



**Department of Energy**  
Washington, DC 20585

December 15, 2015

The Honorable Joyce L. Connery  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW, Suite 700  
Washington, DC 20004

Dear Madam Chairman:

This letter is in response to your letter dated August 31, 2015, in which the Board expressed its concern that the approach being used to evaluate the need to update the Idaho Site Probabilistic Seismic Hazard Analysis (PSHA) is not well-defined and may not be technically defensible.

As requested, enclosed is a report from the Idaho Operations Office that addresses the five topics identified in your letter including:

- The criteria used to assess whether a PSHA update is necessary at Department of Energy (DOE) the Idaho Site;
- The technical definition of a "significant" increase in expected ground motions;
- The basis for the DOE position on why the preliminary seismic hazard analysis will provide values of calculated risk accurate enough to use in regulatory decision making;
- How a probabilistic risk assessment and/or seismic margin assessment will be applied; and
- The procedure for evaluating site-wide risk.

As discussed in the attached report, the Idaho Site has developed a risk-informed methodology for quantifying the significance of changes in seismic risk at its operational nuclear facilities, as part of the ten-year review of natural phenomena hazards (NPH) required by DOE Order 420.1C, *Facility Safety*. This approach incorporates a risk-informed method that is intended to support decisions on how to best improve safety at DOE nuclear facilities given new information on seismic hazards. The Idaho Site approach has been reviewed and endorsed by the DOE Idaho Operations Office and the Office of Nuclear Energy.

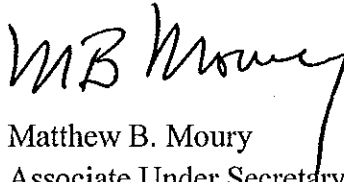
The Office of Nuclear Safety, within the Office of Environment, Health, Safety and Security, believes that the methodology being developed by the Idaho Site for quantifying the significance of changes in seismic risk at its operating nuclear facilities is a viable and pragmatic approach for meeting DOE safety requirements. However, we are closely following its application at the Idaho Site and are coordinating with DOE's Seismic Safety Lessons Learned Committee to



evaluate the Idaho Site methodology for possible endorsement as an appropriate Department-wide approach for conducting a determination on the significance of new seismic information and making risk-informed decisions on completing ten-year updated NPH assessments. This methodology will be evaluated through the standard DOE processes for review and comment before it is adopted in the Departmental Directives system.

Please contact me at (202) 586-1285 or Dr. Sharon Jasim-Hanif, my staff lead, at (301) 903-4664 if the Board or Board staff has any questions or would like to be briefed on this subject.

Sincerely,

A handwritten signature in black ink, appearing to read "MB Moury". The signature is written in a cursive, slightly slanted style.

Matthew B. Moury  
Associate Under Secretary for  
Environment, Health, Safety and Security

Enclosure

**Idaho Site Response to Defense Nuclear Facilities Safety Board  
Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review  
(October 2015)**

Introduction

To meet the ten-year natural phenomena hazard (NPH) review required by Department of Energy (DOE) Order 420.1C, *Facility Safety*, the Idaho Site, with the support of an independent peer review panel, has developed a risk-informed methodology for quantifying the significance of changes in seismic risk at its operational nuclear facilities. The seismic risk assessment project outlines this risk-informed methodology for performing the site's operational facility seismic hazard ten-year review in conformance with the requirements of DOE Order (O) 420.1C. The Idaho Site methodology is focused on ensuring nuclear facility safety by utilizing a holistic approach; including structures, systems, and components (SSC) fragilities; systems analysis; and consequence analysis. The methodology is based on first performing a Senior Seismic Hazard Analysis Committee (SSHAC) Level 1 study. This study provides a technically defensible seismic hazard estimate to conduct an assessment of changes to data, criteria, and assessment methods that might change the hazard results. This information is then used to determine how the hazard results impact the assessed risk of the Idaho site nuclear facilities currently in operation. In the final step, the seismic risk results are reviewed to determine changes in risk, evaluate if these changes are significant, and obtain other risk insights. These insights provide a basis for identifying and choosing among various options to address changes in risk, if appropriate.

The Idaho Site is applying this methodology to understand its nuclear facility operational risk today, operate its nuclear facilities safely in the interim, and inform future Probabilistic Seismic Hazard Analysis (PSHA) updates when appropriate. Under this activity, the Idaho Site contractor will perform the following:

- An independent team of experts will develop the risk-informed methodology.
- Develop and define a defensible estimate of the seismic hazard through SSHAC level 1 PSHA.
- Analyze the impacts to the operating facility's SSCs (fragility calculations).
- Combine the SSC fragilities with the seismic hazard to estimate the change in seismic risk.
- Determine if the change in seismic risk at operating nuclear facilities is significant.
- Report the results of this review to the Idaho Operations Office, including recommendations for future activities.

**Idaho Site Response to Defense Nuclear Facilities Safety Board  
Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review  
(October 2015)**

Discussion

DOE nuclear facilities must comply with DOE O 420.1C, which requires that all such facilities review their NPH assessments no less than every ten years. The Order points to DOE Standard (STD) 1020-2012, *Natural Phenomena Hazards Analysis and Design Criteria for Department of Energy Facilities*, for guidance in conducting NPH assessment reviews. In addition to providing a discussion of the applicable evaluation criteria, the Standard references other documents, including American National Standards Institute/American Nuclear Society (ANSI/ANS)-2.29-2008, *Probabilistic Seismic Hazards Analysis*, and Nuclear Regulatory Commission's (NRC) NUREG-2117, *Practical Implementation Guidelines for SSHAC Level 3 and 4 Hazard Studies*. These documents provide supporting criteria and approaches for evaluating the need to update an existing NPH assessment, including a seismic hazard assessment (SHA). All of the documents are consistent at a high level regarding the general conceptual criteria that should be considered. However, none of the documents provides step-by-step detailed guidance on the required or recommended approach for evaluating the significance of new information and determining whether or not an existing PSHA should be updated.

The conceptual approaches and criteria given in these documents deal with changes that may have occurred associated with seismic or geological information, as well as modeling methods that might impact the inputs to the PSHA, the calculated hazard itself, or the technical basis for the hazard inputs. The DOE Order is aimed at achieving and assuring the safety of nuclear facilities—which is a function not only of the level of the seismic hazard but also the capacity of the facility to withstand vibratory ground motions—thus, the risk of exceeding a design basis earthquake. The inclusion of risk information in the evaluation process is both prudent and in compliance with the objectives of the Order.

To support the 10-year NPH assessment review required by DOE O 420.1C and consistent with DOE-STD-1020-2012, the Idaho Site, with support of external experts, has developed a well-defined and technically defensible methodology to determine if changes in the data, criteria, and assessment methods used to develop a seismic hazard are significant. This methodology was developed to support the following attributes:

- Meet the requirements associated with the update of seismic hazards as defined in DOE orders and standards.
- Provide a risk-informed decision making tool for the evaluation of existing nuclear facilities to ensure resources are effectively utilized to manage operational risk.
- Ensure operational risk is evaluated utilizing both the hazard and facility response, to ensure a complete understanding of the facility risk.

**Idaho Site Response to Defense Nuclear Facilities Safety Board  
Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review  
(October 2015)**

- Provide a means to define a defensible estimate of the hazard for utilization in the evaluation of risk to existing nuclear facilities.

The process is discussed at a high level in PLN-2856 *INL Seismic Risk Assessment Project*, and has been further refined by an independent panel of experts in the report *Proposed Risk-Informed Seismic Hazard Periodic Reevaluation Methodology for Complying with DOE Order 420.1C*. The process discussed in PLN-2856 has been thoroughly vetted and discussed with the Idaho Operations Office (NE-ID) and the Office of Nuclear Energy. DOE-ID's memorandum (OS-OPAD-NSP-15-028), dated July 28, 2015, which is included as an appendix to this report, documents the review and concurrence, by the Central Technical Authority, Office of Nuclear Energy, of this risk-informed approach for compliance with DOE O 420.1C.

The report *Proposed Risk-Informed Seismic Hazard Periodic Reevaluation Methodology for Complying with DOE Order 420.1C*, prepared by a panel of nationally recognized experts, provides detail on the process and underlying basis that provide a sound technical underpinning of the approach. This document will be finalized in the first quarter of fiscal year 2016 to support completion of the seismic project execution plan (PLN-2856).

Currently, the Idaho Site is finalizing results from a SSHAC Level 1 study, which will provide a defensible estimate of the seismic hazard for use in this risk-informed approach to determine the significance of changes to data, criteria, and assessment methods. While the hazard assessment activities and the hazard products developed will provide a defensible, well-documented basis to make comparisons with the existing technical underpinnings of the current design or licensing bases for the facility of interest, this is not an update to the PSHA and is not being used to support design of new facilities or major modifications to existing facilities.

The following provides details specific to the five items requested in the Defense Nuclear Facilities Safety Board letter dated August 31, 2015, outlining the technical basis for the planned risk assessment approach:

1) *The criteria used to assess whether a PSHA update is necessary at INL.*

The criteria used to assess whether a PSHA update is necessary is outlined in DOE requirements. DOE O 420.1C establishes programmatic and facility requirements for NPH mitigation, including criteria for seismic assessment at sites of existing nuclear facilities that have SSCs rated for Seismic Design Criteria (SDC) 3 or higher.

DOE O 420.1C requires that:

*“Existing facility or site NPH assessments must be reviewed at least every 10 years for any significant changes in data, criteria, and assessment methods that would warrant updating the assessments. Sections 9.0 and 9.2 of DOE-STD-1020-2012 contains criteria and guidance for performing these reviews.” [emphasis added].*

**Idaho Site Response to Defense Nuclear Facilities Safety Board  
Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review  
(October 2015)**

DOE STD 1020-2012 Section 9.2.2 states:

*Consistent with DOE 420.1C, a preliminary estimate of whether changes to data, models, or methods are “significant” and warrant updating the assessments should be performed and consider the following criteria:*

- *Are the changes to data, models, or methods likely to cause a change in the estimates of the major inputs to hazard calculations?*
- *Given potential changes to the hazard inputs, by what magnitude might the calculated hazard results change, and how might the results impact current site design standards? [emphasis added].*

The activities associated with this project will meet the requirements as specified in DOE O 420.1C and guidance in DOE-STD-1020-2012 by determining the significance of the changes in data, criteria, and assessment methods since the last PSHA update in 2000 through a structured methodology that includes evaluation of the impact of the changes on the current facility design standards and risk of failure of SSCs. A final report of the review of the seismic hazard will document the basis for determining if the changes are significant, and make recommendations based on the impact of changes to the facility design standards and risk of operational nuclear facilities.

- 2) *The technical definition of a "significant" increase in expected ground motions predicted by the preliminary seismic hazard analysis as it is compared against the Uniform Hazard Response Spectrum from the previous PSHA and the response spectra used to design or evaluate the Fuel Manufacturing Facility (FMF) and the Integrated Waste Treatment Unit (IWTU).*

The process/criteria for determining whether a change in the hazard is “significant,” for existing facilities, is provided in the report *Proposed Methodology for Evaluating the Need for an Update of an Existing PSHA to Comply with DOE Order 420.1C* being produced by the Seismic Risk-Informed Methodology Independent Review Panel.

The process to determine significance is comprised of the following steps:

- Evaluate if there are any changes associated with data, models or methods in the seismic hazard development;
- Perform a SSHAC Level 1 study to define a defensible seismic hazard;
- Determine if the defensible seismic hazard is still bounded by the facility authorization basis;

**Idaho Site Response to Defense Nuclear Facilities Safety Board**  
**Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review**  
**(October 2015)**

- If necessary, conduct a risk evaluation to determine the impacts to operational risk of nuclear facilities based on changes in the defensible seismic hazard, and
- If necessary, address any immediate nuclear safety concerns identified, develop recommendations to reduce risk, and outline steps for a higher PSHA update to the appropriate SSHAC level.

At the end of this process, the Idaho Site will be provided with a final recommendation, and if necessary, a basis for identifying and choosing among various options to address changes in risk at its operational nuclear facilities.

- 3) *The basis for DOE's position on why the preliminary seismic hazard analysis mentioned above will provide values of calculated risk accurate enough to use in regulatory decision making.*

For this evaluation methodology, the Idaho Site needs a defensible estimate of the seismic hazard, for its SDC-3 or higher facilities. Because a defensible estimate is needed for applying the criteria outlined in the report (and that basis should include an assessment of all associated uncertainties), the Seismic Risk-Informed Methodology Independent Review Panel recommended that a site-specific SSHAC Level 1 or 2 study be conducted. The study should include a participatory or in-process peer review. If conducted according to regulatory guidance (i.e., NRC NUREG/CR-6372, *Recommendations for Probabilistic Seismic Hazard Analysis*, and NUREG-2117), the hazard assessment activities and the hazard products developed will provide a defensible, well-documented basis to make comparisons with the existing technical underpinnings of the current design or licensing bases for the facility of interest. It should be noted that the SSHAC Level 1 or 2 study will provide a reliable basis to evaluate the need for an update of a PSHA; however, the SSHAC Level 1 or 2 study is not, in itself, an update. The Idaho Site recognizes that new construction of an SDC-3 or higher facility will require that a hazard study be conducted using the SSHAC Guidelines for a Level 3 study (see NUREG/CR-6372 and NUREG-2117).

- 4) *How a probabilistic risk assessment and/or seismic margin assessment will be applied at FMF and IWTU, and how the results will be used to assess whether a PSHA update is necessary.*

As for the Integrated Waste Treatment Unit (IWTU), it is currently a Performance Category (PC)-2<sup>1</sup> facility that requires no periodic review of seismic hazard and seismic margin. If its mission changes in the future, and it needs to serve a PC-3 (or equivalent SDC-3) mission, the facility will be evaluated for such a purpose at that time.

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<sup>1</sup> The term Performance Category was utilized in previous versions of DOE Standard 1020 rather than Seismic Design Category.

**Idaho Site Response to Defense Nuclear Facilities Safety Board  
Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review  
(October 2015)**

For a PC-3 (or equivalent SDC-3) facility, which would require an assessment of SSC adequacy based on updates of NPH Assessments (SDC-3 or higher or NPH Design Criteria (NDC-3) or higher), the risk methodology will be applied. The approach for the assessment of facilities focuses on changes in the significance of operational nuclear facility risk by utilizing a defensible estimate of the seismic hazard, an advanced understanding of system fragilities, and consequence analysis. This risk-informed methodology will allow the Idaho Site to define the overall change in seismic related risk for its nuclear facilities. If the new level of risk is not acceptable, then appropriate action can be taken to reduce that risk. For example, an unacceptable risk could be reduced through: 1) the modification of facility SSCs' to increase fragilities; 2) a reduction of the material at risk; or 3) reduction of the uncertainties associated with defensible estimates of the seismic hazard. This risk-informed methodology will enhance the periodic seismic hazard review by enabling the nuclear facility operator to view potential changes in the probabilistic seismic hazard in a manner that is directly related to the operation of the particular nuclear facility.

- 5) *The procedure for evaluating site-wide risk, because the PSHA characterizes a sitewide hazard.*

The issue of cumulative risk from simultaneous failure of multiple co-located or closely located nuclear facilities is currently a topic of discussion within the technical community. DOE requirements do not call for consideration of cumulative site-wide risk from simultaneous failure of multiple facilities. The commercial nuclear industry also does not consider cumulative risk from simultaneous failure of multiple co-located reactors.

### Conclusion

The risk-informed methodology being applied at the Idaho Site has been comprehensively evaluated and vetted to ensure it is based on sound technical underpinnings and is fully compliant with DOE Orders and Standards. It ensures both the continued safe operation of existing nuclear facilities and allows facility operators to make informed decisions that effectively utilize resources to manage operational risk. This approach recognizes that, while the SSHAC Level 1 study provides a defensible estimate of the seismic hazard for use in this process, it does not constitute a PSHA update. The process outlined in the *Proposed Methodology for Evaluating the Need for an Update of an Existing PSHA to Comply with DOE Order 420.1C*, will allow the Idaho Site to determine the significance of the changes to data, criteria, and assessment methods for the seismic hazard.



**Idaho Site Response to Defense Nuclear Facilities Safety Board  
Request August, 31 2015 – Idaho Site Probabilistic Seismic Hazard Analysis Review  
(October 2015)**

Appendix

- 1) Memorandum, R. Boston to K. A. Markham, Subject: Department of Energy, Office of Nuclear Energy, Central Technical Authority Concurrence on Approach for DOE 420.1C, “Facility Safety” Compliance for the Idaho National Laboratory 10-Year Update of the Seismic Natural Phenomena Hazard Assessment” (OS-OPAD-NSP-15-028) dated July, 28, 2015

# memorandum

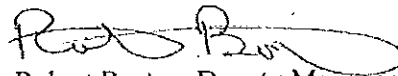
Idaho Operations Office

Date: July 28, 2015

Subject: ACTION: Department of Energy, Office of Nuclear Energy, Central Technical Authority  
Concurrence on Approach for DOE 420.1C, "Facility Safety" Compliance for the Idaho  
National Laboratory 10-Year Update of the Seismic Natural Phenomena Hazard Assessment  
(OS-OPAD-NSP-15-028)

To: Kelli A. Markham, Associate Deputy Assistant  
Secretary for Nuclear Facility Operations  
DOE-HQ, NE-3/GTN

This memorandum requests your concurrence as the Central Technical Authority, Office of Nuclear Energy (NE) on the Department of Energy, Idaho Operations Office (NE-ID)/Idaho National Laboratory (INL) approach for compliance with DOE 420.1C, "Facility Safety" for the Idaho National Laboratory 10-Year Update of the Seismic Natural Phenomena Hazard Assessment. The approach for compliance is outlined in the attachment.

  
Robert Boston, Deputy Manager  
Operations Support

Attachment

cc: M. R. Cox, BEA

### Summary

Consistent with DOE O 420.1C, "Facility Safety," and DOE STD-1020-2012, "Natural Phenomena Hazards Analysis and Design Criteria for Department of Energy Facilities," Idaho National Laboratory (INL) is developing a risk informed methodology for quantifying the significance of changes to data, criteria, and assessment methods by examining the changes to seismic risk at its operational nuclear facilities. This approach is consistent with the requirements of DOE O 420.1C and DOE STD-1020-2012. The Department of Energy, Idaho Operations Office (NE-ID) is focused on ensuring nuclear facility safety, including structures, systems, and components (SSC) fragilities; systems analysis; and consequence analysis.

The process to determine significance is comprised of the following steps:

- Evaluate if there are any changes associated with data, models or methods in the seismic hazard development.
- Perform a Senior Seismic Hazard Analysis Committee (SSHAC) Level 1 study to define a defensible seismic hazard.
- Determine if the defensible seismic hazard is still bounded by the facility authorization basis.
- If necessary, conduct a risk evaluation to determine the impacts to operational risk of nuclear facilities based on changes in the defensible seismic hazard, and
- If necessary, address any immediate nuclear safety concerns identified, develop recommendations to reduce risk, and outline steps for a higher Probabilistic Seismic Hazard Analysis (PSHA) update to the appropriate SSHAC level.

At the end of this process, NE-ID will be provided a final recommendation, and if necessary, a basis for identifying and choosing among various options to addressing changes in risk at its operational nuclear facilities.

### DOE Requirement

Department of Energy (DOE) Order DOE O 420.1C establishes programmatic and facility requirements for Natural Phenomena Hazard (NPH) mitigation, including criteria for seismic assessment at sites of existing nuclear facilities that have SSCs rated for Seismic Design Criteria (SDC) 3 or higher. The NE-ID and the INL are implementing this Order. DOE O 420.1C requires that:

*"Existing facility or site NPH assessments must be reviewed at least every 10 years for any significant changes in data, criteria, and assessment methods that would warrant updating the assessments. Section 9.2 of DOE-STD-1020-2012 contains criteria and guidance for performing these reviews."*

DOE STD 1020-2012 Section 9.2.2 states:

*Consistent with DOE 420.1C, an estimate of whether changes to data, models, or methods are "significant" and warrant updating the assessments should be performed and consider the following criteria:*

- *Are the changes to data, models, or methods likely to cause a change in the estimates of the major inputs to hazard calculations?*
- *Given potential changes to the hazard inputs, by what magnitude might the*

*calculated hazard results change, and how might the results impact current site design standards?*

The activities associated with this project will meet the requirements as specified in DOE O 420.1C and DOE STD 1020-2012 by determining the significance of the changes in data, criteria, and assessment methods since the last PSHA Update in 2000. It should be noted that neither the Order or Standard provide any clear guidance on what defines "significant" pertaining to changes in development of the seismic hazard. A final report of the review of the assessment will define the change in seismic risk, determine if the change is significant, and make recommendations based on the impact of changes to the risk of operational nuclear facilities.

### **Applicability**

DOE-STD-1020-2012, Section 9, "Evaluation and Modification of SSCs in Existing Facilities" states that: "...provides criteria and guidance for existing hazard categories 1, 2 and 3 nuclear facilities with SSCs in NDC-3 or higher for:

- *NPH design and evaluation of SSCs in existing facilities for major modifications (the term "major modification" is defined in DOE-STD-1189-2008);*
- *Periodic review and update of NPH assessments;*
- *Facility condition assessments; and*
- *Potential evaluation and upgrading/modification of SSCs due to changes in the NPH assessments".*

For INL facilities, the Advanced Test Reactor (ATR), Fuel Manufacturing Facility (FMF), and Zero Power Physics Reactor (ZPPR) are the only facilities that would be applicable to SSC updates from updated NPH Assessment (SDC-3 or higher or NPH Design Criteria (NDC)-3 or higher). Currently there are no DOE EM facilities at INL that would be affected, i.e., facilities or ongoing missions that exceed NDC/PC-2, by an update to the PSHA or benefit from the risk-informed methodology.

### **Background**

In 2010, the INL commenced activities to evaluate the need to update the PSHA as an approach to meet the requirement specified in DOE O 420.1B, "Facility Safety" which states "*NPH assessment review must be conducted at least every 10 years and must include recommendations to DOE for updating the operational assessments based on significant changes found in methods or data.*" In that year, a Seismic Evaluation Team (SET) completed a report which recommended the INL PSHA be updated. The SET report also included 10 prioritized data collection studies that could be performed to provide data that would reduce the uncertainties in future PSHA calculations. These 10 data collection studies were reviewed by NE-ID (with Idaho Cleanup Project personnel) and a team of nationally recognized experts, and narrowed down to a set of options that would provide an adequate reduction in uncertainties for a potential future update to the INL PSHA. The INL developed a plan (PLN-3912) consistent with the NE-ID recommendations for acquiring subsurface data in preparation to evaluate the need for INL PSHA update.

In May 2014, DOE O 420.1C was placed into the INL Contract. Based on the new requirements, NE-ID and INL made the decision to realign the NPH update assessment activity for seismic to comply with the new Directive. This resulted in a new plan (PLN-2856) and new strategy that is currently being followed.

PLN-2856 provides additional risk insights not included in PLN-3912, and not considered in the SET Report. This effort provides a near term approach to address concerns associated with nuclear facility risk as compared to PLN-3912. The process outlined in PLN-3912 focused on additional data acquisition and would have taken years to further define potential seismic hazard impacts to nuclear facilities. PLN-2856 considers implications of the seismic hazard on nuclear facility risk by December 2015. These risk insights will allow INL to better understand and make recommendations to address nuclear facility risk issues, if necessary. PLN-2856 has been developed to incorporate a risk informed approach to determine if there has been significant change in seismic risk at operational INL nuclear facilities. DOE 420.1C and DOE-STD-1020-2012 have requirements for nuclear facility safety, specifically for NPH events, and is supportive of the implementation of a risk-informed methodology. The approaches specified in PLN-3912 will be further evaluated as part of the recommendations identified from this effort.

#### **Approach (PLN-2856)**

The scope and activities of PLN-2856 of the assessment activity for this project are the following:


- Evaluate if there are any changes associated with data, models or methods in the seismic hazard development.
- Perform a SSHAC Level 1 study to define a defensible seismic hazard.
- Determine if the defensible seismic hazard is still bounded by the facility design basis.
- If necessary, conduct a risk evaluation to determine the impacts to operational risk of nuclear facilities based on changes in the hazard.
- If necessary, address any immediate nuclear safety concerns identified, and develop recommendations to reduce risk and for a higher SSHAC level PSHA update.

The first step was completed under the original effort in PLN-3912 and a report of changes associated with data, models or methods in the seismic hazard development was prepared. The SSHAC Level 1 process will evaluate and parameterize uncertainties of Seismic Source Characterization models and ground motion prediction equations (GMPEs). The analysis will leverage the work performed for the SET sensitivity analyses regarding regional seismicity and GMPEs, sensitivity analyses at the Naval Reactors Facility (NRF) for fault sources (local and distant), and the evaluation of existing subsurface data which compiled seismic velocity data and their rock and soil properties for MFC as well as other INL facility areas.

The approach for the assessment focuses on changes in the significance of operational nuclear facility risk by utilizing a defensible estimate of the seismic hazard, an advanced understanding of system fragilities, and consequences analysis. This risk-informed methodology will allow the INL to define the overall change in seismic related risk for its nuclear facilities. If the new level of risk is not acceptable then appropriate action can be taken to reduce that risk. For example, an unacceptable risk could be reduced through, 1) the modification of facility SSCs' to increase

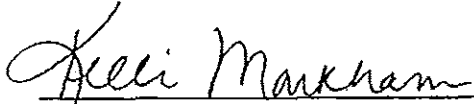
fragilities, 2) a reduction of the material at risk, or 3) reduction of the uncertainties associated with defensible estimates of the seismic hazard. This risk-informed methodology will enhance the periodic seismic hazard review by enabling the nuclear facility operator to view potential changes in the probabilistic seismic hazard in a manner that is directly related to the operation of the particular nuclear facility.

**Approval of Approach:**

  
Robert Boston  
Deputy Manager, Operations Support

8/4/2015  
Date

**Concurrence on Approach:**

  
Kelli A. Markham  
Central Technical Authority  
U. S. Department of Energy, Office of Nuclear Energy

8/31/2015  
Date