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

March 15, 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 - ISSUANCE OF AMENDMENT NOS. 274 AND 328 RE: ONE-TIME CHANGE TO SUPPORT PROACTIVE UPGRADE OF THE EMERGENCY COOLING POND SUPPLY PIPING (EPID L-2021-LLA-0015)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 274 and 328 to Renewed Facility Operating License Nos. DPR-51 and NPF-6, respectively, for Arkansas Nuclear One, Units 1 and 2 (ANO-1 and ANO-2). The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated February 8, 2021, as supplemented by letters dated September 23, 2021, and February 17, 2022.

The amendments modify ANO-1, TS 3.7.8, “Emergency Cooling Pond (ECP),” and ANO-2, TS 3.7.4.1, “Emergency Cooling Pond,” to permit the ECP to be considered operable for up to 65 days in support of a proactive upgrade on the ECP piping supply to the service water system intake bays.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

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

Enclosures:
1. Amendment No. 274 to DPR-51
2. Amendment No. 328 to NPF-6
3. Safety Evaluation

cc: Listserv

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-313

ARKANSAS NUCLEAR ONE, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 274
Renewed License No. DPR-51

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (EOI, the licensee), dated February 8, 2021, as supplemented by letters dated September 23, 2021, and February 17, 2022, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.c.(2) of Renewed Facility Operating License No. DPR-51 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 274, are hereby incorporated in the renewed license. EOI shall operate the facility in accordance with the Technical Specifications.

3. This amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Jennifer L. Dixon-Herrity

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Date: 2022.03.15 12:43:52 -04'00'

Jennifer L. Dixon-Herrity, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. DPR-51
and the Technical Specifications

Date of Issuance: March 15, 2022

ATTACHMENT TO LICENSE AMENDMENT NO. 274

RENEWED FACILITY OPERATING LICENSE NO. DPR-51

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

Replace the following pages of Renewed Facility Operating License No. DPR-51 and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Operating License

REMOVE	INSERT
3	3

Technical Specifications

REMOVE	INSERT
3.7.8-1	3.7.8-1
3.7.8-2	3.7.8-2

(5) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(6) EOI, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

c. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

EOI is authorized to operate the facility at steady state reactor core power levels not in excess of 2568 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 274, are hereby incorporated in the renewed license. EOI shall operate the facility in accordance with the Technical Specifications.

(3) Safety Analysis Report

The licensee's SAR supplement submitted pursuant to 10 CFR 54.21(d), as revised on March 14, 2001, describes certain future inspection activities to be completed before the period of extended operation. The licensee shall complete these activities no later than May 20, 2014.

(4) Physical Protection

EOI shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans, including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contains Safeguards Information protected under 10 CFR 73.21, is entitled: "Arkansas Nuclear One Physical Security Plan, Training and Qualifications Plan, and Safeguards Contingency Plan," as submitted on May 4, 2006.

3.7 PLANT SYSTEMS

3.7.8 Emergency Cooling Pond (ECP)

LCO 3.7.8 The ECP shall be OPERABLE.

----------NOTE----------
The ECP may be considered OPERABLE on a one-time basis for up to 65 days during upgrade of the ECP supply piping to the SWS intake bays provided:

a. A loss of Lake Dardanelle event is not in progress, and

b. A temporary pumping system is capable of supplying the SWS from the ECP. The temporary pumping system may be unavailable for testing or necessary maintenance provided its availability is restored within 72 hours, and

c. The compensatory measures described in the ANO correspondence letter 0CAN022201, dated February 17, 2022, Enclosure, Attachment 4 shall be implemented. Failure to meet one or more of the continuing compliance compensatory measures is acceptable provided the measure(s) is/are restored within 72 hours.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Degradation of the ECP noted pursuant to SR 3.7.8.4 below or by other inspection.	A.1 Determine ECP remains acceptable for continued operation.	7 days
B. Required Action and associated Completion Time of Condition A not met. OR LCO not met for reasons other than Condition A.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.8.1	Verify that the indicated water level of the ECP is greater than or equal to that required for an ECP volume of 70 acre-ft.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.2	----------NOTE---------- Only required to be performed from June 1 through September 30. ---------- Verify average water temperature is ≤ 100 °F.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.3	Perform soundings of the ECP to verify: 1. A contained water volume of ECP ≥ 70 acre-feet, and 2. The minimum indicated water level needed to ensure a volume of 70 acre-feet is maintained.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.4	Perform visual inspection of the ECP to verify conformance with design requirements.	In accordance with the Surveillance Frequency Control Program

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ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 328
Renewed License No. NPF-6

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated February 8, 2021, as supplemented by letters dated September 23, 2021, and February 17, 2022, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-6 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 328, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications

3. This amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Jennifer L. Dixon-Herrity

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Jennifer L. Dixon-Herrity, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-6
and the Technical Specifications

Date of Issuance: March 15, 2022

ATTACHMENT TO LICENSE AMENDMENT NO. 328

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

Replace the following pages of Renewed Facility Operating License No. NPF-6 and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Operating License

REMOVE	INSERT
-3-	-3-

Technical Specifications

REMOVE	INSERT
3/4 7-16	3/4 7-16
---	3/4 7-16a

(4) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) EOI, pursuant to the Act and 10 CFR Parts 30 and 70 to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to conditions specified in the following Commission regulations in 10 CFR Chapter I; Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

EOI is authorized to operate the facility at steady state reactor core power levels not in excess of 3026 megawatts thermal. Prior to attaining this power level EOI shall comply with the conditions in Paragraph 2.C.(3).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 328, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

Exemptive 2nd paragraph of 2.C.2 deleted per Amendment 20, 3/3/81.

(3) Additional Conditions

The matters specified in the following conditions shall be completed to the satisfaction of the Commission within the stated time periods following issuance of the renewed license or within the operational restrictions indicated. The removal of these conditions shall be made by an amendment to the renewed license supported by a favorable evaluation by the Commission.

2.C.(3)(a) Deleted per Amendment 24, 6/19/81.

PLANT SYSTEMS

3/4.7.4 EMERGENCY COOLING POND

LIMITING CONDITION FOR OPERATION

3.7.4.1 The emergency cooling pond (ECP) shall be OPERABLE[1] with:

a. A minimum contained water volume of 70 acre-feet.

b. An average water temperature of ≤ 100 °F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the volume and/or temperature requirements of the above specification not satisfied or, with the requirements of Action b not met, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. If degradation is noted pursuant to 4.7.4.1.d below or by other inspection, perform an evaluation to determine that the ECP remains acceptable for continued operation within 7 days.

SURVEILLANCE REQUIREMENTS

4.7.4.1 The ECP shall be determined OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying that the indicated water level of the ECP is greater than or equal to that required for an ECP volume of 70 acre-feet.

b. In accordance with the Surveillance Frequency Control Program during the period of June 1 through September 30 by verifying that the pond's average water temperature at the point of discharge from the pond is within its limit.

c. In accordance with the Surveillance Frequency Control Program by making soundings of the pond and verifying:

1. A contained water volume of ECP ≥ 70 acre-feet, and

2. The minimum indicated water level needed to ensure a volume of 70 acre-feet is maintained.

d. In accordance with the Surveillance Frequency Control Program by performance of a visual inspection of the ECP to verify conformance with design requirements.

Note 1: The ECP may be considered OPERABLE on a one-time basis for up to 65 days during upgrade of the ECP supply piping to the SWS intake bays provided:

a. A loss of Lake Dardanelle event is not in progress, and

b. A temporary pumping system is capable of supplying the SWS from the ECP. The temporary pumping system may be unavailable for testing or necessary maintenance provided its availability is restored within 72 hours, and

SURVEILLANCE REQUIREMENTS (Continued)

c. The compensatory measures described in the ANO correspondence letter 0CAN022201, dated February 17, 2022, Enclosure, Attachment 4 shall be implemented. Failure to meet one or more of the continuing compliance compensatory measures is acceptable provided the measure(s) is/are restored within 72 hours.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 274 AND 328, RESPECTIVELY, TO

RENEWED FACILITY OPERATING LICENSE NOS. DPR-51 AND NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNITS 1 AND 2

DOCKET NOS. 50-313 AND 50-368

1.0 INTRODUCTION

By application dated February 8, 2021 (Reference 1), as supplemented by letters dated September 23, 2021, and February 17, 2022 (References 2 and 3, respectively), Entergy Operations, Inc. (Entergy, the licensee), requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One (ANO), Units 1 and 2 (ANO-1 and ANO-2).

The proposed one-time changes would modify ANO-1, TS 3.7.8, “Emergency Cooling Pond (ECP),” and ANO-2, TS 3.7.4.1, “Emergency Cooling Pond,” to permit the ECP to be considered operable for up to 65 days in support of a proactive upgrade on the ECP piping supply to the service water system (SWS) intake bays. The licensee stated that the upgrades are currently planned to take place 65 days before the start of a spring refueling outage for each unit individually.

Separately, by letter dated July 15, 2020 (Reference 4) the licensee submitted a request for U.S. Nuclear Regulatory Commission (NRC or the Commission) approval of an alternative to the American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, to allow the use of carbon fiber reinforced polymer material at ANO for the ECP piping upgrades. By letter dated September 30, 2021 (Reference 5), the NRC staff authorized the alternative.

While the ECP piping is being proactively upgraded, the ECP would otherwise be inoperable with respect to regulatory compliance. Currently, both the ANO-1 and ANO-2 TSs require a shutdown when the ECP is inoperable. In its license amendment request (LAR) dated February 8, 2021, the licensee stated that, to reduce an unnecessary burden of an extended plant shutdown, it requests approval of a TS amendment to allow the ECP to be considered operable based on the use of a temporary pumping system for up to 65 days, while the respective proactive upgrade to the ECP supply piping for each unit is in progress.

The supplemental letters dated September 23, 2021 and February 17, 2022, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards

consideration determination as published in the *Federal Register* on April 20, 2021 (86 FR 20530).

2.0 REGULATORY EVALUATION

The NRC staff considered the following regulatory requirements, guidance, and licensing and design basis information during its review of the proposed change.

2.1 System Description

The design and operation of the primary components and systems of concern for this LAR are described in Section 2.1, "System Design and Operation," of the enclosure to the LAR dated February 8, 2021. Portions of the licensee's description are provided below:

> *Ultimate Heat Sink (UHS)*
>
> The UHS sources for both ANO-1 and ANO-2 are the Dardanelle Reservoir and the ECP. While the Dardanelle Reservoir is the preferred source, the Seismic Category 1 ECP is available in the unlikely event of the loss of the Dardanelle Reservoir. The design basis of the UHS is to provide sufficient heat removal for up to 30 days to support a normal shutdown of one unit, a normal shutdown of both units, or a normal shutdown of one unit with a simultaneous emergency shutdown of the other unit assuming a coincident loss of coolant accident (LOCA) on that unit.
>
> As stated above, the UHS consists of two water sources:
>
> a. The ECP with the following associated Seismic Category 1 reinforced concrete structures:
>
> 1. Pipe inlet structure,
> 2. Pipe outlet structure, and
> 3. SWS intake structure
>
> b. The Dardanelle Reservoir with the associated Seismic Category 1 reinforced concrete SWS intake structure.
>
> The design basis safety functions of the UHS are assured following:
>
> a. The most severe natural phenomena associated with the site location, including earthquake, tornado, flood, or drought, taken individually,
>
> b. Site-related events, such as canal blockage, ice formation, transportation accidents, oil spills, or fires that historically have occurred or that may occur during the plant lifetime, and
>
> c. [A]ny single failure of a man-made structure, including failure of the downstream Dardanelle Dam, or any upstream dam or dams.
>
> Both the ECP and the Dardanelle Reservoir feed the SWS pump bays separately. The ECP and associated unit ECP supply pipe provides the

necessary water volume to support SWS cooled loads to meet the SWS design basis. …

Dardanelle Reservoir (Lake Dardanelle)

The Dardanelle Reservoir is the primary heat sink for both ANO-1 and ANO-2. The Dardanelle Reservoir is the source of cooling water for the SWS for both ANO-1 and ANO-2 during normal operating conditions. Switchover from the reservoir to the ECP may be accomplished by actuation of the motor operated sluice gates in the SWS intake structure, and either remote manual actuation of the SWS discharge return valves to the ECP if the ECP is used for normal shutdown or automatic actuation of the SWS discharge return valves to the ECP during accident conditions. …

Emergency Cooling Pond

The Dardanelle Reservoir provides the primary heat sink during normal plant operation while the ECP is a backup Seismic Category 1 source for plant safe shutdown, if necessary, under normal or accident conditions. The ECP serves as a heat sink for simultaneously shutting down both units in the unlikely event of a loss of the Dardanelle Reservoir water inventory or blockage of the intake structure.

Each unit is designed with separate intake and discharge water lines from the ECP to the respective SWS pump bays. The ECP supply to the SWS intake structures is a gravity flow line. As stated previously, the SWS of either unit can be aligned to discharge to the ECP. The ends of the lines terminating at the ECP are housed in [Seismic] Category 1 structures to prevent blockage of the pipe entrance and outlet. In addition, screens are provided on the ECP intake structure to prevent the inclusion of soil or foreign objects in the water delivered from the ECP. …

Service Water System

The SWS provides required cooling water flows to Emergency Safeguards Features (ESF) equipment served by the system, as well as to various non safety-related portions of the plant. Structures, systems, and components (SSCs) important to safety are cooled by the SWS. Each unit's SWS is designed with two redundant 100 [percent] capacity trains and three 100 [percent] capacity pumps which can be operated from offsite power or from onsite emergency power. …

The normal and preferred SWS source of water during normal and accident conditions is the Dardanelle Reservoir. The flow from the reservoir is provided with traveling screens for debris removal. When the Dardanelle Reservoir is not available, the ECP provides the necessary cooling water to the SWS.

Normal and Emergency Operation

During normal power operation, the SWS is supplied by the preferred source, the Dardanelle Reservoir. However, when the Dardanelle Reservoir is not available

> the SWS will be temporarily supplied from the ECP. During emergency operations (DBA [design basis accidents]) the SWS is expected to remain supplied by the preferred Dardanelle Reservoir source. However, in the case of a failure of the downstream Dardanelle dam, the ECP will provide the UHS function. …

Additional design and operational details for the UHS, ECP, and SWS can be found in the Safety Analysis Reports (SARs) for ANO-1 (Section 9.3, "Cooling Water Systems") and ANO-2 (Section 9.2.5, "Ultimate Heat Sink") (References 6 and 7, respectively).

2.2 Description of the Proposed Changes

2.2.1 Current TS Requirements

ANO-1 ECP TS 3.7.8 requires the ECP to be operable in Modes 1, 2, 3, and 4. If the ECP is inoperable for reasons other than a degradation of the ECP structure, the unit is required to be placed in Mode 3 (Hot Standby) within 6 hours and in Mode 5 (Cold Shutdown) in 36 hours.

ANO-2 ECP TS 3.7.4.1 also requires the ECP to be operable in Modes 1, 2, 3, and 4. If the ECP is inoperable for reasons other than a degradation of the ECP structure, the unit is required to be placed in Mode 3 (Hot Standby) within 6 hours and Mode 5 (Cold Shutdown) in the following 30 hours.

2.2.2 Proposed Revision to TSs

The proposed changes to the ANO-1 and ANO-2 TSs would add a Note to the limiting condition for operation (LCO) that would allow the ECP to be considered operable on a one-time basis for up to 65 days during the proactive upgrade of the ECP supply piping, provided that a loss of the Dardanelle Reservoir is not in progress and that a temporary pumping system is available that is capable of supplying the SWS from the ECP. The licensee proposed the addition of the following Note for LCO 3.7.8 for ANO-1 and LCO 3.7.4.1 for ANO-2:

> The ECP may be considered OPERABLE on a one-time basis for up to 65 days during upgrade of the ECP supply piping to the SWS intake bays provided:
>
> a. A loss of Lake Dardanelle event is not in progress, and
>
> b. A temporary pumping system is capable of supplying the SWS from the ECP. The temporary pumping system may be unavailable for testing or necessary maintenance provided its availability is restored within 72 hours, and
>
> c. The compensatory measures described in the ANO correspondence letter 0CAN022201, dated February 17, 2022, Enclosure, Attachment 4 shall be implemented. Failure to meet one or more of the continuing compliance compensatory measures is acceptable provided the measure(s) is/are restored within 72 hours.

2.3 Regulatory Requirements

The NRC staff evaluated the proposed changes in the areas of plant systems, risk assessment, mechanical engineering, TSs, and human factors, utilizing the regulatory requirements described below.

The regulations in 10 CFR 50.36(b) state, in part, that the "technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto…." As required by 10 CFR 50.36(c)(2), the TSs include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Per 10 CFR 50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the condition can be met. The remedial actions must provide the requisite "reasonable assurance" of safety and compliance.

The regulation in 10 CFR 50.65(a)(4) requires that licensees assess and manage the increase in risk associated with planned maintenance activities.

The regulations in 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants" (hereinafter referred to as the GDC), establish the minimum requirements for the principal design criteria for water-cooled nuclear power plants. The principal design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for SSCs important to safety. ANO-1 and ANO-2 were designed and constructed to meet the intent of the GDC of the U.S. Atomic Energy Commission (AEC) as originally proposed in July 1967. Thus, ANO design and construction were initiated and proceeded to a significant extent based upon the criteria proposed in 1967.

Section 1.4, "General Design Criteria," of the ANO-1 SAR describes how the ANO-1 GDC meet the intent of the corresponding GDC published as Appendix A to 10 CFR Part 50, in 1971. Section 3.1, "Conformance with AEC General Design Criteria," of the ANO-2 SAR describes how the ANO-2 GDC meet the intent of the corresponding GDC published as Appendix A to 10 CFR Part 50 in 1971.

The NRC staff identified the following GDCs as applicable to this LAR:

- GDC 5, "Sharing of Structures, Systems, and Components (SSCs)," requires that SSCs important to safety shall not be shared between nuclear power units unless it can be shown that their ability to perform their safety functions will not be significantly impaired by the sharing. The ECP serves as the source of emergency cooling water for simultaneously shutting down both ANO-1 and ANO-2 in the unlikely event of a loss of the Dardanelle Reservoir water inventory.

- GDC 44, "Cooling Water," requires that a "system to transfer heat from structures, systems, and components important to safety to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems, and components under normal operating and accident conditions." The UHS is also required to have redundancy and be able to withstand a single failure. The ANO-1 and ANO-2 SSCs important to safety are cooled by the SWS. Two redundant sources of cooling water are available for reactor equipment to use as a UHS: the ECP and the Dardanelle Reservoir. These two sources feed the SWS separately and there is no single failure that could prevent the UHS from meeting its design basis.

2.4 Applicable Guidance

The guidance referenced in the technical evaluation for the NRC staff's review of this LAR, as supplemented, includes the following:

NUREG-1764, Revision 1, "Guidance for the Review of Changes to Human Actions," dated September 2007 (Reference 8). This document provides guidance for reviewing changes in human actions, such as those that are credited in nuclear power plant safety analyses.

RG 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated January 2018 (Reference 9), describes a risk-informed approach acceptable to the NRC for assessing the nature and impact of proposed permanent licensing-basis changes by considering engineering issues and applying risk insights. This RG also provides risk-acceptance guidelines for evaluating the results of such evaluations.

RG 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," dated May 2011 (Reference 10), describes an acceptable risk-informed approach for assessing TS changes, specifically changes to completion times (CTs). This RG also provides risk acceptance guidelines for evaluating the results of such assessments. Section C.2.4, "Acceptance Guidelines for Technical Specification Changes," of RG 1.177 provides the following three-tiered TS acceptance guidelines for evaluating the risk associated with one-time CT changes:

- The licensee has demonstrated that the impact on plant risk from implementing the one-time-only TS CT change is acceptable: (1) an incremental conditional core damage probability (ICCDP) of less than 1×10^{-6} and an incremental conditional large early release probability (ICLERP) of less than 1×10^{-7}, or (2) an ICCDP of less than 1×10^{-5} and an ICLERP of less than 1×10^{-6} with effective compensatory measures implemented to reduce the sources of increased risk. (Tier 1)

- The licensee has demonstrated that there are appropriate restrictions on dominant risk-significant configurations associated with the change. (Tier 2)

- The licensee has implemented a risk-informed plant configuration control program. The licensee has implemented procedures to utilize, maintain, and control such a program. (Tier 3)

RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated March 2009 (Reference 11), describes an acceptable approach for determining whether the quality of the probabilistic risk assessment (PRA), in total or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA can be used in regulatory decisionmaking for light-water reactors (LWRs).

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (hereinafter referred to as the SRP) used in the review of this LAR include SRP Section 18, Revision 3, "Human Factors Engineering," dated December 2016 (Reference 12), provides guidance for the review of human factors engineering (HFE) considerations of plant modifications and important human actions.

3.0 TECHNICAL EVALUATION

The NRC staff evaluated the licensee's application to determine whether the proposed TS changes are consistent with the, licensing and design basis information, regulations, and regulatory guidance discussed in Section 2.0 of this safety evaluation (SE).

The licensee performed a risk assessment to support a risk-informed LAR, which would add a Note to TS LCO 3.7.8 for ANO-1 and TS LCO 3.7.4.1 for ANO-2. In the LAR, the licensee states that, although the proposed TS changes did not involve any change to a CT or surveillance frequency, the risk assessment followed the principles outlined in RG 1.177, Revision 1, to determine the acceptability of the risk impact with respect to meeting the intent of the Commission's Safety Goal Policy Statement, "Safety Goals for the Operations of Nuclear Power Plants; Policy Statement," published in the *Federal Register* on August 4, 1986 (51 FR 28044), as corrected, and republished, on August 21, 1986 (51 FR 30028).

RG 1.177, Revision 1, describes a risk-informed approach acceptable to the NRC, for assessing proposed changes to TS CTs, which is based on meeting the five key principles outlined in RG 1.174, Revision 3. The NRC staff reviewed the proposed extension of the ECP operability against the five key principles of RG 1.174:

3.1 Principle 1: Compliance with Current Regulations

In Attachment 4 of the enclosure to the supplemental letter dated February 17, 2022, the licensee identified the following compensatory measures that will be maintained to meet the current regulations during the 65-day ECP piping upgrade and their scheduled completion dates:

1. The temporary pump will be tested and minimum flow requirements verified prior to removing the installed ECP supply piping from service.

2. The Army Corps of Engineers will be briefed on the ECP piping upgrade activities and on the increased sensitivity of Lake Dardanelle level during the period of the ANO ECP piping upgrade. The Army Corps will be requested to minimize any activity and provide advanced notification of activity that could impact the lake level or amount of debris in the lake.

3. The 65-day allowance for the ECP to remain operable during the ECP supply piping upgrade will be applied only prior to a spring outage to provide additional margin to the TS maximum ECP temperature limit.

4. The temporary pump system will be started to ensure its continued availability on a weekly basis.

5. Personnel trained to start the pump will be dedicated and onsite 24 hours a day, stationed in reasonable proximity of the pump, during the ECP piping upgrade when the ECP temporary pump is being relied upon as a backup for the Dardanelle Reservoir, with direct communications with the respective ANO Control Room.

6. During the ANO-2 ECP piping upgrade, equipment will be staged near each ECP pipe opening to allow pipe closure, within 48 hours, when external flooding is projected to exceed 350 feet (ft) mean sea level (MSL).

7. No elective maintenance or elective testing will be performed that could challenge the Dardanelle Reservoir SWS suction source.

8. The SWS pumps, bays, traveling screens, and sluice gates that are important for ensuring cooling water is provided to the supported SSCs will be given protected train status.

9. The intake traveling screens will be inspected for debris and general physical condition at least once per shift.

10. The accessible portions of the temporary ECP system piping will be inspected on a weekly basis.

11. Fish nets will be installed in the Dardanelle Reservoir SWS intake canal when required by existing winter operations procedural guidance and inspected for any gross physical damage or large quantities of debris twice a week, weather permitting, to ensure the nets remain intact and capable of performing the intended function.

12. An adequate fuel supply will be maintained to supply the temporary pump for approximately 24 hours of continuous operation.

13. At least once per week, a briefing will be conducted for applicable personnel to ensure individuals remain cognizant of the cues that would prompt Operator action to start the temporary pumping system and open the discharge valve.

14. The ECP level will be maintained greater than or equal to (≥) 5.5 ft during the 65-day preventative maintenance window.

15. The risk impact will be reassessed against the acceptance guidelines for a small risk increase as defined in RG 1.177 (Incremental Conditional Core Damage Probability (ICCDP) < 1E-6 and Incremental Conditional Large Early Release Probability (ICLERP) < 1E-7) prior to removing the installed ECP supply piping from service during the 65-day preventative maintenance window and will inform the NRC before proceeding if either criterion is not met.

In the enclosure to its supplemental letter dated September 23, 2021, the licensee provided a table describing the implementation method of each compensatory measure and any impacts to plant safety-related SSCs.

The NRC staff reviewed the proposed compensatory measures and the licensee's proposed implementation of each measure. Compensatory Measures 5, 6, 9, 10, and 11 ensure that reasonable administrative measures will be in place to reduce the risk of inadvertent compromise of plant safety systems. Compensatory Measures 2, 3, 7, 8, 14, and 15 ensure that conditions will be established and maintained to directly manage risk associated with the piping repair activities. Compensatory Measures 1, 4, 12, and 13 ensure readiness of the temporary pumping system prior to and during the piping repair activities. The NRC staff reviewed the proposed compensatory measures, including the implementation method and

impacts to plant safety related SSCs, and determined that the measures are appropriate and acceptable. Additional evaluations of specific compensatory measures are provided in Sections 3.2, 3.6, and 3.7 of this SE.

TS requirements for licensees are specified in 10 CFR 50.36(c). The licensee proposed to modify the ANO-1 and ANO-2 ECP on a one-time basis by including a note that imposes effective compensatory measures evaluated above but does not revise the shutdown requirements of 10 CFR 50.36(c). Therefore, the NRC staff concludes that the licensee's LAR does not deviate from existing regulations. A more detailed evaluation of 10 CFR 50.36 compliance can be found in Section 3.8 of this SE.

3.2 Principle 2: Evaluation of Defense-in-Depth

Defense-in-depth is an approach to designing and operating nuclear facilities involving multiple independent and redundant layers of defense to compensate for human and system failures. The guidance in Section C.2.1.1, "Defense in Depth," of RG 1.174, Revision 3, states that the defense-in-depth philosophy consists of seven considerations and that consistency with the defense-in-depth philosophy is maintained by showing that the intent of each consideration would still be met following the implementation of the proposed licensing basis change.

In Section 3.4, "Defense-in-Depth Principles," of the enclosure to the LAR, the licensee provides a discussion regarding each of these seven items. The licensee discusses how its risk informed assessment is consistent with the philosophy of defense-in-depth. The following sections provide the NRC staff's evaluation of each of the seven considerations.

3.2.1 Preserve a Reasonable Balance Among the Layers of Defense

During the ECP piping upgrade, if a DBA were to occur, the reservoir would remain available and provide a source of cooling to the SWS for decay heat removal. Should a failure occur in the Lake Dardanelle dam, the temporary ECP pumping system would be available to supply cooling water to two loops of the SWS.

The installation of the temporary ECP pumping system and the temporary pipe spool pieces to restore the ECP buried pipe, provide balance among the layers of defense.

In a bay level event, referred to as a "shad run," the intake traveling screens have occasionally become clogged due to large shad fish kills. Entergy installs fish nets (shad nets) at the entrance to the ANO intake canal from the Dardanelle Reservoir to capture shad. Abnormal operating procedures describe the actions necessary to respond to a shad run and other temporary bay level events, which may include temporarily aligning one or more SWS bays to the ECP.

During a high wind or earthquake event, the temporary ECP pump and piping will be restrained or protected to provide reasonable assurance of functionality during such an event. Therefore, based on the information provided above, the NRC staff concludes that a reasonable balance among the layers of defense will be preserved.

3.2.2 Preserve Adequate Capability of Design Features Without an Overreliance on Programmatic Activities as Compensatory Measures

A temporary ECP diesel-driven pumping system will be utilized as a compensatory measure in the event the preferred UHS source (Dardanelle Reservoir) is lost or becomes temporarily unavailable during the upgrade of the ECP supply piping.

The NRC staff concludes that the addition of the temporary pumping system and the availability the Dardanelle Reservoir ensure that there is not an overreliance on programmatic activities as compensatory measures.

3.2.3 Preserve System Redundancy, Independence, and Diversity Commensurate with the Expected Frequency and Consequences of Challenges to the System, Including Consideration of Uncertainty

The use of a temporary pumping system with the ECP maintains reasonable capability of the ECP to remove decay heat and withstand external events.

As described in Section 3.4 of this SE, the PRA analysis indicates that the proposed temporary ECP pumping system provides acceptable system redundancy, independence, and diversity commensurate with the expected frequency and consequences of challenges to the system during the 65-day pipe replacement period for each unit, including consideration of uncertainty.

3.2.4 Preserve Adequate Defense Against Potential Common Cause Failures (CCFs)

In Section 3.4 of the enclosure to the LAR, the licensee stated that “there are no CCFs that could render both the Dardanelle Reservoir and the ECP incapable of supplying inventory to the SWS.” The NRC staff determined that the provision of the temporary ECP system provides protection against fouling and loss of water inventory events that could affect the normal intake from Lake Dardanelle, thereby supporting the licensee’s statement.

3.2.5 Maintain Multiple Fission Product Barriers

In Section 3.4 of the enclosure to the LAR, the licensee stated that “[t]he proposed change does not impact the three fission barriers.” The licensee further stated that “[t]he SWS bays will continue to be supplied by the preferred source, the Dardanelle Reservoir, and if the Dardanelle reservoir is not available, the temporary ECP pumping system will be capable of supplying the required inventory to the SWS bays to meet the design basis.” Based on its review, the NRC staff determined that the temporary ECP pumping system, as proposed, provides reasonable capability of supplying the required inventory to meet the design basis.

3.2.6 Preserve Sufficient Defense Against Human Errors

Section 4.1, “General Deterministic Review Criteria,” of NUREG-1764 provides review guidance for verifying that certain deterministic aspects of the change have been appropriately considered by the licensee. This includes a criterion for providing adequate assurance that the change does not compromise defense-in-depth as it relates to the preservation of defenses against human errors.

The NRC staff reviewed the licensee’s description of defenses against human errors within the context of defense-in-depth. In Section 3.4 of the enclosure to the LAR, the licensee stated that

measures include the use of a trained person, in communication with the control room, for starting and monitoring the temporary ECP pumping system. The licensee further stated that the temporary pumping system will be pre-staged and tested prior to the start of the 65-day allowance, with pre-job briefs being conducted to reinforce good human performance behaviors and other barriers that reduce risk. Additionally, the licensee stated that measures will be established, including briefing applicable personnel at least weekly, to minimize the potential for human errors. The NRC staff's detailed review of the HFE-related aspects of the licensee's LAR, as supplemented, is provided in Section 3.6 of this SE.

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the preservation of defenses against human errors aspect of defense-in-depth conforms to the applicable criterion of NUREG-1764 and is acceptable to the extent needed to support this application. Specifically, the manner in which defenses against human errors will be preserved, using means such as training and briefings, provides reasonable assurance that the change will not compromise defense-in-depth in this regard.

3.2.7 Continue to Meet the Intent of the Plant's Design Criteria

In Section 3.4 of the enclosure to the LAR, the licensee stated that "[t]he design criteria with respect to this activity is to ensure an UHS is available for at least 30 days to support normal, shutdown, and emergency operations."

Further, the licensee stated that "[a]lthough the temporary equipment and piping material will not be designed or manufactured to nuclear quality standards, the temporary pumping system will be tested to nuclear quality standards," as identified in Section 3.4 of the enclosure to the LAR.

In its response to Request for Additional Information (RAI) SCPB-1 by supplemental letter dated February 17, 2022, the licensee stated that the temporary piping system will utilize United States of America Standard B31.1.0, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section III, and the Plastic Pipe Institute Handbook of Polyethylene Pipe and related plastic piping standards. The licensee also stated that the carbon steel piping and plastic piping interface will be designed using the codes, standards, and guides stated above for the pipe material. The NRC staff considers that utilization of the piping standards identified in the supplemental letter provides a reasonable expectation of reliability for the temporary piping system.

As described in Section 3.4 of this SE, the PRA analysis indicates that the proposed temporary ECP pumping system provides sufficient capability to resist seismic events that have the potential to occur during the piping upgrade window. In addition, the PRA found that the wind-resistance capability of the temporary ECP pumping system and the site features will provide sufficient protection against the potential wind events that could occur during the piping upgrade window. The external flooding event is not considered credible to occur coincident with any other events.

In addition, as described in the LAR, if an external flood event exceeds an elevation of 350 ft MSL, the ANO-2 buried ECP piping upgrade activities will be terminated and the ECP piping will be closed to restore a flow path from the ECP to the ANO-2 SWS pumps within 48 hours. An external flood event is not of concern for ANO-1 since the portions of the control circuits for the SWS bay sluice gates that are susceptible to flood damage are located above the maximum permissible flood level described in the SAR.

Based on the above information, the NRC staff concludes that ANO-1 and ANO-2 will continue to meet the intent of applicable plant design criteria, including GDCs 5 and 44. following implementation of the proposed TS changes.

3.3 Principle 3: Evaluation of Safety Margins

The guidance in Section C.2.1.2, "Safety Margin," of RG 1.174, Revision 3, discusses two specific criteria that should be addressed when considering the impact of the proposed changes on safety margin:

- Codes and standards or their alternatives approved for use by the NRC are met, and

- Safety analyses acceptance criteria in the licensing basis (e.g., FSAR [Final SAR], supporting analyses) are met, or the proposed revisions provide sufficient margin to account for uncertainty in the analysis and data.

The temporary system and piping are sized to deliver the maximum design basis demand. However, the temporary equipment will not be manufactured under a 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," program. The capability of the temporary pumping system and piping to resist tornado and seismic events is reviewed in Section 3.7.3 of this SE. In addition, the tornado protection and seismic qualification of the normal heat sink (Dardanelle reservoir and intake structure) remain the original design standards, and are not affected by the temporary system.

Based on the NRC staff's evaluation, the proposed changes do not compromise the ability of the plant systems to perform their safety functions. Therefore, the NRC staff concludes that the applicable safety margins are maintained.

3.4 Principle 4: Change in Risk Consistent with the Commission's Policy Statement on Safety Goals

RG 1.177, Revision 1, addresses Principle 4 through a three-tiered approach for evaluating risk associated with proposed changes to TS CTs:

- Tier 1 assesses the risk impact of proposed one-time TS CT changes in accordance with acceptance guidelines in RG 1.177, consistent with the Commission's Policy Statement on Safety Goals for the operations of nuclear power plants. The risk impact is evaluated against incremental plant risk while equipment covered by the proposed TS CT changes are out of service, as represented by the ICCDP and the ICLERP. The Tier 1 evaluation also addresses acceptability of the plant-specific PRAs used to assess the changes in risk.

- Tier 2 identifies and evaluates any potential risk-significant plant configurations that could result if any equipment, in addition to that associated with the proposed TS CT changes, will be taken out of service simultaneously, or if other risk-significant operational factors, such as concurrent system or equipment testing, are involved. The purpose of this evaluation is to ensure that there are appropriate restrictions on dominant risk-significant equipment configurations associated with the proposed TS CT

changes. In addition, compensatory measures that can mitigate any corresponding increase in risk are identified and evaluated.

- Tier 3 addresses the licensee's overall configuration risk management program to ensure that adequate programs and procedures have been established for identifying risk-significant plant configurations resulting from maintenance or other operational activities, and that appropriate compensatory measures are taken to avoid risk-significant configurations that may not have been considered in the Tier 2 evaluation.

The evaluation presented below addresses the NRC staff's philosophy of risk-informed decisionmaking. For proposed changes resulting in a change in core damage frequency (CDF) or risk, the increase should be small and consistent with the intent of the Commission's Policy Statement on Safety Goals.

3.4.1 Tier 1 Evaluation – Risk Impact

As part of this evaluation, the licensee should demonstrate that its PRA (or its qualitative analyses, bounding analyses, detailed analyses, or compensatory measures if a PRA of sufficient scope is not available) is acceptable for assessing the proposed one-time TS CT changes. Also, uncertainties should be appropriately considered in the analyses and interpretation of findings. The Tier 1 review involves two aspects: (1) evaluation of the technical acceptability of the ANO PRAs used to support this application, and (2) evaluation of the PRA results and insights based on the licensee's proposed changes. The following sections present the NRC staff's assessment of the LAR, as supplemented.

3.4.1.1 PRA Acceptability

The NRC staff's review of the technical acceptability of the ANO PRAs supporting this application is consistent with the safety implications of the proposed TS changes and the role the PRA plays in justifying the changes. That is, the more the potential change in risk or the greater the uncertainty in that risk that results from the requested TS changes, or both, the greater the rigor that must go into ensuring the acceptability of the PRA.

The guidance in Section C.2.3, "Determining the Acceptability of a Probabilistic Risk Assessment," of RG 1.174, Revision 3, states, in part, that "[t]he PRA analysis used to support an application is measured in terms of its appropriateness with respect to scope, level of detail, conformance with the technical elements, and plant representation. These aspects of the PRA are to be commensurate with its intended use and the role the PRA results play in the integrated decision process." The acceptability of the PRA must be compatible with the safety implications of the TS change being requested and the role that the PRA plays in justifying that change. That is, the more the potential change in risk or the greater the uncertainty in that risk from the requested TS change, or both, the more rigor that must go into ensuring the acceptability of the PRA. This applies to Tier 1, and it also applies to Tier 2 and Tier 3 to the extent that a PRA model is used.

The sections that follow present the NRC staff's assessment of acceptability of the licensee's PRA (i.e., internal events, internal flooding, and internal fire PRAs), quantitative seismic and high winds analyses, and qualitative analyses of other external hazards relative to the four aspects of PRA.

3.4.1.1.1 Scope of the PRA

The guidance in Section C.2.3.2, "Scope of the Probabilistic Risk Assessment for Technical Specification Change Evaluations," of RG 1.177, Revision 1, states that the licensee should perform evaluations of CDF and large early release frequency (LERF) to support any risk-informed changes to TS. The scope of the analysis should include all hazard groups (i.e., internal events, internal flooding, fires, seismic events, high winds, and other external hazards) unless it can be shown the contribution from specific hazard groups does not affect the decision.

Based on the LAR, the change in risk (i.e., ICCDP, and ICLERP) resulting from the proposed ECP CT extension is estimated utilizing PRAs for at-power internal events, internal flooding, and internal fire. High winds and seismic hazards were estimated using a simplified bounding approach. Other external hazards were screened from further consideration using qualitative assessments. Based on its review of the LAR, as supplemented, the NRC staff finds that the licensee's risk assessment, when compared to the guidance contained in RGs 1.174, Revision 3, and 1.177, Revision 1, is of sufficient scope for use in this specific risk-informed application.

3.4.1.1.2 Conformance of PRA with the Technical Elements, and Acceptability of External Hazard Analyses

The licensee used the guidance in RG 1.200, Revision 2, to address the plant PRA technical acceptability for this LAR. RG 1.200 provides regulatory guidance for assessing the technical acceptability of a PRA and endorses (with clarifications and qualifications) the use of the American Society of Mechanical Engineers/American Nuclear Society (ANS) PRA Standard ASME/ANS RA-Sa-2009, "Addenda to ASME RA-S-2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications" (Reference 13) (hereafter referred to as the PRA Standard), as well as PRA peer review guidance developed by the Nuclear Energy Institute (NEI).

The PRA Standard provides technical supporting requirements (SRs) in terms of three capability categories. The intent of the delineation of the capability categories within the SRs is generally that the degree of scope and level of detail, the degree of plant specificity, and the degree of realism increase from Capability Category I to Capability Category III. Per RG 1.200, Capability Category II of the PRA Standard is the level of detail that is adequate for the majority of applications.

The licensee used its internal events, internal flooding, and internal fire PRAs to support this application. Each ANO unit has its own PRA for each of these hazards. Simplified bounding analyses for high winds and seismic events were also used. The NRC staff's assessments of the following PRAs and their conformance with the technical elements in the PRA Standard, as endorsed by RG 1.200, for use in supporting this risk-informed application are presented below. Also, the NRC staff's assessment of the bounding analyses for high winds and seismic hazards and qualitative assessments for other external hazards is discussed.

<u>Internal Events PRA</u>

The NRC staff review of the ANO internal events PRAs is based on: (1) the results of the peer reviews of the internal events PRAs and the associated facts and observation (F&Os) closure reviews described in Section 4, "Applicability and Acceptability of the PRA Models," of Attachment 5 to the enclosure of the LAR; and (2) the previously docketed information relevant

to the NRC staff's review of the internal events PRA for ANO-2's implementation of 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA 805" (NFPA 805) (Reference 14), including the NRC staff's record of review for internal events F&Os (Reference 15).

In Section 4 of Attachment 5 to the enclosure to the LAR, the licensee described the peer review and F&O resolution history of the ANO internal events PRAs. The licensee stated that all SRs were found to be met at Capability Category II or better, and all F&Os have been closed in accordance with NRC-accepted processes, except for F&O QU-D3-01 for ANO-2.

The licensee's resolution of F&O QU-D3-01 has been reviewed previously by the NRC staff for ANO-2's implementation of NFPA 805 and was found acceptable for use. This finding is documented in the NRC staff's record of review. The licensee's resolution of this F&O is acceptable for use in this application because no changes to the previous resolution are proposed.

Based on the information in the LAR and the discussion above, the NRC staff finds that the internal events PRAs conform to the applicable technical elements in the PRA standard, as endorsed by RG 1.200, Revision 2, and are acceptable to the extent needed to support this application.

Internal Flooding PRA

In Section 4 of Attachment 5 to the enclosure to the LAR, the licensee described the peer review and F&O resolution history of the ANO internal flooding PRAs. The licensee stated that all SRs were found to be met at Capability Category II or better, and all F&Os have been closed in accordance with NRC-accepted processes.

Based on the information in the LAR and the discussion above, the NRC staff finds that the internal flooding PRAs conform to the applicable technical elements in the PRA Standard, as endorsed by RG 1.200, Revision 2, and are acceptable to the extent needed to support this application.

Internal Fire PRA

The NRC staff's review of the ANO internal fire PRAs is based on: (1) the results of the peer reviews of the internal fire PRAs and the associated F&O closure reviews described in Section 4 of Attachment 5 to the enclosure to the LAR; and (2) the previously docketed information relevant to the NRC staff's review of the internal fire PRA for ANO-2's implementation of NFPA 805, including the NRC staff's record of review for internal fire F&Os (Reference 16).

In Section 4 of Attachment 5 to the enclosure to the LAR, the licensee described the peer review and F&O resolution history of the ANO internal fire PRAs. The licensee stated that, except as noted below, all SRs were found to be met at Capability Category II or better and all F&Os have been closed in accordance with NRC-accepted processes.

For ANO-1, SRs CF-A2 (F& CF-A2-01) and HRA-D1 (no F&O) were not assessed as meeting Capability Category II.

SR CF-A2 concerns the characterization of uncertainties associated with the applied conditional failure probabilities. Specifically, F&O CF-A2-01 was written to address the uncertainties

related to circuit failure probabilities. In Section 4 of Attachment 5, the licensee stated that the analysis has been updated to use the mean values and variances for circuit failure probabilities based on NUREG/CR-7150, "Joint Assessment of Cable Damage and Quantification of Effects from Fire (JACQUE-FIRE)," Volume 3: "Technical Resolution to Open Issues on Nuclear Power Plant Fire-Induced Circuit Failure," dated November 2017 (Reference 17). Further, the licensee states that sampling was used to propagate uncertainties through the model to generate probability distributions for CDF and LERF. The licensee concludes that this change eliminates the issue described in the F&O, and that the SR is now met at Capability Category I/II/III. Based on the licensee's statements, the NRC staff finds that this resolution is appropriate for this application because the ANO-1 model has been updated to use up-to-date information, and the identified issue has been resolved.

To achieve Capability Category II for SR HRA-D1, the fire PRA model should include evaluation of operator recovery actions that can restore the functions, systems, or components to provide a realistic evaluation of significant accident sequences. Contrary to this, the peer review found that the ANO-1 fire PRA used screening values for most operator recovery actions, and assigned the SR Capability Category I. In Section 4 of Attachment 5 to the enclosure to the LAR, the licensee stated that the fire PRA has been updated to include evaluation of every credited operator recovery action using the NUREG-1921, "EPRI [Electric Power Research Institute]/NRC-RES [Office of Nuclear Regulatory Research] Fire Human Reliability Analysis Guidelines," dated July 2012 (Reference 18), methodology. The licensee concludes that the SR now meets Capability Category II. Based on the licensee's statements, the NRC staff finds that this resolution is appropriate for this application because the ANO-1 model has been updated to resolve the identified issue.

For ANO-2, SRs PP-B2 and PP-B3 (F&O PP-B3-01), PP-B5 (F&O PP-B5-01), CS-B1 (F&O CS-B1-01), and IGN-A10 (F&O IGN-A10-01) were not assessed as meeting Capability Category II.

The acceptability of the ANO-2 non-Capability Category II SRs (PP-B2, PP-B3, PP-B5, CS-B1, and IGN-A10), as well as the licensee's resolution of the related F&Os have been reviewed previously by the NRC staff for ANO-2's implementation of NFPA 805 and found acceptable for use. These findings are documented in the NRC staff's record of review dated October 22, 2014. The NRC staff finds that these are acceptable for use in this application because no changes to the previously acceptable resolutions are proposed, and the proposed activities do not differentially affect these SRs when compared to the base-line plant.

Based on the information in the LAR and the discussion above, the NRC staff finds that the internal fire PRAs conform to the applicable technical elements in the PRA standard, as endorsed by RG 1.200, Revision 2, and are acceptable to the extent needed to support this application.

High Winds Risk

The ANO units do not have high winds PRAs. To make up for this, the licensee performed a simplified bounding analysis. The licensee's analysis is described in Section 1, "Risk Assessment and Probabilistic Risk Assessment (PRA) Insights," of Attachment 5 to the enclosure to the LAR. As described, the analysis uses plant-specific high winds equipment selection, high winds frequency, missile strike probability, and wind loading fragility. The plant-specific high winds event frequency was divided into intervals based on wind speed. The licensee then constructed a simplified bounding high winds model that convoluted the

frequencies of the wind speed intervals and the equipment failure probabilities. The proposed temporary pumping system, with its associated failure probabilities, was credited for risk mitigation, except for the two highest wind speed categories, for which no credit was taken.

Based on the information in the LAR, the NRC staff finds that the licensee's approach appropriately evaluates the risk of the high winds hazard for the application because it is bounding and considers plant-specific information in alignment with RGs 1.174, Revision 3 and 1.177, Revision 1.

Seismic Risk

The ANO units do not have seismic PRAs. To make up for this, the licensee performed a simplified bounding analysis. The licensee's analysis is described in Section 1 of Attachment 5 to the enclosure to the LAR. As described, the analysis uses plant-specific seismic equipment selection, seismic hazard, and seismic fragility. The plant-specific frequency of the seismic event was divided into intervals based on ground acceleration. The licensee then constructed a simplified bounding seismic model that convoluted the frequencies of the ground acceleration intervals and the equipment failure probabilities. The proposed temporary pumping system, with its associated failure probabilities, was credited for risk mitigation, except for the highest ground acceleration interval, for which no credit was taken.

Based on the information in the LAR, the NRC staff finds that the licensee's approach appropriately evaluates the risk of the seismic hazard for the application because it is bounding and considers plant-specific information in alignment with RGs 1.174, Revision 3 and 1.177, Revision 1.

Other External Event Hazards

The licensee described its evaluation of other external hazards in Section 1 of Attachment 5 to the enclosure to the LAR. The licensee used risk insights from the Individual Plant Examination for External Events Program to generically screen all other external hazards from further consideration except for external flooding. The licensee stated that external flooding was then qualitatively screened because the temporary pumping system (which is not normally in operation and which is routed largely outside the main structures) would not change the external flooding profile or create another consequential external flooding threat. The licensee further stated that the temporary pumping system was not expected to significantly impact other external hazards, based on a confirmatory plant-specific qualitative review.

Based on the information in the LAR, the NRC staff finds that the licensee has appropriately evaluated other external hazards and determined that those hazards do not impact this application in accordance with RG 1.177, Revision 1.

3.4.1.1.3 Level of Detail in the PRA

The guidance in Section C.2.3.3 of RGs 1.174, Revision 3, "Level of Detail in a Probabilistic Risk Assessment to Support an Application," and 1.177, Revision 1, "Probabilistic Risk Assessment Modeling," address the level of detail required of the PRA to model the risk impact of the proposed changes. If the impact of the proposed changes to the plant cannot be associated with elements of the PRA, the PRA should be modified accordingly, or the impact of the change should be evaluated qualitatively as part of the integrated decisionmaking process.

In any case, the licensee should properly account for the effects of the changes on the reliability and unavailability of SSCs or on operator actions.

Section 1 of Attachment 5 to the enclosure to the LAR describes the assumptions and modifications to the PRAs (i.e., the internal events, internal flooding, and fire PRAs) necessary to model the risk impact of the proposed TS CT changes, including adding logic to the PRAs to represent the relevant failure modes for components comprising the proposed temporary pumping system and the associated operator actions.

Based on its evaluation of these assumptions and modifications described in the LAR, as supplemented, the NRC staff finds that the level of detail in the PRAs and the assumptions and modifications made to the PRA models are appropriate to evaluate the risk impact of the proposed TS CT changes, and therefore, the level of detail meets the guidance in Section C.2.3.3 of RGs 1.174 and 1.177.

3.4.1.1.4 Plant Representation in the PRA

The guidance in Section C.2.3.4. “Plant Representation in a Probabilistic Risk Assessment to Support an Application,” of RG 1.174, Revision 3, states that “[t]he PRA results used to support an application are derived from a base PRA model that represents the as-built and as-operated plant to the extent needed to support the application. Consequently, the PRA should have been maintained and updated, where necessary, to ensure it represents the as-built and as-operated plant.”

In Section 4 of Attachment 5 to the enclosure to the LAR, the licensee describes the PRA configuration and control program to maintain and update the ANO PRAs such that the PRAs represent the as-built, as-operated plant. The licensee has procedures to provide the guidance, requirements, and processes for the maintenance, update, and upgrade of the PRAs. The licensee stated that these procedures have been peer reviewed and align with the PRA Standard. As part of this program, the licensee evaluates and prioritizes changes in PRA inputs, as well as addresses discovery of new information that could affect the PRAs. Any identifiable plant change is analyzed for its risk significance.

All plant changes not yet incorporated into the PRAs are tracked and periodically reviewed. The licensee stated that all such items were reviewed for their impact on that application, and that no items were found to have a significant impact on risk (i.e., ICCDP and ICLERP).

Based on the licensee's PRA configuration and control program to maintain and update the PRAs, the NRC staff finds the PRA results used to support this application are derived from an integrated PRA that represents the as-built and as-operated plant to the extent needed to support the application.

3.4.1.2 PRA Results and Insights

The guidance in Section C.2.4, of RG 1.177, Revision 1, indicates that the appropriate risk metrics for one-time TS CT changes are ICCDP and ICLERP, and that they should be compared against the applicable risk acceptance guidelines, which are also identified in Section C.2.4. Since the LAR specifies effective compensatory measures to reduce the sources of increased risk, as discussed earlier in this SE, the appropriate risk acceptance guidelines are an ICCDP of less than 1×10^{-5} and an ICLERP of less than 1×10^{-6}.

The licensee calculated the ICCDP and ICLERP of the proposal as follows:

	ANO 1	ANO 2	RG 1.177 criteria
ICCDP	7.67×10^{-7}	8.86×10^{-7}	$< 1 \times 10^{-5}$
ICLERP	6.48×10^{-8}	7.46×10^{-8}	$< 1 \times 10^{-6}$

The NRC staff reviewed the licensee's assessment and finds that the risk increase for the proposed ECP CT extension is consistent with RG 1.177, Revision 1, Section C.2.4.

3.4.1.3 Sensitivity and Uncertainty Analyses

In accordance with the guidance in RGs 1.174, Revision 3, and 1.177, Revision 1, uncertainties should be appropriately considered in the analysis and interpretation of findings. Also, the guidance in RG 1.174 states, in part, that "the results of the sensitivity studies should confirm that the guidelines are still met even under the alternative assumptions…."

In Section 2, "Summary of the Risk Measures Calculated Including Intermediate Results," of Attachment 5 to the enclosure to the LAR, the licensee discusses uncertainties in its risk analysis. The licensee stated that a detailed uncertainty assessment was not performed because the risk results (ICCDP and ICLERP) are driven by the seismic hazard. The licensee identified that, qualitatively, uncertainties were identified in the assumptions for the high winds and seismic hazards, but that the other hazards screened out. The licensee further stated that an uncertainty evaluation was performed using the information in NUREG-1855, Revision 1, "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decisionmaking," dated March 2017 (Reference 19), and that the results supported the application.

The licensee identified seismic fragility as a key source of uncertainty. The licensee performed a sensitivity study on the seismic fragility of the Dardanelle Dam by increasing its fragility logarithmic standard deviation (β_C) from 0.35 to 0.45. The licensee stated that the results did not change the acceptability of the calculated risk metrics. The licensee also stated that a conservative value for β_C was used for the temporary pump and its protective structure.

The licensee also determined that the fragility of the temporary pump protective structure against high winds was a key assumption. The licensee stated that a sensitivity study was performed by increasing the structure's fragility, which increased the likelihood of failure, thus reducing the risk mitigation for those wind speed intervals for which it was credited. The licensee stated that the study results did not change the acceptability of the calculated risk metrics.

The licensee considered the effect of the proposal on the CCF model for the service water pumps. The LAR describes a sensitivity study that was performed by removing one pump from the model, and reports that the results did not change the acceptability of the calculated risk metrics.

Based on the information in the LAR, the NRC staff finds that the licensee followed an acceptable process to identify key assumptions, dispositioned key assumptions for this application, and performed its sensitivity and uncertainty analyses consistent with RGs 1.174 and 1.177. The results are, therefore, acceptable to the extent needed to support this application.

3.4.2 Tier 2 Evaluation – Avoidance of Risk-Significant Plant Configurations

The guidance in Section C.2.3, "Evaluation of Risk Impact," of RG 1.177, Revision 1, discusses Tier 2 of the three-tiered approach for evaluating risk associated with proposed changes to TS CT. According to the Tier 2 evaluation, the avoidance of risk-significant plant configurations limits potentially high-risk configurations that could exist if equipment, in addition to that associated with the proposed changes, are simultaneously removed from service or other risk-significant operational factors, such as concurrent system or equipment testing, are involved. Therefore, a licensee's Tier 2 evaluation should identify the dominant risk-significant configurations relevant to the proposed TS CT change and ensure appropriate restrictions are placed on these configurations (e.g., assess whether certain enhancements to the TS or procedures are needed to avoid these plant configurations). In addition, compensatory measures that can mitigate any corresponding increase in risk should be identified and evaluated.

In Section 3.2, "Justification," of the enclosure to the LAR, the licensee provided a list of compensatory measures that will be in place for the duration of the proposed altered configuration. These measures can be divided into three categories: (1) measures to ensure availability and reliability of the temporary pumping system; (2) measures to ensure the availability of the normal flow path of water into the intake structure; and (3) measures to ensure the availability of the unaffected SWS SSCs. The NRC staff concludes that these compensatory measures appropriately mitigate the increased risk of the proposed change because they help avoid high risk evolutions and reinforce the plants' ability to mitigate random failures.

In Section 2 of Attachment 5 to the enclosure to the LAR, the licensee provided configuration-specific insights. The licensee stated, in part, that "the removal of a credited SWS pump from service, or the misalignment of the associated sluice gates, would present a high-risk configuration." The licensee further stated that the current "TSs ensure that two SWS pumps, including the associated sluice gates, are aligned for operation." The NRC staff finds that the licensee identified risk-significant configurations during the proposed upgrade period and identified how these conditions will be avoided. Based on these findings, the NRC staff concludes that the licensee's Tier 2 evaluation is consistent with the guidance of RG 1.177, Revision 1, because risk-significant plant equipment outage configurations will be avoided during the upgrade period and appropriate compensatory measures that can mitigate any corresponding increase in risk have been identified and will be implemented.

3.4.3 Tier 3 Evaluation – Risk-Informed Configuration Risk Management

Section C.2.3 of RG 1.177, Revision 1, discusses Tier 3 of the three-tiered approach for evaluating risk associated with proposed changes to TS CT. Tier 3 is the establishment of an overall configuration risk management program to ensure other potentially lower probability, but nonetheless risk-significant, configurations resulting from maintenance and other operational activities are identified and managed. Because the Maintenance Rule, as codified in 10 CFR 50.65(a)(4), requires licensees to assess and manage the potential increase in risk that may result from activities such as surveillance testing, and corrective and preventive maintenance, a licensee may use its existing Maintenance Rule program to satisfy Tier 3.

In Section 2 of Attachment 5 to the enclosure to the LAR, the licensee stated that ANO has an established configuration risk management program that will remain in effect during the periods under consideration. The licensee stated that the risk of the proposed change is driven by the

estimated frequencies and postulated consequences of external hazards (that is seismic and high winds) that are not modeled in the PRA. The licensee further stated that these factors are not influenced by maintenance and operational activities permitted by the proposed change. Finally, the licensee identified three compensatory measures not specifically modeled in the PRA that will mitigate risk of the proposed change. These measures consist of weekly briefings on cues to start the pumping system, weekly temporary pump start tests, and weekly temporary pumping system inspections. The NRC staff reviewed the licensee's assessment and finds that the licensee's Tier 3 program is consistent with the guidance in RG 1.177 and finds the proposed change acceptable.

3.5 Principle 5: Performance Measurement Strategies – Implementation and Monitoring Program

RG 1.174, Revision 3, and RG 1.177, Revision 1, establish the need for an implementation and monitoring program to ensure that no adverse safety degradation occurs because of the changes to the TSs. An implementation and monitoring program intended to ensure that the impact of the proposed TS change continues to reflect the reliability and availability of SSCs impacted by the change.

Furthermore, Section 3.2, "Maintenance Rule Control," of RG 1.177 states, in part, that:

> To ensure that extension of a TS CT … does not degrade operational safety over time, the licensee should ensure, as part of its Maintenance Rule program (10 CFR 50.65), that when equipment does not meet its performance criteria, the evaluation required under the Maintenance Rule includes prior related TS changes in its scope.

The licensee provides an evaluation of the proposed TS change against the three-tiered approach in Section 3.3, "Risk Assessment Summary," and Attachment 5 of the LAR. As discussed in Section 3.1 of this SE, the licensee proposes fifteen compensatory measures that can mitigate any corresponding increase in risk associated with the proposed changes. In addition, the SWS is monitored under the ANO Maintenance Rule program. If the established Maintenance Rule program reliability or availability performance criteria for the SWS are exceeded, the performance criteria are evaluated for 10 CFR 50.65(a)(1) actions, which requires increased management attention and goal setting in order to restore the SWS performance to an acceptable level.

The NRC staff reviewed the proposed changes. One acceptable approach for making risk-informed decisions about proposed TS changes is to show that the proposed changes meet the five key principles stated in RG 1.177. The NRC staff finds that the implementation and monitoring program for the proposed TS change described by the licensee satisfies the fifth key principle of RGs 1.174 and RG 1.177.

3.6 Description and NRC Staff Evaluation of the Credited Operator Actions

In the LAR, as supplemented, the licensee described proposed changes to ANO-1 TS 3.7.8 and ANO-2 TS 3.7.4.1 to allow the ECP to remain operable on a one-time basis for up to 65 days while performing proactive upgrades to the ECP supply piping. The proposed changes would, in part, utilize a temporary pumping system to supply the SWS from the ECP. In its LAR, the licensee stated that during the 65-day period in question, supply to the SWS would be from Lake Dardanelle under normal conditions, while a temporary, above ground engine-driven

pumping system would also be made available to supply the SWS bays from the ECP should a loss of Lake Dardanelle supply to the SWS occur.

In the LAR, as supplemented by the letter dated September 23, 2021, the licensee provided a description of how specific measures would be maintained during the period of the ECP piping upgrade. These measures (also discussed in Section 3.1 of this SE) are described, in part, as including the following:

- Starting the temporary pump system to ensure its continued availability on a weekly basis.

- Maintaining dedicated personnel trained to start the pump onsite 24 hours a day, stationed in reasonable proximity of the pump, and with direct communications with the respective ANO Control Room.

- Briefing applicable personnel at least weekly to ensure that individuals remain aware of the cues that would prompt operator action to start the temporary pumping system and open the discharge valve.

In accordance with the guidance provided in Section 18 of the SRP, the NRC staff used a graded approach to evaluate the HFE considerations related to the changes described in the LAR. Because the licensee submitted a risk-informed LAR, the NRC HFE staff coordinated with NRC risk analysis staff, in conjunction with the application of the guidance of NUREG-1764, in determining the risk significance of the proposed change and the corresponding level of review. Using the risk-informed screening process of NUREG-1764, the NRC staff made a quantitative determination that a Level II review was preliminarily warranted. The NRC staff then performed a qualitative assessment of the human actions associated with the change request in order to determine whether the level of review should be elevated or reduced. Based upon this assessment, the NRC staff determined that the level of review should remain at Level II. Using the screening and review guidance of NUREG-1764, the NRC staff then determined that the relevant Level II review criteria included deterministic, analysis, procedures, training, and human action verification criteria. The relevant deterministic criterion was considered in Section 3.2.6 of this SE. The remaining, relevant Level II review criteria are considered below.

3.6.1 Analysis

Section 4.2, “Analysis,” of NUREG-1764 provides review guidance for verifying that the licensee has analyzed the changes to human actions and identified the HFE inputs for any modifications to procedures and training that may be necessary.

3.6.1.1 Functional and Task Analysis

The NRC staff reviewed the licensee’s description of how personnel will know when the human action is necessary, as well as that it is performed correctly. In Section 2.1, “System Design and Operation,” of the enclosure to the LAR, the licensee states that “[o]perator action is credited in the inventory analysis for a loss of Lake Dardanelle event to transfer the SWS discharge to the ECP.” In Section 3.2 of the enclosure to the LAR, the licensee further states that a temporary ECP diesel-driven pumping system will be utilized as a compensatory measure in the event that the Dardanelle Reservoir is lost or becomes temporarily unavailable, and that the proper SWS bay level will be maintained by this pump using a mechanical float control valve to regulate flow from the temporary pump. In Attachment 5 to the enclosure to the LAR, the

licensee states that a weekly briefing would ensure responsible personnel are cognizant of the cues that would prompt operator action to start the temporary pump and open the discharge valve. In the supplemental letter dated September 23, 2021, the licensee also states that a procedure change addressing the weekly shift briefings will be implemented and will be used in conjunction with scheduled weekly briefings to ensure that individuals remain cognizant of the relevant cues.

The NRC staff reviewed the licensee's analyses that provide a description of what the personnel must do, including how human tasks or performance requirements are being changed. In Section 3.2 of the LAR, the licensee states that existing procedures direct operators to transfer the suction of the SWS pumps from the reservoir to the ECP if bay level drops below a given value, and that this is accomplished by first initiating manual closure of the Dardanelle Reservoir sluice gate, and then opening the ECP supply sluice gate once the level in the SWS bay starts to drop. The licensee notes that the transfer of SWS pumps to ECP suction is currently already designed to be a manual action. The licensee states that the same sequence would be followed while the ECP diesel-driven pumping system is being utilized as a compensatory measure, with the exception that, in lieu of opening the ECP sluice gate, the temporary pump would instead be started. In Attachment 5 of the enclosure to the LAR, the licensee states that the temporary pumping system would be operated locally and that these actions would include manually starting the temporary pump, manually opening the discharge isolation valve, and subsequently aligning a secondary fuel tank after about 20 hours of operation.

The NRC staff reviewed the licensee's description of analyses of reasonable, or credible, potential errors and their consequences. In Attachment 5 of the enclosure to the LAR, the licensee describes failure modes for components comprising the proposed temporary pumping system and the associated human failure events. The licensee states that human reliability analysis was performed to establish appropriate human error probabilities. The failures included within the licensee's analysis included both operator cognitive and execution failures to start the temporary pump and open the discharge valve, as well as operator failure to open the fuel transfer valve. The acceptability of the PRA is evaluated in Section 3.4.1.1 of this SE.

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the functional and task analysis conforms to the applicable criteria of NUREG-1764 and is acceptable to the extent needed to support this application because it describes how personnel will know when the human action is necessary and performed correctly, the analysis of what the personnel must do and how human tasks are being changed, and the analysis of potential errors and their consequences.

3.6.1.2 Staffing

The NRC staff reviewed the licensee's description of the effects of the changes in human actions upon the number, qualifications, and current staffing levels of operations personnel. In Section 3.2 of the enclosure to the LAR, the licensee describes specific measures to be maintained in support of the temporary ECP pumping system during the 65-day ECP piping upgrade. The licensee stated that one of these measures will consist of having dedicated personnel, trained on starting the temporary pump, continually stationed within a reasonable proximity of the pump and in direct communications with the respective control room. The licensee stated that having a dedicated individual available to start the temporary pump and initiate flow is intended to minimize the time delay associated with starting the pump. Furthermore, in Section 3.4 of the enclosure to the LAR, the licensee also stated that the use of a dedicated individual for starting the pump when required will result in existing operations staff

not being challenged with additional actions. Additionally, in the supplemental letter dated September 23, 2021, the licensee stated that the "procedure change for the temporary ECP pumping system will include shift complement requirements for the dedicated personnel needed to operate the temporary ECP pumping system."

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the staffing changes conform to the applicable criterion of NUREG-1764 and are acceptable to the extent needed to support this application because the effects of changes in human actions upon the number and qualifications of operations personnel are adequately described.

3.6.2 Procedures and Training

Section 4.3, "Design of Human System-Interfaces, Procedures, and Training," of NUREG-1764 provides review guidance for verifying that the licensee has supported the human actions by appropriate modifications to procedures and training.

3.6.2.1 Procedures

The NRC staff reviewed the licensee's description of modifications to plant procedures as they relate to changes in operator task requirements. In response to RAI IOLB-1 in the supplemental letter dated September 23, 2021, the licensee confirmed that a procedure change will be developed to replace the step for opening the ECP sluice gate with a step to notify the dedicated personnel to start the temporary ECP pumping system and that training will also be performed on this procedure change prior to implementation.

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the modifications to plant procedures conform to the applicable criterion of NUREG-1764 and are acceptable to the extent needed to support this application because they support the human actions by appropriate modifications to procedures.

3.6.2.2 Training

The NRC staff reviewed the licensee's description of modifications to operator training as it relates to operator task requirements. In Sections 3.2 and 3.4 of the enclosure to the LAR, the licensee stated that the individuals who will be dedicated for purposes of starting the temporary pump will be trained on operating the temporary pump. In the supplemental letter dated September 23, 2021, the licensee stated that procedure change training will be conducted prior to implementation, as well.

In response to RAI IOLB-2a by supplement dated September 23, 2021, the licensee confirmed that operating procedures for ANO-1 and ANO-2 Intake Building ventilation will be revised to reflect the usage of a temporary enclosure and that training will be evaluated and provided, if warranted, as part of the temporary modification engineering change and procedure change processes.

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the training modifications conform to the applicable criterion of NUREG-1764 and are acceptable to the extent needed to support this application because they support the human actions by appropriate modifications to training.

3.6.3 Human Action Verification

Section 4.4, “Human Action Verification,” of NUREG-1764 provides review guidance for verifying that the licensee has demonstrated that the human actions can be successfully accomplished with the modified procedures and training.

3.6.3.1 Availability and Accessibility

The NRC staff reviewed the licensee’s description of the availability and accessibility of all required components. In Section 3.2 of the enclosure to the LAR, the licensee describes specific measures to be maintained in support of the temporary ECP pumping system during the 65-day ECP piping upgrade. The licensee stated that one of these measures will consist of having dedicated personnel continually stationed within a reasonable proximity of the temporary pump and in direct communications with the respective control room. Furthermore, the licensee also stated that the temporary ECP pump and piping will be tested to ensure it can deliver the minimum required flow to the SWS in the time required for starting the system. Additionally, the licensee stated that manual startup of the temporary ECP supply pump and piping system has also been shown to be acceptable and that weekly starts of the temporary ECP pump will be performed to ensure continued pump reliability.

In response to RAI IOLB-2b by supplement dated September 23, 2021, the licensee confirmed that the planned piping configurations for both ANO-1 and ANO-2 will leave adequate clearance beside the pipe for egress to and from each access door and that the reduced opening was still considered adequate for access by operations, security, and fire brigade personnel. The licensee further stated that, for ANO-1, “[a]ccess to the Motor Control Center, SWS pumps, SWS motors, and Fire System Pump equipment on the second floor would not be impacted.” However, for ANO-2, the licensee stated that, while access to the Motor Control Center and SWS pumps would not be impacted, a “portion of the ANO-2 stairs up to the SWS motors will have to be removed to facilitate the temporary pipe routing” and that a “[s]caffold will be built to bridge over the temporary piping and provide access to the second floor.”

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the availability and accessibility of required components conforms to the applicable criteria of NUREG-1764 and is acceptable to the extent needed to support this application because the availability and accessibility of required components is described.

3.6.3.2 Walkthroughs

The NRC staff reviewed the licensee’s description of walkthrough activities conducted for the human actions to determine that procedures are accurate and usable, that the training program appropriately addressed the changes, and that the human actions can be completed within the required time. In Section 3.2 of the enclosure to the LAR, the licensee stated that the temporary ECP pump and piping will be tested to ensure that it can deliver the minimum required flow to the SWS in the time required for starting the system. The licensee further noted that manual startup of the temporary ECP supply pump and piping system has been shown to be acceptable and that weekly starts of the temporary ECP pump will be performed to ensure continued pump reliability. In response to RAI IOLB-1 by supplement dated September 23, 2021, the licensee confirmed that a procedure change will be developed, and that training will also be performed on this procedure change prior to implementation.

Based on the information in the LAR, as supplemented, and the discussion above, the NRC staff finds that the walkthrough activities conform to the applicable criterion of NUREG-1764 and are acceptable to the extent needed to support this application because walkthrough activities are described for determining that the human actions can be completed within the required time and are supported by procedures and training.

3.6.4 Finding on Assessment of Credited Operator Actions

The NRC staff finds that the aforementioned general deterministic analysis, procedures, training, and human action verification criteria collectively provide reasonable assurance that the licensee will comply with the regulations and that the health and safety of the public will not be endangered.

3.7 NRC Staff Evaluation of the Temporary Pumping System

3.7.1 System Description

As stated in Section 3.2 of the enclosure to the LAR, a temporary ECP diesel-driven pumping system will be utilized as a compensatory measure in the highly unlikely event that the preferred UHS source (Dardanelle Reservoir) is lost or becomes temporarily unavailable during the upgrade of the ECP supply piping. The licensee further stated that the temporary pumping system will be sized to provide adequate flow to support the safety-related equipment of both trains of the SWS system to safely shut down the ANO-1 and ANO-2 units under normal or accident conditions.

The licensee stated that the temporary pumping system will consist of a diesel-driven pump, fuel tank, suction strainer, high density polyethylene and carbon steel suction and discharge piping, and valves to control flow. The temporary ECP pumping system will be a commercial grade, nonsafety-related system installed as a compensatory measure. In Section 3.2 of the enclosure to the LAR, the licensee describes specific compensatory measures that will be maintained in support of the temporary ECP pumping system during the 65-day ECP piping upgrade. Those measures include weekly temporary pump start tests, and weekly temporary pumping system inspections to verify the continued integrity of the temporary ECP pumping system.

3.7.2 Fuel Supply

As stated in Section 3.2 of the enclosure to the LAR, the pump and fuel tank will be located adjacent to the ECP with a containment system to prevent any potential fuel spill from entering the ECP. A temporary fuel tank will be installed for the temporary ECP pumping system. The fuel tank capacity will provide sufficient fuel supply to operate the pump for approximately 24 hours without refueling. The test program for the temporary ECP pumping system will include steps to perform a check of the fuel tank level after each weekly pump test and fuel will be added, if necessary.

In its response to RAI EMIB-2 by supplement dated September 23, 2021, the licensee stated that the 24-hour fuel storage requirement is based on meeting the PRA mission time for the SWS to ensure safe and stable operation of the plant. The PRA assumes that within a 24-hour period additional resources would be in place. The design basis mission time for the SWS is 30 days. The licensee also stated that it maintains a purchase order for diesel fuel delivery service to supply fuel for the emergency diesel generators because of the emergency diesel generator testing fuel consumption. Moreover, the licensee clarified that a procedure change

for the temporary ECP pumping system will include instructions for refilling the fuel tank for the temporary ECP pumping system by the local vendor. Furthermore, as a backup fuel supply, the licensee maintains a portable 500-gallon diesel fuel tank trailer within each of the FLEX buildings that could be used to replenish the temporary pumping system fuel tank and provide an additional 24 hours of run time.

The NRC staff finds that the licensee's response to RAI EMIB-2 is acceptable because the 24-hour fuel storage requirement is based on meeting the PRA mission time for the SWS to ensure safe and stable operation of the plant, a procedure change for the temporary ECP pumping system will have instructions for refilling the fuel tank for the temporary ECP pumping system by the local vendor, and a backup fuel supply within each of the FLEX buildings will provide an additional 24 hours of run time.

3.7.3 Design Considerations

As stated in Section 3.2 of the enclosure to the LAR, although the temporary ECP supply system will be a commercial nonsafety-related system installed as a compensatory measure, which will not fully meet the quality, seismic, or tornado missile design basis, the temporary ECP pump and piping will be restrained or protected to ensure functionally during high wind and seismic events. To provide high confidence that the system will remain functional during a seismic event, the system piping and equipment anchorage will be analyzed to withstand seismic loads generated from the current ANO maximum design basis earthquake ground acceleration of 0.20g. The seismic capability of the temporary equipment will be established through qualitative evaluation using generic industry data compared with the ANO design basis earthquake. Restraints will be provided, if necessary, such that the system will remain functional during a seismic event. Also, the temporary pump skid and wind barriers will be located far enough from the ECP edge such that the pond embankment will not be affected by the skid during a seismic event.

In Section 3.4 of the enclosure to the LAR, the licensee also stated that the seismic capability of the temporary system pump, associated controls, fuel tank, and valves is substantiated through comparison to generic industry data. Based on the robustness of the temporary pumping system, the PRA found that the system provided sufficient capability to resist seismic events that have the potential to occur during the pipe upgrade window. A similar approach was taken with respect to wind resistance and tornado missile protection.

As described in Section 3.4 of this SE, the PRA evaluation indicates that the proposed temporary ECP pumping system provides sufficient capability to resist seismic events that have the potential to occur during the piping upgrade window. In addition, the PRA found that the wind resistance capability of the temporary ECP pumping system and the site features do provide sufficient protection against potential wind events that could occur during the piping upgrade window. Moreover, as described in in Sections 3.4.1.1 and 3.4.1.1.2 of this SE, the NRC staff finds that the licensee's bounding analyses for high winds and seismic hazards and qualitative assessments for other external hazards are acceptable.

Based on the information in the LAR and the discussion above, the NRC staff finds that the licensee has demonstrated that the design of the temporary ECP pumping system would remain functional during seismic events, high wind, and tornado missile events and is therefore, acceptable.

3.7.4 Testing and Preparedness

Although the temporary equipment and piping material will not be designed or manufactured to nuclear quality standards, the temporary pumping system will be tested to nuclear quality standards, as identified in Section 3.4 of the enclosure to the LAR. In Section 3.2 of the enclosure to the LAR, the licensee describes specific measures that will be maintained in support of the temporary ECP pumping system during the 65-day ECP piping upgrade. Specifically, the licensee stated that the temporary ECP pump and piping will be tested to ensure it can deliver the minimum required flow to the SWS in the time required for manual startup of the temporary ECP supply pump and piping system. The licensee also stated that weekly starts of the temporary ECP pump will be performed to ensure continued pump reliability. In addition, the licensee will also conduct weekly visual inspections of the temporary above grade ECP piping to verify the continued integrity of the temporary system.

In Section 3.2 of the enclosure to the LAR, the licensee also stated that a dedicated individual trained to operate the pump will be stationed onsite when the temporary pump is relied upon as a backup to the Dardanelle Reservoir. Having a dedicated individual available to start the pump and initiate flow will minimize the pump start initiation time, minimizing the time for the water inventory to reach the SWS intake bays.

In its February 17, 2022, response to RAI EMIB-3, regarding how the minimum flow requirements would be determined and why they would be sufficient to support the intended safety function of the ECP temporary pumping system, the licensee stated that the temporary pumping system will be sized to provide adequate flow to support the safety-related equipment of both trains of the SWS to safely shutdown the unit under normal or accident conditions.

For the accident condition, ANO-1 SAR Table 9-15 identifies single loop DBA service water nominal flow of 6,255 gallons per minute (gpm) and ANO-2 SAR Section 9.2.5.3 identifies a service water pump DBA flow of 9,500 gpm. The ANO-2 flow requirements bound the flow requirements for ANO-1. The temporary pumping system will be sized to provide approximately 21,000 gpm flow for two-loop operation, which bounds the ANO-2 minimum flow for ESF alignment during a DBA. The other ANO unit, not under repair, will maintain full ECP flow capacity from its normal ECP suction line,

For the normal shutdown condition, the ANO-2 flow requirements also bound the flow requirements for ANO-1. The licensee reviewed the ANO-2 operating history for SWS flow during normal shutdowns occurring at the same time of year (spring) as the planned 65-day ECP supply piping upgrade window to establish the necessary pump capacity. The temporary pumping system will be sized to provide sufficient flow of approximately 21,000 gpm flow to allow a normal shutdown utilizing two loops of the SWS, which will bound the higher ANO-2 SWS flow required for normal shutdowns.

Therefore, the licensee concluded that by ensuring the temporary pumping system minimum flow requirements bound both the accident condition and the normal shutdown condition, the flow rate delivered by the temporary pumping system will be sufficient to support the intended safety function.

The NRC staff reviewed the above information and determined that the licensee's response provides sufficient information to technically justify the conclusion that the minimum flow requirements would be sufficient to support the intended safety function of the ECP temporary pumping system, and is therefore acceptable.

Based on the information in the LAR, as supplemented, the NRC staff finds that the specific measures described above are acceptable because: (1) the weekly testing and weekly visual inspection will ensure readiness of the temporary system, and (2) the adequate sizing of the temporary ECP pump and piping system will deliver the required minimum flow. Therefore, the NRC staff concludes that these measures will provide reasonable assurance to ensure the continued integrity of the temporary ECP piping system to support its intended safety function.

3.7.5 Summary of NRC Staff Evaluation of the Temporary Pumping System

As discussed above, the NRC staff determined that the licensee has provided sufficient information to demonstrate that the temporary pumping system will be sized to provide adequate flow to support the intended safety function of the ECP temporary pumping system. The licensee has also demonstrated that the design of the temporary ECP pumping system would remain functional during seismic events, high wind, and tornado missiles. In addition, the licensee has provided reasonable assurance that the specified measures will be maintained in support of the temporary ECP pumping system during the 65-day ECP piping upgrade. Therefore, the NRC staff concludes that the temporary pumping system is acceptable for use as a compensatory measure in the highly unlikely event that the preferred UHS source is lost or becomes temporarily unavailable during the upgrade of the ECP supply piping.

3.8 NRC Staff Evaluation of Proposed Technical Specification Changes

ANO-1 ECP TS 3.7.8 and ANO-2 TS LCO 3.7.4.1, currently require the ECP to be operable in Modes 1 (Power Operation), 2 (Startup), 3 (Hot Standby) and 4 (Hot Shutdown). If the ECP is inoperable for reasons other than a degradation of the ECP structure, ANO-1 is required to be placed in Mode 3 (Hot Standby) within 6 hours and in Mode 5 (Cold Shutdown) within 36 hours. Similarly, ANO-2 must be placed in Mode 3 within 6 hours, and in Mode 5 within the following 30 hours.

The proposed change to the ANO-1 and ANO-2 TSs would add the following Note to the subject LCOs that would allow the ECP to be considered operable on a one-time basis for up to 65 days during the proactive upgrade to the ECP supply piping, provided that a loss of the Dardanelle Reservoir is not in progress and provided that a temporary pumping system is available that is capable of supplying the SWS from the ECP.

> The ECP may be considered OPERABLE on a one-time basis for up to 65 days during upgrade of the ECP supply piping to the SWS intake bays provided:
>
> a. A loss of Lake Dardanelle event is not in progress, and
>
> b. A temporary pumping system is capable of supplying the SWS from the ECP. The temporary pumping system may be unavailable for testing or necessary maintenance provided its availability is restored within 72 hours, and
>
> c. The compensatory measures described in the ANO correspondence letter 0CAN022201, dated February 17, 2022, Enclosure, Attachment 4 shall be implemented. Failure to meet one or more of the continuing compliance compensatory measures is acceptable provided the measure(s) is/are restored within 72 hours.

Proposed TS Note's Compliance with Current Regulations

NRC Staff Review of Addition of Item a of TS Note

ANO's ECP design provides a shared heat sink for removing operating heat from safety-related components if the heat sink provided by the Dardanelle Reservoir is unavailable. This is done utilizing the SWS. ANO-1 TS Surveillance Requirement 3.7.8.4 and ANO-2 Surveillance Requirement 4.7.4.1 require the licensee to verify that adequate inventory exists to support long term (i.e., 30 days) cooling for the units. Further, the TSs require the licensee to perform an engineering evaluation of any apparent changes in visual appearance or other abnormal degradation within 7 days to determine OPERABILITY. In addition to the TS-required surveillances, the licensee would be implementing the following specific compensatory measures as referenced in the letter dated February 17, 2022.

- Personnel trained to start the pump will be dedicated and onsite 24 hours a day, stationed in reasonable proximity of the pump, during the ECP piping upgrade when the ECP temporary pump is being relied upon as a backup for the Dardanelle Reservoir, with direct communications with the respective ANO Control Room.

- No elective maintenance or elective testing will be performed that could challenge the Dardanelle Reservoir SWS suction source.

- The SWS pumps, bays, traveling screens, and sluice gates that are important for ensuring cooling water is provided to the supported SSCs will be given protected train status.

- Fish nets will be installed in the Dardanelle Reservoir SWS intake canal when required by existing winter operations procedural guidance and inspected for any gross physical damage or large quantities of debris to ensure the nets remain intact and capable of performing the intended function.

The TSs, as modified by the addition of Item a of the Note, along with the compensatory measures, do not affect the LCO requirements or shutdown requirements of the current TSs discussed above or the requirements of 10 CFR 50.36(c). Therefore, the addition of Item a of the proposed Note is acceptable.

NRC Staff Review of Addition of Item b of TS Note

ANO-1 LCO 3.7.7 and ANO-2 LCO 3.7.3.1 require two SWS loops to be OPERABLE in Modes 1, 2, 3, and 4 to provide the required redundancy to ensure that the system functions to remove post-accident heat loads. In Modes 5 and 6, the operability requirements of the SWS are determined by the systems it supports. If one SWS loop is inoperable, the LCOs require that an Action be taken to restore that loop to an OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE SWS loop is adequate to perform the heat removal function.

The licensee stated that the proposed 72-hour CT in Item b of the proposed TS Note is to restore the continuing compliance compensatory measure, and is consistent with the 72 hours allowed for rendering the temporary pumping system unavailable for testing. In addition, in its

letter dated September 23, 2021, the licensee confirmed the NRC staff's understanding that the 72-hour CT is consistent with the TS allowed time to restore an inoperable SWS loop in accordance with ANO-1 TS 3.7.7 and ANO-2 TS 3/4.7.3. The supplemental letter dated February 17, 2022, lists two specific compensatory actions related to the SWS as follows:

- The SWS pumps, bays, traveling screens, and sluice gates that are important for ensuring cooling water is provided to the supported SSCs will be given protected train status.

- Entergy will reassess the risk impact against the acceptance guidelines for a small risk increase as defined in RG 1.177 (Incremental Conditional Core Damage Probability (ICCDP) < 1E-6 and Incremental Conditional Large Early Release Probability (ICLERP) and will inform the NRC before proceeding if either criterion is not met.

The TS LCOs, as modified by the addition of Item b of the proposed Note along with the compensatory measures, do not affect the LCO requirements or shutdown requirements of the current TSs or the requirements of 10 CFR 50.36(c). Therefore, the addition of Item b of the proposed Note is acceptable.

NRC Staff Review of Addition of Item c of TS Note

The proposed TS Note obligates the licensee to implement effective compensatory measures, as specified in the licensee's letter dated February 17, 2022. Since the addition of Item c of the proposed Note does not affect the LCO requirements or shutdown requirements of the current TSs or the requirements of 10 CFR 50.36(c), and Item c would be a part of the LCOs (i.e., LCO 3.7.8 for ANO-1 and LCO 3.7.4.1 for ANO-2), the licensee would be required to enter TS LCOs Action statements if the specified measures are not appropriately implemented. Therefore, the addition of item c of the proposed Note is acceptable.

Technical Specification Evaluation Conclusion

As indicated in the regulatory evaluation section of this SE, 10 CFR 50.36(c)(2)(i) states that TS will contain LCOs that "are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met." The current ANO-1 ECP TS 3.7.8 and ANO-2 TS LCO 3.7.4.1 meet the requirements of 10 CFR 50.36. The proposed amendment would add a Note stating that the ECP may be considered OPERABLE on a one-time basis for up to 65 days during upgrade of the ECP supply piping to the SWS intake bays provided that Items a, b, and c of the Note are all met. Therefore, the NRC staff concludes that the addition of the Note to the LCOs is consistent with and meets the requirements of 10 CFR 50.36.

3.9 NRC Staff Conclusion

The NRC staff reviewed the proposed one-time changes to modify ANO-1 TS 3.7.8 and ANO-2 TS 3.7.4.1 to permit the ECP to be considered operable for up to 65 days in support of a proactive upgrade on the ECP piping supply to the SWS intake bays.

Based on its review of the ANO LAR, as supplemented, the NRC staff concludes that the ANO PRA (i.e., internal events, internal flooding, and internal fire PRAs) and non-PRA analyses are

acceptable for assessing risk to the extent needed to support this application. The NRC staff based this conclusion on the findings that, for this risk-informed application and to the extent needed to support the application: (1) the licensee's risk assessment is of sufficient scope; (2) the ANO internal events, internal flooding, and internal fire PRAs appropriately conform to the applicable technical elements in the PRA standard, as endorsed by RG 1.200, to the extent needed to predict the ICCDP and ICLERP, (3) the simplified bounding risk analyses for high winds and seismic hazards appropriately follow the guidance in RGs 1.174, Revision 3 and 1.177, Revision 1; (4) external flooding and other external hazards not addressed using PRA methods do not impact this application; (5) the level of detail in the PRA models and the PRA assumptions are appropriate to evaluate the risk impact for this application; and (6) the PRAs represents the as-built and as-operated plant.

In addition, the NRC staff concludes that the ANO deterministic, analysis, procedural, training, and human action verification measures associated with changed human actions collectively provide reasonable assurance that the applicant will comply with regulations and that the health and safety of the public will not be endangered.

Based on these findings, the NRC staff has determined that the compensatory measures are acceptable, and the staff further concludes that the licensee's request to permit the ECP to be considered operable for up to 65 days in support of a proactive upgrade on the ECP piping supply to the SWS intake bays follows the three-tiered approach and performance monitoring programs outlined in RG 1.177, Revision 1, and meets the five key principles outlined in RG 1.174, Revision 3. The NRC staff finds that the proposed changes do not significantly affect the seven considerations for defense-in-depth and the proposed changes preserve defense-in-depth commensurate with the expected frequency and consequence of challenges to the system resulting from the proposed changes.

The NRC staff concludes that there is reasonable assurance that the proposed TS changes will have minimal impact on the licensee's ability to continue to comply with the requirements of 10 CFR 50.36. In addition, the NRC staff concludes that there is reasonable assurance that, in accordance with 10 CFR 50.65(a)(4), the proposed temporary pumping system and other compensatory measures satisfactorily minimize the increased risk associated with the maintenance activity to replace the ECP piping.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendments on February 8, 2022. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, as published in the *Federal Register* on April 20, 2021 (86 FR 20530), and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Gaston, R., Entergy Operations, Inc. letter to U.S. Nuclear Regulatory Commission, "License Amendment Request One-Time Change to Support Proactive Upgrade of the Emergency Cooling Pond Supply Piping, Arkansas Nuclear One, Unit 1 and Unit 2, NRC Docket Nos. 50-313- and 50-368, Renewed Facility Operating License Nos. DPR-51 and NPF-6," dated February 8, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21039A756).

2. Gaston, R., Entergy Operations, Inc. letter to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information License Amendment Request One-Time Change to Support Proactive Upgrade of the Emergency Cooling Pond Supply Piping, Arkansas Nuclear One, Unit 1 and Unit 2, NRC Docket Nos. 50-313- and 50-368 Renewed Facility Operating License Nos. DPR-51 and NPF-6," dated September 23, 2021 (ADAMS Accession No. ML21266A413).

3. Gaston, R., Entergy Operations, Inc. letter to U.S. Nuclear Regulatory Commission, "Response to the Second Request for Additional Information License Amendment Request for One-Time Change to Support Proactive Upgrade of the Emergency Cooling Pond Supply Piping, Arkansas Nuclear One, Unit 1 and Unit 2, NRC Docket Nos. 50-313- and 50-368, Renewed Facility Operating License Nos. DPR-51 and NPF-6," dated February 17, 2022 (ADAMS Accession No. ML22048B163).

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5. Dixon-Herrity, J., U.S. Nuclear Regulatory Commission, letter to ANO Site Vice President, Entergy Operations, Inc., "Arkansas Nuclear One, Units 1 and 2 – Approval of Request for Alternative from Certain Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (EPID L-2020-LLR-0104), dated September 30, 2021 (ADAMS Accession Nos. ML21265A255 (not publicly available, proprietary information) and ML21188A022 (public)).

6. Entergy Operations, Inc., “Arkansas Nuclear One – Unit 1 SAR Amendment 29,” Safety Analysis Report (ADAMS Accession No. ML20133J853).

7. Entergy Operations, Inc., “Arkansas Nuclear One – Unit 2 SAR Amendment 29,” Safety Analysis Report (ADAMS Accession No. ML20294A315).

8. U.S. Nuclear Regulatory Commission, “Guidance for the Review of Changes to Human Actions,” NUREG-1764, Revision 1, dated September 2007 (ADAMS Accession No. ML072640413).

9. U.S. Nuclear Regulatory Commission, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis,” Regulatory Guide 1.174, Revision 3, dated January 2018 (ADAMS Accession No. ML17317A256).

10. U.S. Nuclear Regulatory Commission, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications,” Regulatory Guide 1.177, Revision 1, dated May 2011 (ADAMS Accession No. ML100910008).

11. U.S. Nuclear Regulatory Commission, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” Regulatory Guide 1.200, Revision 2, dated March 2009 (ADAMS Accession No. ML090410014).

12. U.S. Nuclear Regulatory Commission, “Human Factors Engineering,” NUREG-0800, Section 18, Revision 3, dated December 2016 (ADAMS Accession No. ML16125A114).

13. American Society for Mechanical Engineers/American Nuclear Society, ASME/ANS RA-Sa-2009, “Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications,” Addendum A to RA-S-2008, ASME, New York, NY, American Nuclear Society, La Grange Park, Illinois, dated February 2009.

14. George, A., U.S. Nuclear Regulatory Commission, letter to Vice President, Operations, Entergy Operations, Inc., “Arkansas Nuclear One, Unit No. 2 – Issuance of Amendment Regarding Transition to a Risk-Informed, Performance Based Fire Protection Program in Accordance with 10 CFR 50.48(c) (TAC No. MF0404),” dated February 18, 2015 (ADAMS Accession no. ML14356A227).

15. U.S. Nuclear Regulatory Commission, “Record of Review Dispositions to Arkansas Nuclear One Unit 2 (ANO-2) Internal Events PRA Facts and Observations (F&Os),” dated August 15, 2014 (ADAMS Accession No. ML14329A411).

16. U.S. Nuclear Regulatory Commission, “Record of Review dispositions to Arkansas Nuclear One Unit 2 (ANO-2) Fire PRA Facts and Observations (F&Os) and Supporting Requirements (SRs) Not Met or Met at Capability Category (CC) I,” dated October 22, 2014 (ADAMS Accession no. ML14329A426).

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19. U.S. Nuclear Regulatory Commission, "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decisionmaking," NUREG-1855, Revision 1, dated March 2017 (ADAMS Accession No. ML17062A466).

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Date: March 15, 2022

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT NOS. 274 AND 328 RE: ONE-TIME CHANGE TO SUPPORT PROACTIVE UPGRADE OF THE EMERGENCY COOLING POND SUPPLY PIPING (EPID L-2021-LLA-0015) DATED MARCH 15, 2022

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