

## **NRR-PMDAPeM Resource**

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**From:** DiFrancesco, Nicholas  
**Sent:** Friday, April 22, 2016 3:04 PM  
**To:** 'MAUER, Andrew'  
**Cc:** Shams, Mohamed; Titus, Brett  
**Subject:** NRC Comments on Path 3 MSA Template  
**Attachments:** NRC Comments on Appendix H seismic MSA Path 3 Template.docx

Andrew,

Appreciate the opportunity to comment on the Path 3 MSA template for seismic. The attached comments identify a some editorial suggestions and minor opportunities to clarify licensee MSA plans.

Please let me know if you have any questions.

Many thanks,  
*Nick*

Senior Project Manager - Seismic Reevaluation Activities  
U.S. Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation  
Japan Lesson Learned Project Division  
[nicholas.difrancesco@nrc.gov](mailto:nicholas.difrancesco@nrc.gov) | Tel: (301) 415-1115

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**From:** MAUER, Andrew [<mailto:anm@nei.org>]  
**Sent:** Thursday, April 07, 2016 2:34 PM  
**To:** DiFrancesco, Nicholas ; Shams, Mohamed  
**Subject:** [External\_Sender] Path 3 MSA Template

Mohamed/Nick,

Attached is the proposed MSA template that the industry has developed to support Path 3 MSA submittals for seismic. We would welcome any feedback and would appreciate hearing from you by April 22.

Thanks,  
Andrew

*Andrew N. Mauer*  
Senior Project Manager  
Emergency Preparedness & Risk Assessment

Nuclear Energy Institute  
1201 F Street, NW, Suite 1100  
Washington, DC 20004  
[www.nei.org](http://www.nei.org)

T: 202.739.8018  
M: 202.344.7137  
F: 202.533.0157

E: [anm@nei.org](mailto:anm@nei.org)

T: @N\_E\_I

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**Sent Date:** 4/22/2016 3:03:40 PM  
**Received Date:** 4/22/2016 3:03:00 PM  
**From:** DiFrancesco, Nicholas

**Created By:** Nicholas.DiFrancesco@nrc.gov

**Recipients:**

"Shams, Mohamed" <Mohamed.Shams@nrc.gov>

Tracking Status: None

"Titus, Brett" <Brett.Titus@nrc.gov>

Tracking Status: None

"MAUER, Andrew" <anm@nei.org>

Tracking Status: None

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10 CFR 50.4

[DATE]

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Company/Licensee/Site Name  
Company/Licensee/Site Docket Number(s)  
Company/Licensee/Site Renewed License Number(s)

**Subject:** NEI 12-06, Appendix H, Revision 2, H.4.3 Path 3: GMRS > SSE but < IHS, Mitigating Strategies Assessment (MSA) report for the New Seismic Hazard Information

**References:**

1. NEI 12-06, Revision 2, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, December 2015, ADAMS Accession Number ML16005A625
2. JLD-ISG-2012-01, Revision 1, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, February 2016, ADAMS Accession Number ML15357A163
3. [Company/Licensee Seismic Hazard Reevaluations submittal and any supplements, [DATE(S)], ADAMS Accession Number(s)]
4. [NRC Letter, Company/Licensee Staff Assessment of Information provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima DAI-ICHI Accident, dated [DATE], ADAMS Accession Number MLxxxxxxx]
5. U.S. NRC, "NUREG-1407: Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities", ADAMS Number ML063550238, Washington, D.C., June, 1991.
6. NEI, "NEI 12-01 Revision 0: Guideline for Assessing Beyond-design-basis Accident Response Staffing and Communications Capabilities", Washington, D.C., May, 2012.
7. EPRI, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Report Number 1025287, Palo Alto, CA, November, 2012.
8. EPRI, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility Evaluation", Report Number 3002004396, Palo Alto, CA, July 30, 2015.
9. [PLANT OIP/FIP Submittal Reference]

Ladies and Gentlemen,

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The purpose of this letter is to provide the results of the assessment for [PLANT/SITE] to demonstrate that an Individual Plant Examination of External Events (IPEEE) based alternate mitigating strategy (AMS) can be implemented considering the impacts of the reevaluated seismic hazard. The assessment was performed in accordance with the guidance provided in Appendix H of NEI 12-06 Revision 2 (Reference 1) which was endorsed by the NRC (Reference 2).

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the licensee's reevaluated seismic hazard information at [PLANT/SITE], developed using Probabilistic Seismic Hazard Analysis (PSHA). The MSSHI for Path 3 includes ~~the a performance-based Ground Motion Response Spectrum (GMRS), Uniform Hazard Response Spectra (UHRS) at various annual probabilities of exceedance, and a family of seismic hazard curves~~ at various frequencies and ~~fractiles~~ developed at the [PLANT/SITE] control point elevation. [PLANT/SITE] submitted the reevaluated seismic hazard information including the UHRS, GMRS and the hazard curves to the NRC on [DATE(s)] (Reference(s) 3, [x associated with blue text]), [Reference all supplemental submittals that may have been made in response to the 10 CFR 50.54(f) request for information]. The NRC staff concluded that the MSSHI that was submitted adequately characterizes the reevaluated seismic hazard for the site (Reference 4).

Consistent with Section H.4.3 of Reference 1, the [PLANT/SITE] GMRS is bounded by the high-confidence-of-low-probability-of-failure (HCLPF) spectrum developed from evaluations for the IPEEE between 1-10 Hz – referred to as the IHS. Section 6.1.2 of Reference 2 identified that the method described in Section H.4.3 of Reference 1 is applicable to [PLANT/SITE].

Based upon the mitigating strategies assessment in Attachment 1, the mitigating strategies for [PLANT/SITE] considering the impacts of the reevaluated seismic hazard [can be implemented as designed or will be modified as discussed in the attachment].

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

Should you have any questions regarding this submittal, please contact [Company/Licensee/Site contact and phone number]

I declare under penalty of perjury that the foregoing is true and correct. Executed on the [DATE].

Sincerely,

[Company/Licensee/Site Vice President]

Attachment: Mitigating Strategies Assessment for [Plant]

cc: [Company/Licensee/Site specific distribution]

**Commented [A1]:** Clarification: This paragraph should be clear to the information needed to perform the assessment.

**Commented [A2]:** Editorial: Why isn't the RFI itself referenced and discussed?

**Commented [A3]:** Editorial: Consider saying "1 and 10 Hz" in order to fit in this sentence better.

**Commented [A4]:** Editorial: This sentence is a bit awkward because it isn't obvious what IHS means. I understand what it is based on the usages in NEI 12-06 and in meetings, but it would be helpful to define it somewhere in this template.

**Commented [A5]:** Editorial: It could be helpful to include a statement as to whether there are exceedances above 10 Hz.

**Commented [A6]:** Editorial: Or "the Attachment"

**Commented [A7]:** Clarification: I don't see a template section on modifications planned.

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ATTACHMENT 1

Commented [A8]: Editorial: Letter References Attachment 1

Company/Licensee

Plant/Site Name

Company/Licensee/Site Docket Number(s)

Company/Licensee/Site Renewed License Number(s)

Mitigating Strategies Assessment for [Plant]

DRAFT

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## INTRODUCTION

The purpose of this mitigating strategies assessment is to evaluate and demonstrate that [PLANT/SITE] can mitigate the effects of the reevaluated seismic hazard information developed pursuant to the NRC's 10CFR 50.54(f) letter dated March 12, 2012. the effects of the reevaluated seismic hazard developed in response to NRC letter pursuant to 10CFR 50.54(f) dated March 12, 2012. The assessment was performed in accordance with the guidance provided in Reference 1. Reference 1 discusses a method to develop an alternate mitigating strategy (AMS) to address the mitigating strategies seismic hazard information (MSSHI). This includes a modification of the general criteria and baseline assumptions included in Section 3.2.1 of Reference 1 to exclude consideration of losses such as an extended loss of AC power (ELAP), Loss of offsite power (LOOP) or loss of ultimate heat sink (LUHS) unless caused by the seismic hazard. Reference 2 provides an NRC staff position that the method described in Section H.4.3 of Reference 1 for an AMS is acceptable for mitigating a beyond design basis external event. Further, the protection of onsite power sources and normal access to the UHS from the seismic hazard is an acceptable method of mitigating a simultaneous loss of all AC power and loss of normal access to the ultimate heat sink.

**Commented [A9]:** Editorial: Potentially redundant to the prior phrase appearing in this sentence, but it might be included to demonstrate a diverse and flexible way of saying this....

**Commented [A10]:** Editorial: Hyphenate as a compound modifier.

An IPEEE-based alternate mitigating strategy (AMS) relies on the seismic evaluation of plant equipment to demonstrate robustness of structures, systems and components (SSCs) to the GMRS. The IPEEE for [PLANT/SITE] relied on the results of an [choose one: SPRA, an EPRI seismic margins assessment (SMA) methodology, or an NRC SMA methodology] to demonstrate the capability to bring the plant to a safe shutdown condition following a review level earthquake (RLE) as described in NUREG-1407 (Reference 5). The [choose one: SPRA, an EPRI seismic margins assessment (SMA) methodology, or an NRC SMA methodology] approach evaluated two safe shutdown success paths. The safe shutdown success paths provide independent means of achieving a safe shutdown condition following a severe seismic event (e.g., core cooling by heat removal from the steam generators and core cooling by RCS 'feed and bleed').

**Commented [A11]:** Editorial: This would be redundant to the "an" outside of the square brackets.

**Commented [A12]:** Editorial: *Id.*

**Commented [A13]:** Editorial: This would just sound silly because it would be a use of an indefinite article immediately after the definite article.

**Commented [A14]:** Editorial: *Id.*

Seismic evaluations performed under the IPEEE included SSCs in those two safe shutdown success paths. Therefore, based on the results of the IPEEE, safe shutdown of the plant following a seismic event can be accomplished, and consequences can be mitigated, for a seismic event up to the plant capacity level (i.e., the IHS) for which the SSCs in the IPEEE were evaluated.

**Commented [A15]:** Editorial: Please define IHS.

**Commented [A16]:** Clarification: This logic chain omits a comparison of the RLE or the IHS to the GMRS. That should be included for completeness.

### Indefinite Coping

A plant-specific evaluation was performed and concluded that SSCs that limit the SMA-based IPEEE coping duration to 72 hours are available for an indefinite period following a beyond design-basis seismic event at the reevaluated seismic hazard level to support continued maintenance of the safe shutdown condition.

**Commented [A17]:** Clarification: Is this portion supposed to be included in submittals from non-SMA based IPEEE submittals?

### Example

The [PLANT/SITE] IPEEE was based on the EPRI SMA method. This approach defined the Seismic Equipment List (SEL) for evaluation of safe shutdown success paths to be comprised of those SSCs required to bring the plant to a stable condition (either hot or cold shutdown) and maintain that condition for at least 72 hours. Therefore, the IPEEE results have been evaluated for limitations that are based

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on the 72 hour coping duration. Generally, the conclusions of the SMA are not sensitive to coping duration. However, certain consumable items, such as water and fuel oil inventories, have been evaluated based on a limited onsite supply. The ability to continue coping would potentially require re-supply of consumables.

Site access is restored to a near-normal status and/or augmented transportation resources are available within a few days as determined by NEI 12-01 (Reference 6), to allow for additional supplies to be brought in and allow for continuation of coping strategies and maintain the plant in a stable condition. A plant-specific evaluation has been performed to identify consumables and/or SSCs that are limiting for the 72 hour coping duration assumed in the development of the IPEEE.

The coping evaluation concluded that only cooling water supply to the steam generators (auxiliary feedwater) was considered limiting in the IPEEE for an extended coping period. Several alternative water supplies are available to [PLANT/SITE] to support coping for an extended period following the beyond design-basis seismic event to support continued maintenance of the safe shutdown condition. Additional seismically robust water sources include the 100,000 gallon primary water storage tank, site fire water system with two 245,000 gallon fire water tanks, and the condenser hotwell. The high-volume city water supply, if available following a seismic event, is an additional water source with essentially indefinite supply capability. Portable pumps are available from the National SAFER Response Centers (NSRC) to support water transfer from the alternate supplies.

Although not determined to be limiting, fuel oil supplies supporting diesel generator operation were also evaluated for extended coping. [PLANT/SITE] has established standing contracts with fuel providers to replenish diesel fuel supplies. The on-site supplies have been evaluated to last approximately [xxxx] days to continue the strategies evaluated under the IPEEE and/or on-site FLEX strategies. Additionally, the National SAFER Response Centers (NSRC) has the ability to air lift fuel bladders for use in the limited cases prior to roadways being made available for site access.

**End of Example**

**IPEEE Upgrade to Full Scope** [only applies to plants that conducted focused-scope assessment, any reviews conducted below that have been performed and submitted in response to the 50.54(f) letter should be referenced below instead of restating the review/results.]

The [PLANT/SITE] IPEEE was included in the focused scope bin, and an upgrade to a full scope assessment is required as described in EPRI 1025287 (Reference 7).

[PLANT/SITE] was binned as a 0.3g Focused Scope plant in NUREG-1407. As stated in Section 3.3.1 of the SPID, focused-scope IPEEE submittals may be used for screening against the GMRS provided they are enhanced to bring them in line with full scope assessments. The enhancements include (1) a full scope detailed review of relay chatter and (2) a full evaluation of soil failures.

**Full Scope Relay Chatter Review**

[PLANT/SITE] performed an assessment of relay chatter effects in accordance with the scope and procedures described in NUREG-1407 [Reference 5]. [PLANT/SITE] was an A-46 plant and the relay chatter review was conducted consistent with staff recommendations outlined in NUREG-1407, Appendix D, Table 7.17.2, which includes expansion of the A-46 relay scope to include IPEEE systems and evaluation of the entire expanded scope at the IPEEE Review Level Earthquake.

**Commented [A18]:** Clarification: This is not really true; NEI 12-01 did not determine anything. Consider modifying this to read something like "Site access is assumed to be restored ... as discussed in NEI 12-01...."

**Commented [A19]:** Clarification: This is somewhat incomplete because it only documents that the licensee looked for problems, not solutions. Consider modifying this to state that "A plant-specific evaluation has been performed to identify consumables and/or SSCs that are limiting for the 72 hour coping duration assumed in the development of the IPEEE and to identify methods of addressing any shortfalls."

**Commented [A20]:** Clarification: Should be clear on sources that should be available following a seismic event.

**Commented [A21]:** Editorial: One word

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Include conclusions from relay chatter review, including any modifications – reference submittal template for 2.1 relay chatter review for level of detail.

#### Soil Failure Analysis

[PLANT/SITE] has completed a soil failure analysis in accordance with the procedures described in NUREG-1407, which defers to the guidance provided in EPRI NP-6041-SL. Soil failure modes include soil liquefaction, foundation settlement, and slope instability (failure). The soil failure evaluation was conducted in accordance with Section 7 of EPRI NP-6041-SL.

Include conclusions from soil failure analysis review, including any modifications.

#### Spent Fuel Pool Cooling Evaluation

The evaluation of spent fuel pool cooling for [PLANT/SITE] was performed based on the initial conditions established in NEI 12-06 for spent fuel cooling coping in the event of an ELAP/LUHS. The evaluation also used the results of pool heatup analyses from the ELAP evaluation as input.

#### Example

##### Spent Fuel Pool Cooling

The FLEX strategy for spent fuel pool (SFP) cooling utilizes SFP level monitoring and make-up capability as described in Plant X OIP/ FIP (Reference 9). The SFP level is monitored using installed level monitoring instrumentation with remote monitoring capability [or other method described in the OIP/FIP]. SFP make-up capability is provided using the portable FLEX [SFP makeup] pump taking suction through a portable flexible hose and discharging through a permanently installed FLEX makeup connection tie-in to the SFP emergency make-up piping [through a flexible hose directly to the SFP]. The source of make-up water is the plant ultimate heat sink [pond, river, reservoir, lake, sound, as applicable] [or – is the plant XXX tank].

The permanently installed plant equipment relied on for the implementation of the SFP Cooling FLEX strategy has been designed and installed, or evaluated to remain functional, in accordance with the plant design basis to the SSE loading conditions. The spent fuel pool integrity evaluations demonstrated inherent margins of the spent fuel pool structure and interfacing plant equipment above the SSE to a peak spectral acceleration of 0.8g [Reference(s) X]. The portable FLEX equipment availability, including its storage and deployment pathways, and the permanently installed plant equipment needed to accomplish SFP cooling have subsequently been evaluated considering the GMRS-consistent loading conditions. [This can be accomplished in accordance with the guidance in NEI 12-06, Appendix H, Section H.4.4, Steps 2 and 3 since the GMRS to SSE ratio [PLANT/SITE] is  $\leq 2 \times \text{SSE}$ .]

**Commented [A22]:** Editorial: Is this intended to be example text similar to the previous section? If so, use the same formatting.

**Commented [A23]:** Clarification: Should this be blue bracketed text?

**Commented [A24]:** Clarification: We are not considering ISFSIs.

**Commented [A25]:** Editorial: Is this heading necessary? It seems duplicative of the "Spent Fuel Pool Cooling Evaluation" heading.

**Commented [A26]:** Clarification: This could cause issues regarding the question of seismic capacity of the SFPI installed under EA-12-051, which is not being upgraded to the MSSHI. We should be transparent as to what we expect here and not attempt to impose requirements to evaluate that instrument to a higher level by means of a template.

**Commented [A27]:** Clarification: Consider amplifying the safety basis for SPF integrity evaluation insights.

**Commented [A28]:** Clarification: Both the approach used for this evaluation and the conclusion should be included in the submittal.

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[Note 1: If the plant's FLEX strategy for SFP cooling includes an option to run a flexible hose directly from the discharge of the portable pump to the pool, then no additional evaluation of the permanently installed FLEX makeup connection and the SFP emergency make-up piping is required. Modify the 3<sup>rd</sup> paragraph to align with this SFP cooling strategy]

End of Example

#### High Frequency Evaluation

To address high frequency exceedance above the IHS, [PLANT/SITE] has conducted an evaluation of high frequency motion sensitive components (relays) in accordance with the guidance in EPRI 3002004396 (Reference 8) and found no adverse impact from the GMRS level seismic demands for the two shutdown trains. Furthermore, the high frequency evaluation confirmed that reactor protective functions will maintain the plant in a safe condition following GMRS level seismic demands.

**Commented [A29]:** Clarification: Limited conclusion. The conclusion should be more specific to the licensees' ability to maintain the plant in a safe status. Something along the lines of the following sentence is a good start.

#### AVAILABILITY OF FLEX EQUIPMENT

With the exception of SFP cooling, the AMS described in H.4.3 does not rely upon availability of FLEX equipment.

**Commented [A30]:** Clarification: Suggest dispositioning HF exceedances above the IHS in a logical manner. Suggested sentence for example.

On-site FLEX equipment may be available for deployment to support the maintenance of core cooling, containment, and spent fuel cooling functions. In order to provide additional potential mitigating capability, portable FLEX equipment not being used for the AMS is stored and reasonably protected in accordance with Section 5.3.1 of NEI 12-06.

Additionally, [PLANT/SITE] maintains the capability to obtain additional portable FLEX equipment from offsite sources. No strategies are need to be preplanned for the use of the offsite equipment, since this equipment would augment onsite equipment and plans.

**Commented [A31]:** Clarification: Suggest providing additional clarity on the use of offsite equipment.

Portable equipment is also available from offsite. The industry has established two (2) National SAFER Response Centers (NSRCs) to support utilities during beyond design basis events. [PLANT/SITE] has established contracts with the Pooled Equipment Inventory Company (PEICo) to participate in the process for support of the NSRCs as required. Each NSRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. In the event of a BDB seismic event, equipment can be moved from an NSRC to a local assembly area established by the Strategic Alliance for FLEX Emergency Response (SAFER) team. From there, equipment can be taken to the site and staged at the SAFER onsite Staging Area by helicopter, if ground transportation is unavailable. Communications will be established between the site and the SAFER team via satellite phones and required equipment moved to the site as needed. First arriving equipment will be delivered to the site within 24 hours from the initial request. The order in which equipment is delivered is identified in the [PLANT/SITE] SAFER Response Plan and no modifications to the sequence are necessary following a seismic event.

**Commented [A32]:** Clarification: Suggest providing clarity that no modifications to the plan for a seismic event are needed.