UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 24, 2022

ANO Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
N-TSB-58
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - AUDIT SUMMARY FOR LICENSE AMENDMENT REQUESTS TO ADOPT 10 CFR 50.69, "RISK-INFORMED CATEGORIZATION AND TREATMENT OF STRUCTURES, SYSTEMS AND COMPONENTS FOR NUCLEAR POWER REACTORS" (EPID L-2021-LLA-0105 AND EPID L-2021-LLA-0106)

Dear Sir or Madam:

By letters dated May 26, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML21147A234 and ML21147A264), Entergy Operations, Inc. (Entergy, the licensee), submitted license amendment requests for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2). The proposed amendments would modify the ANO-1 and ANO-2 licensing basis by the addition of a license condition that would allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations* Section 50.69, "Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors."

To support its review, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a virtual regulatory audit on November 8 and 9, 2021. The NRC staff reviewed documents and held discussions with members of Entergy and its contractors. The regulatory audit summary is enclosed with this letter.

If you have any questions, please contact me at (301) 415-4037 or by e-mail at Thomas.Wengert@nrc.gov.

Sincerely,

/RA/

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-313 and 50-368

Enclosure:
Audit Summary

cc: Listserv

OFFICE OF NUCLEAR REACTOR REGULATION

REGULATORY AUDIT SUMMARY FOR NOVEMBER 8–9, 2021, AUDIT

IN SUPPORT OF LICENSE AMENDMENT REQUESTS

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

1.0 BACKGROUND

By letters dated May 26, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML21147A234 and ML21147A264), Entergy Operations, Inc. (Entergy, the licensee), submitted license amendment requests (LARs) for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2). The proposed amendments would modify the ANO-1 and ANO-2 licensing basis by the addition of a license condition that would allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.69, "Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors."

On July 19, 2021 (ADAMS Accession No. ML21200A047), the U.S. Nuclear Regulatory Commission (NRC) staff issued an audit plan, which provided the list of requested documents and other details pertaining to the audit. An audit team, consisting of NRC staff and one contractor from the Pacific Northwest National Laboratory (PNNL), conducted a remote regulatory audit to support the review of the LARs on November 8–9, 2021. The purpose of the audit was to gain an understanding of the information needed to support the NRC staff's licensing decision regarding the LARs and to develop requests for additional information (RAIs). The information submitted in support of the LARs is under final review, and any additional information needed to support the LARs review will be formally requested by the NRC staff using the RAI process in accordance with the Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-101, Revision 6, "License Amendment Review Procedures" (ADAMS Accession No. ML19248C539).

The regulatory audit is a planned license or regulation-related activity that includes the examination and evaluation of primarily non-docketed information. The regulatory audit is conducted with the intent to gain understanding, to verify information, and/or to identify information that will require docketing to support the basis for a licensing or regulatory decision. Performing a regulatory audit of the licensee's information is expected to assist the NRC staff in efficiently conducting its review or gain insights on the licensee's processes or procedures. Information that the NRC staff relies upon to make the safety determination must be submitted on the docket. However, the NRC staff may review supporting information retained as records under 10 CFR 50.71, "Maintenance of records, making of reports," and/or 10 CFR 54.37, "Additional records and recordkeeping requirements," which, although not required to be

submitted as part of the licensing action, would help the NRC staff better understand the licensee's submitted information.

2.0 AUDIT ACTIVITIES

The NRC audit team consisted of five NRC staff members from NRR, Division of Risk Assessment, Probabilistic Risk Assessment (PRA) Licensing Branches (APLA and APLC); one staff member from NRR, Division of Engineering and External Hazards, Instrumentation and Controls Branch; one staff member from NRR, Division of Safety Systems, Nuclear Systems Performance Branch; and one PNNL contractor. Attachment 1 of this enclosure provides the list of participants from NRC, PNNL, the licensee, and other attendees.

The NRC audit team held an entrance meeting on Monday, November 8, 2021, with the licensee's staff and contractors. During the remainder of the audit, the NRC audit team participated in technical discussions with the licensee based on technical discipline, in accordance with the audit agenda dated October 15, 2021 (ADAMS Accession No. ML21281A254). Attachment 2 of the enclosure includes a list of documents reviewed during the audit.

The general objectives of the audit were to verify conformance of the licensee's proposed program with NRC-endorsed guidance, validate that the quality of the PRAs is adequate for the application, and identify any new information that may be needed for NRC to reach a regulatory or licensing decision. In general, the audit consisted of an entrance meeting; presentations prepared by the licensee on technical topics associated with the 10 CFR 50.69 LARs; discussion of the audit questions prepared by NRC and PNNL staff, which consisted of discussion of written and verbal responses by the licensee; special *ad hoc* sessions on technical issues that were deemed by NRC staff to merit more attention; and inspection of various pertinent reports such as PRA-related reports.

3.0 RESULTS OF THE AUDIT

Technical discussions were focused on the following major areas: PRA model changes since the submittal of the LARs, internal events, fire, seismic, and external hazards topics. The NRC audit team participated in an audit exit meeting with the licensee on Tuesday, November 9, 2021, where the NRC staff provided a brief summary of the team's goals, objectives, and technical discussion conclusions. The NRC staff provided a brief conclusion regarding the audit objectives that were met and details on the path forward. There were no open items in the discussion and no substantive deviations from the audit plan.

Following is a brief summary of the results of the discussions concerning the specific audit questions identified in the NRC letter dated October 15, 2021:

General

Given that Entergy submitted separate LARs for ANO-1 and ANO-2 for the 10 CFR 50.69 applications, each audit question has a response for each unit. This is due in part that ANO-1 is a Babcock & Wilcox reactor design, whereas ANO-2 is a Combustion Engineering plant. In addition, the two units have separate PRA models that require individual assessments of PRA technical adequacy.

Audit Question 01

The licensee provided updated language for the proposed license conditions for each unit, including correcting the passive categorization method reference. The NRC staff identified other minor changes to be made.

Audit Question 02

Regarding Audit Question 02 for ANO-1, the licensee confirmed that Diverse and Flexible Mitigation Capability (FLEX) is credited in the internal events PRA model (FPIE), but not in the fire PRA (to be included at a subsequent date). In addition, the licensee noted that there will be some updates (Pressurized Water Reactor Owners Group data and logic updates) to the FPIE model. This process will take approximately 2 years.

The licensee performed a no-FLEX sensitivity that demonstrated a 2.5 - 3 percent increase in risk. However, it did not analyze the impact this sensitivity has on categorization to determine if it is a key source to be evaluated by the integrated decisionmaking panel (IDP).

The licensee provided details of how the FLEX operator human error probabilities were determined. The NRC staff requested additional details regarding manual valves, security versus operational personnel, flooding pathways, and extended loss of alternating current power (ELAP) declaration. The licensee stated that a pre-initiator evaluation had not been performed for ANO-1, and that the ELAP declaration was not included in the ANO-1 model.

Regarding Audit Question 02 for ANO-2, the licensee confirmed that FLEX was incorporated into the current fire PRA, but not in the current revision of the FPIE. However, the licensee confirmed that FLEX will be incorporated into the next revision of the FPIE. The licensee stated that this revision is a PRA upgrade due to changing the station blackout event trees and fault logic and will conduct a focused-scope peer review in December 2021. The licensee confirmed that its categorization, per 10 CFR 50.69, would be based on the current revision of the fire PRA (contained in the current FPIE) and on the new revision of the FPIE.

The licensee performed both no-credit FLEX and 2x portable diesel generator failure rate FLEX probability sensitivities for the current fire PRA, both of which resulted in significant increases in risk values. However, the licensee did not analyze the impact that this sensitivity would have on categorization to determine if it is a key source to be evaluated by the IDP. Unlike ANO-1, the licensee stated that the ANO-2 model includes the ELAP basic event and performed the pre-initiator review of FLEX equipment.

Regarding the development of ANO-2 FLEX human failure events, the licensee provided the same response as that for ANO-1. Regarding FLEX, the licensee provided additional clarifications that assisted in the NRC staff's understanding of the responses. The FLEX question will remain open with some additional modifications.

Audit Question 03

Regarding Audit Question 03, the licensee stated that the Open Phase Isolation System (OPIS) is currently under an engineering change review and that a model update request for later incorporation into the PRA models had been initiated. The licensee estimated that the inclusion of OPIS impact to risk is very low.

Audit Question 04

Regarding Audit Question 04, the licensee believes, with one exception, that there are no differences between the proposed ANO approach and the method the NRC staff previously approved for LaSalle County Station, Units 1 and 2 (LaSalle). In addition, the ANO applications will incorporate the three LaSalle supplements that provided additional details supporting the method approved by the NRC staff. In addition, the licensee clarified the correct reference that contains the updated LaSalle information.

Audit Question 05

Regarding Audit Question 05, the licensee explained in detail how the specific ANO guidance would implement the Tier 2 process described in Section 2.3.1 of Electric Power Research Institute Report 3002017583, "Alternative Approaches for Addressing Seismic Risk in 10 CFR 50.69 Risk-Informed Categorization" (ADAMS Accession No. ML21082A170). A new insight for the NRC staff is that the current industry guidance for Tier 2 plants is to perform the Tier 1 analysis, as it provides information useful in the Tier 2 implementation.

Audit Question 06

Regarding Audit Question 06, the licensee confirmed that Figure 5-6 of Nuclear Energy Institute (NEI) 00-04, "10 CFR 50.69 SSC Categorization Guideline," dated July 2005 (ADAMS Accession No. ML052910035), will be followed in categorizing structures, systems, and components (SSCs) credited in screening external hazards.

The licensee provided a list of specific SSCs for ANO-1 and ANO-2 that are credited regarding the external flooding hazard, but stated the list is incomplete, as several other SSCs have yet to be evaluated.

Audit Exit Meeting

At the conclusion of the audit, the NRC staff provided a summary of the audit questions that would be retained as future RAIs and those questions that would be modified based on the audit discussions. The additional information needed to support the LAR review will be formally communicated by the NRC staff using the RAI process in accordance with NRR Office Instruction LIC-101.

Attachments:
1. List of Participants
2. List of Documents Reviewed During Audit

LIST OF PARTICIPANTS

U.S. Nuclear Regulatory Commission (NRC) Audit Team

Thomas Wengert	NRR[1]/DORL[2]/LPL4[3]
Robert Pascarelli	NRR/DRA[4]/APLA[5]
Jeff Circle	NRR/DRA/APLA
Mark Wilk	PNNL[6]
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Jigar Patel	NRR/DRA/APLA
Sunwoo Park	NRR/DRA/APLC[7]
De (Wesley) Wu	NRR/DRA/APLC
Jack Zhao	NRR/DEX[8]/EICB[9]
Summer Sun	NRR/DSS[10]/SNSB[11]

Entergy Operations, Inc. (Entergy), Arkansas Nuclear One, Team

Phil Couture	Entergy
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Joseph Renner	Jensen-Hughes
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Adam Adriano	Jensen-Hughes
Usama Faradj	Jensen-Hughes
Leo Stanley	Jensen-Hughes

[1] Office of Nuclear Reactor Regulation
[2] Division of Operating Reactor Licensing
[3] Plant Licensing Branch IV
[4] Division of Risk Assessment
[5] Probabilistic Risk Assessment Licensing Branch A
[6] Pacific Northwest National Laboratory
[7] Probabilistic Risk Assessment Licensing Branch C
[8] Division of Engineering and External Hazards
[9] Instrumentation and Controls Branch
[10] Division of Safety Systems
[11] Nuclear Systems Performance Branch

LIST OF DOCUMENTS REVIEWED DURING THE AUDIT

Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2) Documents Available for Review on the Audit Portal

Entergy Operations, Inc. (Entergy, the licensee) provided the following supporting documents (e.g., analyses, calculations, reports, drawings, and procedures) on the ANO audit document portal for review in support of the audit, as follows:

ANO-1 Documents

- "Arkansas Nuclear One Unit 1 PRA [Probabilistic Risk Assessment] Peer Review Report Using ASME [American Society of Mechanical Engineers] PRA Standard Requirements," August 2009

- Engineering Report No. PSA-ANO1-08-FNO-CL, Revision 0, "ANO-1 PRA Finding Level Fact and Observation Independent Assessment," April 9, 2020

- LTR-RAM-II-10-003, "Fire PRA Peer Review Against the Fire PRA Standard Supporting Requirements from Section 4 of the ASME/ANS [American Nuclear Society] Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessments for Nuclear Power Plant Applications for the Arkansas Nuclear One, Unit 1 Fire Probabilistic Risk Assessment," January 27, 2010

- "Results of Focused Scope Peer Review for ANO-1," June 7, 2012

- Project Report No. ENTGS009-ANO1-PR-1000, Revision 0, "ANO-1 Power Plant Probabilistic Risk Assessment Focused-Scope Peer Review (LERF [Large Early Release Frequency])," September 6, 2019

- Project Report No. ENTGANO150-REPT-001, Revision 0, "Arkansas Nuclear One Unit 1 Internal Flooding Probabilistic Risk Assessment Peer Review"

- "Focused Scope Peer Review for ANO-1 Fire PRA FSS-A, C, D, E and H," November 2012

- Engineering Report No. PSA-ANO1-01-IF-SOU, Revision 2, "Arkansas Nuclear One Unit 1 Internal Flooding Sources of Uncertainty," June 23, 2021

- Engineering Report No. PSA-ANO1-01-SOU, Revision 2, "ANO-1 PRA - Internal Events Sources of Uncertainty," June 23, 2021

- Engineering Report No. PSA-ANO1-03-SOU, Revision 1, "Arkansas Nuclear One Unit 1 Fire PRA Sources of Uncertainty," June 23, 2021

- Engineering Report No. PSA-ANO1-01-QU-01, Revision 1, "Arkansas Nuclear One Unit 1 – Sensitivity and Uncertainty Analysis," October 1, 2019

- Engineering Report No. PSA-ANO1-03-FQ-01, “ANO-1 Fire PRA Uncertainty/Sensitivity Analysis,” Revision 0, April 14, 2018

- Engineering Report No. PSA-ANO1-03, Revision 1, “ANO-1 Fire Probabilistic Risk Assessment Summary Report,” Revision 6, Jensen Hughes for Entergy, February 2, 2019.

- Engineering Report No. PSA-ANO1-01-AS, Revision 1, “ANO-1 PSA [Probabilistic Safety Analysis] Accident Sequence Analysis,” October 1, 2019

- Engineering Report No. PSA-ANO1-01-DA, Revision 2, “ANO-1 PSA Data Analysis,” January 14, 2020

- Engineering Report No. PSA-ANO1-01-HR, Revision 2, “ANO-1 PRA - Human Reliability Analysis,” January 14, 2020

- Engineering Report No. PSA-ANO1-01-SC Revision 1, “ANO1 PSA –Success Criteria,” October 1, 2019

- Engineering Report No. PSA-ANO1-01-SY-11 Revision 1, “ANO-1 PRA System Notebook Emergency/Auxiliary Feedwater (EFW/AFW),” October 1, 2019

- Engineering Report No. PSA-ANO1-01-SY-01 Revision 1, “ANO-1 PRA System Notebook Engineered Safeguards Actuation System (ESAS),” October 1, 2019

- “Arkansas Nuclear One Unit 1 Fire HRA Peer Review Report Using ASME/ANS PRA Standard Requirements,” June 2014

ANO-2 Documents

- LTR-RAM-II-08-020, “RG [Regulatory Guide] 1.200 PRA Peer Review Against the ASME PRA Standard Requirements for the Arkansas Nuclear One, Unit 2 Probabilistic Risk Assessment, Final Deliverable,” July 30, 2008

- LTR-RAM-II-09-046, “ Fire PRA Peer Review Against the Fire PRA Standard Supporting Requirements from Section 4 of the ASME/ANS Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessments for Nuclear Power Plant Applications for the Arkansas Nuclear One Unit 2 Fire Probabilistic Risk Assessment,” September 29, 2009

- Project Report No. ENTGS009-ANO2-PR-1000, “ANO-2 Power Plant Probabilistic Risk Assessment Focused-Scope Peer Review (LERF),” September 6, 2019

- Project Report No. ENTGANO150-REPT-002, “Arkansas Nuclear One Unit 2 Internal Flooding Probabilistic Risk Assessment Peer Review”

- “Arkansas Nuclear One, Unit 2 Fire PRA Focus Scope Peer Review Report,” October 6, 2016

- "Focused Scope Peer Review for ANO-2 Fire PRA FSS-A, C, D, E and H," November 2012

- "Arkansas Nuclear One Unit 2 Fire HRA Peer Review Report," June 2014

- LTR-RAM-I-11-064, "Focused Scope Fire PRA Peer Review for Arkansas Nuclear One Unit 2," December 2, 2011

- Engineering Report No. PSA-ANO2-08-FNO-CL, Revision 0, "ANO-2 PRA Finding Level Fact and Observation Independent Assessment," April 9, 2020

- Engineering Report No. PSA-ANO2-01-IF-SOU, Revision 2, "Arkansas Nuclear One Unit 2 Internal Flooding Sources of Uncertainty," June 23, 2021

- Engineering Report No. PSA-ANO2-01-SOU, Revision 2, "Arkansas Nuclear One Unit 2 Internal Events Sources of Uncertainty," June 23, 2021

- Engineering Report No. PSA-ANO2-03-SOU, Revision 1, "Arkansas Nuclear One Unit 2 Fire PRA Sources of Uncertainty," June 23, 2021

- Engineering Report No. PSA-ANO2-03-HRA, Revision 0, "Arkansas Nuclear One - Unit 2 Fire PRA Human Reliability Analysis (HRA) Notebook" (No date)

ANO-1 and ANO-2 Common Documents

- EN-DC-500-01, Revision 0A, "10 CFR 50.69 [Title 10 of the *Code of Federal Regulations* Section 50.69] Active Component Categorization"

- EN-DC-500-02, Revision 0A, "10 CFR 50.69 Passive Component Characterization"

- EN-DC-500-03, Revision 0A, "10 CFR 50.69 Alternative Treatment Requirements"

- EN-DC-500-04, Revision 0A, "10 CFR 50.69 Integrated Decision Making Panel Duties and Responsibilities"

- EN-DC-500-05, Revision 0A, "Individualized Instruction of Project Team and Site Personnel"

- EN-DC-500-06, Revision 0A, "10 CFR 50.69 ANO Specific Requirements"

- EN-DC-500, Revision 0A, "10 CFR 50.69 Program and Periodic Review"

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - AUDIT SUMMARY FOR LICENSE AMENDMENT REQUESTS TO ADOPT 10 CFR 50.69, "RISK-INFORMED CATEGORIZATION AND TREATMENT OF STRUCTURES, SYSTEMS AND COMPONENTS FOR NUCLEAR POWER REACTORS" (EPID L-2021-LLA-0105 AND EPID L-2021-LLA-0106) DATED JANUARY 24, 2022

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