



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

July 28, 2021

Mr. Joel Burch
President
Nuclear Fuel Services, Inc.
P.O. Box 337, MS 123
Erwin, TN 37650-0337

SUBJECT: NUCLEAR FUEL SERVICES, INC – CORE INSPECTION REPORT
07000143/2021002

Dear Mr. Burch:

On June 30, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Nuclear Fuel Services, Inc. On July 21, 2021, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Robert E. Williams, Jr., Chief
Projects Branch 1
Division of Fuel Facility Inspection

Docket No. 07000143
License No. SNM-124

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

SUBJECT: NUCLEAR FUEL SERVICES, INC – CORE INSPECTION REPORT
07000143/2021002 – DATED July 28, 2021

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NAME	L. Harris	J. Rivera-Ortiz	T. Sippel	K. McCurry	R. Williams
DATE	7/27/2021	7/27/2021	7/27/2021	7/27/2021	7/28/2021

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Number: 07000143

License Number: SNM-124

Report Number: 07000143/2021002

Enterprise Identifier: I-2021-002-0114

Licensee: Nuclear Fuel Services, Inc.

Facility: Nuclear Fuel Services, Inc.

Location: Erwin, TN

Inspection Dates: April 01, 2021 to June 30, 2021

Inspectors: L. Harris, Senior Resident Inspector
K. McCurry, Technical Assistant
T. Sippel, Fuel Facility Inspector

Approved By: Robert E. Williams, Jr., Chief
Projects Branch 1
Division of Fuel Facility Inspection

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a core inspection at Nuclear Fuel Services, Inc, in accordance with the fuel cycle facility inspection program. This is the NRC's program for overseeing the safe operation of licensed fuel cycle facilities. Refer to <https://www.nrc.gov/materials/fuel-cycle-fac.html> for more information.

List of Violations

No violations of more than minor significance were identified.

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
WER	07000143/2021-001-00	Event Notification (EN) 55218 - Immediate Report to The Texas Department of State Health Services	88135.02	Closed

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Inspections were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2600, "Fuel Cycle Facility Operational Safety and Safeguards Inspection Program." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

SAFETY OPERATIONS

88015 - Nuclear Criticality Safety

The inspectors evaluated selected aspects of the licensee's Nuclear Criticality Safety program to verify compliance with selected portions of 10 CFR 70, including 70.24, 70.61, 70.62, and Appendix A, Chapter 5, "Nuclear Criticality Safety," of the facility's license application, and applicable licensee procedures.

Criticality Analysis (IP Section 02.01)

The inspectors interviewed licensee staff and reviewed nuclear criticality safety evaluations (NCSEs), and associated control flowdowns and calculations, to verify compliance with 10 CFR Part 70 and applicable sections of the license application, including, parts of sections 5.1.1 and 5.5.2. Specifically, the inspectors interviewed licensee staff and reviewed the following NCSEs associated with the Blended Low Enriched Uranium (BLUE) Preparation Facility (BPF):

- 54T-14-0008, "Nuclear Criticality Safety Analysis for the BPF Process Ventilation System," Revision 7, including the review of all ten accident sequences, which cover various process upsets such as filter failures, loss of ventilation, introduction of moderation, and uranium accumulation in unfavorable geometries, as well as a review of the what-if analysis and the basis for why the licensee screened certain upsets as not credible;
- 54T-15-0004, "Nuclear Criticality Safety Evaluation for 300 Complex Waste Handling," Revision 1, including the review of the what-if analysis, all credible accident sequences, and the basis for why selected accident sequences were screened as not credible; and
- 54T-10-0032, "Nuclear Criticality Safety Evaluation for BPF Liquid Waste Discard System (U)," Revision 6, including the review of the what-if analysis, accident sequence A-2 related to the transfer of high uranium-235 concentration solution, and non-credible accident sequences considering only the condensate tank was operating.

Criticality Implementation (IP Section 02.02)

The inspectors selected engineered and administrative controls from the licensee's integrated safety analysis (ISA) summary to verify proper implementation through a review of process and system descriptions, control flowdowns, procedures, plant walk-downs, and operator interviews to verify compliance with 10 CFR Part 70 and applicable sections of the license application, including, sections 5.3.5 and 5.3.7. Specifically, the inspectors interviewed licensee staff and reviewed the following controls from the NCSEs listed above, the associated control flowdowns, and the ISA Summary, including their management measures:

- Administrative controls BPV-1, BPV-2, BPV-3, BPV-5, and BPV-21 involving operator actions related to high-efficiency particulate absorbing (HEPA) filters, non-destructive assay scanning, solution concentration samples, and block valves. Passive engineering controls BPV-4, BPV-16, BPV-17, BPV-19, and BPV-20 consisting of drains, overflow lines, and air gaps. The inspectors walked down the system, reviewed implementing procedures and runsheets, and observed a solution sample pulled from the scrubber blowdown tank.
- Administrative controls WST-1, WST-2, WST-3, WST-4, WST-5, WST-6, WST-7 and WST-8. The inspectors walked down 300 complex waste handling areas with licensee Nuclear Criticality Safety (NCS) engineers, reviewed procedures that implemented items relied on for safety (IROFS) and the basis for the IROFS in the NCSE, and observed actual and simulated waste handling activities used to implement the IROFS.
- Administrative control BLW-2 and active engineering control BWL-4 related to U-235 concentration and inline radiation monitors.

Criticality Operational Oversight (IP Section 02.03)

The inspectors assessed the NCS staff's oversight of plant operators, procedures, and operations of systems involving special nuclear material to verify compliance with 10 CFR Part 70 and applicable sections of the license application, including sections 5.3.4, 11.5 and 11.5.1. Specifically, the inspectors performed the following activities:

- reviewed the basic NCS training provided to BPF operators;
- interviewed licensee NCS engineers concerning controls to monitor for and prevent long-term accumulations in ventilation ductwork and unfavorable geometry vessels;
- observed a licensee NCS engineer conduct an NCS audit and reviewed the NCS audit reports;
- reviewed audit procedures and interviewed NCS staff concerning the conduct of NCS audits;
- interviewed operators involved in 300 complex waste handling concerning criticality control methods, including the implementation of IROFS WST-1, WST-2, WST-3, WST-4, WST-5, WST-6, WST-7 and WST-8; and

- interviewed operators also responsible for implementing IROFS BPV-3.

Criticality Programmatic Oversight (IP Section 02.04)

The inspectors reviewed recently revised NCS program procedures, and NCS staff qualification plans to verify compliance with 10 CFR Part 70 and applicable sections of the license application, including parts of sections 5.1.2 and 5.2, as well as section 5.3.3. Specifically, the inspectors interviewed licensee NCS staff and reviewed the following:

- scrubber blowdown tank sample logs, duct surveys, and HEPA filter differential pressure runsheets;
- qualification plans, procedures, and records related to the qualification of NCS Engineers and Senior NCS Engineers, including documentation relating to NCS support for the emergency response program; and
- the most recent revisions to licensee procedures for the NCS engineer qualification program and NCS audits.

Criticality Incident Response and Corrective Action (IP Section 02.05)

The inspectors reviewed the licensee's criticality accident alarm system (CAAS) and corrective action program (CAP) to verify compliance with 10 CFR Part 70, including 70.24, and applicable sections of the license application, including, sections 5.3.9, 5.4.2 and 11.6. Specifically, the inspectors observed equipment, reviewed documents, and interviewed licensee staff concerning the following:

- the licensee's response to the 2/26/21 SCALE User Notification of a cross section error concerning the h-poly material, and the 4/1/21 SCALE User Notification of an error that can occur when using multiple chords;
- a sample of recent NCS-related condition reports in PIRCS;
- the conduct of the 2020 NCS evacuation drill;
- the use of equipment to monitor for hazardous levels of radiation during and after a CAAS activation;
- the use of equipment quickly identify individuals who received doses of ten rads or more after a CAAS activation; and
- calculation of locations which could potentially receive an excessive dose during a criticality accident.

88135.02 - Plant Status

The inspectors routinely conducted walk-downs of licensee areas, observed operators, material control and accounting and security force personnel, inspected postings and licensee guidance documents, interviewed plant personnel, and discussed the results of operational and shift turnover meetings to gain insight into the status of facility activities,

risk-inform the selection and implementation of the appropriate core inspection procedures and ensure compliance with license and regulatory requirements.

Plant Tours (IP Section 03.01)

The inspectors performed weekly tours of plant operating areas housing special nuclear material (SNM) to verify that licensed activities were conducted safely and in compliance with the license and Title 10 of the Code of Federal Regulations (10 CFR) 70, "Domestic Licensing of Special Nuclear Material."

Status Meetings (IP Section 03.02)

The inspectors, on a routine basis, attended and reviewed the results of scheduled licensee meetings to determine plant status and awareness of site activities so that inspection resources were appropriately focused on those activities with the higher safety significance. The inspectors performed the following specific activities:

- attended plan-of-the-day licensee meetings
- attended Corrective Action Review and Safety/Security Review Board meetings
- reviewed current status of Employee Concerns Program

Posting of Notices (IP Section 03.04)

The inspectors reviewed recent NRC reports and other items to verify that the licensee posted notices to workers in accordance with 10 CFR 19.11.

Event Review (IP Section 03.06)

The inspectors reviewed the plant event(s) listed below to determine if the events warranted the use of formal event review criteria and to evaluate the licensee's response was in accordance with 10 CFR Parts 40.60 (source material), 70.50 (mainly radiological events), 70.52 (criticality and safeguards events), 71.95 (transportation events), 73.71 (safeguards events) and 20.2201, 20.2202, and 20.2203 (radiological and environmental events).

- EN 55218, Immediate Report to The Texas Department of State Health Services, dated April 27, 2021

Radiation Work Permit (RWP) (IP Section 03.09)

The inspectors reviewed and observed the RWPs listed below to determine whether the RWP contains the information required by Chapter 4, "Radiation Safety;" of the license application, the Radiation Protection Manual; and implementing procedures:

- SWP-21-32-006, 333-U-Met associated with repair request WR296275
- SWP-31-34-010 and pre-job brief associated with safety related equipment test

Annual Security and Emergency Preparedness Drills/Exercises (IP Section 03.10)

The inspectors discussed the licensee's performance during the Emergency Preparedness and/or security Force-on-Force (FOF) tactical response exercise/training evolutions listed below to determine whether they were implemented in accordance with 10 CFR 70.22(l)(3) and/or 10 CFR 73.46(b)(9):

- Emergency evacuation drill conducted on June 24, 2021 - The inspectors conducted pre-drill walk-downs of the evacuation areas/routes, discussed the results of the drill with the licensee to verify compliance with 10 CFR 70.24(a)(3), and confirmed that observations were captured in the problem identification and resolution system.
- Security FOF tactical response exercises conducted on April 6, 2021 and June 22, 2021.

88135.04 - Resident Inspection Program Operational Safety

The inspectors evaluated whether the material condition and as-found configuration of selected site structures, systems, and components, documentation, personnel, and IROFS to verify compliance with 10 CFR Part 70, the license, the safety analysis report (SAR) and/or license application, and licensee policies and procedures; and determine whether they are appropriate, available, and reliable to protect worker and public safety during normal, off-normal, and accident conditions.

Operations Safety Walkdown (IP Section 03.01)

The inspectors evaluated the operational safety of the process listed below.

- Downblending Raffinate Process - The inspectors visually inspected and reviewed the following IROFS with engineering and safety staff: RTD-001, RTD-002, RTD-003, RTD-004, and RTD-005.

88135.05 - Resident Inspection Program Fire Protection (Annual/Quarterly)

The inspectors evaluated the operational status and material condition of fire protection systems, structures, and components (SSCs) to verify compliance with the fire protection program as described in Chapter 7, "Fire Safety" of the license application, and the National Fire Protection Association (NFPA) 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," as required. Also, the inspectors evaluated onsite fire brigade performance during a fire alarm annunciation.

Fire Area Walkdown (IP Section 03.01)

The inspectors walked down and evaluated the fire areas listed below. The inspectors' review included fire hazard analysis, smoke/heat detector, fire extinguisher, emergency lights, manual pull stations, and sprinkler tests and inspections for these areas.

- Building 100
- Building 330

Fire Brigade Drill Performance Sample (IP Section 03.02)

The inspectors evaluated the fire bigrade response to a fire alarm as described below:

- On May 6, 2021 a detector annunciated in a 105 laboratory area. The inspectors observed announcement of the fire alarm, response by the fire brigade and supporting staff, command and control, and decision process to declare the alarm false and stand down the response.

88135.19 - Post Maintenance Testing

The inspectors evaluated post maintenance test activities to verify compliance with license application Chapter 11, "Management Measures," and test procedures and/or work order instructions to confirm functional capability of the IROFS and/or safety control(s) following maintenance.

Post-Maintenance Testing (IP Section 03.01)

The inspectors reviewed the post maintenance tests listed below. The inspectors either directly observed the tests or reviewed the results.

- N303FURDOORS601(Area 600 repair), initial test on 5/19/20121 and re-test on 5/20/21

88135.22 - Surveillance Testing

The inspectors evaluated IROFS and safety controls that required periodic surveillance and/or calibration tests to ensure they were available and reliable to perform their function when needed, to comply with license application Chapter 11, "Management Measures" and the performance requirements of 10 CFR 70.61 and 70.62, and to maintain their operational readiness consistent with the ISA.

Surveillance and Calibration Testing (IP Section 03.01)

The inspectors reviewed the surveillance and/or calibration tests listed below. The inspectors either directly observed the tests or reviewed the results.

- N304VENDRAIN034, Ventilation 304
- N307VENDRAIN031, Ventilation 304
- N333XSCREEN3A01, Screen 303
- N333OVERFLO1E01A, Overflow 333, associated pre-job brief and SWP 17807
- N333OVERFLO1E01B, Overflow 333, associated pre-job brief and SWP 17807

INSPECTION RESULTS

No issues were identified.

WER	EN 55218 - Immediate Report to The Texas Department of State Health Services WER 2021-001	88135.02
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Description: This was a concurrent report to the NRC for an immediate notification to the State of Texas due to a minor traffic accident involving a low level waste shipment bound to the Waste Control Specialists (WCS) facility in Andrews, Texas. The trailer sustained light damage to the rear of the trailer. No damage to the shipment contents was identified during visual inspection. This event did not result in adverse safety consequences to the public or the environment. The NRC evaluated this issue per NRC Management Directive 8.3 and determined that routine follow-up inspection was the appropriate level of response commensurate with the safety significance of the event and licensee's immediate corrective actions. No violations of NRC requirements were identified. This EN is considered closed.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On July 21, 2021, the inspectors presented the core inspection results to Joel Burch and other members of the licensee staff.
- On May 13, 2021, the inspectors presented the NCS inspection results to John A. Stewart and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
88015	Calibration Records	Ludlum-18	Calibration and Controls for High Enriched Process Scanning	12/16/2020
	Corrective Action Documents	81487; 81599; 81602; 81635; 82698; 83086; 83276; 83401; 83574	PIRCS	05/10/2021
	Corrective Action Documents Resulting from Inspection	83688, 83691	PIRCS	05/13/2021
	Drawings	333-F0060-D	BPF Process Ventilation P&ID	04/12/2018
		NFS-HS-E-02, Attachment A	Emergency Evacuation Routes	Rev. 48
	Engineering Evaluations		NFS Site Integrated Safety Analysis Summary	Rev. 17
		21T-21-0001	Blended Low Enriched Uranium Preparation Facility Integrated Safety Analysis Summary	Rev. 18
		54T-10-0032	Nuclear Criticality Safety Evaluation for BPF Liquid Waste Discard System (U)	Rev. 6
		54T-10-0035	Control Flowdown and Field Verification for BPF Liquid Waste Discards	Rev. 5
		54T-14-0008	Nuclear Criticality Safety Analysis for the BPF Process Ventilation System	Rev. 7
		54T-15-0003	Control Flowdown and Field Verification for BPF Process Ventilation System	Rev. 8
		54T-15-0008	Control Flowdown and Field Verification for 300 Complex Waste Handling	Rev. 1
		PSI-RP-20-001	Determination of IEZ Boundary for Buildings 105, 310, 330, and 440	Rev. 0
	Miscellaneous		NCS Engineer Procedure Qualification Report	
			NCS Audit Records	
		21T-20-0501	Re: NFS Annual Criticality Alarm Evacuation Drills	05/21/2020

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		RS-409-333-5-1	Pre-filter, HEPA Filter, and Enclosure Pressure (IROFS BPV-1)	05/10/2021
		TRN-17	BPF Common Operator Training, Module 4: Nuclear Criticality Training	
	NDE Reports		Three Versapack Load Sheets with NDA values	
	Procedures	FM-HS-B-40-02	Locations with Area Radiation Monitors (ARMs) or RMS-3s	Rev. 5
		NFS-ACC-116	Procedure for NDA of the 333 Building Scrubber System, Raffinate Tanks, Caustic Tanks, and the Process Off-Gas Ductwork Using a Portable NDA System	Rev. 7
		NFS-ACC-121	Procedure for Operations of Selected Portable NDA Systems	Rev. 6
		NFS-CAP-009-01	Corrective Action Program (CAP) Screening Process	Rev. 6
		NFS-HS-E-02	Emergency Criticality Evacuation	Rev. 4
		NFS-HS-E-07	On-Site Radiological Emergency Assessment	Rev. 36
		NFS-HS-E-11	Radiological Scene and Contamination Control	Rev. 25
		NFS-NCS-AUDITWG	Nuclear Criticality Safety Audit Writer's Guide	Rev. 6, dated 01/29/2021
		NFS-NCS-QUALP	Nuclear Criticality Safety Engineer Qualification Program	Rev. 2, dated 01/11/2021
		NFS-WST-031	Waste Packaging for Disposal Inside MAA	Rev. 18
		SOP 409, Section 25	333 BPF Scrubber Blowdown Tank	Rev. 7
		SOP 409, Section 5	Monitoring & Servicing of Area Process Ventilation System	Rev. 14
	Radiation Surveys	NDA-31	BPF (Bldg. 333) POG Ductwork Data Sheet	03/29/2021
		NDA-31	BPF (Bldg. 333) POG Ductwork Data Sheet	01/28/2021
		RS-333-24-2	333 BPF NOx Scrubber Sample Log (IROFS BPV-3)	05/10/2021
		RS-333-25-1	BPF Scrubber Blowdown Weekly Sample Log (IROFS BPV-3)	05/13/2021
	88135.02	Corrective Action Documents	83388, 83380, 83401, 83625, 83854, 83855, 83920, 84058, 84092, 84087, 84084, 83261	Selected items reviewed that were entered into the problem identification and resolution program

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Miscellaneous	21G-21-0076	Attachment, 30-Day Report	04/27/2021