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NUCLEAR REGULATORY COMMISSION  
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March 28, 2018

MEMORANDUM TO: Craig G. Erlanger, Director  
Division of Fuel Cycle Safety, Safeguards,  
and Environmental Review  
Office of Nuclear Material Safety  
and Safeguards

FROM: Margie A. Kotzalas, Chief  
Programmatic Oversight **\RA\ J. Downs for M. Kotzalas**  
and Regional Support Branch  
Division of Fuel Cycle Safety, Safeguards,  
and Environmental Review  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: CLOSURE OF GENERIC LETTER 2015-01, "TREATMENT OF  
NATURAL PHENOMENA HAZARDS IN FUEL CYCLE  
FACILITIES"

On March 11, 2011, the Tohoku–Taiheiyou–Oki earthquake occurred near the east coast of Honshu, Japan. This magnitude 9.0 earthquake and the subsequent tsunami caused significant damage to at least four of the six units of the Fukushima Dai-ichi Nuclear Power Station. As a result, there was a loss of offsite and onsite electrical power systems.

On March 31, 2011, the U.S. Nuclear Regulatory Commission (NRC) staff issued Information Notice (IN) 2011-08, "Tohoku-Taiheiyou-Oki Earthquake Effects on Japanese Nuclear Power Plants – for Fuel Cycle Facilities," to inform fuel cycle facilities of the effects of the Tohoku-Taiheiyou-Oki earthquake on nuclear power plants in Japan. The NRC expectation was that the IN recipients would review the information for applicability to their facilities and consider actions, as appropriate, to ensure that features and preparations necessary to withstand or respond to severe external events from natural phenomena (e.g., earthquakes, tsunami, floods, tornadoes, and hurricanes) are reasonable. The suggestions contained within IN 2011-08 were not NRC requirements; therefore, no specific action or written response was required.

The NRC staff performed a systematic evaluation and inspection of selected fuel cycle facilities, in light of the lessons learned from the accident at the Fukushima Dai-ichi Nuclear Power Station, to confirm that licensees were in compliance with applicable regulatory requirements and license conditions. The NRC staff also evaluated and inspected the readiness of the licensees to address natural phenomena events and other licensing bases events related to natural phenomena hazards (NPH).

CONTACT: Jonathan Marcano, NMSS/FCSE/PORSB  
(301) 415-6731

During the initial evaluations and inspections, the NRC staff determined that the evaluated facilities had established programs, procedures, and equipment to respond to licensing basis events involving fire, flooding, and loss of utilities. However, the NRC staff was not able to fully assess whether the facilities were able to adequately prevent or mitigate the consequences of credible natural phenomena events. The staff identified that certain licensees had not clearly documented the assumptions used to develop their Integrated Safety Analysis (ISA) and other safety assessments. Thus, the NRC staff was unable to verify that these facilities were in compliance with their licensing basis and regulatory requirements.

The lack of supporting documentation raised questions about the validity of the assumptions made by licensees regarding the performance of structures, systems, and components (SSCs). Although unresolved items were opened, the NRC staff remained confident that public health and safety remained adequately protected at the evaluated facilities given the consideration of seismic capacity in SSCs, radiological/chemical source terms, and existing safety programs (i.e., items relied on for safety). Based on these findings, the NRC issued Generic Letter (GL) 2015-01, "Treatment of Natural Phenomena Hazards (NPH) in Fuel Cycle Facilities," (Agencywide Documents Access and Management System [ADAMS] Accession Number ML14328A029).

GL-2015-01 was issued for two purposes: (1) to request addressees to submit information to demonstrate compliance with regulatory requirements and applicable license conditions regarding the treatment of natural phenomena events in the facilities' ISAs; and (2) to determine if additional NRC regulatory action is necessary to ensure that licensees comply with their licensing basis and existing NRC regulations.

GL-2015-01 requested that each licensee provide the following information within 90 days of its date of issuance:

- a) Submit the definitions of "unlikely," "highly unlikely," and "credible" in evaluating natural phenomena events in the ISA such as earthquakes, tornadoes, tornado missile impacts, floods, hurricanes, and other wind storms.
- b) Submit a description of the licensee's safety assessment for the licensing and design basis natural phenomena events, including the following information:
  - i. likelihood and severity of the natural phenomena events, such as earthquakes, tornadoes, floods, hurricanes, and other wind storms;
  - ii. accident sequences as a result of natural phenomena event impacts to facility structures and internal components;
  - iii. assessment of the consequences for the accident sequences from item ii that result in intermediate and/or high consequence events; and
  - iv. IROFS to prevent or mitigate the consequences of the events from items ii and iii.
- c) For facilities subject to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, Subpart H requirements, submit a description of the results of the ISA review used to comply with 10 CFR 70.62(c). This requested documentation should have identified the characteristics of the licensing and design basis natural phenomena events applicable to the site. Additionally, the documentation should have evaluated possible changes in the methodology, likelihood, and severity of natural phenomena

events with those used in the original design, evaluation, and licensing of the facility.

- d) Submit for NRC staff review a summary of the results of any facility assessments or walk downs, if performed, to identify and address degraded, nonconforming, or unanalyzed conditions that can affect the performance of the facility under natural phenomena and have available for NRC inspection the documentation of the qualifications of the team.

The NRC staff conducted significant stakeholder interactions while developing the GL, including public meetings, workshops, and presentations at the Fuel Cycle Information Exchange. Although the NRC staff received responses to the GL from all recipients, the majority of responses to the actions requested in GL-2015-01 lacked the technical detail necessary for the NRC staff to perform an effective review. Therefore, to clarify expectations regarding the information provided in the responses, the NRC staff conducted additional stakeholder interactions. To formally obtain the technical detail needed to complete the review, the NRC staff issued requests for supplemental information (RSIs). As a lessons learned for future generic communications, given the initial lack of technical detail in the responses to GL-2015-01, the NRC staff should maintain an active level of engagement with addressees to ensure an effective review.

After receiving sufficiently detailed responses, staff from the NRC's Division of Fuel Cycle Safety, Safeguards, and Environmental Review (FCSE) completed the technical review of licensee responses to GL-2015-01. The technical reviews involved an assessment of the information provided by the licensees to determine if the licensees adequately responded to the requested actions of GL-2015-01. The FCSE staff documented the outcome of these reviews in Technical Evaluation Reports (TERs). The FCSE staff also supported the NRC's Division of Fuel Facility Inspection, in Region II, with the completion of inspection activities related to Temporary Instruction (TI) 2600/016, "Inspection of Activities Associated with NRC Generic Letter 2015-01" (ADAMS Accession Number ML15317A506). The inspections independently verified compliance with applicable regulatory requirements and license conditions regarding the treatment of NPH as described in the ISAs of the licensees.

Based on the technical review of the licensee responses to GL-2015-01 and the results of the TI 2600/016 inspections, the NRC staff concluded that licensees performed appropriate evaluations of NPH for their facilities. Consistent with the, "Closure Strategy for Generic Letter 2015-01: Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities," dated August 11, 2015 (ADAMS Accession Number ML15195A474), the NRC staff issued a closure letter to each addressee that referenced the licensee-specific TERs and inspection reports associated with the GL. As a result, GL-2015-01 is considered closed and no further information or action is required.

In accordance with Section IV.J of the handbook for Management Directive 8.18, "NRC Generic Communications Program" (ADAMS Accession Number ML15327A372), the NRC staff conducted an effectiveness review of GL-2015-01. This review evaluated the GL's focus in communicating the safety or security concern, the adequacy of the request for information and/or actions, the adequacy of addressee response to the GL, and whether the GL was sufficient to provide a basis for regulatory decision-making.

The NRC staff's issuance of GL-2015-01 communicated the safety concern by focusing on licensee programs, procedures, and equipment that respond to events involving natural phenomena, extended loss of power, and the loss of offsite water (i.e., initiating events having the potential to cause consequences of concern at fuel cycle facilities). The information requested in GL-2015-01 was adequate to evaluate the safety concern. As previously discussed, there were some challenges in obtaining addressee responses that contained the

technical detail necessary for the NRC staff to perform an effective review. Ultimately, adequate responses were received that provided sufficient information to perform an effective review. As a result of this review, fuel cycle licensees have improved the documentation and justification of assumptions made regarding the mitigation or prevention of the potential consequences from NPH accident sequences. This improvement in documentation is reflected in each licensee's ISA, which is a key element for demonstrating compliance with the licensing basis and regulatory requirements.

Based on the NRC staff's systematic evaluation and inspections of selected fuel cycle facilities in the 2012 timeframe, the review of the licensee responses to GL-2015-01, and the results of the TI 2600/016 inspections, the following are examples of safety improvements achieved through this effort:

- More than half of the licensees implemented updates to ISA documentation in order to accurately reflect design and safety information for NPH. The updates to the ISA included, in part, changes to characteristics of the initiating events and controls credited for NPH.
- More than half of the licensees adopted measures in safety programs, like the Configuration Management Program, to carefully evaluate the impacts of facility and design changes on the NPH safety assumptions and IROFS.
- One licensee implemented significant facility modifications for seismic and missile protection to meet the applicable regulatory requirements and to provide reasonable assurance of public health and safety.
- One licensee installed new equipment in its fuel wash pit area to ensure it could withstand an earthquake having the frequency and magnitude that established the basis for the licensee's evaluation to demonstrate compliance with regulatory requirements (i.e., evaluation basis earthquake). One other licensee has plans to redesign its fuel wash pit area to reduce the potential for a criticality during a natural phenomena event.
- More than half of the licensees implemented facility modifications involving piping and equipment supports to improve resiliency against seismic hazards.

Based on the regulatory activities completed as a result of the issuance of GL-2015-01, the NRC staff plans to complete the following improvements and actions:

- The staff is developing an IN to inform fuel cycle licensees of recent issues and inspection findings regarding programs and procedures for determining and implementing management measures for isolation controls. Isolation controls are required to be available and reliable to perform specific safety functions that prevent or mitigate accident sequences. The IN is being developed, in part, due to inspection issues identified during the implementation of TI 2600/016 inspections.
- The staff is in the process of evaluating guidance on seismic hazards. The results of the evaluation will be used to inform the decision to issue or update NRC guidance.

The issuance of GL-2015-01 was an effective mechanism to provide NRC staff the basis for concluding that fuel cycle facility licensees are in compliance with applicable regulatory requirements related to NPH. The closure of GL-2015-01 is an example of a major regulatory effort that yielded significant programmatic accomplishments for the NRC's Fuel Facilities Business Line. The enclosed table provides a list of all the GL-2015-01 correspondence.

Enclosure:

Generic Letter 2015-01 Correspondence

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**DISTRIBUTION:**

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<b>OFC</b>	FCSE/PORSB	FCSE/ERB	FCSE/PORSB	FCSE/PORSB	FCSE/ERB
<b>NAME</b>	JMarcano	AWalker-Smith	MKotzalas	JMarcano	AWalker-Smith
<b>DATE</b>	02/05/2018	02/08/2018	02/08/2018	03/08/2018	03/08/2018
<b>OFC</b>	FCSE/ECB	FCSE/FMB	FCSE	FCSE/PORSB	
<b>NAME</b>	JZimmerman	RJohnson	CErlanger	MKotzalas	
<b>DATE</b>	03/12/2018	03/15/2018	03/28/2018	03/28/2018	

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