



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

August 3, 2018

EN 53331

Mr. Brad Beard
FMO Facility Manager
Global Nuclear Fuel-Americas, L.L.C.
P.O. Box 708, Mail Code J20
Wilmington, NC 28402

**SUBJECT: GLOBAL NUCLEAR FUEL – AMERICAS, L.L.C – NUCLEAR REGULATORY
COMMISSION INTEGRATED INSPECTION REPORT 70-1113/2018-003 AND
NOTICE OF VIOLATION**

Dear Mr. Beard:

This letter refers to the inspections conducted during the second quarter of calendar year 2018 (April 1 – June 30, 2018), at the Global Nuclear Fuel – Americas, L.L.C facility in Wilmington, NC. The purpose of the inspections was to determine whether activities authorized under the license and implementation of programs and procedures in the areas of Nuclear Criticality Safety and Maintenance and Surveillance were conducted safely and in accordance with Nuclear Regulatory Commission (NRC) requirements. Additionally, the inspectors followed-up on the circumstances associated with an event involving two radwaste accumulation tanks, which occurred on April 12, 2018, and was reported through Event Notice 53331, “Potentially Degraded Items Relied On For Safety,” on April 13, 2018. The enclosed report presents the results of these inspections. At the conclusion of the inspections, the inspectors discussed the findings with you and members of your staff during an exit meeting on June 21, 2018, and a subsequent exit telephonically on July 26, 2018.

These inspections examined activities conducted under your license as they relate to public health and safety and compliance with the Commission’s rules and regulations and with the conditions in your license. Within the areas mentioned above, the inspections consisted of an examination of selected procedures and representative records, observations of activities, facility walk-downs, and interviews with personnel. Throughout the inspections, observations were discussed with your managers and staff.

Based on the results of these inspections, the NRC has determined that one severity level (SL) IV violation was identified.

The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Website at (<http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>). The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report. The violation is being cited in the Notice because the violation was not licensee identified, as would be required for a non-cited violation per the NRC's Enforcement Policy, section 2.3.2.

The NRC has concluded that information regarding the reason for the violation, the corrective actions that have been taken and the results achieved, and the date when full compliance was achieved is already adequately addressed on the docket in this inspection report (70-1113/2018-003). Therefore, you are not required to respond to this letter unless the description herein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, 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, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you have any questions, please contact Tom Vukovinsky of my staff at 404-997-4622.

Sincerely,

/RA/

Eric C. Michel, Chief
Projects Branch 2
Division of Fuel Facility Inspection

Docket No. 70-1113
License No. SNM-1097

Enclosures:

1. Notice of Violation
2. NRC Inspection Report 70-1113/2018-003
w/ Supplemental Information

cc:

Scott Murray, Manager
Facility Licensing
Global Nuclear Fuels – Americas, L.L.C.
Electronic Mail Distribution

W. Lee Cox, III, Chief
North Carolina Department of Health and Human Services
Division of Health Service Regulation
Radiation Protection Section
Electronic Mail Distribution

SUBJECT: GLOBAL NUCLEAR FUEL – AMERICAS, L.L.C – NUCLEAR REGULATORY
 COMMISSION INTEGRATED INSPECTION REPORT 70-1113/2018-003
 AND NOTICE OF VIOLATION

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 ADAMS: Yes ACCESSION NUMBER:ML18218A018 SUNSI REVIEW COMPLETE FORM 665 ATTACHED

OFFICE	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI
SIGNATURE	/RA/	via feeder	via feeder	via feeder	via feeder		
NAME	T. Vukovinsky	N. Peterka	R. Womack	M. Ruffin	B. Adkins		
DATE	8/3/2017	7/ /2017	7/ /2017	7/ /2017	7/ /2017	7/ /017	7 /2017
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

NOTICE OF VIOLATION

Global Nuclear Fuel – Americas, L.L.C
Wilmington, NC

Docket No. 70-1113
License No. SNM-1097

During an NRC inspection conducted June 19 through 21, 2018, one violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Title 10 of the *Code of Federal Regulations* (10 CFR) 70.62(d) requires, in part, "The management measures shall ensure that engineered and administrative controls and control systems that are identified as items relied on for safety (IROFS) pursuant to §70.61(e) of this subpart 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 CFR 70.61 of this subpart."

Contrary to the above, on or before April 7, 2018, the licensee failed to implement adequate management measures to ensure that the Accumulation Tank density control, identified as an IROFS, was maintained to ensure the system was available and reliable to perform its function when needed, to comply with the performance requirements of 10 CFR 70.61.

This is a Severity Level IV violation (Section 6.2.d of the Enforcement Policy).

The NRC has concluded that information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence, and the date when full compliance was achieved, is already adequately addressed on the docket in inspection report 70-1113/2018-003. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation, 70-1113/2018-003-01," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region II within 30 days of the date of the letter transmitting this Notice.

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

In accordance with 10 CFR 19.11, you may be required to post this NOV within two working days.

Dated this 3rd day of August, 2018.

U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.: 70-1113

License No.: SNM-1097

Report No.: 70-1113/2018-003

Licensee: Global Nuclear Fuel - Americas, LLC

Location: Wilmington, North Carolina 28402

Dates: April 1, 2018 to June 30, 2018

Inspectors: B. Adkins, Senior Fuel Facility Inspector, (Section C.1)
N. Peterka, Fuel Facility Inspector (Section A.1)
M. Ruffin, Fuel Facility Inspector in Training (Section B.1)
R. Womack, Fuel Facility Inspector (Section C.1)

Approved by: E. Michel, Chief
Projects Branch 2
Division of Fuel Facility Inspection

EXECUTIVE SUMMARY

Global Nuclear Fuel - Americas, LLC
NRC Integrated Inspection Report 70-1113/2018-003
April 1 – June 30, 2018

Nuclear Regulatory Commission (NRC) regional inspectors conducted inspections during normal shifts in the areas of Safety Operations, Facility Support, and event follow-up. During the inspection period, normal production activities were ongoing. These announced, routine inspections consisted of a selective examination of licensee activities accomplished by direct observation of safety-significant activities and equipment, walk-downs of the facility including items relied on for safety (IROFS), interviews and discussions with licensee personnel, and a review of facility records and procedures. One violation of NRC requirements was identified.

Safety Operations

- In the area of Nuclear Criticality Safety, no violations of more than minor significance were identified. (Section A.1)

Facility Support

- In the area of Maintenance and Surveillance, no violations of more than minor significance were identified. (Section B.1)

Special Topics

- One cited Severity Level IV violation was identified for failure to implement adequate management measures to ensure the Accumulation Tank density control, identified as an IROFS, was maintained to ensure the system was available and reliable to perform its function when needed, to comply with the performance requirements of 10 CFR 70.61, as required by 10 CFR 70.62(d). (Section C.1)

Attachment

Key Points of Contact
List of Items Opened, Closed, and Discussed
Inspection Procedures Used
Documents Reviewed

REPORT DETAILS

Summary of Plant Status

Global Nuclear Fuel - Americas (GNF-A), LLC manufactures uranium dioxide (UO₂) powder, pellets, and light water reactor fuel bundles at its Wilmington, NC facility. The facility converts uranium hexafluoride (UF₆) to UO₂ using a Dry Conversion Process (DCP) and performs UO₂, gadolinium pellet and fuel fabrication operations. During the inspection period, normal production activities at the facility were ongoing.

A. Safety Operations

1. Nuclear Criticality Safety (Inspection Procedure 88015)

a. Inspection Scope

The inspectors reviewed documents, performed system walk-downs, and interviewed licensee personnel to verify compliance with the requirements of the License Application section 5.0, "Nuclear Criticality Safety."

Criticality Analysis

The inspectors reviewed selected Criticality Safety Analyses (CSAs) to determine whether properly reviewed and approved CSAs were in place and of sufficient detail and clarity to permit independent review. The inspectors reviewed selected CSAs to determine whether calculations were performed within the validated area of applicability and consistent with the validation report. The inspectors reviewed the selected CSAs and associated assumptions and calculations to verify consistency with the commitments in the License Application, including the consideration of the Double Contingency Principle, assurance of subcriticality under normal and credible abnormal conditions with the use of subcritical margin, technical practices and methodologies, and treatment of nuclear criticality safety (NCS) parameters. The CSAs were selected based on several factors such as risk-significance, whether they were new or recently revised, the use of unusual control methods, and operating history. The CSAs reviewed included CSA-702.00.100, CSA-702.00.200, CSA-407.00.200 and CSA-601.01.100.

The inspectors reviewed the licensee's generation of accident sequences to verify whether the CSAs systematically identified normal and credible abnormal conditions for the analysis of process upsets in accordance with the commitments and methodologies in the License Application. This effort included the review of accident sequences the licensee determined to be not credible to determine whether the bases for incredibility were consistent with the commitments, definitions, and methodologies in the License Application, and were documented in sufficient detail to permit an independent assessment of credibility. This review was conducted for the following CSAs: CSA-702.00.100.

Criticality Implementation

The inspectors performed walk-downs of the Radioactive Waste Processing Area to determine whether existing plant configuration and operations were bound by, and consistent with, the process description and safety basis in the CSA. The inspectors

reviewed process and system descriptions, and setpoint analyses to verify engineered controls established in the CSAs were included. The inspectors reviewed operating procedures and postings, to verify the selected administrative controls established in the CSAs were included. The inspectors interviewed operators and engineers to verify that administrative actions established in the CSAs were understood and implemented properly in the field.

The inspectors reviewed the integrated safety analysis (ISA) Summary and supporting ISA documentation to determine whether the controls identified in the ISA were supported by the technical basis in the CSAs.

Criticality Operational Oversight

The inspectors reviewed NCS-related training records to determine whether operator training included instruction in criticality hazards and control methods, whether the licensee's established NCS-related operator training was consistent with commitments in the License Application, and whether NCS staff were involved in the development of operator training. The inspectors interviewed operations staff to determine whether they were cognizant of NCS hazards and control methods related to their specific job function. The NCS-related training records reviewed included annual refresher training for operators.

The inspectors accompanied NCS engineers on general walk-downs of the facility to determine whether NCS staff routinely inspected fissile material operations to ascertain that criticality requirements were being satisfied. Additionally, the inspectors interviewed two NCS engineers and reviewed audit records that had been documented since the last NCS inspection.

Criticality Programmatic Oversight

The inspectors reviewed the selected CSAs listed above to verify they were performed in accordance with NCS program procedures and received appropriate independent review and approval. The inspectors conducted interviews and reviewed corrective action program (CAP) entries to verify that audit findings were being identified, entered, and tracked resolution of the issue.

The inspectors reviewed selected NCS-related CAP entries to verify whether abnormal conditions were identified and entered into the CAP, whether the proposed corrective actions addressed the problem identified, whether they were prioritized on a schedule commensurate with their significance, and whether they were completed as scheduled.

b. Conclusion

c.

No violations of more than minor significance were identified.

B. Facility Support

1. Maintenance and Surveillance (Inspection Procedure 88025)

a. Inspection Scope

The inspectors reviewed documents, performed system walk-downs, and interviewed managers, supervisors, engineers and technicians to verify that maintenance and surveillance program activities complied with the requirements of the License Application section 11.3, "Maintenance." The inspectors interviewed maintenance staff and performed document reviews for items relied on for safety (IROFS) and other safety controls to assure they remained available and reliable to perform their safety function when needed. The inspectors reviewed work packages to determine whether they were adequately reviewed prior to returning the equipment to service. The following IROFS were inspected:

- IROFS 702-06, Accumulation Tank Density Control
- IROFS 702-07, Tank Safe Geometry
- IROFS 702-09, Aging Tank Density Control
- IROFS 702-10, Aging Tank Safe Geometry
- IROFS 803-06, Secondary HEPA Filter Monitoring
- IROFS 803-07, Grinder Apitron Filters
- IROFS 803-09, Secondary HEPA Filtration
- IROFS 804-01, FMO Exhaust Scrubber System
- IROFS 804-02, Scrubber Sump Safe Geometry

The inspectors reviewed samples of the licensee's maintenance program and observed maintenance planning and turn over meetings to verify provisions were in place to ensure pre-job planning and preparation of work orders supporting maintenance and surveillance activities were conducted in accordance with licensee procedures and requirements. The inspectors reviewed samples of maintenance and surveillance work orders and post maintenance testing records for accuracy and to determine whether the functionality of IROFS and safety controls were verified operational in accordance with maintenance procedures and ISA accident sequences. In addition the inspectors assessed the work orders to verify they were accurate, contained the proper level of detail, and that post-maintenance testing and calibrations, as specified by the license requirements, were performed prior to restoring the equipment to operational status.

The inspectors walked down the radwaste accumulation vessels (V-262 and V-264) and the aging tanks to observe the method in which visual inspections of the tanks were conducted and to observe previous maintenance work activities on the accumulation tanks to determine if the updated preventative maintenance procedures for the tank inspections were adequate. The inspectors reviewed the work orders that were generated for the maintenance activities conducted on the radwaste accumulation vessels to verify the work was properly authorized prior to the commencement.

The inspectors interviewed a maintenance supervisor regarding the training and qualification program for maintenance personnel performing work on safety-related equipment, including IROFS, to verify compliance with the requirements of the License Application section 11.4, "Training and Qualifications." The inspectors reviewed the

training and qualification records of two maintenance mechanics, one HVAC maintenance mechanic, one instrumentation technician and one controls technician to verify the individuals were qualified to perform their assigned maintenance activities in accordance with approved training procedures CP-20-107, "GNF-A Manufacturing Training and Qualification Program."

The inspectors reviewed the most recent focused self-assessment report to verify it met license requirements in regards to maintenance activities. The inspectors verified that the assessment findings were properly entered into the licensee's CAP.

The inspector reviewed the licensee's problem identification and resolution/CAP to verify that performance issues relating to the maintenance and surveillance of IROFS and safety controls were entered into the corrective action program and evaluated the adequacy of corrective actions taken. The list of corrective actions reviewed can be found in Section 4 of the Attachment.

b. Conclusion

No violations of more than minor significance were identified.

C. Special Topics

1. Event Follow-Up (Inspection Procedure 88075)

a. LER EN 53331 Global Nuclear Fuel Americas – Potentially Degraded Items Relied On For Safety

On April 13, 2018, in accordance with 10 CFR Part 70 Appendix A (b)(2), GNFA submitted a 24-hour report to the NRC for potentially degraded IROFS that resulted in the failure to meet the performance requirements of 10 CFR 70.61. Specifically, GNFA reported that an accumulation of material had occurred in a safe geometry waste tanks, accumulation tanks V-262 & V-264. The potential cause of the accumulation was reduced recirculation flow, which was an engineered feature that mixed the contents of the tank as part of a density control. The primary safety concern was the potential for a nuclear criticality in the tanks. Additional details related to the event are summarized in the paragraph below.

During the annual shutdown power outage on April 12, 2018, several valves in the radiological waste accumulation tanks (V-262/V-264) were replaced per change request #26119 because the existing valves would not operate. During this work, it was discovered that the V-264 tank recirculation injection nozzle flow line was plugged and consequently degraded. The recirculation injection nozzle function is credited as part of IROFS 702-06, Accumulation Tank Density Control, and therefore the Nuclear Safety Engineering (NSE) Manager was notified and the interior of both tanks was inspected for sludge buildup. Various samples were taken from the material for determination of uranium value and after lab analysis were determined to range from 7 to 15% uranium content. A plan was developed to better quantify the uranium content of the tanks starting with tank V-264. During cleanout of V-264, the nozzles were removed and the sludge was washed out from the nozzle ports in the bottom of the tank. However, it became apparent that prompt quantification of the initial sludge mass was not possible and a decision was made to report the event to the NRC on April 13, 2018.

In a response to the event, the NRC sent a criticality safety inspector to the site on April 17, 2018, to obtain additional information. Upon arrival at the site the inspector received a status briefing from licensee management and conducted a tour of the affected tanks. The inspector reviewed Temporary Operating Procedure (TOP) #26244 to verify the procedure contained adequate safety controls for the prevention of criticality and potential exposure to airborne contamination. The inspector verified that lockouts were utilized to control hazardous energy sources during cleanout operations and radiological hazards were controlled by a job-specific radiation work permit (RWP). The inspector attended the pre-job briefing to assess whether the licensee adequately communicated the scope of the TOP and potential safety hazards such as criticality and airborne exposure to uranium to assigned workers. The inspector observed tank cleanout activities over a two-day period to ensure that operations were conducted in a safe and controlled manner including proper management oversight and implementation of criticality controls. The inspector reviewed preliminary sample data from the removed material to determine if the estimated quantity of uranium had the potential to exceed the quantity needed for a critical mass, 27 kg.

The inspectors reviewed records to determine if the licensee was performing annual visual inspections for material buildup to prevent long term accumulation of material in the accumulation tanks. The inspector reviewed the nuclear criticality safety evaluation (NCSE) and corresponding analyses to determine the impact of the failed/degraded IROFS on the potential risk for criticality as well as compliance with the double contingency principle. The inspectors reviewed the condition report used to document the LER and immediate corrective actions. The inspectors noted that the licensee categorized the event as Level A, which requires a formal root cause analysis of the event. The specific causes, extent of condition, and corrective actions associated with this event were reviewed in detail during an inspection of the LER from June 19 - 21, 2018.

During the inspection in June, the inspectors reviewed multiple RWPs, operating procedures, and TOPs as well as interviewed radioactive waste operators, radiation protection monitors, and licensee managers to verify the licensee's reportability determination as required by 10 CFR 70.50 was adequate. The inspectors determined that normal operations occurred in accordance with established procedures prior to, during, and shortly after the event and that the licensee determined that additional abnormal operations were necessary, and developed a specific radiation work permit and temporary operating procedures for the work. Thus, their reportability determination was accurate.

The inspectors also reviewed radiation protection work instructions, stationary air sampler (SAS) results, and interviewed radioactive waste operators, radiation protection monitors, and licensee managers to verify that controls were in place during the event as required by 10 CFR 20. The inspectors noted that two SAS results during the initial week of event follow-up exceeded 0.3 derived air concentration (DAC) during times of increased occupancy without engineered or additional radiological controls in place. Throughout the event follow-up, additional SAS results in excess of 1.0 DAC occurred after additional controls in the form of respiratory protection were implemented and no regulatory dose or intake limits were exceeded by radiation workers.

Based on the initial information gathered, the NRC concluded that the licensee's response to the event was adequate and that no special inspection was warranted. The inspectors concluded that the actual potential for criticality was low based on the uranium content of the material, favorable tank geometry, and adequate administrative controls implemented by the licensee during tank cleanout.

The inspectors reviewed the root cause analysis performed by the licensee to verify the analysis was an in depth review, that the proper conclusions were made concerning the cause of the event and the compliance with 10 CFR 70.61 performance requirements, and that the licensee's proposed corrective actions were sufficient and addressed the issue.

The inspectors determined the licensee met the performance requirements of 10 CFR 70.61 based on the licensee's ISA as the IROFS density control is not considered failed until the quantity of uranium in the tank exceeds the 27 kg value. However, the inspectors determined that the IROFS was degraded due to the licensee's failure to implement adequate management measures to ensure IROFS 702-06, accumulation tank density control, remained available and reliable to perform its intended safety function as required by 10 CFR 70.62(d).

b. Conclusion

One minor violation and one Severity Level (SL) IV violation of NRC requirements were identified.

Minor Violation

WI-27-105-01, "Posting and Control of Radiological Areas," requires either posting of an area as an airborne radioactivity area (ARA) or documentation of an assessment as to why an area is not posted when the area exceeds 0.3 DAC for 12 hours. Contrary to the above, on April 10 and April 12, the licensee failed to follow their procedure and neither posted the URU area as an ARA, or documented the assessment as to why no posting was necessary following two stationary air sampler results in excess of 0.3 DAC. This nonconformance does not align with any escalated enforcement examples in the NRC Enforcement Policy and is minor because it aligns with example 6.e. in IMC 0616 Appendix B. This failure to comply with WI-27-105-01 constitutes a minor violation that is not subject to enforcement action in accordance with the NRC Enforcement Policy.

Severity Level IV Violation: Inadequate Management Measures for Accumulation Tanks V-262/264

Introduction: The inspectors identified a self-revealing SL IV Violation of 10 CFR 70.62(d) for the licensee's failure to ensure adequate management measures were in place to ensure IROFS were available and reliable to perform their function when needed. Specifically, adequate measures were not in place to ensure the density monitoring system IROFS in the Radwaste Accumulation Vessels was available and reliable to perform its intended safety function if called upon.

Description: On April 7, 2018, the licensee discovered an unknown foreign material blocking the recirculation injection nozzle for tank V-264 while performing valve replacements on the radwaste system. Following discovery of the blockage, the tanks

were inspected for material and it was discovered that tank V-262 contained approximately 14 inches of material in the bottom, and tank V-264 contained approximately 10 inches of material. The liquid in the tanks is continuously circulated through a density monitor (IROFS 702-06) and returned to the tanks through injection swirl nozzles to ensure mixing and minimize the settling of particulate within the tanks. Upon determining that the density control was no longer reliable, the licensee made a report to the NRC under 10 CFR 70 Appendix A (b)(2) for the failure to meet the performance requirements as Event Notice 53331. The licensee developed a plan to remove the material from the tanks to quantify the amount of uranium within the material. The licensee determined that tank V-262 contained approximately 25 kg Uranium-235 (U-235) and tank V-264 contained approximately 13.3 kg U-235. The amount of material recovered was less than the licensee's established safe mass limit of 27 kg U-235.

Analysis: 10 CFR 70.62(d) states, in part, that "management measures shall ensure that engineered and administrative controls and control systems that are identified as items relied on for safety pursuant to 70.61(e) of this subpart 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 CFR 70.61 of this subpart."

One of the management measures in place for the density monitoring system was an annual maintenance inspection of the tanks to ensure no accumulation of uranium bearing material was present and that any particulate materials remained suspended in solution for the density monitoring system to have a representative sample of the tank's content. The inspectors determined that the management measures the licensee had in place did not ensure the density monitoring system IROFS would remain available and reliable. Specifically, guidance for maintenance personnel was lacking on how to properly inspect the tanks, the degree to which the tanks should be emptied prior to inspection, and how to visually confirm the swirl nozzles were operable. As a result, an accumulation of uranium bearing material occurred on the bottom of both tanks V-262/264 and the recirculation nozzle for tank V-264. As a result, the accumulation tanks were in a degraded state for an extended period of time, resulting in the density sample of the tanks not being representative of the actual tank contents. However, the degradation of the density monitoring system did not result in an actual safety consequence to the facility.

The noncompliance is more than minor based on the criteria of "example j" of Inspection Manual Chapter 0616 Appendix B, which states, the violation is more than minor in part because, "The failure resulted in no remaining risk margin above and beyond the performance requirements of 70.61(b) and (c)." Specifically, the plugging of the V-264 recirculation nozzle and accumulation of material in both tanks led to the degradation of the density monitoring system (IROFS 702-06), such that it no longer provided a representative sample of the tanks uranium density. As a result, the safety margin above the performance requirements was degraded and the licensee was just meeting the requirements of 10 CFR 70.61 which for the licensee is $10^{-4}/y$.

The inspectors determined that the performance requirements of 10 CFR 70.61 were still met due to additional passive engineered controls in place for the accumulation tank geometry and considering the new failure data for the density control, a revised initiating event frequency of $10^{-1}/y$ was deemed appropriate. Because no criticality accident occurred, there was no actual safety consequence due to the degradation of the density

monitoring system. Given the remaining passive safety control in place for the tanks geometry, it was determined the potential safety consequence from a criticality was low for the time period preceding discovery on April 12, 2018. In accordance with section 2.2.2.d of the NRC Enforcement Policy, violations that are less serious, but are of more than minor concern, and result in no or relatively inappreciable potential safety or security consequences are characterized as Severity Level IV violations.

Enforcement: 10 CFR 70.62(d) requires, in part, "That management measures shall ensure that engineered and administrative controls and control systems that are identified as items relied on for safety pursuant to §70.61(e) of this subpart 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 CFR 70.61 of this subpart."

Contrary to the above, before April 7, 2018, the licensee failed to implement adequate management measures to ensure that the Accumulation Tank density control, identified as an IROFS, was maintained to ensure the system was available and reliable to perform its function when needed, to comply with the performance requirements of 10 CFR 70.61.

The licensee's immediate corrective actions to restore compliance following the discovery of the degradation of the density monitoring system was to completely drain the tanks and perform a thorough cleanout and inspection. The licensee initiated a root cause investigation as directed by Condition Report 28419 and performed inspections on similar tanks in the facility.

The licensee's corrective actions to prevent recurrence of the violation included the following: (1) revise the annual inspection instructions for tanks V-262/264 to include additional criteria to remove the recirculation nozzles and flush the tank for the visual inspection; (2) create a preventative maintenance task to inspect the system nozzles and piping flow restrictions for the accumulation tanks and other applicable tanks; and (3) as a long term corrective action, evaluate adding additional inspection ports to facilitate tank inspections. The proposed corrective actions are expected to be completed by the middle of 2018.

The failure to provide adequate management measures for the density monitoring system IROFS for accumulation tanks V-262/264 is a SL IV violation of 10 CFR 70.62(d) requirements and will be tracked as VIO 70-1113/2018-003-01, "Inadequate Management Measures for Accumulation Tanks V-262/264." A Notice of Violation is enclosed.

D. Exit Meeting

The inspection scope and results were presented to members of the licensee's staff at various meetings throughout the inspection period and were summarized on June 21, 2018 and July 26, 2018, to B. Beard and staff. No dissenting comments were received from the licensee. Proprietary information was discussed but not included in the report.

SUPPLEMENTAL INFORMATION

1. KEY POINTS OF CONTACT

Licensee personnel

<u>Name</u>	<u>Title</u>
T. Croom	Maintenance Coordinator, HVAC
J. Degoyer	ISA Engineer
M. Dodds	Senior NCS Engineer
D. Eghbali	Senior NCS Engineer
P. Lachance	Maintenance Staff Manager
K. McGowan	Training Lead FMO
S. Murray	Manager, Facility Licensing
D. Nay	FMO Manufacturing Engineering Manager
P. Ollis	Facility Licensing
J. Rohner	NCS Program Manager

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened & Closed

70-1113/2018-003-01	VIO	Inadequate Management Measures for Accumulation tanks V-262/264
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Closed

70-1113/2018-001	LER	Loss or Degraded Items Relied on for Safety – Accumulation Tank (Paragraph C.1)
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Discussed

None

3. INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety
88020	Operational Safety
88025	Maintenance and Surveillance of Safety Controls
88075	Event Follow-up

4. DOCUMENTS REVIEWED

Records:

Certification of Annulus Measurements, Tank V-262, Brighton Corporation, dated March 1, 1984

Certification of Annulus Measurements, Tank V-264, Brighton Corporation, dated February 1, /84

Change Request (CR)-18474, CMTrac Audit Report - Poison Panel Measurements, dated October 4, 2015

CSA-601.01.100, Bundle Forest, Revision (Rev.) 7, February 2018

CSA-702.00.100, Radwaste System, Rev. 2, November 2016

CSA-407.00.200, Radwaste Appendix, Rev. 2, November 2016

Event Notice (EN)-53331, Global Nuclear Fuels America – Potentially Degraded Items Relied on for Safety, dated April 13, 2018

QRA-702/703, Radwaste / Waste Treatment, Rev. 6, dated December 19, 2016

Radwaste Accumulation Sludge Sample Results 6396233, dated April 9, 2018

Radwaste Accumulation Sludge Sample Results 6396234, dated April 9, 2018

Radwaste Accumulation Sludge Sample Results 6396696, dated April 13, 2018

Radwaste Accumulation Sludge Sample Results 6399634, dated April 19, 2018

Radwaste Accumulation Sludge Sample Results 6399677, dated April 19, 2018

Root Cause Investigation Report, Solids Buildup in Radwaste Accumulation Vessels V-262/V-264, dated June 7, 2018

RWP 5747 – Worker entry into Radiologically Controlled Area

RWP 5822 – Open and inspect the Annular Tanks located in URU Centrifuge Room, Rad Waste, and the Chemical Area. Flanges to be removed and sludge drained from the tank. Nozzles to be cleaned and/or replaced

Tank Inspection History.xlsx, dated April 27, 2018

WO 503550

WO 610619

WO 595465

WO 595458

WO 595460

WO 612111

WO 595454

WO 450194

WO 592173

WO 621517

WO 592654

WO 621524

WO 554500

WO 575502

Procedures:

CAA Temporary Operating Procedure 26305: Composite Sample and Consolidation of RW Tank Sludge

CP-24-100, Wilmington Maintenance Administration, Rev. 2.0, dated March 12, 2018

CP-20-107, GNF-A Manufacturing Training and Qualification Program, Rev 7.0, dated March 26, 2018

CP-12-102, Calibration Program for Instrumentation and Controls, Rev 2.1, dated November 18, 2016

CP-06-216, Functional Test Instructions, Rev 1.1, dated February 9, 2018

OP 1080.20.205, Decon Facility – Abnormal Operations, Rev. 00, dated August 24, 2015
 OP 1910.00.100, FMO Rad Waste Process – General Information, Rev. 0, dated June 5, 2017
 OP 1910.00.201, FMO Rad Waste Process – Normal Operations, Rev. 0
 OP 1910.00.202, FMO Rad Waste Process – Abnormal Operations, Rev. 0
 QRA-702/703, Radwaste / Waste Treatment, Rev. 6
 SD 01.24.06, Tanks V-262 and V-264 Annual Inspections
 Temporary Operating Procedure #26244, Inspect and Flush Waste Annular Tanks to Characterize Sludge, and to Ensure Proper Operation, dated April 10, 2018
 WI-18-104-02, Internal Nuclear Safety Audits, Rev 3.0, dated May 16, 2016
 WI-27-104-02, Internal Nuclear Safety Audits, Rev. 3, dated May 16, 2016
 WI-27-105-01, Posting and Control of Radiological Areas, Rev 2.0, dated June 8, 2018
 WI-27-105-07, Airborne Radioactivity Measurement and Control, Rev 4.0, dated March 26, 2018

Condition Reports:

CR 26241
 CR 26268
 CR 26311
 CR 28268
 CR 28277
 CR 28419
 CR 28535

Other:

CSA-702.00.200, Criticality Safety Analysis Radwaste System Appendix, Rev. 2
 Drawing 68685428X, Reinf. Concrete Leak Chec & Inspection Pit, Rev. 1
 Focused Self-Assessment Report, dated March 16, 2018
 PFD-9001 Model
 Piping & Instrument Diagram (P&ID) CP-9509, Rad Waste Accumulation System P&ID, Rev. 5
 Process Flow Diagram (PFD)-9001, PFD for Rad Waste Treatment Using Caustic, Rev. 3
 QRA-702/703, Radwaste/Waste Treatment, Rev. 6, dated December 19, 2016
 Rad Waste Accumulation Discussion, Event Report 53331, dated May 2018
 Radiation Worker Training, Criticality Safety, October 2017
 SD 01.24.09, Tanks V-9011 and V-9500 Annual Inspection, dated April 30, 2018
 SD 01.24.16, Quarantine Tanks Annual Inspection V-421, V-422, V-632 and V-636, dated April 30, 2018
 SD 01.24.08, Annual Visual Inspection of Tank V-9010, dated April 30, 2018
 Tank Inspection History for V-262/V-264
 Solids Buildup in Radwaste Accumulation Vessels V-262/V-264 Root Cause Investigation Report, Rev. 1, dated June 7, 2018