCS audits (since the last NCS inspection) to assure that appropriate issues were identified and resolved. The inspectors noted that audits were performed by NCS engineers who reviewed open NCS infractions, plant operations for compliance with license requirements, procedures and postings, and equipment to verify that past evaluations remained adequate. The inspectors confirmed that deficiencies identified during audits were communicated to area supervision and entered into the licensee's corrective action program (CAP).

The inspectors performed plant walk-downs of the FMF and BPF to verify that risk-significant fissile material operations were being conducted safely and in accordance with regulatory requirements. The inspectors interviewed licensee NCS engineers both before and during walk-downs. The inspectors verified that controls identified in NCS analyses were installed or implemented and were adequate to ensure safety. The inspectors verified that safety was maintained for observed facility operations and that cognizant NCS engineers were knowledgeable and interacted regularly with operators

on the process floors. The inspectors observed NCS postings on various enclosures and process equipment to confirm that postings were current and accurately reflected criticality safety requirements established in the NCS analyses.

The inspectors conducted interviews with operators and area supervisors to assess the effectiveness of NCS-related training. Additionally, the inspectors conducted interviews with training personnel to verify that training requirements were consistent with license commitments. The inspectors reviewed training records to verify that NCS engineers were qualified to perform NCS-related duties as required by Section 5.3.3 of the license. The inspectors observed while the NCS staff conducted NCS training for new operators, which included a review of the hazards associated with criticality, a review of previous criticality accidents, and a description of the types of controls used to prevent criticality accidents. The inspectors reviewed training lesson plans for General Employee Training and Annual Refresher Training for site employees to determine if the training was consistent with the requirements of ANSI/ANS 8.20, Nuclear Criticality Safety Training.

The inspectors reviewed the licensee's response to a selection of recent internally-reported events identified in Section 4.0 of the Attachment. The inspectors reviewed the progress of investigations and interviewed licensee staff considering the events and the associated corrective actions. The inspectors observed that the events were investigated in accordance with procedures and appropriate corrective actions were assigned and tracked.

The inspectors reviewed the procedure that covers validation and verification of NCS computer codes for compliance with Section 5.5.4 of the license and ANSI/ANS 8.1, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors. The inspectors interviewed NCS staff to determine if computers are re-verified following changes to the computer platform including changes to software/operating system or hardware. The inspectors reviewed the verification report for personal computer N2406 to confirm that computer system changes did not adversely impact the validation of SCALE 6.1.1.

b. Conclusion

No findings of significance were identified.

5. Fire Protection Quarterly (IP 88135.05)

a. Inspection Scope and Observations

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

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

b. Conclusion

No findings of significance were identified.

**B. Radiological Controls**

1. Radiation Protection Quarterly (IP 88135.02)

a. Inspection Scope and Observations

During tours of the production areas, inspectors observed radiation protection controls and practices implemented during various plant activities including the proper use of personnel monitoring equipment, required protective clothing, and frisking methods for detecting radioactive contamination on individuals exiting contamination controlled areas. The inspectors noted that plant workers properly wore dosimetry and used protective clothing in accordance with applicable Special Work Permits (SWPs). The inspectors also noted that radiation area postings complied with plant procedures and included radiation maps with up-to-date radiation levels. The inspectors monitored the operation of radiation protection instruments and verified calibration due dates.

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

- SWP 16130, Building 301 Receipt Calciner Main Pusher Maintenance
- Building 440 Posted Radiologically Controlled Area during LEU transfer

b. Conclusion

No findings of significance were identified.

2. Radiation Protection (IP 88030)

a. Inspection Scope and Observations

The inspectors reviewed the 2014 and available 2015 radiation safety committee meeting minutes and the current As Low As Reasonably Achievable (ALARA) program in order to ensure that the program performance was being reviewed, at least annually, to comply with 10 CFR 20.1101, Radiation protection programs. The inspectors interviewed the radiation safety program manager and radiological supervisors to determine that the radiation protection program responsibilities, functions, and independence were separated from operations. The inspectors reviewed radiological protection procedures in order to determine that changes to these procedures, made since the last inspection, were consistent with regulations and license requirements.

The inspectors reviewed calibration, operation, and data management associated with measurement of air samplers filter media on Tennelec Alpha/Beta Counting equipment. Data transfer from the Tennelec via Eclipse identification to the REMCON health and safety database was evaluated to determine the accuracy of the data transfer process. As a result, the inspectors determined that the airborne uptake data transfer was accurate and complete.

The inspectors reviewed the Total Effective Dose Equivalent results for plant personnel and determined that they were less than the regulatory limit of 5 rem/year. The inspectors reviewed 2014 and available 2015 plant personnel dosimeter results, as submitted by the licensee to their contractor, and determined that the Lens Dose Equivalent and Shallow Dose Equivalent results were less than the regulatory limit of 15 rem/year and 50 rem/year, respectively. The inspectors verified that records were maintained in accordance with 10 CFR 20.2106, Records of individual monitoring results. The contractor used for dosimetry processing was approved by the National Voluntary Laboratory Accreditation Program (NVLAP).

The inspectors determined the respiratory protection program was in compliance with 10 CFR 20.1703, Use of individual respiratory protection equipment. The inspectors determined that the respiratory protection program adequately identified potential hazards and that users were properly trained and qualified in the use of respiratory protection equipment. The respirators inspected were NIOSH-approved and did not show any physical indications of deterioration. The inspectors evaluated the respirator reprocessing areas including respirator washing, drying, visual inspections, cartridge replacement, reassembly, radiological contamination assessment, and repackaging.

The inspectors evaluated the on-site laboratory uranium analysis of employee urine bioassay samples. The evaluation included how the analysis data was managed and eventually incorporated into employee dose calculations. The inspectors spent considerable time evaluating all production areas, decommissioning operations, and radiological waste processing areas of the facility. The inspectors verified that radiological signs and postings accurately reflected radiological conditions. Areas were posted in accordance with 10 CFR Part 20, Standards for Protection Against Radiation, and the Notice to Employees, NRC Form 3, was posted in a high traffic area (at the security turnstiles) in accordance with 10 CFR 19.11, Posting of notices to workers.

Based on reviews of the procedures and observations, the inspectors determined that radiological assessments were adequately evaluated to the magnitude and extent of radiation levels in accordance with 10 CFR 20.1501, General.

The inspectors reviewed the 2014 ALARA report and corrective actions in response to that assessment and determined that 10 CFR Part 20 requirements were satisfied. The inspectors reviewed ALARA program records and determined that the ALARA concept was being implemented.

b. Conclusion

No findings of significance were identified.

3. Effluent Control and Environmental Protection (IP 88045)

a. Inspection Scope and Observations

The inspectors interviewed licensee staff on program changes and verified that there were not any significant program changes within the last 12 months. Furthermore, the inspectors determined that the one significant personnel change during this period met license requirements.

The inspectors verified that the environmental protection program remained independent from operations. In addition, the inspectors reviewed revisions to the procedures since the last inspection and determined that all changes complied with procedural requirements and did not diminish safety.

The inspectors reviewed recent internal and external self-assessments and audits and verified that they satisfied the quality assurance requirements of the license application. All findings were entered into the CAP (PIRCS) and corrected.

The inspectors reviewed the last two semi-annual effluent reports and determined that the licensee was in compliance with 10 CFR 70.59, Effluent monitoring reporting requirements. Also, the inspectors verified that the licensee maintained records and reports in accordance with 10 CFR 20.2101, General Provisions, and 20.2106.

The inspectors reviewed records of airborne effluents and found all results to be below 10 CFR Part 20 requirements. Furthermore, the inspectors observed air filter collections for stacks and off-site ambient air monitors and determined that sampling methods were adequate and in compliance with approved procedures. Additionally, the inspectors confirmed that air monitoring and air filter analyzing equipment were recently calibrated and functioning properly.

The inspectors reviewed records of liquid effluent discharges and sewer sampling and found all results to be below 10 CFR Part 20 requirements. The inspectors reviewed monthly averages for Waste Water Treatment Facility (WWTF) liquid effluent discharges to the Nolichucky River for 2014 and 2015, and determined that the radiological content in these discharges was less than regulatory limits. All liquid effluent and sewer monitoring equipment was operating normally and was calibrated. The inspectors observed laboratory measurements and sample handling and determined that acceptable quality controls were in place.

The inspectors reviewed the public dose assessment and determined that the average annual effluent concentrations released from January 2013 through June 2014 were less than 10 CFR Part 20 limits. The inspectors determined that the licensee was implementing ALARA requirements in 10 CFR 20.1101(d).

The inspectors reviewed corrective actions related to the environmental program entered into PIRCS since January 2014. The inspectors confirmed that the licensee was adequately identifying and correcting issues associated with environmental protection.

b. Conclusion

No findings of 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 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 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 Problem, Identification, Review, and PIRCS.

- WR 240325, Repair/Replace B301 Receipt Calciner Main Pusher per SOP 409-71 R20, "301 Receipt Calciner"
- WR 48864, Parts Issues, Trending, and Work Control Evaluation

b. Conclusion

No findings of 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 safety-related equipment test requirement.

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

- N302VALVEBA0J89 &0J90, Area J Spring Return Ball Valves

b. Conclusion

No findings of 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 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, 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, specifically the licensee's PIRCS trending program. Specifically inspectors reviewed the following:

- 56N-15-0002, Independent (Atkins) Triennial ISA Program Audit of NFS, dated June 2015
- Quality Assurance Audit QA-15-05, Incident Investigations
- Quality Assurance Audit QA-15-12, Fitness for Duty

b. Conclusion

No findings of significance were identified.

4. Emergency Preparedness (EP) Drill (IP 88135)

a. Inspection Scope and Observations

On September 15, 2015, the inspector observed an annual Criticality Evacuation training drill. This drill was intended to identify any licensee weaknesses and deficiencies in alarm notification, Emergency Response Organization response, and implementation of the site accountability plan. The inspectors observed emergency response operations at the Emergency Monitoring Supply Center, Personnel Assembly Area and on-scene coordination to verify that evacuation for a criticality event was done in accordance with NFS-GH-903, Emergency Plan, and licensee conformance with other applicable emergency plan implementing procedures. The inspectors also attended the post-drill critiques to compare any inspector-observed weaknesses with those identified by the licensee in order to verify whether the licensee was properly identifying EP-related issues and entering them into PIRCS, as appropriate.

In addition, on August 28, 2015, the inspector observed and participated in an Emergency Control Center table top training with the licensee for limited scope classification scenarios.

b. Conclusion

No findings of significance were identified.



5. Transportation of Radioactive Material (IP 86740)

a. Inspection Scope and Observations

The inspectors evaluated whether the licensee had established and was maintaining an effective program to ensure radiological and nuclear safety during the receipt, packaging, delivery, and private carriage of licensed radioactive materials. The inspector also evaluated whether transportation activities were in compliance with the applicable transport regulations.

The inspectors observed the preparation and loading of packages for radioactive waste and special nuclear material product shipments. The inspectors also reviewed associated implementing procedures, shipping records, and surveys. The licensee ensured that the appropriate documentation accompanied the packages being shipped. The licensee recorded the required information on the packaging and shipping orders including the transportation index, package activity, labeling, and placards.

The inspectors reviewed the training records to ensure that the licensee had administered 49 CFR 172.704 hazardous materials transportation training to affected personnel as required by the Department of Transportation (DOT). The inspector reviewed audits of the transportation program and determined the licensee was performing periodic audits of the program as required. The results of the audits were appropriately addressed in the corrective action program.

Introduction: The inspectors identified a Non-Cited Violation for failure to treat mixed waste prior to shipping the waste to a disposal facility as required by 10 CFR 61.56(a).

Description: On September 4, 2014, the licensee officially notified the Division of Solid Waste Management of the Tennessee Department of Environment and Conservation (TDEC) that it had inadvertently shipped a total of eight filters in five containers of low-level mixed hazardous waste as non-hazardous low-level radioactive waste to the Nevada National Security Site (NNSS).

The chromium concentration in the filters was estimated after-the-fact to be between 6 - 16 parts per million (ppm), which was above the 5 ppm regulatory limit. The filters were included in three separate shipments that occurred earlier in the year. The licensee immediately suspended shipments to NNSS until the issue was investigated and corrective actions taken.

In the uranium metal processing area, the licensee processes both metal and oxide feed. The licensee determined that it erroneously designated a batch name for metal, which per process knowledge is non-hazardous, to the oxide feed stream. As a corrective action, the licensee modified its process for assigning batch numbers to the waste streams to prevent recurrence of the issue.

Analysis: 10 CFR 20 Appendix G, Section III (A)(1) requires the licensee to prepare all wastes so that the waste meets the waste characteristic requirements in 61.56 of the chapter. 10 CFR 61.56(a)(8) states that, in part, "waste containing hazardous . . . material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials."

The inspectors determined that the risk to the environment was low. The filters were packaged individually, transported, and buried in certified DOT (i.e., DOT 7A Type A and Versa Pac Type AF) containers. The filters consumed a small volume in each container and were surrounded by fill material. Therefore, the potential for leaching into the environment was low.

The noncompliance is more than minor based on the screening criteria question #28 of Inspection Manual Chapter 0616 Appendix B, which asks, in part, "Does the noncompliance involve a failure to properly characterize, classify, label, track, or dispose of radioactive waste and does it result in the failure to meet a disposal facility's waste acceptance criteria?" However, because the licensee identified the violation and notified TDEC and NNSA in a timely manner, and implemented corrective actions to prevent reoccurrence, the inspectors determined that it met the criteria for a Non-Cited Violation.

Enforcement: 10 CFR 20 Appendix G, Section III (A)(1) requires the licensee to prepare all wastes so that the waste meets the waste characteristics requirements in 61.56 of the chapter. 10 CFR 61.56(a)(8) states that, in part, "waste containing hazardous . . . material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials."

Contrary to the above, the licensee failed to treat the hazardous material prior to shipping the waste to a disposal facility. This non-repetitive, licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section 2.3.2 of the NRC Enforcement Policy (NCV 70-143/2015-004-01).

b. Conclusion

One non-cited violation of NRC requirements was identified.

**D. Other Areas**

1. Follow-up on Previously Identified Issues

a. (Closed) Licensee Event Report (LER) 70-143/2015-503-0, Unplanned Medical Treatment

1) Inspection Scope and Observations

An employee experienced a cut to his hand while operating a valve at the Waste Water Treatment Facility. The sheet metal jacketing around the insulated valve and piping had sharp edges that contributed to the laceration. Following the injury, the employee walked to the on-site medical facility for treatment. Licensee management initiated NRC Event Notification # 50912 on March 20, 2015, in accordance with 10 CFR 70.50(b)(3). NRC inspectors reviewed radiological surveys of the employee, the employee's clothing, the valve at the WWTF, and the onsite medical facility where the employee was treated. Survey results indicated no significant radiological contamination associated with the injury. All activities associated with the injury were in compliance with regulatory requirements.

## 2) Conclusion

This LER is closed.

- b. (Closed) Violation (VIO) 07000143/2015-003-01, "Inadequate Procedural Guidance for the Proper Handling of Potentially Contaminated Waste."

### 1) Inspection Scope and Observations

On Saturday, April 4, 2015, a licensee fuel supervisor noticed an unusual odor coming from an area near the main process floor. Upon further investigation, the supervisor and an operator discovered a ruptured and smoldering two-liter container on the floor of an unoccupied storage area and a visible brownish-red haze in the air. The contents of the container, cleaning products, had been ejected onto the floor and adjacent areas within the 306 West storage area as a result of a chemical reaction between two incompatible chemicals. In an effort to avoid unplanned chemical reactions, the licensee had procedures and training in place that provided details on how items were to be rinsed and dried prior to being placed into approved containers to minimize the potential for a chemical reaction. A lack of detailed guidance in SOP-401-17, FMF Cleaning, Revision 7, was identified by the licensee as a causal factor to the event. The SOP did not provide detailed guidance to operators on how to adequately clean non-compatible materials. Specifically, detail was lacking in the procedure concerning rinsing and drying of items prior to placement into containers.

The inspectors reviewed the revised FMF Cleaning procedure that added additional detail on rinsing and drying of items, as well as appropriate locations to clean the materials generated in specific areas, and determined it to be of adequate detail. The inspectors reviewed training material given to the FMF operators and supervisors and interviewed select staff to assess their understanding of the training and procedure revision. The staff had appropriate understanding of the training and revision changes. No issues were noted with the licensee's corrective actions and management of the issue.

## 2) Conclusion

This Violation is considered closed.

## E. Exit Meeting

The inspection scope and results were presented to members of the licensee's staff at various meetings throughout the inspection period and were summarized on September 3 and 24, and October 8, 2015, to J. Duling and his staff. No dissenting comments were received from the licensee. Proprietary and classified information was discussed but not included in the report.

## SUPPLEMENTARY INFORMATION

### 1. KEY POINTS OF CONTACT

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

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

#### Opened

70-143/2015-004-01      NCV      Failure to Treat Mixed Waste (Paragraph C.5)

#### Closed

70-143/2015-004-01      NCV      Failure to Treat Mixed Waste (Paragraph C.5)

70-143/2015-503-00      LER      Unplanned Medical Treatment (Paragraph D.1.a)

70-143/2015-003-01      VIO      Inadequate Procedural Guidance for the Proper Handling and Cleaning of Potentially Contaminated Waste (Paragraph D.1.b)

### 3. INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety Program
88030	Radiation Protection
86740	Transportation of Radioactive Material

88045	Effluent Control and Environmental Protection
88135	Resident Inspection Program For Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	ISA Implementation
88135.05	Fire Protection
88135.17	Permanent Plant Modifications
88135.19	Post Maintenance Testing
88135.22	Surveillance Testing

#### **4. DOCUMENTS REVIEWED**

##### Procedures:

BLEU-HS-B-16, Routine Sampling of Sanitary Sewer  
 ENG-10-06, Collision Predictions for Powered Equipment in 306E  
 ENG-HTG-59, Cold Weather Preparedness to Facilitate Plant-Wide Freeze Protection  
 LOA-2266W-003, Clean Filter Processing Through Receipt Calciner, 04/27/15  
 LOA-2266W-012, Clean Filter Processing Through Receipt Calciner, May 20, 2015  
 NFS-EC-1, Calibration of Weight or Mass Measuring Systems  
 NFS-HS-A-02, Determination of Uranium in Urine using Kinetic Phosphorous Analysis  
 NFS-HS-A-05, Calibration of Radiation Monitoring Instruments  
 NFS-HS-A-16, Safety Audits, Assessments, and Inspections  
 NFS-HS-A-37, Respirator Fit Testing  
 NFS-HS-A-39, Medical Evaluation of Respirator Wearer  
 NFS-HS-A-63, Verification and Validation of Nuclear Criticality Safety Analysis Codes  
 NFS-HS-A-68, ISA Risk Assessment Procedure  
 NFS-HS-B-16, Routine Sampling of Sanitary Sewer and Groundwater Treatment Facility Effluent,  
 NFS-HS-B-18, Collection and Analysis of NFS Stack Samples  
 NFS-HS-B-20, Routine Sampling of Environmental Media,  
 NFS-HS-B-42, Quality Assurance and Respirator Maintenance  
 NFS-HS-B-73, Analysis of Environmental Liquid and Environmental Air Samples  
 NFS-HS-B-77, Operation of the Tennelec Counting System  
 NFS-HS-B-97, Sampling of Banner Spring Branch and North West Storm Water Ditch  
 NFS-HS-CL-10, Nuclear Criticality Safety Fuel Manufacturing Facility, Rev. 26, 02/01/15  
 NFS-HS-CL-28, Nuclear Criticality Safety for the CDL Facility, Rev 2, 06/27/11  
 NFS-HS-CL-28-11, Attachment A 301 RFS Calciner Furnace System Station Limit Cards  
 SOP-299 Waste Water Treatment Facility  
 SOP-401-16, Processing of Materials Generated in the FMF, Rev. 19, 07/13/15  
 SOP-401-17, FMF Cleaning, Rev. 8, 08/03/15  
 SOP-WST-26, Handling/Shipping Instructions for the ES-3100 Drum

##### Records:

1<sup>st</sup> Quarter 2015 ALARA Performance Report  
 1<sup>st</sup> Half 2015 Average Radioactivity in Stream Sediment, Soil, and Vegetation  
 2nd Quarter 2015 ALARA Performance Report for Occupational Exposure, presented to the SSRC dated September 3, 2015  
 2015 Third Quarter Erwin Utilities Industrial Monitoring Results, Municipal Sewer Analysis  
 21T-09-0817, Fire Hazard Analysis 306 East Building Insert (Waste Packaging Station), dated August 19, 2009  
 21T-11-0609, Nuclear Criticality Safety Engineer Qualification Program, Revision (Rev.) 0  
 21T-12-0496, March 2012, Technical Basis for the NFS Air Sampling Program

21T-14-0578, ALARA Goals for January 1, 2014 through December 31, 2014, dated March 24, 2014

21T-15-0781, ALARA Goals for January 1, 2015 through December 31, 2015, dated March 18, 2015

23T-11-0066, Calibration Weight or Mass Measuring Systems, Rev. 9

27T-14-0126, Annual Refresher Training, October 2014

27T-15-0110, NFS Training Department BPF Common Operator Lesson Plan

27T-15-0131, NFS Training Department General Employee Training Lesson Plan, dated August 21, 2015

306W Bottle Rupture Event, NFS NSRB Presentation, dated July 21, 2015

4<sup>th</sup> Quarter 2014 ALARA Performance Report of Internal Dose Occupational Exposures

54T-04-0108, Risk Index and IROFS Summary for Transfer Carts and Process Floor Storage Racks, dated September 16, 2004

54T-08-0048, Nuclear Criticality Safety Evaluation of the Waste Drum Storage and the Bottle and Cylinder Storage Racks on the East Side of Building 306 East, Rev. 1

54T-09-0009, Control Flowdown and Field Verification for the Waste Drum Storage and the Bottle Storage Racks on the East Side of Building 306 East, Rev. 1

54T-13-0013, Nuclear Criticality Safety Evaluation for 301 RFS Calciner Furnace, June 2013, Rev. 5

54T-14-0025, Verification of Computer Codes for NCS for Uranium Systems with Enrichments up to 100 wt% <sup>235</sup>U SCALE 6.1 with the V7-238 Library from ENDF/B VII, Rev. 0

54X-02-0019, Nuclear Criticality Safety Evaluation for Storage Racks in Building 306-West (U), Rev. 0

Calibration Packages for sewer and outfall sampling stations

ES-3100 Design Package

Executive Summary, Clean Filter Processing Through 301 Receipt Calciner Performance Qualification Test

Flow meter calibration records March – June 2015

General H&S Survey Report, dated March 20, 2015 @ 16:10

HFS-HS-B-44, Attachment D “Ventilation Vent Hood Inward Face-Velocities” evaluation conducted week of August 11, 2015

NVLAP Accreditation, Miron Technologies (GDS) Inc., dated June 11, 2015

OPR-TB-APR15-02, Oxidizers and Organics

P46489-118752, Trend Evaluation for Personal Exposure Events, dated January 26, 2015

QA-14-16 Quality Assurance Audit of Environmental Safety

Quarterly Assessment of Offsite Ambient Radiation 1<sup>st</sup> Quarter 2015

Radiological Survey form per HEA-02-01-35, Contamination Report for the Wastewater Dike #7, dated March 20, 2015

Radiological Survey, NFS-HS-B-30, Rev 7, attachment A & B for Bldg 100 dated March 20, 2015, and Contamination Report, HEA-02-01-01/100-A0010, Rev B, dated March 20, 2015

Reports for Dissolved Radiological Groundwater Monitoring Data January thru September 2015

Request for Safety Evaluation, BPF U-Oxide Legacy Filter Processing, 07/07/15

Semiannual Assessment of Radioactive Gaseous Effluents 1<sup>st</sup> Half 2015

Thirty-day Report 21G-15-0056, dated April 17, 2015 @ 13:00

Audits and Assessments/Investigations:

21T-15-2045

21T-15-2083

21T-15-2084  
21T-15-2113  
21T-15-2114  
21T-15-2125  
21T-15-2138  
21T-15-2139  
21T-15-2140  
21T-15-2141  
21T-15-2149  
21T-15-2226

PIRCS Reviewed:

47770, 47894, 48358, 48794, 48799, 48870, 48947, 49047, 49094, 49123, 49142, 49306,  
49410, 49477, 49517, 49545, 49563, 49566, 49581, 49615, 49726, 49812, 49845, 50147,  
50149, 50150, 50151, 50170, 50180

PIRCS Written as a Result of the Inspection:

47505, IROFS Failure Documentation  
49258, SWP Barrier Control  
49260, 333 SX V-Troughs  
49336, Stacking of Pallets  
49388, T&WM Operator Use of Torque Pattern  
49405, ES3100 SS Washers  
49505, Radiological Maintenance Tent Construction  
49835, Enclosure Door Open  
49842, Daily PH Meter Calibration Form Enhancement  
49875, Stack Sampling Procedure Enhancements  
49973, Storage Rack Condensation  
49974, Safety Shower Leak  
50014, Cold Weather Preparedness  
50137, SGSS Tape Scale Indicator  
50145, Verification of NCS Computer Codes