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

August 4, 2017

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

SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NUMBER 70-143/2017-006

Dear Mr. Duling:

The Nuclear Regulatory Commission (NRC) conducted an announced inspection during the week of July 10, 2017, at the Nuclear Fuel Services facility in Erwin, TN. 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 July 13, 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 (NPH) 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. 70-143
License No. SNM-124

Enclosure:
Inspection Report 70-143/2017-006
w/Attachment: Supplementary Information

cc: (See page 3)

cc:
Mike McKinnon
Operations Director
Nuclear Fuel Services, Inc.
Electronic Mail Distribution

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

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

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

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

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

David W. Deming
Manager, Program Field Office – NFS
Naval Nuclear Laboratory
1205 Banner Hill Rd
Erwin, TN

SUBJECT: NUCLEAR FUEL SERVICES, INC. – U. S. NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NUMBER 70-143/2017-006

DISTRIBUTION:
M. Sykes, RII
L. Pitts, RII
C. Rivera
M. Kotzalas
R. Johnson, NMSS
L. Cuadrado, NMSS
M. Baker, NMSS
PUBLIC

☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE
ADAMS: ☒ Yes ACCESSION NUMBER:ML17216A146 ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	RII:DFFI	RII:DFFI	RII:DFFI	NMSS			
SIGNATURE	/RA/	/RA/	/RA/	/RA/			
NAME	BAdkins	LPitts	CRivera	JMarcano			
DATE	8/02/2017	8/03/2017	8/03/2017	8/01/2017			
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\DFFI\REPORTS\FINAL REPORTS\NFS\CY 2017\NFS 2017-006 NPH.DOCX

U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	70-143
License No.:	SNM-124
Report No.:	70-143/2017-006
Licensee:	Nuclear Fuel Services, Inc.
Facility:	Nuclear Fuel Services, Inc.
Location:	Erwin, TN 37650
Dates:	July 10 through July 13, 2017
Inspectors:	B. Adkins, Senior Fuel Facility Inspector (Sections A.2, A.3, and A.4) J. Marcano, Structural Engineer (Sections A.1, A.5, and B.1)
Approved by:	O. López-Santiago, Chief Safety Branch Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Inspection Report 70-1151/2017-006
July 10 through July 13, 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 (NPH) 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 NFS buildings and equipment; (Paragraph A.1);
- Seismic-induced fire/explosion; (Paragraph A.2);
- Seismic-induced releases of hazardous chemicals; (Paragraph A.3);
- Seismic-induced criticality and high consequence dose to the worker (Paragraph A.4); and
- Tornado/high wind events (Paragraph A.5)

Other Areas

- Closure of Unresolved Item (URI) 2012-006-01, "Further evaluate whether the licensee is in compliance with Table 2.2 of the license application regarding management measures for IROFS PREP-A and PREP-B." (Paragraph B.1.a)
- Closure of URI 2012-006-02, "Further evaluate whether IROFS UNB-V seismic bracing was installed in accordance with NFPA 13 requirements." (Paragraph B.1.b)

- Closure of URI 2012-006-03, “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.” (Paragraph B.1.c)

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

REPORT DETAILS

Summary of Plant Status

The Nuclear Fuel Services (NFS) facility produces nuclear fuel for the U.S. Navy and performs down blending of highly enriched uranium (HEU) into low enriched uranium (LEU). During the inspection period, normal production activities were ongoing.

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 (NPH) 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 permanent 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

Seismic – Building Structures

NFS performed a seismic analysis on the structural integrity of the buildings given their construction under the applicable Southern Building Code (SBC). As described in the NFS 2016 ISA Site Summary and its responses to GL-2015-01, the buildings are designed to the applicable SBC for wind and flooding. NFS used the International Building Code (IBC) 2012 and 2015 to re-evaluate the primary building and process equipment ability to withstand earthquakes loads associated with a 2 percent probability of exceedance in 50 years.

The inspectors conducted walk downs of the primarily process buildings in the 300 complex; reviewed the design bases, calculations, and design drawings of a sample of buildings and had discussions with 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 paid special attention to ensure that cantilever concrete masonry unit (CMU) walls were adequately analyzed because of the potential for seismic induced failure. The inspectors also walked down one of the main CMU walls in Building 333 since this CMU wall is relied on as fire barrier in the ISA. The inspectors then verified that the wall was evaluated in the seismic model of the 300 complex buildings.

Seismic - Internal Components

NFS performed a seismic analysis of internal components such as process enclosures, process solution columns, process reaction vessels, process storage racks, reagent tanks, and piping. The methodology was based on the requirements of the IBC 2015 and American Society of Civil Engineers (ASCE) 7-10. An importance factor of 1.5 and site class B criteria were used to obtain the seismic demands. The methodology uses the equivalent static force method to obtain seismic demands as a percentage of the item weight or based on seismic walk downs to evaluate adequate vertical and horizontal supports of piping to consider new accident sequences and determine the need for new Items Relied On For Safety (IROFS). NFS evaluated the components under seismic loads associated with a return period of 2,475 years or 2 percent probability of occurrence in 50 years.

The inspectors selected a sample of major equipment and performed area walk downs in the Building 300 complex to ensure that all potential hazards were considered in the seismic analysis and ISA. The inspectors reviewed the design bases, calculations, and design drawings of the process enclosures, process solution columns, process reaction vessels, process storage racks, and piping. During the walk downs the inspector's paid special attention to the as-built configuration of the internal components to ensure they were adequately represented in the seismic calculations. The inspectors verified that adequate anchorage was provided on racks and process enclosure. Inspectors also verified that components sitting above or near IROFS would not cause negative interactions during ground motion movement. For piping, the inspectors performed walk downs of the natural gas and hydrogen gas lines to ensure the lines had adequate vertical supports and that the vertical support trapeze structures were adequately anchored to structural members.

b. Conclusion

No violations of NRC requirements were identified.

2. Seismic-Induced Fire and Explosions

a. Inspection Scope and Observations

The licensee evaluated the consequences from seismically induced fires and explosions and concluded that any potential failures of process equipment containing flammable gases or liquids such as hydrogen and natural gas were bounded by existing accident sequences analyzed in the ISA. The inspectors reviewed existing ISA accident sequences to determine if the sequences remained valid during a credible NPH event. The inspectors reviewed the Integrated Safety Evaluation for Seismic Events at NFS, dated May 19, 2016, to determine the applicable IROFS credited for seismic-induced fire and explosion events. The following fire-related IROFS were inspected:

- IROFS-FIRE-5 – passive engineered control for flammable gas and chemical supply piping materials of construction;
- IROFS-FIRE-17, active engineered control for actuation of an excess flow valve to isolate hydrogen during a pipe rupture; and
- IROFS-FIRE-8 – administrative control to isolate bulk chemical and flammable gas piping during a fire

The inspectors reviewed the implementation of IROFS-FIRE-5, which is credited as a passive engineered control (PEC) to prevent the release of hazardous chemicals and flammable gases during a facility fire. The inspectors reviewed the structural analysis to verify that the piping was credited to survive a site-specific evaluation basis earthquake. This included a review of the walk downs performed by the structural analysis contractor to verify that the piping and associated supports were consistent with the methodology contained in "Seismic Qualification Utility Group (SQUG) Methodology for the Use of Experience Data for Seismic Verification of Equipment." The inspectors conducted independent walk downs of the flammable gas tanks and piping, and supports to independently verify the results from the contractor's walk downs. The inspectors reviewed corrective action reports to verify that the licensee entered recommendations/deficiencies identified during the structural contractor's walk downs into the corrective action system. The inspectors reviewed the implementation of applicable management measures including the Piping Integrity Program. Specifically, the inspectors reviewed records from ultrasonic thickness (UT) testing of the flammable (hydrogen) gas piping. The purpose of the testing was to confirm that the wall thickness meets minimum thickness requirements identified in applicable piping material specifications and that piping is not corroding at a significant rate that could impact the ability of the piping to withstand an evaluation basis earthquake. The inspectors reviewed records to determine if the UT thickness test equipment was properly calibrated and that personnel performing the measurements were properly trained. As a result of their review, the inspectors identified one minor violation of NRC requirements for failure to meet Section 11.8.12 of their Special Nuclear Material License SNM-124 which states, in part, that measuring and test devices are properly calibrated at appropriate intervals to maintain performance within required limits. Specifically, the inspectors identified that the UT test equipment was out of calibration by approximately one week at the time of the inspection. This issue was considered minor because the device had not been used to perform any UT measurements since the calibration expired. This failure to comply with Section 11.8.12 of their license constitutes a minor violation that is not subject to enforcement action in accordance with Section 2.3.1 of the NRC Enforcement Policy. This nonconforming condition was entered into their corrective action system as PIRCS Problem ID# 59017.

Also with respect to IROFS-FIRE-5, the inspectors determined that NFS did not have an approved procedure to perform UT measurements performed as part of their piping integrity program. The inspectors concluded that a detailed procedure was necessary to ensure that the testing was performed in a controlled manner consistent with industry standards on ultrasonic testing. The inspectors concluded that this was a minor violation of Section 11.4 of their license which states, in part, that activities involving IROFS are conducted in accordance with written procedures. The inspectors concluded that this issue was minor because when interviewed the technician could articulate the basic steps necessary to perform the measurements in order to achieve reliable and correct results. This failure to comply with Section 11.8.12 of their license constitutes a minor violation that is not subject to enforcement action in accordance with Section 2.3.1 of the NRC Enforcement Policy. This minor violation was entered into their corrective action system as PIRCS Problem ID# 58988.

The inspectors reviewed recent records from safety-related equipment (SRE) testing performed on the excess flow valve for the compressed hydrogen system. This valve is credited as an active engineered control (AEC), IROFS-FIRE-17, to isolate the hydrogen supply during a large facility fire. Specifically, the valve is credited to automatically close on excess flow or low pressure that could result from a rupture in the hydrogen supply

piping during a large earthquake or vehicle impact. The inspectors verified that the SRE test procedure adequately tested the safety function of the valve and that the testing was being performed on a periodic basis.

Specific to IROFS-FIRE-8, the inspectors conducted walk downs to verify the installation and operability of manual isolation valves in the hydrogen and natural gas supply piping. The inspectors reviewed SOP-381, Essential Valves, which established the requirements for the actuation of valves for bulk chemicals and bulk gases. Specifically, this procedure is used by emergency response personnel to isolate bulk chemicals and flammable gases during a facility fire. The inspectors verified that the valves were clearly identified on facility drawings and properly labeled so that emergency response personnel can quickly identify and close the valves during a site emergency. The inspectors interviewed the Fire Brigade Chief to discuss implementation of the IROFS including the parties responsible for closing the valves during an emergency and the associated required training.

The inspectors reviewed the ISA Summary and procedure NFS-GH-56, Management Measures Identification and Implementation of IROFS, to determine the applicable management measures for IROFS-FIRE-8. As a result of their review, the inspectors identified that no specific management measures were identified because the IROFS was a bounding IROFS and was not specifically credited in an accident sequence. Upon further investigation, the inspectors noted that NFS-GH-56 does not list preventive maintenance or functional testing as applicable management measures for administrative controls. The inspectors concluded that the procedure was inadequate because IROFS-FIRE-8 was not purely administrative because it relies on the operability of mechanical components, specifically that personnel can close the valves if directed to during an emergency. 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 its required safety function. Subsequently, the inspectors discovered an applicable corrective action report (PIRCS# 29120) written in 2015 which identified the need for a periodic cycling test to ensure that essential valves could perform their intended safety function. Based on their review of the PIRCS, the inspectors concluded that the licensee failed to properly screen the issue which resulted in an improper classification of “No Condition Adverse to Safety.” The licensee indicated during interviews that the condition was identified during an emergency preparedness critique as an enhancement and was not considered to be safety or IROFS related. As a result of improper classification, the licensee considered the activity to be low priority and ultimately assigned a completion date of 2018 to develop the PM to cycle the valves. The inspectors also identified during a walk down that the wrench needed to operate the natural gas shutoff valve during an emergency was missing. The inspectors noted that similar emergency shutoff valves had wrenches available to operate the valves during an emergency situation. As a result of the issues identified above, 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 following: (1) licensee subsequently identified that closing the isolation valves was a recommendation from the applicable fire hazards analyses and classification of the valves as a bounding IROFS was not required and (2) there were other isolation valves in the area that could have been used to isolate the natural gas supply 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 PIRCS Problem Report #59036.

b. Conclusion

No violations of more than a minor significance were identified.

3. Seismic-Induced Chemical Release

a. Inspection Scope and Observations

The structural evaluation performed by NFS concluded that internal processing equipment will be able to withstand the postulated evaluation basis earthquake; therefore; seismic events are not expected to introduce any new accident sequences not previously analyzed in the ISA that could result in intermediate or high acute chemical exposure consequences. The inspectors reviewed existing accident sequences and IROFS to ensure that a release during seismic event was bounded by existing analyses including the potential for a common mode failure. Specifically, the inspectors reviewed the bounding release scenario which involves a leak of ammonium hydroxide in the Building 304 Breezeway. The inspectors reviewed the structural analysis to verify that the piping and components were credited to survive a site-specific evaluation basis earthquake. This included a review of the walk downs performed by the structural analysis contractor to verify that the ammonium hydroxide piping and associated supports met the guidelines contained in "Seismic Qualification Utility Group (SQUG) Methodology for the Use of Experience Data for Seismic Verification of Equipment". The inspectors conducted independent walk downs of the ammonium hydroxide piping and supports to independently verify the results from the contractor's walk downs. The inspectors reviewed records from UT measurements performed on ammonium hydroxide piping as part of the piping integrity program.

b. Conclusion

No violations of more than a minor significance were identified.

4. Seismic Induced Criticality

a. Inspection Scope

Based on their seismic evaluation, NFS determined that the building would remain intact for the evaluation basis earthquake, which corresponds to an initiating event frequency score of earthquake -4 obtained from the use of earthquake loads with an exceedance probability of 4E-4. The licensee evaluated all relevant internal components under the seismic loads associated with a 2 percent probability of exceedance in 50 years (evaluation basis earthquake) and determined that no new accident sequences that result in criticality consequences were identified. The licensee further analyzed solution columns and determined that even during the evaluation basis earthquake they would flex at the joints rather than break or leak. The inspectors reviewed the structural analysis to verify that an evaluation basis earthquake would not result in large cracks or openings in the floor such that fissile solution would accumulate in an unsafe geometry and that the glass columns would leak but not break.

The inspectors reviewed 54T-16-0003, Nuclear Criticality Safety Analysis for Seismic Events at Nuclear Fuel Services. The internal equipment that NFS evaluated included the solution columns, piping, gloveboxes, and storage racks. The licensee identified four scenarios that could credibly lead to criticality. In all cases, the scenarios involve the leak or rupture of process equipment containing uranium solution accumulating in unfavorable geometry locations. As stated in the NCSE, the licensee conducted a comparison of the different areas and concluded that the solvent extraction area bounded the other areas due to the concentration and volume of solution in the area and the limited floor space. Based on the licensee's analysis, the solution is assumed to spread out on the floor and not result in a critical configuration.

In addition to a review of the NCS and structural analyses, the inspectors conducted detailed walk downs of the 300 Area Complex and the Bleu Preparation Facility (BPF) to verify that the analyzed events documented in the NCSE were bounding. The inspectors interviewed NCS engineers before and during walk downs. The inspectors reviewed facility drawings for the solvent extraction area to confirm that room dimensions used in the bounding calculations were consistent with the dimensions stated in the design drawings. The inspectors verified that certain management measures designed to maintain IROFS were being performed within their assigned frequency and in accordance with procedures. Specifically, the inspectors reviewed floor flatness survey records and calculations to demonstrate that a large spill of fissile solution from the glass columns in the solvent extraction area would not exceed the safe slab height determined in the NCS analysis.

With respect to the potential for collection of spilled solution into unfavorable geometry (UFG) drums, containers, electrical panels, ductwork, etc., NFS conducted an analysis of items that have the potential to become UFG containers due to earthquakes (e.g., fallen ductwork). This evaluation concluded that gloveboxes would not fail, light fixtures would break if they fell, and electrical panels already have holes (NCS drains) in them to prevent the accumulation of solution. The inspectors conducted facility walk downs to verify that electrical panels contained holes as stated in the NCSE.

From a programmatic standpoint, the inspectors evaluated the adequacy of the licensee's NCS program and analyses to assure the safety of fissile material operations and compliance with respect to NPH events. The inspectors reviewed select NCS documents including the newly developed NCS evaluation concerning NPH events (54T-16-003). The inspectors verified the technical basis for NCS limits and assumptions, evaluated potential NPH-related criticality accident sequences, and verified that the licensee performed evaluations to assure sub-criticality of processes under all normal and credible abnormal conditions.

The inspectors reviewed the Emergency Plan and applicable emergency procedures to ensure that mitigative actions with regard to an inadvertent criticality due to flooding and other natural phenomena were evaluated.

b. Conclusion

No violations of more than a minor significance were identified.

5. Tornadoes and High Winds

a. Inspection Scope

Even though accident sequences associated with high winds, tornadoes, or hurricanes were determined to be highly unlikely, the licensee stated in their response to GL 2015-01 that appropriate emergency management measures would be activated by employees either sheltering in place or evacuating. The inspectors reviewed these emergency management measures to verify that procedures were in place to respond to potential high wind events outside of the analyzed event in the ISA.

Specifically, the inspectors reviewed NFS-GH-903 "Emergency Plan," and procedures NFS-HS-E-03, "Emergency Response Organization," and NFS-HS-E-13, "Take Cover". These procedures are intended to assist the Emergency Response Organization in preparing for and responding to an environmental or weather related threats such as tornados, hurricanes and earthquakes. The procedure stipulates actions for the plant superintendent to order operators to move away from operations and to "take cover". The inspectors conducted interviews with the emergency director regarding the implementation of this procedure as well as other procedures that could be implemented during an event.

b. Conclusion

No violations of more than a minor significance were identified.

B. Other Areas

1. Follow-up on Previously Identified Issues

a. (Closed) Unresolved Item (URI) 2012-006-01, Further evaluate whether the licensee is in compliance with Table 2.2 of the license application regarding management measures for IROFS PREP-A and PREP-B

Building 333 (excluding solvent extraction), CDL Building, and the UNB are designated as IROFS (corresponding to IROFS PREP-A and PREP-B) for accident sequences involving seismic events. Table 2.2 of the license application states, in part, that record management, vendor specifications, and independent installation verification are part of the required management measures to ensure the availability and reliability of passive engineer controls designated as IROFS. This URI was opened in 2012 because the licensee could not provide seismic and wind design information for Building 333 to verify the earthquake and wind design requirements for Building 333.

Building 333 was part of the new seismic evaluation that NFS completed for the site (NSA-TR-NFS-14-01). The inspectors reviewed the design information for Building 333 and verified that it meets the seismic requirements specified in the ISA. The criteria for seismic evaluation for this building was the seismic load in IBC 2015 which meets the criteria documented in the ISA as required to meet the 1998 version of the ASCE 7 code, "Minimum Design Loads for Buildings and Other Structures." For wind loading, NFS was able to retrace the design information for Building 333. The inspectors reviewed the design information and concluded that it meet the criteria stipulated in the ISA. Building 333 addition constructed in the 1990's used the wind criteria of the SBC

1988 with a wind speed of 90 mph. Building 333 addition designed in 1998 used the wind load criteria from ASCE 7-98 with a wind speed of 90 mph. Therefore, this URI was closed.

b. (Closed) URI 2012-006-02, Further evaluate whether IROFS UNB-V seismic bracing was installed in accordance with NFPA 13 requirements

The UNB building has been removed from service and it was in process of demolition during the inspection. IROFS UNB-V is no longer needed. Therefore, this URI is closed.

c. (Closed) URI 2012-006-03, Further evaluate whether the licensee is in compliance with the requirements of 70.62(c) and 70.61 performance requirements regarding natural phenomena events and sequences

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 NFS 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 URI 2012-006-03, "Failure to evaluate whether the licensee is in compliance with the requirements of 70.62(c) and 70.61 performance requirements regarding natural phenomena events and sequences," 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. Nuclear Fuel Services, Inc., submitted a response to the GL in September 2015, 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. Based on the inspections performed, the inspectors determined that NFS adequately evaluated that all nuclear processes under an earthquake were subcritical. The NRC identified two minor violations for failure to meet Section 11 of their license and one minor violation for failure to meet 10 CFR 70.62(d). These violations were determined to be of minor significance and are discussed in detail in Section A.2 of this report. No other violations of significance were identified. The inspectors noted that the licensee will be updating their ISA to include information related to NPH. The licensee issued PIRCS# 58990 to document the need to complete this activity. Based on the inspections performed, the NRC has concluded that NFS is in compliance with regards to 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 summarized on July 13, 2017, to R. Freudenberger and staff. The inspectors received no dissenting comments from the licensee. Proprietary and security-related information were discussed but not included in the report.

SUPPLEMENTAL INFORMATION

1. KEY POINTS OF CONTACT

Name	Title
N. Brown	NCS Unit Manager
R. Freudenberger	Safety & Safeguards Director
B. Mauer	ISA and Fire Protection
A. Morie	Safety & Safeguards Program Manager and Licensing Manager
B. Rice	NCS Engineer
E. Senter	ISA and Fire Protection
S. Skiles	NCS Engineer

Other licensee employees contacted included engineers, technicians, production staff, and office personnel.

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

70-143/2012-006-01	URI	Further evaluate whether the licensee is in compliance with Table 2.2 of the license application regarding management measures for IROFS PREP-A and PREP-B
70-143/2012-006-02	URI	Further evaluate whether IROFS UNB-V seismic bracing was installed in accordance with NFPA 13 requirements
70-143/2012-006-03	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
IP 88055, Fire Protection
IP 88070, Permanent Plant Modifications

4. DOCUMENTS REVIEWED

Record:
NJCLHFLOFCVHL01, SRE Test for Excess Flow Valve, dated March 24, 2017

Procedures:
NFS-CAP-009-01, Corrective Action Program (CAP) Screening Process, Revision (Rev.) 03, dated October 12, 2016
SOP-381, Essential Valves, Rev. 5, dated February 6, 2017
NFS-GH-939, Piping Integrity, Rev. 7, dated May 1, 2017

Condition Reports Reviewed:
PIRCS# 29120, Create a PM to Exercise Essential Valves, dated December 15, 2016
PIRCS# 29739, Modified procedure to ensure piping supports are evaluated in future changes.

Condition Reports Written as a Result of this Inspection:
PIRCS #58990, Integrated Safety Analysis ISA Summary Needs to be Revised, July 13, 2017
PRICS#58987, Add recommendations from Supplement to the Seismic Evaluation of Equipment for NFS, dated July 13, 2017
PIRCS#58988, Ultrasonic Thickness Procedure Difficulties, dated July 13, 2017
PIRCS#59017, Calibration Expiration of UT Meter, dated July 17, 2017
PRICS#59036, Failure to Meet 70.62(d) Management Measures for IROFS-FIRE-8, dated July 18, 2017
PIRCS#59058, Tracking Deadweight Loads on NFS Pipe Supports, dated July 19, 2017

Other Documents:
21T-16-0562, ISA Seismic Events Evaluation, Rev. 0, dated May 19, 2016
21X-04-0111, Fire Risk Evaluation Buildings 304 and 306 West Breezeways – Hydrogen Gas Fire and Explosion (U), Rev. 0, dated February 16, 2005
000-F0006-D, Natural Gas P&ID, Rev. K, dated December 2, 2016
105-F0029,-D, Building 111 Natural Gas P&ID, Rev. A, dated July 12, 2016
105-F0030-D, Building 105 Natural Gas P&ID, Rev. B, dated August 18, 2016
000-F0307-D, Compressed Hydrogen System P&ID, Rev. J, dated August 21, 2015
000-F0308-D, Liquid Hydrogen System P&ID, Rev. K, dated September 18, 2015
Atkins-NS-TR-NFS-17-02, Supplement to the Seismic Evaluation of Equipment for Nuclear Fuel Services Fuel Fabrication Facility, Rev. 0, dated April 2017
Column Support Structures: “Proposed Bowl Wash Station Support Structure”, dated August 29, 2017
“K5 & K6 Product Column Structure Seismic and Structural Analysis,” dated July 1, 2008
“Results of Structural/Seismic Evaluation of Mezzanine Storage,” dated February 20, 2007
Drawing No. 301-24010 “Structural Building 301 Addition General Notes and Legend,” Rev. A, dated February 25, 1991
“Structural Computations for Gravity, Wind & Seismic Building 333” Beeson, Lusk & Street Architects

NRC/NFS Generic Letter Communications:
NRC Generic Letter 2015-01, Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities, dated June 22, 2015, ADAMS ML14328A029
Nuclear Fuel Services, Incorporated, Reply to NRC Generic Letter 2015-01, Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities, dated September 14, 2015
Nuclear Fuel Services, Incorporated, Request for Supplemental Information Concerning Response to Generic Letter, dated February 8, 2016
Nuclear Fuel Services, Incorporated, Information Requested by Inspectors During Onsite Review of Generic Letter 2015-01 Response, dated March 8, 2016

Nuclear Fuel Services, Incorporated, Supplemental Information Requested by the NRC Regarding the 2015 Nuclear Fuel Services Response to Generic Letter 2015-01, dated June 8, 2016

NRC, Nuclear Fuel Services, Incorporated, Second Request for Supplemental Information Concerning Response to Generic Letter 2015-01, dated December 5, 2016

Nuclear Fuel Services, Incorporated, Response to NRC Second Request for Supplemental Information Regarding the 2015 Nuclear Fuel Services Response to Generic Letter 2015-01

Nuclear Fuel Services, Incorporated, Proposed Extension of Due Date for Responding to NRC Second Request for Supplemental Information Concerning the NFS Response to Generic Letter 2015-01