June 25, 2015

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

FROM: Margie Kotzalas, Chief **/RA/**
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Division of Fuel Cycle Safety, Safeguards,
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Office of Nuclear Material Safety
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SUBJECT: RESPONSE TO PUBLIC COMMENTS ON DRAFT INTERIM STAFF GUIDANCE, "NATURAL PHENOMENA HAZARDS IN FUEL CYCLE FACILITIES"

A notice of opportunity for public comment on Draft Interim Staff Guidance (ISG) for Natural Phenomena Hazards (NPH) in Fuel Cycle Facilities was published in the *Federal Register on* February 24, 2015 (80 FR 9755). Comments were received from Stephen McDuffie (Agencywide Document and Management System (ADAMS) Accession No. ML15096A476) and the Nuclear Energy Institute (NEI) (ADAMS Accession No. ML15104A341). Enclosed are the staff responses to these comments.

In addition to providing comments on the draft ISG, NEI commented on the Draft Generic Letter 20XX-XX, "Treatment of Natural Phenomena Hazards at Fuel Cycle Facilities" (79 FR 46472). The staff's response to those comments will be documented in a separate memorandum.

Enclosure:
Response to Public Comments
on Draft Interim Staff Guidance

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(301) 415-6731

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ML15121A039

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RESPONSE TO PUBLIC COMMENTS ON
DRAFT INTERIM STAFF GUIDANCE, "NATURAL PHENOMENA HAZARDS IN FUEL CYCLE FACILITIES"

Comments on this draft Interim Staff Guidance (ISG) are available electronically at the U.S. Nuclear Regulatory Commission's (NRC's) electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this page, the public can gain entry into Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. Comments were received from the following individuals or groups:

Letter No.	ADAMS No.	Commenter Affiliation	Commenter Name	Abbreviation
1	ML15096A476	U.S. Department of Energy	Stephen McDuffie	SMcDuffie
2	ML15104A341	Nuclear Energy Institute	Janet R. Schlueter	NEI

This document lists each public comment by Letter No. For each comment, the NRC has either repeated the comment as written by the commenter or summarized the comment for conciseness and clarity. Each comment is referred to in the form [XXX]-[YYY]-[ZZZ], where: [XXX] represents the Abbreviation from the above table, [YYY] represents the Letter No. from the above table, and [ZZZ] represents the sequential comment number from that commenter.

SMcDuffie 1-1

In the section titled "Consideration of NPH in ISA of Existing Fuel Cycle Facilities," on page 2 of 8 in the PDF file, the end of the first paragraph states, "The current building code uses ground motions with a 4x10-3 annual exceedance probability." This exceedance probability would be a ground motion with a 250-year return period. This may be a typo, and perhaps it should be 4x10-4, for a 2500-year return period. Please confirm whether or not this is a typo.

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

> *The current building code uses ground motions with a $4x10^{-4}$ annual exceedance probability. In contrast, standard building codes and industry standards require seismic designs based on probabilistic ground motions with 10 percent probability of exceedance in 50 years or 2 percent probability of exceedance in 50 years.*

SMcDuffie 1-2

In the section titled "Graded Approach to Consideration of NPH in the ISA," on page 4 of 8, the second bullet in the list states, "Preventing loss of capability to perform functions important to safety during and/or after the earthquake that could lead to consequences to the public and/or worker." I suggest replacing earthquake with event so this encompasses all NPH events, not just earthquakes.

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

> *Prevents loss of capability to perform functions important to safety during and/or after the natural phenomena event that could lead to consequences to the public and/or worker; and*

SMcDuffie 1-3

In the section titled "Evaluation of Structures and Components at Existing Facilities," on page 4 of 8, the final paragraph on the page contains the sentence, "Facilities designed and constructed with building codes and standards that contained criteria for seismic loads resulting from earthquakes having accelerations associated to 10 percent probability of exceedance in 50 years." This is an incomplete sentence, and its intent is unclear.

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

> *For example, a facility may have been designed and constructed with building codes and standards that contained criteria for seismic loads resulting from earthquakes having accelerations associated to 10 percent probability of exceedance in 50 years.*

SMcDuffie 1-4

In the section titled "Emergency Response and Other Considerations," on page 7 of 8, is the statement, "Consistent with the regulations and guidance in NUREG-1520, licensees should establish a process to periodically reevaluate changes to the natural phenomena data and data collection methods, modeling techniques (hazard curves), and assessment methods to ensure assumptions are still valid." If this statement is correct, please clarify exactly where this requirement or expectation for a periodic re-evaluation of changes to NPH data, models, and methods appears. At present, 10 CFR Part 50 contains no such requirement for power reactor licensees (see Fukushima Near-Term Task Force recommendation 2.2), and I am unaware of such a requirement for 10 CFR Part 70 licensees. Please elaborate on the location of this requirement or, if none exists, modify this paragraph.

NRC Response

The NRC disagrees with this comment. As stated in the draft ISG, the regulatory requirements in Title 10 of the Code of Federal Regulations (10 CFR) 70.62(c)(1) require licensees to conduct and maintain an Integrated Safety Analysis (ISA) that considers the effects of natural phenomena hazards (NPH). Chapter 3 of NUREG-1520 contains guidance about the concept of maintaining the ISA and safety program. Appendix B to Chapter 3, page 3-b-3, provides further guidance with regards to the importance of periodically re-examining the assumptions used for external initiating events such as NPH.

To provide further clarification to the text discussed in this comment, the following changes were made to the final ISG.

> *The regulatory requirements in 10 CFR 70.62(c)(1) require licensees to conduct and maintain an ISA. Consistent with the regulations and guidance in NUREG-1520, licensees should establish a process to periodically re-evaluate changes to the natural phenomena data and data collection methods, modeling techniques (hazard curves), and assessment methods to ensure assumptions are still valid. If the assumptions used for determining credibility of NPH events change, such as updated building codes and standards, the staff should assess the licensee's documentation of the processes used to evaluate any impacts to the current safety basis that could be affected by these changes.*

NEI 2-1

Section, Page, and Line: Page 2, sentences 4-5, 6

Comment: While industry agrees with the statements as presented, there can be a common approach or method used by the ISA teams with phenomena criteria and assumptions unique for NPH.

Proposed Resolution: ISG should explicitly recognize that ISA teams might use criteria and assumptions unique to NPH.

NRC Response

The NRC agrees with this comment. The purpose of the ISG is to provide methods acceptable to the staff for the review of the treatment of NPH. The guidance is not intended to be inclusive of all the methodologies that can be used by licensees to demonstrate compliance with applicable regulatory requirements and license conditions.

To provide further clarification to the text discussed in this comment, the following changes were made to the final ISG.

> *Many existing fuel cycle facilities were designed and constructed using applicable building codes and standards adopted by State or local authorities at the time the facility was constructed. These building codes and standards established minimum requirements for providing safety to life and property from seismic hazards. This goal of providing safety of life and property is accomplished through the specification of prescriptive criteria to achieve adequate performance of a structure to ensure its capability to withstand a defined intensity of earthquake ground motions. The development of seismic design criteria is an ongoing process of improvement which is reflected in the evolution of seismic criteria in building codes and standards. For example, a facility may have been designed and constructed with building codes and standards that contained criteria for seismic loads resulting from earthquakes having accelerations associated to 10 percent probability of exceedance in 50 years. If adequate documentation exists, such as design calculations or reference material, these facilities may be able to demonstrate that their SSCs will adequately perform with a low likelihood of structural collapse under the specified accelerations.*

On the other hand, some fuel cycle facilities were designed and built to a building code that did not prescribe criteria for seismic hazards. For example, most facilities built in the eastern United States were designed without consideration of potential earthquake hazards. Given that these licensees still must consider seismic hazards as part of their ISA, the licensee may be able to make an assessment using the as-built condition of the facility. This assessment includes a review of existing documentation such as drawings and construction specifications to identify as-built characteristics of the SSCs. The assessment can identify information such as properties of materials used in construction, structural systems used, and elements that can affect seismic performance. Walk-downs of the facility can identify and confirm as-built data gathered as well as identify deviations from original drawings. From walk-downs, the licensee can identify and provide special emphasis on components that can affect operations with hazardous materials. The NRC reviewer should assure that the assessment demonstrates that the performance requirements have been met.

NEI 2-2

Section, Page, and Line: Page 2, paragraph 2, lines 7-8
Comment: NRC uses the phrase "standard practice associated with each natural phenomena event." The term "standard practice" is vague and should be clarified or deleted.
Proposed Resolution: Perhaps NRC is referring to USGS standards or some other universally accepted approach in use today. NRC should either clarify this term or delete it to avoid confusion.

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

The staff's review should focus on ensuring that the definitions are consistent with accepted standards associated with each natural phenomena event.

NEI 2-3

Section, Page, and Line: Page 2, paragraph 3, last line
Comment: Phrase: "components may fail." A component failure does not necessarily have to be prevented or mitigated. The intermediate or high consequence event that might result from that component failure (if any) needs to be prevented or mitigated to meet acceptable performance criteria.
Proposed Resolution: ISG should explicitly recognize that a component failure does not necessarily have to be prevented or mitigated.

NRC Response

The NRC agrees with the fundamental concept of this comment. The regulations in 10 CFR Part 70 are a set of performance-based requirements intended to limit the likelihood of intermediate or high consequence events (as defined in 70.61 "Performance requirements") that

might result from components failures at a facility. However, for new facilities and new processes at existing facilities, Appendix D to Chapter 3 of NUREG-1520 states that "new facilities and new processes at existing facilities must also address the requirements of 10 CFR 70.64, "Requirements for New Facilities or New Processes at Existing Facilities," which includes the baseline design criterion for NPH (10 CFR 70.64(a)(2))." It continues to state that "New structures associated with facilities being reviewed, such as the gas centrifuge facilities and the mixed oxide fuel fabrication facility, will be designed and constructed to meet the seismic regulatory requirements. Hence, these facilities and additional new facilities to be licensed under 10 CFR Part 70 are not expected to present designs with seismic deficiencies." The prevention of component failures by design is consistent with the concept of defense in depth.

To provide further clarification to the text discussed in this comment, the following changes were made to the "Discussion" section of the final ISG.

> *The purposes of the review of a licensee or applicant's treatment of NPH are to support findings that the licensee's safety program and facility, equipment, and procedures are sufficient to provide reasonable assurance that the performance requirements of 10 CFR 70.61, and other regulatory requirements can and will be met. 10 CFR 70.61 requires that credible high consequence events be "highly unlikely" and credible intermediate consequence events be "unlikely". 10 CFR 70.62(a)(2) requires the licensee to develop and maintain the information that demonstrates that these requirements are met. This licensee evaluation involves identifying accident sequences, which start with an initiating event, intermediate failure events (usually of item relied on for safety (IROFS) or structures) leading to a particular accident, often a release of hazardous material, identifying the consequences of the accident, and the overall likelihood of the accident sequence. The next step is to determine that the performance requirements have been met. Typically for NPH this involves showing that either (a) the frequency of the NPH is less than $1x10^{-6}$ per year (NPH is not credible for location i.e., hurricanes in Washington state), or (b) that failures induced by the NPH that can cause high consequences are "highly unlikely" or intermediate consequences are "unlikely." The acceptance criteria for unlikely and highly unlikely are addressed in the guidance provided in Chapter 3 of NUREG-1520, Revision 1, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility." For each natural hazard phenomenon a frequency versus magnitude typically can be obtained, from which the applicant's ISA can relate likelihood to the magnitude of that phenomenon that can cause an event leading to high or intermediate consequences.*

NEI 2-4

Section, Page, and Line: Page 3, first full paragraph, sentence 3
Comment: This sentence is incomplete.
Proposed Resolution: Add "or highly unlikely" after the words "not credible."
NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

The licensee's assessment should indicate which events are considered to be not credible or highly unlikely and the basis for that determination.

NEI 2-5

Section, Page, and Line: Page 3, paragraph 2, sentence 1
Comment: This sentence is incomplete.
Proposed Resolution: Add "and result in not meeting performance criteria" to the end of the sentence.

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

In order to meet the requirements of 10 CFR 70.62(c)(1), licensees should also evaluate the completeness of events as discussed in the ISA if current information about NPHs indicates that unanalyzed events may be credible and result in accidents that exceed the performance requirements of 70.61.

NEI 2-6

Section, Page, and Line: Page 3, paragraph 2, sentence 2
Comment: This sentence is incomplete.
Proposed Resolution: After "current condition of the facility" add "or current ISA site status, e.g., new seismic studies."

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

The staff's review should assure that the description of the site and the facility, the design basis, the underlying data, and the assumptions are appropriate to the current condition of the facility as documented in the current ISA.

NEI 2-7

Section, Page, and Line: Page 4, item 2
Comment: Licensees may designate an SSC as an IROFS and still not need to respond to item (2) of the GL.
Proposed Resolution: NRC should clarify this issue. See industry general comment 2 in the cover letter.

NRC Response

Refer to response to "NEI General Comment-2" below.

NEI 2-8

Section, Page, and Line: Page 4, item 5
Comment: The possible multiple failures that result in a consequence not meeting the performance criteria in the rule need to be addressed. For instance, if total loss of power to the site is postulated within a likely PHA event but no power is needed to meet performance criteria then it is not an issue even though there may have been multiple "failures" of SSC's.
Proposed Resolution: NRC should clarify that the common cause analysis is only needed if the "failures" result in not meeting the performance criteria.

NRC Response

The NRC agrees with the comment. No changes were made to the final ISG.

The ISA evaluation for NPH should consider multiple concurrent failures that lead to accident sequences exceeding the performance requirements of 10 CFR 70.61.

NEI 2-9

Section, Page, and Line Page 5, paragraph 3
Comment: The terms "primary" and "secondary" systems, structures and components are not terms used routinely by the fuel facilities or used historically by NRC for fuel facilities.
Proposed Resolution: Industry suggests that these qualifiers be removed from the ISG to avoid confusion.

NRC Response

The NRC agrees with this comment. Qualifiers were removed from the final ISG.

NEI 2-10

Section, Page, and Line: Page 5, paragraph 3, sentence 3
Comment: The phrase, "secondary SSCs or items that indirectly contribute to seismic performance" is unclear and its use unprecedented.
Proposed Resolution: NRC should clarify its expectations with regard to this phrase or delete it avoid confusion.

NRC Response

The NRC agrees with this comment. This phrase was deleted from the final ISG.

NEI 2-11

Section, Page, and Line: Page 6, last sentence

Comment: "…earthquake that is highly unlikely..." is confusing at best and possibly incorrect.
Proposed Resolution: "Highly unlikely" should be changed to "unlikely"; otherwise, from a 70.61 perspective, a breach in the containment system is not relevant.

NRC Response

The NRC agrees with this comment. The sentence was deleted from the final ISG.

NEI 2-12

Section, Page, and Line: Page 7, paragraph 3, sentence 1
Comment: What about radiological and chemical safety and assessments?
Proposed Resolution: NRC should clarify whether radiological and chemical safety is intended to be included in this effort? If so, they should be explicitly included.

NRC Response

The NRC agrees with this comment. Changes were made to the final ISG as listed below.

> *The effects from failures and impacts to the facility from natural phenomena events should be considered in radiological safety, chemical safety, nuclear criticality safety and fire safety assessments.*

NEI General Comment-1

The ISG supplements NUREG-1520 and does not supersede it. As a result, the ISG would be incorporated into NUREG-1520 during a future revision. Also, we understand that the scope of the ISG is broader than the GL although it could be used to inform licensees' responses to the final GL.

NRC Response

As stated in the "Purpose" section of the draft ISG, the ISG provides additional guidance for evaluating events that may result from NPH. The ISG supplements existing guidance in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility." To avoid confusion, the staff made changes to the final ISG to note the sections that the ISG supplements from existing guidance in NUREG-1520.

NEI General Comment-2

10 CFR 70.64(a) and (a)(2) do not require retrofits to existing facilities when historical data is used to analyze NPH events. Further, consistent with 10 CFR Part 70, Page 3-D-1 of NUREG-1520, Revision 1 regarding the use of historical data states: "The baseline design criteria must be applied to the design of new facilities and new processes at existing facilities but does not require retrofits to existing facilities." Therefore, based on this NRC staff position, the use of historical data to analyze NPH events does not necessarily require retrofits.

NRC Response

The NRC disagrees with this comment in that it confuses the applicability of the requirements of 10 CFR 70.64, "Requirements for New Facilities or New Processes at Existing Facilities," which includes the baseline design criterion for NPH (10 CFR 70.64(a)(2)). The regulations in 70.61(a), '*Baseline design criteria,"* states, "*Each prospective applicant or licensee shall address the following baseline design criteria in the design of new facilities. Each existing licensee shall address the following baseline design criteria in the design of new processes at existing facilities that require a license amendment under § 70.72. The baseline design criteria must be applied to the design of new facilities and new processes, but do not require retrofits to existing facilities or existing processes (e.g., those housing or adjacent to the new process);* ***however, all facilities and processes must comply with the performance requirements in § 70.61*** *(emphasis added)."*

10 CFR 70.64(a)(2), *"Natural phenomena hazards,"* states, *"The design must provide for adequate protection against natural phenomena with* ***consideration of the most severe documented historical events for the site*** *(emphasis added)."*

The use of historical data to analyze NPH events is not related to the applicability of the 10 CFR 70.64 requirements. As stated above, all facilities and processes must comply with the performance requirements in 70.61 and 70.62.

NEI General Comment-3

Page 3-D-4 of NUREG-1520, Revision 1 lists a 500-year flood as acceptable to meet the definition of "unlikely" even if the licensee defines unlikely as less than 1E-3. NRC should provide a similar clear statement on seismic events specifying what constitutes an acceptable definition of "unlikely" and "highly unlikely" in the ISG.

NRC Response

As explained in the Statements of Consideration for the 10 CFR Part 70 final rule (56211 FR Vol. 65, No. 181, September 18, 2000), the regulations in Part 70 apply to different types of fuel cycle facilities, some of which are more complex and have more accident sequences than others. Given the broad spectrum of regulated facilities, guidance on the application of the ISA will serve as the tool that defines the design criteria in accordance with the safety function needed to meet the regulatory requirements in 10 CFR Part 70.

NEI General Comment-4

NRC should add two items to the final ISG: 1) relevant NPH examples, similar to those discussed during the March 2015 public meeting; and 2) an NPH decision flow chart for clarity and completeness. With regard to item 1, industry has found the severity level examples provided in Inspection Manual Chapter 2606, Enclosure 1 helpful and believes incorporating relevant examples into the final ISG would provide additional clarity for current and future

licensees as well as NRC personnel. Regarding item 2 above, industry provided its flow chart for the treatment of NPH in the ISA via an NEI letter 3, which should be included in the final ISG.

NRC Response

The staff will consider this suggestion for future revisions of NUREG-1520.