From: Wengert, Thomas
Sent: Thursday, February 3, 2022 7:46 AM
To: Keele Jr, Riley D
Cc: Clark, Robert; Dixon-Herrity, Jennifer
Subject: Final RAI RE: License Amendment Requests to Implement Provisions of 10 CFR 50.69 (L-2021-LLA-0105/-0106)
Attachments: ANO-1 and ANO-2 - Final RAI Regarding 10 CFR 50.69 LAR.pdf

On January 11, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff sent Entergy Operations, Inc. (the licensee) the draft Request for Additional Information (RAI) identified below. This RAI relates to the license amendment requests to modify the Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2) licensing basis that would allow the implementation of the provisions of Title 10 of the *Code of Federal Regulations*, Part 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors."

The NRC staff held a conference call with the licensee staff on January 24, 2022, to clarify this request. During the call, the NRC staff agreed to make some wording changes to RAIs ANO-1 RAI 03(c), ANO-2 RAI 02(b)(4), and ANO-2 RAI 03(c) to further clarify the request. The NRC staff has also made some additional editorial and formatting changes in this final RAI to enhance clarity. The licensee agreed to provide a response to this RAI within 30 days of this correspondence. A publicly available version of this revised, final RAI (attached) will be placed in the NRC's Agencywide Documents Access and Management System (ADAMS).

From: Wengert, Thomas
Sent: Tuesday, January 11, 2022 7:15 AM
To: Keele Jr, Riley D <rkeele@entergy.com>
Cc: Clark, Robert <RCLARK@entergy.com>; Dixon-Herrity, Jennifer <Jennifer.Dixon-Herrity@nrc.gov>
Subject: ANO-1 and ANO-2 - Draft RAI RE: License Amendment Requests to Implement Provisions of 10 CFR 50.69 (L-2021-LLA-0105/-0106)

By letters dated May 26, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML21147A234 and ML21147A264), Entergy Operations Inc (Entergy, the licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) modify the Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2) licensing basis to allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations*, Part 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." Entergy's proposed license amendment requests would allow alternative treatment requirements for equipment determined to be of low safety significance. The proposed changes are based on Nuclear Energy Institute (NEI) 00-04, "10 CFR 50.69 SSC Categorization Guideline," Revision 0, dated July 2005, which is endorsed by the U.S. Nuclear Regulatory Commission (NRC) in Regulatory Guide 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to Their Safety Significance," Revision 1 dated May 2006.

The NRC staff has reviewed the submittals and has determined that additional information is required for the staff to complete its review of this application. This request for additional information (RAI) is identified as draft at this time to confirm your understanding of the

information that the NRC staff needs to complete the evaluations. If the request for information is understood, please respond to this RAI within 30 days of the date of this request.

Please contact me if you would like to set up a conference call with the NRC staff to clarify this request for information.

Tom Wengert
Project Manager – Arkansas Nuclear One
NRR/DORL/LPL4
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Hearing Identifier: NRR_DRMA
Email Number: 1507

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REQUEST FOR ADDITIONAL INFORMATION REGARDING

LICENSE AMENDMENT REQUEST

FOR APPLICATION TO ADOPT 10 CFR 50.69,

"RISK-INFORMED CATEGORIZATION AND TREATMENT OF STRUCTURES,

SYSTEMS AND COMPONENTS FOR NUCLEAR POWER REACTORS"

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNITS 1 AND 2

DOCKET NOS. 50-313 AND 50-368

By letters dated May 26, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML21147A234 and ML21147A264), Entergy Operations Inc (Entergy, the licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) modify the Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2) licensing basis to allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations*, Part 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." Entergy's proposed license amendment request (LAR) would allow alternative treatment requirements for equipment determined to be of low safety significance. The proposed changes are based on Nuclear Energy Institute (NEI) 00-04, "10 CFR 50.69 SSC Categorization Guideline," Revision 0 dated July 2005, which is endorsed by the NRC in Regulatory Guide 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to Their Safety Significance," Revision 1 dated May 2006. To complete its review, the NRC staff requires additional information, as described below.

ANO-1 REQUEST FOR ADDITIONAL INFORMATION (RAI)

ANO-1 RAI 01 (APLA and APLC) – Proposed License Condition

Paragraph (b)(2)(ii) of 10 CFR 50.69 requires, for a license amendment, a description of measures taken to assure the level of detail of the systematic processes that evaluate the plant for internal and external events are adequate for the categorization of structures, systems, and components (SSCs). The guidance in NEI 00-04[1] allows licensees to implement different approaches, depending on the scope of their PRA (e.g., the approach if a seismic margins analyses is relied upon is different and more limiting than the approach if a seismic PRA is used). Regulatory Guide (RG) 1.201[2] states, in part, "[a]s part of the U.S. Nuclear Regulatory Commission (NRC's) review and approval of a licensee's or applicant's application requesting to implement § 50.69, the NRC staff intends to impose a license condition that will explicitly

[1] NEI 00-04, Revision 0, "10 CFR 50.69 SSC Categorization Guideline," July 2005 (ADAMS Accession No. ML052910035).
[2] U.S. NRC Regulatory Guide (RG) 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to their Safety Significance," dated May 2006 (ADAMS Accession No. ML061090627).

address the scope of the PRA and non-PRA methods used in the licensee's categorization approach."

In Section 2.3 of Enclosure 1 of the LAR, the licensee proposed the following license condition:

> Entergy is approved to implement 10 CFR 50.69 using the processes for categorization of Risk-Informed Safety Class (RISC)-1, RISC-2, RISC-3, and RISC-4 Structures, Systems, and Components (SSCs) using: Probabilistic Risk Assessment (PRA) models to evaluate risk associated with internal events, including internal flooding, and internal fire; the high wind / tornado safe shutdown equipment list to evaluate high wind / tornado missile events; the NUMARC 91-06 shutdown safety assessment process to assess shutdown risk; the Arkansas Nuclear One, Unit 1 (ANO-1) passive categorization method to assess passive component risk for Class 2 and Class 3 SSCs and their associated supports; the results of the non-PRA evaluations that are based on the IPEEE Screening Assessment for External Hazards updated using the external hazard screening significance process identified in ASME/ANS PRA Standard RA-Sa-2009 for other external hazards except seismic; and the alternative seismic approach as described in the Entergy submittal letter dated Date, and all its subsequent associated supplements, as specified in License Amendment No. [XXX] dated [DATE].
>
> Prior NRC approval, under 10 CFR 50.90, will be requested if ANO-1's feedback process determines that a process different from the proposed alternative seismic approach is warranted for seismic risk consideration in categorization under 10 CFR 50.69.

a) Section V.3.0 of the Federal Register Volume 69, No. 224 (69 FR 68034, November 22, 2004) states, in part, that "the licensee is not required to come back to the NRC for review of the categorization process provided they remain within the scope of the NRC's safety evaluation." The NRC staff notes that the above cited changes concern only the aspect of seismic risk consideration in the 10 CFR 50.69 categorization, not the remainder of the approaches proposed for the 10 CFR 50.69 categorization process itself. The proposed license condition is inconsistent with several precedents approved by the NRC staff and the NEI template for 10 CFR 50.69 LARs. Further, the LAR does not provide any justification for the proposed language (i.e., why it is appropriate to use approaches not reviewed by the staff without prior NRC approval for non-seismic hazards). Justify why it is appropriate to use approaches not reviewed by the staff without prior NRC approval for non-seismic hazards or propose a license condition consistent with approved precedents.

b) The NRC staff notes that the passive categorization method previously accepted by the staff is ANO, Unit 2.[3] Provide an explanation that establishes the basis for using ANO-1's passive categorization methodology or provide an updated license condition.

[3] NRC letter to Entergy, "Arkansas Nuclear One, Unit 2 - Approval of Request for Alternative AN02-R&R-004, Revision 1, 'Request to Use Risk-Informed Safety Classification and Treatment for Repair/Replacement Activities in Class 2 and 3 Moderate and High Energy Systems,'" (ADAMS Accession No. ML090930246), dated April 22, 2009.

ANO-1 RAI 02 (APLA) – Credit for FLEX Equipment and Actions

NRC memorandum dated May 30, 2017,[4] provides the NRC staff's assessment of identified challenges and strategies for incorporating Diverse and Flexible Mitigation Capability (FLEX) equipment into a PRA model in support of risk-informed decisionmaking in accordance with the guidance of RG 1.200[5].

With regards to equipment failure probability, in the memorandum dated May 30, 2017, the NRC staff states in Conclusion 8:

> The uncertainty associated with failure rates of portable equipment should be considered in the PRA models consistent with the ASME/ANS PRA Standard as endorsed by RG 1.200. Risk-informed applications should address whether and how these uncertainties are evaluated.

With regards to HRA, NEI 16-06[6] Section 7.5, "Human Reliability Assessment," recognizes that the current HRA methods do not translate directly to human actions required for implementing mitigating strategies. Sections 7.5.4 and 7.5.5 of NEI 16-06 describe such actions to which the current HRA methods cannot be directly applied, such as: debris removal, transportation of portable equipment, installation of equipment at a staging location, routing of cables and hoses; and those complex actions that require many steps over an extended period, multiple personnel and locations, evolving command and control, and extended time delays. In the memorandum dated May 30, 2017, the NRC staff states, in part, in Conclusion 11:

> . . . Until gaps in the human reliability analysis methodologies are addressed by improved industry guidance, [Human Error Probabilities] HEPs associated with actions for which the existing approaches are not explicitly applicable, such as actions described in Sections 7.5.4 and 7.5.5 of NEI 16-06, along with assumptions and assessments should be submitted to NRC for review.

Enclosure 1, Attachment 6, "Disposition of Key Assumptions / Sources of Uncertainty" identified Diverse and Flexible Mitigation Capability (FLEX) equipment PRA credit. The LAR states that a sensitivity study was performed that removed credit of the FLEX feed pump which resulted in less than two percent increase in core damage frequency risk.

a) Provide a description of all FLEX equipment and associated operator actions credited in the ANO-1 PRA including internal events, internal flooding, fire, seismic and external events.

b) Confirm that the sensitivity study highlighted in Enclosure 1 Attachment 6 of the LAR removes all FLEX credit. If all FLEX credit is not removed, provide an assessment, such as a sensitivity study, of the impact risk by FLEX

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[4] U.S. NRC memorandum, "Assessment of the Nuclear Energy Institute 16-06, 'Crediting Mitigating Strategies in Risk-Informed Decision Making,' Guidance for Risk-Informed Changes to Plants Licensing Basis," (ADAMS Accession No. ML17031A269).

[5] U.S. Nuclear Regulatory Commission, "Acceptability of Probabilistic Risk Assessment Results for Risk-Informed Activities," RG 1.200, Revision 3, December 2020 (ADAMS Accession No. ML20238B871).

[6] Nuclear Energy Institute (NEI) 16-06, "Crediting Mitigating Strategies in Risk-Informed Decision Making," Revision 0, dated August 2016 (ADAMS Accession No. ML16286A297).

equipment credited in ANO-1's PRA models. Provide a discussion for the impact of FLEX on the categorization process including a summary of SSCs that changed from HSS to LSS using the plant specific risk analysis.

c) Provide a discussion detailing the methodology used to assess the failure probabilities of any modeled equipment credited in the licensee's mitigating strategies (i.e., FLEX). The discussion should include a justification of the rationale for parameter values, and how the uncertainties associated with the parameter values are considered in the categorization process in accordance with ASME/ANS RA-Sa–2009[7], as endorsed by RG 1.200 (e.g., supporting requirements for HLR-DA-D).

d) Provide a discussion detailing the methodology used to assess operator actions related to FLEX equipment and the licensee personnel that perform these actions. The discussion should include:

   i. A summary of how the licensee evaluated the impact of the plant-specific human error probabilities and associated scenario-specific performance shaping factors listed in (a)–(j) of supporting requirement HR-G3 of ASME/ANS RA-Sa–2009, as endorsed by RG 1.200.

   ii. Whether maintenance procedures for the portable equipment were reviewed for possible pre-initiator human failures that renders the equipment unavailable during an event, and whether the probabilities of the pre-initiator human failure events were assessed as described in HLR-HR-D of ASME/ANS RA-Sa–2009, as endorsed by RG 1.200.

ANO-1 RAI 03 (APLC) – Alternative Seismic Approach

Paragraph (b)(2)(ii) of 10 CFR 50.69 requires that the quality and level of detail of the systematic processes that evaluate the plant for external events during operation are adequate for the categorization of SSCs.

In the LAR, the licensee proposed to address seismic hazard risk using the alternative seismic Tier-2 approach described in Electric Power Research Institute (EPRI) Report 3002017583. The NRC staff understands that EPRI Report 3002017583 is an updated version of EPRI Report 3002012988 and that both reports were reviewed by the staff in conjunction with its safety evaluation for the LAR for adoption of 10 CFR 50.69 by LaSalle County Station, Units 1 and 2 (LaSalle) (ADAMS Accession No. ML21082A422). The NRC staff has not endorsed EPRI Report 3002012988 or EPRI Report 3002017583 as a topical report for generic use. As such, each licensee needs to perform a plant-specific evaluation of the applicability of the information in the EPRI report to its proposed alternative seismic approach.

The NRC staff approved LaSalle's alternative seismic Tier-2 approach based on the information contained in the LaSalle LAR dated January 31, 2020 (ADAMS Accession No. ML20031E699), EPRI Report 3002012988, EPRI Report 3002017583, and supplements to the LaSalle LAR dated October 1, 2020; October 16, 2020; and January 22, 2021 (ADAMS Accession Nos.

[7] American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS) PRA standard ASME/ANS RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," February 2009, New York, NY (Copyright).

ML20275A292, ML20290A791, and ML21022A130, respectively). The NRC staff notes that the licensee's proposed alternative seismic approach is similar to that approved in the staff's LaSalle safety evaluation.

Since the information submitted in the LaSalle LAR supplements was requested by the NRC staff as part of its review of the LaSalle LAR for adoption of 10 CFR 50.69, the staff is unable to use the information in its review of the ANO-1 LAR unless it is incorporated in the licensee's LAR. This information is necessary for the NRC staff to make its regulatory finding on the licensee's proposed alternative seismic approach and has not been submitted by the licensee. Therefore, the licensee is requested to address the following:

a) Identify and justify any differences between the licensee's proposed alternative seismic approach and that approved in the NRC staff's safety evaluation for the LaSalle 10 CFR 50.69 LAR, including any ANO-1 specific considerations.

b) If the licensee's proposed alternative seismic approach is identical to that approved for LaSalle, provide for ANO-1 the above-mentioned information in the LaSalle LAR supplements dated October 1, 2020; October 16, 2020; and January 22, 2021, to support the NRC staff's regulatory finding on the licensee's proposed alternative seismic approach. This information can be provided either by incorporating by reference the identified LaSalle LAR supplements or by responding to the requests for additional information (RAIs) contained in the LaSalle LAR supplements.

c) The licensee stated that EPRI Report 3002017583 with markups is used for 10 CFR 50.69 categorization. The staff notes that EPRI has recently submitted a copy of EPRI Report 3002017583 on the NRC docket (ADAMS Accession No. ML21082A170). The licensee is requested to include the citation for the docketed EPRI Report 3002017583 in the LAR.

d) In Enclosure 1 to the LAR (pages 7, 10, and 12 of 34), the licensee refers to "EPRI Markups provided in Attachment 2 of References [4] and [5]." The NRC staff notes that Reference [5] is the safety evaluation that approved the Vogtle Electric Generating Plant, Units 1 and 2, use of its seismic PRA model for categorization and has no Attachment 2. It is unclear to the NRC staff the relevance of this reference for the proposed alternative seismic approach. Clarify if "Attachment 2 of References [4] and [5]" should read "Attachment 2 of References [4] and [61]."

ANO-1 RAI 04 (APLC) – Implementation of Section 2.3.1 of EPRI Report 3002017583

In Section 3.2.3, "Seismic Hazards," of Enclosure 1 to the LAR, the licensee stated that the categorization team will evaluate correlated seismic failures and seismic interactions between SSCs for each system categorized, and that this process is detailed in Section 2.3.1 of EPRI Report 3002017583. The licensee also indicated that determination of seismic insights will make use of the full power internal events PRA model supplemented by focused seismic walkdowns. However, the NRC staff notes that the LAR does not address any plant-specific implementation of the guidance provided in Section 2.3.1 of EPRI Report 3002017583 that will be applied to seismic evaluation for 10 CFR 50.69 categorization at ANO-1.

Therefore, describe how ANO-1 will implement the guidance in Section 2.3.1 of the EPRI Report, taking into account ANO-1 specific plant design and conditions.

ANO-1 RAI 05 (APLC) – Other External Hazards Screening

NEI 00-04, Revision 0, Section 5.4, “Assessment of Other External Hazards,” provides guidance on assessment of other external hazards (excluding fire and seismic) in 10 CFR 50.69 categorization of SSCs. Specifically, Figure 5-6, “Other External Hazards,” of NEI 00-04 illustrates a process that begins with an SSC selected for categorization and proceeds through a flowchart for each external hazard. Figure 5-6 indicates that, if a component participates in a screened scenario, then, in order for that component to be considered a low safety significant item, it has to be further shown that, if the component were removed, the screened scenario would not become unscreened.

Section 3.2.4, “Other External Hazards,” of Enclosure 1 of the LAR indicates that all other external hazards besides tornado missiles and seismic events were screened with Attachment 4 to Enclosure 1, “External Hazards Screening,” of the LAR providing the results. Based on this description, it appears to the NRC staff that at the time an SSC is categorized, it will not be evaluated using the guidance in NEI 00-04, Figure 5-6, to confirm that the SSC is not credited in screening an external hazard because that evaluation has already been made. The NRC staff notes that plant changes, plant or industry operational experience, or identified errors or limitations in the PRA models could potentially impact the conclusion that an SSC is not needed to screen an external hazard.

Therefore, address the following:

a) Clarify whether an SSC will be evaluated during categorization of the SSC using the guidance in NEI 00-04, Figure 5-6, to confirm that the SSC is not credited in screening an external hazard.

b) If an SSC will not be evaluated using the guidance in NEI 00-04, Figure 5-6, to confirm that the SSC is not credited in screening an external hazard at the time of categorization because that evaluation has already been made, explain how plant changes, plant or industry operational experience, or identified errors or limitations in the PRA models that could change that decision are addressed.

c) Attachment 4 to Enclosure 1 of the LAR indicates that for the ANO-1 and ANO-2 Focused Evaluation (ADAMS Accession No. ML17214A029), the NRC staff concluded that the station demonstrated effective flood protection from the reevaluated flood hazards. However, the licensee did not provide any detailed information about whether any SSCs are credited for the flood protection, and how the SSCs are categorized. Identify any active and passive SSCs that are credited for screening the external flooding hazard and discuss how those SSCs will be included and considered in the proposed categorization process.

ANO-2 REQUEST FOR ADDITIONAL INFORMATION

ANO-2 RAI 01 – Proposed License Condition

Paragraph (b)(2)(ii) of 10 CFR 50.69 requires, for a license amendment, a description of measures taken to assure that the level of detail of the systematic processes that evaluate the plant for internal and external events are adequate for the categorization of structures, systems, and components (SSCs). The guidance in Nuclear Energy Institute (NEI) 00-04[8] allows licensees to implement different approaches, depending on the scope of their PRA (e.g., the approach, where a seismic margins analysis is relied upon is different and more limiting than the approach where a seismic PRA is used). Regulatory Guide (RG) 1.201[9] states, in part, "[a]s part of the NRC's review and approval of a licensee's or applicant's application requesting to implement § 50.69, the NRC staff intends to impose a license condition that will explicitly address the scope of the PRA and non-PRA methods used in the licensee's categorization approach."

Section 2.3, "Description of the Proposed Change," of Enclosure 1, "Evaluation of the Proposed Change," of the LAR proposed the following license condition:

> Entergy is approved to implement 10 CFR 50.69 using the processes for categorization of Risk-Informed Safety Class (RISC)-1, RISC-2, RISC-3, and RISC-4 Structures, Systems, and Components (SSCs) using: Probabilistic Risk Assessment (PRA) models to evaluate risk associated with internal events, including internal flooding, and internal fire; the high wind / tornado safe shutdown equipment list to evaluate high wind / tornado missile events; the NUMARC 91-06 shutdown safety assessment process to assess shutdown risk; the Arkansas Nuclear One, Unit 1 (ANO-1) passive categorization method to assess passive component risk for Class 2 and Class 3 SSCs and their associated supports; the results of the non-PRA evaluations that are based on the IPEEE Screening Assessment for External Hazards updated using the external hazard screening significance process identified in ASME/ANS PRA Standard RA-Sa-2009 for other external hazards except seismic; and the alternative seismic approach as described in the Entergy submittal letter dated Date, and all its subsequent associated supplements, as specified in License Amendment No. [XXX] dated [DATE].
>
> Prior NRC approval, under 10 CFR 50.90, will be requested if ANO-1's feedback process determines that a process different from the proposed alternative seismic approach is warranted for seismic risk consideration in categorization under 10 CFR 50.69.

a) Section V.3.0 of *Federal Register* Volume 69, No. 224 (69 FR 68034, November 22, 2004) states, in part, that "the licensee is not required to come back to the NRC for review of the categorization process provided they remain within the scope of the NRC's safety evaluation." The NRC staff notes that the above cited changes concern only the aspect of seismic risk consideration in the 10 CFR 50.69 categorization, not the remainder

[8] NEI 00-04, Revision 0, "10 CFR 50.69 SSC Categorization Guideline," dated July 2005 (ADAMS Accession No. ML052910035).
[9] RG 1.201, "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to their Safety Significance," dated May 2006 (ADAMS Accession No. ML061090627).

of the approaches proposed for the 10 CFR 50.69 categorization process itself. The proposed license condition is inconsistent with several precedents approved by the NRC staff and the NEI template for 10 CFR 50.69 LARs. Further, the LAR does not provide any justification for the proposed language (i.e., why it is appropriate to use approaches not reviewed by the NRC staff without prior NRC approval for non-seismic hazards). Justify why it is appropriate to use approaches not reviewed by the NRC staff without prior NRC approval for non-seismic hazards or propose a license condition consistent with approved precedents.

b) The NRC staff notes that the passive categorization method previously accepted by the staff is described in the approval of alternative ANO2-R&R-004.[10] Provide an explanation that establishes the basis for using ANO-1's passive categorization methodology or provide an updated license condition that references ANO2-R&R-004.

c) Regarding the second paragraph of the proposed license condition, the NRC staff notes that that the 10 CFR 50.69 categorization process contains several processes. Provide clarification if the intent of this paragraph is to address any process (processes).

ANO-2 RAI 02 – Crediting of FLEX in the Internal Events and Fire PRA Models

The NRC memorandum dated May 30, 2017[11,] provides the NRC's staff assessment of identified challenges and strategies for incorporating Diverse and Flexible Mitigation Capability (FLEX) equipment into a PRA model in support of risk-informed decisionmaking in accordance with the guidance of RG 1.200.

Regarding equipment failure probability in the May 30, 2017, memorandum, the NRC staff concludes (Conclusion 8):

> The uncertainty associated with failure rates of portable equipment should be considered in the PRA models consistent with the ASME/ANS PRA Standard as endorsed by RG 1.200. Risk-informed applications should address whether and how these uncertainties are evaluated.

With regards to human reliability analysis (HRA), NEI 16-06,6 Section 7.5, "Human Reliability Assessment," recognizes that the current HRA methods do not translate directly to human actions required for implementing mitigating strategies. Sections 7.5.4, "Addressing the Actions Not Currently Addressed by Existing HRA Tools," and 7.5.5, "Addressing Complex Actions in Mitigating Strategies," of NEI 16-06 describe such actions to which the current HRA methods cannot be directly applied, such as: debris removal, transportation of portable equipment, installation of equipment at a staging location, routing of cables and hoses; and those complex actions that require many steps over an extended period, multiple personnel and locations, evolving command and control, and extended time delays.

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[10] NRC letter to Entergy Operations, Inc., "Arkansas Nuclear One, Unit 2 - Approval of Request for Alternative ANO2-R&R-004, Revision 1, 'Request to Use Risk-Informed Safety Classification and Treatment for Repair/Replacement Activities in Class 2 and 3 Moderate and High Energy Systems,'" dated April 22, 2009 (ADAMS Accession No. ML090930246).

[11] NRC Memorandum, "Assessment of the Nuclear Energy Institute 16 06, 'Crediting Mitigating Strategies in Risk-Informed Decision Making,' Guidance for Risk Informed Changes to Plants Licensing Basis," dated May 30, 2017 (ADAMS Accession No. ML17031A269).

In the memorandum dated May 30, 2017, the NRC staff states, in part, in Conclusion 11:

> …Until gaps in the human reliability analysis methodologies are addressed by improved industry guidance, HEPs [Human Error Probabilities] associated with actions for which the existing approaches are not explicitly applicable, such as actions described in Sections 7.5.4 and 7.5.5 of NEI 16-06, along with assumptions and assessments, should be submitted to NRC for review.

a) Fire PRA

In Enclosure 1, Attachment 6 of the LAR, the licensee states that "The FLEX portable diesel generator is credited only in the FPRA to ensure long term DC power for Unit 2 extended loss of AC power (ELAP) cases." It further states that the fire model of record is being refined to remove fire PRA conservatisms and, scheduled to be completed first quarter of 2021.

During the audit, the licensee provided an updated FLEX (as currently modeled) sensitivity study. That study demonstrated that when FLEX equipment was not credited, significant impact in the internal fire risk values was observed. No assessment of the impact of FLEX credit on SSC categorization was provided; therefore, it is unclear to the NRC staff the impact of the FLEX uncertainty on SSC categorizations. In addition, the staff was made aware during the audit that the Fire PRA model for the FLEX diesel generator, which is non-safety related, used the industry values for emergency diesel generators (EDG) that are safety related. The staff notes that industry data for failure probabilities of non-safety diesel generators (DG) is available, that the use of safety-related data can be non-conservative, and that the impact of this discrepancy for categorization is unclear.

In light of these observations for the Fire PRA:

1. Confirm that the model of record (MOR) was updated as scheduled.

2. Provide a discussion detailing the methodology used to assess the failure probabilities of the credited FLEX equipment. The discussion should include a justification of the rationale for parameter values, and how the uncertainties associated with the parameter values are considered in the categorization process in accordance with ASME/ANS RA-Sa–2009[7], as endorsed by RG 1.200 (e.g., supporting requirements for HLR-DA-D).

3. Provide a discussion detailing the methodology used to assess operator actions related to FLEX equipment credited in the Fire PRA and the licensee personnel that perform these actions. The discussion should include:

   i. A summary of how the licensee evaluated the impact of the plant-specific HEPs and associated scenario-specific performance shaping factors listed in (a)–(j) of supporting requirement HR-G3 of ASME/ANS RA-Sa–2009, as endorsed by RG 1.200.

   ii. Whether maintenance procedures for the portable equipment were reviewed for possible pre-initiator human failures that render the equipment unavailable during an event, and whether the probabilities of the pre-initiator human failure events were assessed as described in HLR-HR-D of ASME/ANS RA-Sa–2009, as endorsed by RG 1.200.

4. Regarding the uncertainty of FLEX items currently modeled in the Fire PRA:

   i. Provide justification, such as sensitivity studies, that the FLEX uncertainty does not significantly impact any SSC categorization.

   ii. Alternatively to Part (i), confirm the uncertainty related to FLEX modeling is a key source of uncertainty for the categorization process that will presented to the IDP for their consideration.

5. Regarding the use of safety-related EDG data for non-safety DG values:

   i. Provide justification, such as sensitivity studies, that the use of safety-related data for FLEX DGs does not significantly impact any SSC categorization

   ii. Alternatively to Part (i), propose a mechanism to ensure the appropriate DG data is incorporated in the FLEX DG modeling prior to implementing the categorization program.

b) Internal Events PRA

In Enclosure 1, Attachment 6 of the LAR, the licensee states that "Note that no FLEX equipment is credited currently in the Unit 2 internal events model but intended to be added to a future model update." During the audit, the licensee stated that the Internal Events Model is currently being updated to include FLEX equipment, with completion scheduled for first quarter 2022. Also during the audit, the licensee stated that they will use FLEX equipment failure probabilities cited in PWROG-18042-P Revision 1(REF) in the updated model. It is not clear to the staff whether this report is a recognized source for FLEX equipment failure probabilities.

In light these observations for the Internal Events PRA:

1. Provide a description of all FLEX equipment and associated operator actions credited in the updated (as of first quarter 2022) ANO-2 Internal Events PRA.

2. Provide a discussion detailing the methodology used to assess the failure probabilities of any modeled equipment credited in the licensee's mitigating strategies (i.e., FLEX). The discussion should include a justification of the rationale for parameter values, and how the uncertainties associated with the parameter values are considered in the categorization process in accordance with ASME/ANS RA-Sa–2009[7], as endorsed by RG 1.200 (e.g., supporting requirements for HLR-DA-D).

   If the updated Internal Events PRA will use the failure probabilities cited in PWROG-18042-P, Revision 1, either justify why PWROG-18042-P Revision 1 is a recognized source of failures probabilities, or provide a recognized source which cites accepted failure probabilities.

3. Provide a discussion detailing the methodology used to assess operator actions related to FLEX equipment and the licensee personnel that perform these actions. The discussion should include:

    i. A summary of how the licensee evaluated the impact of the plant-specific HEPs and associated scenario-specific performance shaping factors listed in (a)–(j) of supporting requirement HR-G3 of ASME/ANS RA-Sa–2009, as endorsed by RG 1.200.

    ii. Whether maintenance procedures for the portable equipment were reviewed for possible pre-initiator human failures that render the equipment unavailable during an event, and whether the probabilities of the pre-initiator human failure events were assessed as described in HLR-HR-D of ASME/ANS RA-Sa–2009 as endorsed by RG 1.200.

4. Regarding the uncertainty of FLEX equipment modeled in the updated Internal Events PRA:

    i. Provide an analysis, such as a sensitivity study, that assesses the overall impact of FLEX uncertainty on SSC categorization. Include in this response the list of major FLEX components, functions, and operator actions in the updated IEPRA, if any, that were identified as a significant source of uncertainty that would impact SSC categorization, and how these components, functions, or operator actions were addressed in the sensitivity study.

    ii. If it is determined that the FLEX modeling is a key source of uncertainty for the categorization process, confirm that the results of the sensitivity study will be presented to the IDP for their consideration.

ANO-2 RAI 03 (APLC) – Alternative Seismic Approach

Paragraph (b)(2)(ii) of 10 CFR 50.69 requires that the quality and level of detail of the systematic processes that evaluate the plant for external events during operation are adequate for the categorization of SSCs.

In the LAR, the licensee proposed to address seismic hazard risk using the alternative seismic Tier-2 approach described in Electric Power Research Institute (EPRI) Report 3002017583. The NRC staff understands that EPRI Report 3002017583 is an updated version of EPRI Report 3002012988 and both reports were reviewed by the staff in conjunction with its safety evaluation of the LAR for adoption of 10 CFR 50.69 by LaSalle County Station, Units 1 and 2 (LaSalle) (ADAMS Accession No. ML21082A422). The NRC staff has not endorsed EPRI Report 3002012988 or EPRI Report 3002017583 as a topical report for generic use. As such, each licensee needs to perform a plant-specific evaluation of the applicability of the information in the EPRI report to its proposed alternative seismic approach.

The NRC staff approved LaSalle's alternative seismic Tier-2 approach based on the information contained in the LaSalle LAR dated January 31, 2020 (ADAMS Accession No. ML20031E699), EPRI Report 3002012988, EPRI Report 3002017583, and supplements to the LaSalle LAR dated October 1, 2020; October 16, 2020; and January 22, 2021 (ADAMS Accession Nos. ML20275A292, ML20290A791, and ML21022A130, respectively). The NRC staff notes that the

licensee's proposed alternative seismic approach is similar to that approved in the staff's LaSalle safety evaluation.

Since the information submitted in the LaSalle LAR supplements was requested by the NRC staff as part of its review of the LaSalle LAR for adoption of 10 CFR 50.69, the staff is unable to use the information in its review of the ANO-2 LAR unless it is incorporated in the licensee's LAR. This information is necessary for the NRC staff to make its regulatory finding on the licensee's proposed alternative seismic approach and has not been submitted by the licensee. Therefore, the licensee is requested to address the following:

a) Identify and justify any differences between the licensee's proposed alternative seismic approach and that approved in the NRC staff's safety evaluation of the LaSalle 10 CFR 50.69 LAR, including any ANO-2 specific considerations.

b) If the licensee's proposed alternative seismic approach is identical to that approved for LaSalle, provide for ANO-2 the above-mentioned information in the LaSalle LAR supplements dated October 1, 2020; October 16, 2020; and January 22, 2021, to support the NRC staff's regulatory finding on the licensee's proposed alternative seismic approach. This information can be provided either by incorporating by reference the identified LaSalle LAR supplements or by responding to the requests for additional information (RAIs) contained in the LaSalle LAR supplements.

c) The licensee stated that EPRI Report 3002017583 with markups is used for 10 CFR 50.69 categorization. The NRC staff notes that EPRI has recently submitted a copy of EPRI Report 3002017583 on the NRC docket (ADAMS Accession No. ML21082A170). The licensee is requested to include the citation for the docketed EPRI Report 3002017583 in the LAR.

In Enclosure 1 to the LAR (pages 7, 10, and 12 of 35), the licensee refers to "EPRI Markups provided in Attachment 2 of References [4] and [5]." The NRC staff notes that Reference [5] is the safety evaluation that approved the Vogtle Electric Generating Plant, Units 1 and 2, use of its seismic PRA model for categorization and has no Attachment 2. It is unclear to the NRC staff the relevance of this reference for the proposed alternative seismic approach. Clarify if "Attachment 2 of References [4] and [5]" should read "Attachment 2 of References [4] and [61]." The NRC staff also notes that Reference [61], included in the ANO-1 LAR, is missing in ANO-2 LAR.

ANO-2 RAI 04 (APLC) – Implementation of Section 2.3.1 of EPRI Report 3002017583

In Section 3.2.3, "Seismic Hazards," of Enclosure 1 to the LAR, the licensee indicated that the categorization team will evaluate correlated seismic failures and seismic interactions between SSCs for each system categorized, and that this process is detailed in Section 2.3.1 of EPRI Report 3002017583. The licensee also indicated that determination of seismic insights will make use of the full power internal events PRA model supplemented by focused seismic walkdowns.

However, the NRC staff notes that the LAR does not address any plant-specific implementation of the guidance provided in Section 2.3.1 of EPRI Report 3002017583 that will be applied to seismic evaluation for 10 CFR 50.69 categorization at ANO-2.

Therefore, describe how ANO-2 will implement the guidance in Section 2.3.1 of the EPRI Report, taking into account ANO-2 specific plant design and conditions.

ANO-2 RAI 05 (APLC) – Other External Hazards Screening

NEI 00-04, Revision 0, Section 5.4, "Assessment of Other External Hazards," provides guidance on assessment of other external hazards (excluding fire and seismic) in 10 CFR 50.69 categorization of SSCs. Specifically, Figure 5-6, "Other External Hazards," of NEI 00-04 illustrates a process that begins with an SSC selected for categorization and proceeds through a flowchart for each external hazard. Figure 5-6 indicates that, if a component participates in a screened scenario, then, in order for that component to be considered a low safety significant item, it has to be further shown that, if the component were removed, the screened scenario would not become unscreened.

Section 3.2.4, "Other External Hazards," of Enclosure 1 of the LAR indicates that all other external hazards besides tornado missiles and seismic events were screened with Attachment 4 to Enclosure 1, "External Hazards Screening," of the LAR providing the results. Based on this description, it appears to the NRC staff that at the time an SSC is categorized, it will not be evaluated using the guidance in NEI 00-04, Figure 5-6, to confirm that the SSC is not credited in screening an external hazard because that evaluation has already been made. The NRC staff notes that plant changes, plant or industry operational experience, or identified errors or limitations in the PRA models could potentially impact the conclusion that an SSC is not needed to screen an external hazard.

Therefore, address the following:

a) Clarify whether an SSC will be evaluated during categorization of the SSC using the guidance in NEI 00-04, Figure 5-6, to confirm that the SSC is not credited in screening an external hazard.

b) If an SSC will not be evaluated using the guidance in NEI 00-04, Figure 5-6, to confirm that the SSC is not credited in screening an external hazard at the time of categorization because that evaluation has already been made, explain how plant changes, plant or industry operational experience, or identified errors or limitations in the PRA models that could change that decision are addressed.

c) Attachment 4 to Enclosure 1 of the LAR indicates that for the ANO-1 and ANO-2 Focused Evaluation (ADAMS Accession No. ML17214A029), the NRC staff concluded that the station demonstrated effective flood protection from the reevaluated flood hazards. However, the licensee did not provide any detailed information about whether any SSCs are credited for the flood protection, and how the SSCs are categorized. Identify any active and passive SSCs that are credited for screening the external flooding hazard and discuss how those SSCs will be included and considered in the proposed categorization process.