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

December 20, 2017

Mr. Adam Hilton
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 INSPECTION REPORT 70-1113/2017-006

Dear Mr. Hilton:

The Nuclear Regulatory Commission (NRC) conducted an announced inspection during the week of November 27, 2017, at the Global Nuclear Fuel-Americas, L.L.C facility in Wilmington, NC. The purpose of the inspection was to perform Temporary Instruction (TI) 2600/16, Inspection of Activities Associated with NRC Generic Letter 2015-01, Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities. The enclosed report presents the results of the inspection. At the conclusion of this inspection, the results were discussed members of your staff at an exit meeting on November 30, 2017.

During the inspection, 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 inspection are identified in the enclosed report. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

The inspection allowed the staff to independently verify compliance with regulatory requirements and applicable license conditions regarding the treatment of natural phenomena hazards (NPHs) as described in your Integrated Safety Analysis (ISA). No findings of more than a minor significance were identified.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of NRC's "Rules of Practice and Procedure," a copy of this letter and enclosure will be made available electronically for public inspection in the NRC Public Document Room, or from the NRC's Agencywide Documents Access and Management System (ADAMS), which is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please call me at (404) 997-4703.

Sincerely,

/RA/

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

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

Enclosure:
NRC Inspection Report 70-1113/2017-006
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
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Radiation Protection Section
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NAME	T. Vukovinsky	B. Adkins	M. Crespo	K. McCurry	J. Marcano		
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U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	70-1113
License No.:	SNM-1097
Report No.:	70-1113/2017-006
Licensee:	Global Nuclear Fuel - Americas, LLC
Location:	Wilmington, North Carolina 28402
Dates:	November 27 - 30, 2017
Inspectors:	B. Adkins, Senior Fuel Facility Inspector (Sections A.1 and A.5) M. Crespo, Senior Fuel Facility Inspector (Sections A.1, A.2, and A.3) K. McCurry, Fuel Facility Inspector (Sections A.1 and A.4) J. Marcano, Structural Engineer (Sections A.1 and A.5)
Approved by:	O. López-Santiago, Chief Safety Branch Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

Global Nuclear Fuel - Americas, LLC
NRC Inspection Report 70-1113/2017-006
November 27 - 30, 2017

The inspection implemented Temporary Instruction (TI) 2600/16, Inspection of Activities Associated with Nuclear Regulatory Commission (NRC) Generic Letter (GL) 2015-01, Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities. The purpose of the inspection was to independently verify that licensees are in compliance with regulatory requirements and applicable license conditions regarding the treatment of natural phenomena hazards (NPHs) events as described in the Integrated Safety Analysis (ISA). The inspection was conducted by NRC regional inspectors and headquarters (HQ) technical staff during normal shifts in areas of plant modifications, chemical safety, nuclear criticality safety, fire protection, and emergency preparedness. The inspectors performed a selective examination of license 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. No findings of more than a minor significance were identified.

Assessment of the Potential Accident Sequences, Consequences, and Prevention and/or Mitigation Strategies as a Result of Impacts to Facility Structures and Internal Components from NPH

The NRC concluded that the licensee's ISA adequately addressed potential hazards as a result of NPH events. Refer to the following sections below for specific details regarding the inspection.

- Seismic evaluation of building structures and equipment; (Paragraph A.1);
- Seismic-induced fire and explosions; (Paragraph A.2);
- Seismic-induced chemical release; (Paragraph A.3);
- Seismic-induced criticality (Paragraph A.4)
- Other NPH events (Paragraph A.5); and
- Emergency preparedness (Paragraph A.6)

Other Areas

- Closure of Unresolved Item (URI) 2012-006-01, "Further evaluate whether the licensee is in compliance with the requirements of 70.62(c) and 70.61 performance requirements regarding natural phenomena events." (Paragraph B.1)

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

REPORT DETAILS

Summary of Plant Status

Global Nuclear Fuel- Americas (GNF-A), LLC manufactures uranium dioxide (UO_2) powder, pellets, and light water reactor fuel bundles at its Wilmington, NC facility. The facility converts uranium hexafluoride (UF_6) to UO_2 using a Dry Conversion Process (DCP) and performs UO_2, gadolinium (GAD) pellet and fuel fabrication operations. During the inspection, normal production activities at the facility were ongoing. The inspection covered major buildings, equipment and processes associated with licensed activities for the fuel manufacturing facility. The only major building that was not evaluated for potential natural phenomena hazards (NPH) was the Hydrogen Fluoride (HF) Building. This was based on a license amendment dated December 19, 2013 (ML13329A830), which removed the HF recovery process downstream of uranium conversion from the Integrated Safety Analysis (ISA).

The inspection implemented Temporary Instruction (TI) 2600/16, Inspection of Activities Associated with Nuclear Regulatory Commission (NRC) Generic Letter (GL) 2015-01, Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities. The purpose of the inspection was to independently verify that licensees are in compliance with regulatory requirements and applicable license conditions regarding the treatment of NPH events as described in the ISA. The inspection was conducted by NRC regional inspectors and headquarters (HQ) technical staff during normal shifts in areas of plant modifications, chemical safety, nuclear criticality safety (NCS), fire protection, and emergency preparedness. The inspectors performed a selective examination of license 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. No findings of more than a minor significance were identified.

A. Assessment of NPH Accident Sequences, Consequences, and Mitigation/Prevention Strategies

1. Seismic Evaluation of Building Structures and Equipment

a. Inspection Scope

ISA for Seismic Hazards

The inspectors conducted interviews with ISA staff to review the methodology and screening process used by the licensee to identify the potential for credible NPH and demonstrate compliance with the performance requirements of 10 CFR 70.61. The inspectors reviewed CALC-900-007, “Natural Phenomenon Hazard Screening, Definition, and Evaluation,” to evaluate the results from the site NPH screening process.

The inspectors reviewed the qualifications and experience of the team that performed the NPH screening and hazards analysis to ensure they contained the necessary knowledge and experience in the areas of process systems, criticality safety, fire safety, and chemical safety. The inspectors reviewed site procedures that cover configuration management to ensure that the licensee had controls in place to evaluate changes or modifications that could impact the seismic qualification of the building or equipment.

The inspectors conducted walk-downs and reviewed the ISA Summary, qualitative risk assessment (QRA), and criticality safety analyses (CSA) for the fuel bundle assembly area to confirm there were no new accident sequences or items relied on for safety (IROFS) to consider as a result of NPH events. This included a review of the bundle storage racks, inspection pit, and overhead crane. The inspectors verified that the accident sequences were properly scored including credit for initiating event frequency, use of conditional probabilities, and application of IROFS. The inspectors conducted a walk-down of the inspection pit area to determine that the licensee appropriately screened out the potential for a criticality resulting from a seismic event. The inspectors noted that the licensee recently upgraded the inspection pit stands to make them more robust and able to survive a seismic event. Based on the configuration of the pit area (number, location, and size of stands, size of pit, structural grating supports, and mounting details), the inspectors concluded that the potential for a criticality remained highly unlikely as the result of a seismic event.

In the area of configuration management, the inspectors reviewed structural calculations and conducted walk-downs of the fuel bundle storage racks to determine if the structural analysis was consistent with the as built configuration of the racks including floor mounting details, materials of construction, member sizes, critical dimensions, and quality assurance requirements. The inspectors conducted interviews and reviewed records to determine if the licensee followed the 2012 North Carolina State Building Code with respect to Hilti anchor bolt installation, welding of structural members, and structural steel fabrication. The inspectors verified that the subcontractor responsible for fabrication of the bundle forest structural members was certified by the American Institute of Steel Construction (AISC). The inspectors reviewed the seismic calculations to verify that the assumptions and design inputs were consistent with applicable building codes including the American Society of Civil Engineers (ASCE) 7-05, International Building Code 2009 Edition, and United States Geological Survey (USGS) 2008.

Seismic Evaluation of the FMO/FMOX Building

In Section 2.0 of CALC 900-007, GNF-A stated that it evaluated the performance of important systems structures or components for applicable NPH using criteria from the ASCE 7-05 or ASCE 7-10; International Building Code (IBC)-15; and the North Carolina State Building Code 2012. As documented in the NRC's Technical Evaluation Report (TER) (ML16029A144), the staff performed detailed reviews of the structural analysis reports for the main buildings, including additional analysis performed as part of request for additional information (RAI) (ML16218A258 and ML17044A036) with regards to the methodology and assumptions used in the Fuel Manufacturing Operations (FMO) and FMO Extension (FMOX) buildings.

The inspectors conducted walk-downs of the FMO/FMOX buildings to independently verify assumptions used in the structural analysis; reviewed the design bases, calculations, and design drawings of a sample of buildings and interviewed the structural engineer. During the walk-downs the inspectors verified, using a sample approach, that the as-built configuration of the buildings structures closely matched the finite element model used for the seismic evaluation.

The inspectors reviewed a sample of the specification drawings and performed visual observations of the structural member connections to confirm that diagonal brace connections, column connections, and column roof to truss connections have adequate

capacity with respect to the evaluation basis earthquake (EBE). The inspectors noted that the licensee does not have specific drawings detailing the design loads of the connections. However, the inspectors interviewed the design engineer who explained the rationale used for the assumption that adequate capacity exist in the connections to withstand the loads obtain from the seismic analysis of the FMO/FMOX. The design engineer indicated, that since the original design drawings provided adequate details showing the loads of all members interacting in the connections, that all connections where then specified by the connection detailer to comply with the stated loads. Therefore, if the loads obtained from the seismic analysis were bounded by the loads specified in the original design drawings, the connections were assumed to have adequate capacity. Upon visual observation of a sample of connections, all connections matched the typical section details specified in the original drawings.

The inspectors reviewed a sample of the specification drawings and performed visual observations to confirm that the FMO/FMOX roof was replaced with a lighter material to justify lowering the roof dead load from 20 to 10 pounds per square foot (psf) in the seismic analysis. The inspectors reviewed the original calculations from 1971 which provided detailed information on the materials and roof weights. The inspectors also reviewed information on the design for the replacement of the FMO/FMOX roof and validated that the existing configuration of the roof equates to an approximate dead load of 10 psf.

The inspectors selected a sample of major equipment and performed area walk-downs to ensure that all potential hazards were considered in the seismic analysis and ISA. Specifically the inspectors performed walk-downs of the process vessels, process storage racks and piping in the production areas on DCP and FMO/FMOX. Particular attention was given by the inspectors on the piping loads since GNF-A lowered the piping allowance from 15 psf to 5 psf in the structural analysis for the FMO/FMOX. Through visual observations the inspectors validated that a small amount of pipe runs were supported by the roofs purling and thus a 5 psf allowable was adequate.

The inspectors also reviewed the implementation of two structural modifications to piping and equipment supports in the FMO/FMOX building. Specifically, the inspectors reviewed the modification completed by GNF-A for the anchoring system of the sheet metal cover over pellet boat storage rack. The inspectors also reviewed and performed visual observations, of the modifications to piping supports in the UO_2 furnace room implemented by GNF-A to ensure they comply with building code requirements.

Seismic Evaluation of CMU Walls

The inspectors reviewed “CMU Wall Evaluation of the FMO, FMOX, and DCP Buildings,” Rev. 0, dated October 2016. The inspectors also performed walk-downs, interviewed the design engineer and reviewed design information to confirm that the assumptions used to analyze the seismic performance of concrete masonry unit (CMU) walls matched the as-built configuration of the walls. Attention was given to the as-built configuration of the anchorage of CMU walls to columns and roof members. In addition, the inspectors independently verified that the CMU walls are typically of 8 inch of width since this is used as an assumption in the fire modeling of the facility.

b. Conclusion

No violations of more than a minor significance were identified.

2. Seismic-Induced Fire and Explosions

a. Inspection Scope

The inspectors conducted walk-downs of the flammable and combustible gas lines used in the DCP and FMO/FMOX buildings. The inspectors noted the construction of additional supports to the piping in the furnace area as recommended in the seismic evaluation report. The inspectors reviewed the accident sequences associated with the furnace area and evaluated the IROFS designated to ensure that any high consequence events (i.e. a criticality) remained highly unlikely. The inspectors also interviewed the engineer in charge of the flammable gas lines of the furnace area regarding the IROFS in place. The inspectors reviewed the status of the administrative IROFS and their supporting procedures as well as the status of the various valves (both inside the process area and outside the building) available to isolate the gases should a leak be identified. The inspectors reviewed drawings and conducted walk downs to verify that the valves were clearly identified on facility drawings and properly labeled in the plant so that emergency response personnel could quickly identify and close the valves during a site emergency. The inspectors also discussed with the engineer defense-in-depth controls such as the flammable gas detectors installed in the furnace area.

The inspectors reviewed Appendix A3, “Consolidated List of IROFS and Assigned Management Measures,” of the ISA Summary to determine the applicable management measures for IROFS No. 405-17, Hydrogen Gas Leak Detection and Response, and IROFS No. 900-18, Natural Gas Leak Detection and Response. As a result of their review, the inspectors identified that the only management measure applied to both IROFS was procedures since the IROFS were considered to be administrative controls, and therefore don’t require functional testing or preventative maintenance. The inspectors concluded that the management measures were inadequate because the IROFS were not purely administrative since they rely on the operability of mechanical components, specifically the isolation valves. When questioned about testing performed on the valves, the licensee stated that no cycling test was performed to provide assurance that the IROFS would be reliable and available to perform their required safety function. As a result, the inspectors identified a minor violation for failure to meet 10 CFR 70.62(d), which requires IROFS to be reliable and available to perform their required safety function. This violation was considered minor based on the fact there were other isolation valves in the area that could have been used to isolate the hydrogen and natural gas supplies during an actual emergency. This failure to comply with 10 CFR 70.62(d) constitutes a minor violation that is not subject to enforcement action in accordance with Section 2.3.1 of the NRC Enforcement Policy. This noncompliance was entered into the licensee’s corrective action system as Condition Report No. 27379.

In addition, the inspectors evaluated the condition of flammable gas detectors in the DCP building, specifically near the kilns. The inspectors also interviewed operators in the DCP control room regarding expected actions if the detectors alarmed. The inspectors noted the operators were familiar with the procedure for isolating the gas lines on the roof and were aware of the expected automated actions the detectors would

initiate should the detectors alarm. The inspectors also reviewed the condition of the various building fire walls and noted that they were consistent with the walls analyzed in the seismic report.

The inspectors also conducted a walk-down of the SNM containing boxes and containers stored outside on the various pads towards the back of the plant. The inspectors noted the condition of the pads, including the estimated inventory of material, was adequately bounded and reflected in the fire hazards analysis justifying the safety requirements.

b. Conclusion

No violations of more than a minor significance were identified.

3. Seismic-Induced Chemical Release

a. Inspection Scope

The inspectors reviewed the GNF-A ISA, specifically the vaporization system, to assess the potential for intermediate or high consequence accidents related to chemical releases from licensed materials (i.e. UF_6). The licensee's seismic analysis concluded that little to no leaks should occur to due to the evaluated seismic event. In any case, the inspectors noted the presence of HF detectors throughout the room that would detect an UF_6 leak, alarm personal in the area, and shutdown/isolate equipment. The inspectors also noted that the licensee utilized sense and flee as part of the analysis to ensure that the performance requirements were met.

The inspectors also evaluated the performance of the IROFS reactor filters (primary and secondary) that act as the division between licensed SNM activities and non-SNM activities. The inspectors noted that any breach of piping following the filters would constitute a non-SNM related chemical release that would still trigger the room's HF detectors and a subsequent evacuation of the room.

The inspectors performed a walk-down of the UF_6 cylinder handling area to verify that no adverse condition in or around the pad would contradict the analysis for meeting the 10 CFR Part 70.61 performance requirements in the area.

b. Conclusion

No violations of more than a minor significance were identified.

4. Seismic-Induced Criticality

a. Inspection Scope

The inspectors reviewed the list of process nodes evaluated for the risk of criticality identified in Tables 5.1-1 and A-1 of CALC 900-007, and selected two criticality scenarios that were not evaluated in the TER to verify that criticality remains highly unlikely due to a seismic event. Specifically, the inspectors selected the pellet storage cabinets and the bundle forest, both of which have a failure of concern of criticality due

to loss of geometry. The inspectors reviewed the associated CSA to verify that all conditions were bounded, the assumptions, limits, and key measurements used represented the as-built condition, and no scenario resulted in a critical configuration.

In addition, the inspectors conducted walk-downs of five process areas to verify the licensee evaluated all potential NPH-related criticality accident sequences. Specifically, the inspectors walked-down the Dry Scrap Recycle (DSR) Oxidation area to confirm no overheard moderator piping was located in the area. The inspectors observed a rotary press unit and the UO_2 press powder feed tube to verify that the amount of uranium in the feed tube was limited to less than 36 kg UO_2 by a rotary valve interlocked to a level sensor. The inspectors also reviewed the evaluation to confirm the licensee determined the control would remain functional following a seismic event. The inspectors observed the pellet storage cabinets to verify that the mass contents of the cart and station were less than the sintered pellet unsafe mass needed for criticality as identified in the associated CSA. The inspectors walked down the bundle forest to verify the spacing between the bundles matched the dimensions on the as-built drawing and those identified in the CSA, as well as to confirm there were no new accident sequences to consider as a result of NPH events.

The inspectors also performed walk-downs of many other areas in the facility to verify NPH-related criticality scenarios were identified and evaluated. The inspectors walked down the DCP powder area to verify there was ample signage to indicate it was a moderator restricted area (MRA) and that limited moderator was present. The inspectors observed the GAD rod storage cabinets to confirm they were free draining. The inspectors reviewed the seismic analysis for the pellet storage cabinets to verify the dimensions and weight would prohibit the cabinets from tipping or sliding when in the analyzed condition. The inspectors also observed the cabinets to verify the dimensions and locations of the trays were consistent with the CSA, and all doors were kept closed when not being currently accessed. Lastly, the inspectors walked down the newly designed and constructed anchoring system of the sheet metal cover over the pellet boat storage racks to verify that the construction and weight of the roofing as well as the robustness of the storage conveyors was sufficient to prevent a consequence of concern.

Based on the configuration of these nodes and areas in the facility, the inspectors concluded that the potential for a criticality remained highly unlikely as the result of a seismic event.

b. Conclusion

No violations of more than a minor significance were identified.

5. Other NPH Events

a. Inspection Scope

Excessive Precipitation

The IBC 2015 specified design rainfall event is a 100-year, one hour rainfall, which is four inches for the GNF-A location. GNF-A stated that the FMO and FMOX buildings have a nominal three inch parapet that tracks the nominal roof height changes. Thus,

approximately only three inches of water may accumulate in low areas of the roof. The building roof systems were evaluated to determine the maximum depth of water the systems can support assuming all roof drains are blocked. The critical building roof system component is the roof purlins which can support a water depth at allowable stress conditions of 8.2 inches, which exceed the parapet height. Thus, GNF-A concluded that the water will overflow the parapet and the roof will not experience this depth of water. Therefore, the roof can support the design rainfall event.

The inspectors conducted walk-downs of roofs of the main processing buildings; reviewed the design bases, a sample of design drawings and interviewed the structural engineer. During the walk-downs, the inspector's observed the as-built configuration of the FMO/FMOX roof to confirm that parapet height will not allow water to exceed the 8.2 inches assumed in the design. The inspectors noted that the roof has a drainage system in specific areas were water could accumulate if the drainage is blocked, but that the physical height available for water to accumulate will not exceed the 8.2 in assumed in the evaluation. Inspectors also observed that the roofs of building 421 and the DCP building were sloped in a way to allowed water to overflow and not accumulate. Therefore, through observations the inspectors verified that the roof systems will not allow water to accumulate leading to structural overloading from excessive precipitation.

High Winds, Hurricanes, and Tornadoes

During the review of the licensee's response to the generic letter, the staff evaluated GNF-A's approach for considering high wind and tornado induced events within its ISA and the methodologies applied to determine likelihoods, consequences, and IROFS. GNF-A evaluated the building design to withstand a 128.8 mph wind speed, factoring in 3-second gusts. Due to the design of the building, GNF-A concluded that it is highly unlikely that high winds from hurricanes or tropical storms would result in failures of the building structure causing a release of hazardous chemicals or radioactive material.

For tornadoes, GNF-A estimated the wind speed of a highly unlikely (1E-04) tornado strike at the site using the methodology contained in NUREG/CR-4461. The resulting wind speed was 93 mph. Given that this wind speed is significantly lower than that of the design evaluation, GNF-A concluded that tornado induced accident sequences are highly unlikely.

In addition, the licensee stated in their response to GL 2015-01 that with advanced warning of a hurricane or tropical storm that operations would be shut down and protective measures would be implemented. The inspectors verified that these emergency procedures were in place to respond to potential high wind events outside of the analyzed event in the ISA.

In the area of criticality, the licensee evaluated the potential for a wind-induced criticality resulting from building damage to structures and roofs that did not result in catastrophic failure of the building structure. The main concern is the possibility of siding and/or roof damage along with substantial rainfall impacting bulk quantities of UO_2 powder. For MRAs, the inspectors concluded that wind-induced criticality was highly unlikely due to the presence of passive barriers such as multiple roofs and robust storage containers. Specific to FMO/FMOX, the inspectors verified that the outer roof was designed and maintained to meet Factory Mutual (FM) insurance requirements for wind resistance that is consistent with the wind evaluation basis event criteria. For non-MRAs, the inspectors

conducted walk-downs of various facilities including the Building 421 Warehouse, waste incinerator, and the shipping/receiving building to verify that there were either limited quantities of SNM contained in these areas or that the material was contained within robust containers to prevent water intrusion.

With respect to outside facilities, the inspectors conducted an independent walk-down of outside storage facilities to verify that operations involving large quantities of licensed material were no longer performed. The inspectors noted that the licensee does continue to store a large of quantity of low-level radioactive waste boxes on outside storage pads; however, these boxes do not contain the necessary quantity of licensed material (i.e., UO_2) to result in a criticality. This was verified through a review of material control and accounting (MC&A) inventory records. During the walk-down, the inspectors noted that the licensee stores product and heeled UF_6 cylinders on an outside storage pad behind the FMO/FMOX. Due to the design and robustness of the cylinders, the inspectors determined that it was highly unlikely that an NPH event could result in a consequence of concern for the worker or public. The inspectors concluded that the licensee properly screened out high wind events for outside storage facilities in their screening analysis contained in CALC-900-007.

The inspectors conducted walk-downs of GNF-A facilities (DCP & FMO/FMOX) with significant source terms (chemical release of UF_6 and criticality) to determine if the licensee adequately considered the potential for tornado-induced windborne missiles.

b. Conclusion

No violations of more than a minor significance were identified.

6. Emergency Preparedness

a. Inspection Scope

The inspectors reviewed the emergency plan and the corresponding emergency preparedness procedures for NPH events. The inspectors noted the procedures contained instructions that would guide trained and knowledge staff to assess and address conditions that may result during an NPH event. For example, the inspectors noted that the emergency procedures for high wind events such as hurricanes and tornados contained instructions to secure equipment and containers outdoors to prevent airborne missiles. The procedures also contained instructions on the securing of flammable gas lines should the need arise due to a fire within FMO/FMOX and DCP. The inspectors also discussed expected actions with the Emergency Response Organization manager to verify knowledge of the procedures and understanding of the potential hazards present onsite.

b. Conclusion

No violations of more than a minor significance were identified.

B. Other Areas

1. Follow-up On Previously Identified Issues

(Closed) URI 2012-006-01, Further evaluate whether the licensee is in compliance with the requirements of 70.62(c) and 10 CFR 70.61 regarding accident sequences that are a result of natural phenomena events

Following the earthquake at the Fukushima Dai-ichi nuclear power station in March 2011, the NRC conducted TI 2600/015, Evaluation of Licensee Strategies for the Prevention and/or Mitigation of Emergencies at Fuel Facilities, in December 2011 to confirm compliance with applicable regulatory requirements and license conditions; and to evaluate licensee's readiness to address NPH events and other licensing bases events related to NPH. The NRC was unable to verify that GNF-A was in compliance with their licensing basis and regulatory requirements with respect to NPH. Specifically, the inspectors could not confirm that all credible external events (accident sequences) involving process deviations or other events internal to the facility (e.g., consequential explosions, spills, and fires resulting from NPH event) were properly considered in the ISA. The inspectors opened Unresolved Item (URI) 2012-006-01, "Failure to evaluate whether the licensee is in compliance with the requirements of 70.62(c) and 10 CFR 70.61 regarding accident sequences that are a result of natural phenomena events," to track this potential noncompliance.

Following the completion of TI 2600/015, the NRC concluded that this was a generic issue and subsequently issued NRC GL 2015-01, "Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities," in June 2015. The GL requested licensees to provide additional information to support a determination with regard to proper evaluation of NPH impacts at fuel cycle facilities. GNF-A submitted a response to the GL in January 2016, and the response was accepted by the NRC in 2017, following two requests for additional information.

The NRC reviewed this open URI to verify that the licensee had complied with regulatory requirements and applicable license conditions regarding the treatment of NPH events in the ISA. The NRC identified one minor violation for failure to meet 10 CFR 70.62(d). This violation was determined to be of minor significance and is discussed in detail in Section A.2 of this report. No other violations of significance were identified. Based on the inspections performed, the NRC has concluded that GNF-A is in compliance with the regulatory requirements specified in 10 CFR Part 70.61, Subpart H, with respect to the assessment of NPH hazards in the ISA. This URI is considered closed.

C. Exit Meeting

The inspection scope and results were presented to members of the licensee's staff on November 30, 2017, with Adam Hilton 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

Name	Title
A. Hilton	FMO Facility Manager
J. Degolyer	ISA Projects Manager
S. Murray	Manager, Licensing
D. Nay	FMO Manufacturing Engineering Manager
P. Ollis	Facility Licensing
J. Reeves	Manager, Integrated Safety Analysis
J. Rohner	Manager, Criticality Safety Program
M. Venters	Manager, Emergency Preparedness

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened & Closed

None

Closed

70-1113/2012-006-01	URI	Further evaluate whether the licensee is in compliance with the requirements of 70.62(c) and 70.61 performance requirements regarding natural phenomena events accident sequences

3. INSPECTION PROCEDURES USED

TI 2600/16	Inspection of Activities Associated with NRC Generic Letter 2015-01
IP 88015	Nuclear Criticality Safety
IP 88020	Operational Safety
IP 88050	Emergency Preparedness

4. DOCUMENTS REVIEWED

Records:

Atkins-TR-GNF-15-01, GNF Equipment Seismic Evaluation, Revision (Rev.). 1, February 2016

Atkins-TR-GNR-15-01, GNF Equipment Seismic Evaluation, Appendix Q, Fuel Bundle Storage Rack, Rev. 1, dated February 2016

Andrew Consulting Engineers, P.C., Global Nuclear Fuel FMO Fuel Storage Rack Evaluation Basis Analysis, dated January 26, 2016
CALC-900-003, “Material-at-Risk and Intake Thresholds for PHA Consequence Screening,” Rev. 2
CALC 900-007, Natural Phenomena Hazard Screening, Definition, and Evaluation, Rev. 2
Change Request (CR)-15804, Fuel Bundle Expansion Construction & Lifts, Purple Office Area Remodel, ALARA, dated April 25, 2017
CR-23603, Replace Bundle Inspection Stands, dated January 25, 2017
CRR 03.0326, Criticality Safety Analysis – Pellet Storage Cabinets, Rev. 04, dated October 14, 2003
CSA-601.01.100_Bundle Forest, Criticality Safety Analysis, Bundle Forest, Rev. 6, dated June 21, 2016
CSA No. 1020.00, Criticality Safety Analysis, Rotary Press Unit Analysis, Rev. 06, dated January 27, 2012
CSA-900.03.100, Criticality Safety Analysis, Sintered Pellets, Rev. 0, dated June 23, 2015
Drawing No. 3047E87, Fuels Manufacturing Operation Dissociated Ammonia Piping Furnace Room Plan & Elevations, dated August 18, 2011
Drawing No. 3003E11, Fuels Manufacturing Operation Natural Gas piping & Valve Plan, dated 1December 15, 2015
Drawing No. 0089E87, Sh. No. 2, Tray Storage Cabinets, Rev. B, dated June 1987
Drawing No. 6868S401 Structural Steel Framing, dated February 15, 1967
Drawing No. 6868S404, Structural Steel Framing, dated February 15, 1967
Drawing No. 6868S418, Column Schedule Sheet No-1 Fuel MFG Operation, dated February 15, 1967
Drawing No. 700E15, FMO Building Bundle Forest Expansion Structural Notes & QA Plan, Rev. 4
Drawing No. 700E15, FMO Building Bundle Forest Expansion Framing Plan & Schedules, Rev. 4
Drawing No. 700E15, FMO Building Bundle Forest Expansion Foundation & Framing Plan, Rev. 4
Drawing No. 700E15, FMO Building Bundle Forest Expansion Structural Sections, Rev. 4
G.E. Co. Wilmington, N.C., FMO-X Roof Design 37ft Bay, dated December 22, 1971
Global Nuclear Fuels Facility Wildfire Hazard Assessment Report, dated January 21, 2013
QRA-405a/504a, Fabrication-Sinter-Hydrogen Gas Release, Rev. 7
QRA-405/504, Fabrication-Sinter, Rev. 12
Radiological Contingency and Emergency Plan (RC&EP), Rev. 26
Revised Estimate for Construction Inspection and Construction Material Testing FMO Bundle Forest Expansion – Mods to the Steel Rack Layout GE# Site – Wilmington, NC, dated May 20, 2015
Southeastern Steel Construction Inc., FMO Building Bundle Forest Structure GE Plant Wilmington, NC, dated May 7, 2015
Specification No. 33712-1300-002, General Electric Company RECO Project No. 71147
SPM 16-006, Updated Integrated Safety Analysis Summary for the GNF-A Facility, Rev. 19, dated January 29, 2016
Summary Report of: Special Inspections and Construction Observations for GE Bundle Forest Expansion

- 1st report: Period June 11, 2015 to July 2015
- 2nd report: Period of July 23, 2015 to August 2015
- 3rd report: Period August 14 2015 to September 15, 2015

Procedures:
OP 1030.00.200, UO_2 Sintering Furnace Room Flammable Gas Leak, Rev. 00

Condition Reports Written as a Result of the Inspection:
CR 27374, Recommendation to include NPH considerations in WI-16-106-02, the associated handbook and/or the ISA reviewer change evaluation form
CR 27375, Error in drawings for flammable gas lines valves
CR 27378, Error in drawings for flammable gas lines valves
CR 27379, PM for cycling valves for admin IROFS
CR 27391, Written to resolve the delta for surveying of the scrubber (NSRR requires monthly), quarterly is what is being done.

Condition Reports Reviewed:
CR 19809

Other Documents:
ASME B31.1-2001 Table 121.5, Suggested Pipe Support Spacing