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

July 15, 2022

Mr. Steven M. Snider
Vice President, Oconee Nuclear Station
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 – ISSUANCE OF AMENDMENT NOS. 424, 426 AND 425, RE: REVISE TECHNICAL SPECIFICATION 3.7.7, "LOW PRESSURE SERVICE WATER (LPSW) SYSTEM" TO EXTEND THE COMPLETION TIME FOR ONE REQUIRED INOPERABLE LPSW PUMP ON A TEMPORARY BASIS (EPID L-2021-LLA-0157)

Dear Mr. Snider:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment Nos. 424, 426, and 425 to Renewed Facility Operating Licenses DPR-38, DPR-47, and DPR-55, for the Oconee Nuclear Station, Units 1, 2, and 3, respectively. The amendments are in response to the application from Duke Energy Carolinas, LLC, dated September 2, 2021, as supplemented by letter dated April 14, 2022.

The amendments revise Technical Specification (TS) 3.7.7, "Low Pressure Service Water (LPSW) System," to extend the completion time for one required inoperable LPSW Pump on a temporary basis for Oconee Nuclear Station, Units 1, 2, and 3. Specifically, the amendments add a Note modifying the completion time associated with TS 3.7.7, Condition A, Required Action A.1, to 288 hours during Unit 2, Refuel 31 (fall 2023) to allow for the tie-in and testing of an alternate suction source to the shared Unit 1 and Unit 2 'A' and 'B' LPSW pumps.

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

If you have any questions, please call me at 301-415-1009, or by email at Shawn.Williams@nrc.gov.

Sincerely,

/RA/

Shawn A. Williams, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosures:
1. Amendment No. 424 to DPR-38
2. Amendment No. 426 to DPR-47
3. Amendment No. 425 to DPR-55
4. Safety Evaluation

cc: Listserv

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-269

OCONEE NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 424
Renewed License No. DPR-38

1. The Nuclear Regulatory Commission (NRC, the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 1 (the facility), Renewed Facility Operating License No. DPR-38, filed by Duke Energy Carolinas, LLC (the licensee), dated September 2, 2021, and supplemented by letter dated April 14, 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 as 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 hereby amended by page changes to the Renewed Facility Operating License and Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-38 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 424, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley

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Date: 2022.07.15 11:19:27 -04'00'

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. DPR-38
and the Technical Specifications

Date of Issuance: July 15, 2022

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-270

OCONEE NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 426
Renewed License No. DPR-47

1. The Nuclear Regulatory Commission (NRC, the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 2 (the facility), Renewed Facility Operating License No. DPR-47, filed by Duke Energy Carolinas, LLC (the licensee), dated September 2, 2021, and supplemented by letter dated April 14, 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 as 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 hereby amended by page changes to the Renewed Facility Operating License and Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-47 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 426, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley

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Date: 2022.07.15 11:20:09 -04'00'

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. DPR-47
and the Technical Specifications

Date of Issuance: July 15, 2022

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-287

OCONEE NUCLEAR STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 425
Renewed License No. DPR-55

1. The Nuclear Regulatory Commission (NRC, the Commission) has found that:

   A. The application for amendment to the Oconee Nuclear Station, Unit 3 (the facility), Renewed Facility Operating License No. DPR-55, filed by Duke Energy Carolinas, LLC (the licensee), September 2, 2021, and supplemented by letter dated April 14, 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 as 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 hereby amended by page changes to the Renewed Facility Operating License and Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 3.B of Renewed Facility Operating License No. DPR-55 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 425, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley

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Date: 2022.07.15 11:20:54 -04'00'

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. DPR-55
and the Technical Specifications

Date of Issuance: July 15, 2022

ATTACHMENT TO

AMENDMENT NO. 424 RENEWED FACILITY OPERATING LICENSE NO. DPR-38

AMENDMENT NO. 426 RENEWED FACILITY OPERATING LICENSE NO. DPR-47

AMENDMENT NO. 425 RENEWED FACILITY OPERATING LICENSE NO. DPR-55

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

Replace the following pages of the Operating Licenses 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.

Remove Pages	Insert Pages
Operating Licenses	Operating Licenses
License No. DPR-38, page 3	License No. DPR-38, page 3
License No. DPR-47, page 3	License No. DPR-47, page 3
License No. DPR-55, page 3	License No. DPR-55, page 3
Technical Specifications	Technical Specifications
3.7.7-1	3.7.7-1
3.7.7-2	3.7.7-2
3.7.7-3	3.7.7-3

A. Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2610 megawatts thermal.

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 424 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. This license is subject to the following antitrust conditions:

Applicant makes the commitments contained herein, recognizing that bulk power supply arrangements between neighboring entities normally tend to serve the public interest. In addition, where there are net benefits to all participants, such arrangements also serve the best interests of each of the participants. Among the benefits of such transactions are increased electric system reliability, a reduction in the cost of electric power, and minimization of the environmental effects of the production and sale of electricity.

Any particular bulk power supply transaction may afford greater benefits to one participant than to another. The benefits realized by a small system may be proportionately greater than those realized by a larger system. The relative benefits to be derived by the parties from a proposed transaction, however, should not be controlling upon a decision with respect to the desirability of participating in the transaction. Accordingly, applicant will enter into proposed bulk power transactions of the types hereinafter described which, on balance, provide net benefits to applicant. There are net benefits in a transaction if applicant recovers the cost of the transaction (as defined in ¶1 (d) hereof) and there is no demonstrable net detriment to applicant arising from that transaction.

1. As used herein:

   (a) “Bulk Power” means electric power and any attendant energy, supplied or made available at transmission or sub-transmission voltage by one electric system to another.

   (b) “Neighboring Entity” means a private or public corporation, a governmental agency or authority, a municipality, a cooperative, or a lawful association of any of the foregoing owning or operating, or proposing to own or operate, facilities for the generation and transmission of electricity which meets each of

A. Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2610 megawatts thermal.

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 426 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. This license is subject to the following antitrust conditions:

Applicant makes the commitments contained herein, recognizing that bulk power supply arrangements between neighboring entities normally tend to serve the public interest. In addition, where there are net benefits to all participants, such arrangements also serve the best interests of each of the participants. Among the benefits of such transactions are increased electric system reliability, a reduction in the cost of electric power, and minimization of the environmental effects of the production and sale of electricity.

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   (b) “Neighboring Entity” means a private or public corporation, a governmental agency or authority, a municipality, a cooperative, or a lawful association of any of the foregoing owning or operating, or proposing to own or operate, facilities for the generation and transmission of electricity which meets each of

D. Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2610 megawatts thermal.

E. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 425 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

F. This license is subject to the following antitrust conditions:

Applicant makes the commitments contained herein, recognizing that bulk power supply arrangements between neighboring entities normally tend to serve the public interest. In addition, where there are net benefits to all participants, such arrangements also serve the best interests of each of the participants. Among the benefits of such transactions are increased electric system reliability, a reduction in the cost of electric power, and minimization of the environmental effects of the production and sale of electricity.

Any particular bulk power supply transaction may afford greater benefits to one participant than to another. The benefits realized by a small system may be proportionately greater than those realized by a larger system. The relative benefits to be derived by the parties from a proposed transaction, however, should not be controlling upon a decision with respect to the desirability of participating in the transaction. Accordingly, applicant will enter into proposed bulk power transactions of the types hereinafter described which, on balance, provide net benefits to applicant. There are net benefits in a transaction if applicant recovers the cost of the transaction (as defined in ¶1 (d) hereof) and there is no demonstrable net detriment to applicant arising from that transaction.

2. As used herein:

(c) “Bulk Power” means electric power and any attendant energy, supplied or made available at transmission or sub-transmission voltage by one electric system to another.

(d) “Neighboring Entity” means a private or public corporation, a governmental agency or authority, a municipality, a cooperative, or a lawful association of any of the foregoing owning or operating, or proposing to own or operate, facilities for the generation and transmission of electricity which meets each of

3.7 PLANT SYSTEMS

3.7.7 Low Pressure Service Water (LPSW) System

LCO 3.7.7 For Unit 1 or Unit 2, three LPSW pumps and one flow path shall be OPERABLE.

For Unit 3, two LPSW pumps and one flow path shall be OPERABLE.

The LPSW Waterhammer Prevention System (WPS) shall be OPERABLE.

----------NOTE----------
With either Unit 1 or Unit 2 defueled and appropriate LPSW loads secured on the defueled Unit, such that one LPSW pump is capable of mitigating the consequences of a design basis accident on the remaining Unit, only two LPSW pumps for Unit 1 or Unit 2 are required.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required LPSW pump inoperable.		----------NOTE---------- During Unit 2, Refuel 31 with Unit 2 defueled, appropriate LPSW loads secured, and contingent on implementation of the compensatory measures described in Attachment 1 of letter RA-22-0089 dated April 14, 2022, the Completion Time is 288 hours for the tie-in and testing of an alternate suction source to the shared Unit 1/2 LPSW Pumps A and B. ----------
	A.1 Restore required LPSW pump to OPERABLE status.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. LPSW WPS inoperable.	B.1 Restore the LPSW WPS to OPERABLE status.	7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	12 hours 60 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.7.1	Verify LPSW leakage accumulator level is within Water levels between 20.5” to 41”. During LPSW testing, accumulator level > 41” is acceptable.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.2	----------NOTE---------- Isolation of LPSW flow to individual components does not render the LPSW System inoperable. ----------	
	Verify each LPSW manual, and non-automatic power operated valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.3	Verify each LPSW automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.4	Verify each LPSW pump starts automatically on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.5	Verify LPSW leakage accumulator is able to provide makeup flow lost due to boundary valve leakage.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.6	Verify LPSW WPS boundary valve leakage is ≤ 20 gpm.	In accordance with the Surveillance Frequency Control Program

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION FOR

AMENDMENT NO. 424 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-38

AMENDMENT NO. 426 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-47

AMENDMENT NO. 425 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-55

DUKE ENERGY CAROLINAS, LLC

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

1.0 INTRODUCTION

By application dated September 2, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21245A210), as supplemented by letter dated April 14, 2022 (ML22104A010), Duke Energy Carolinas, LLC (Duke, the licensee), requested changes to the technical specifications (TSs) for the Oconee Nuclear Station, Units 1, 2, and 3 (Oconee, ONS).

The proposed change would revise TS 3.7.7, "Low Pressure Service Water (LPSW) System," to extend the completion time for one required inoperable LPSW pump on a temporary basis for Oconee, Units 1, 2, and 3. Specifically, the amendments add a Note modifying the completion time associated with TS 3.7.7, Condition A, Required Action A.1, to 288 hours during Unit 2, Refuel 31 (fall 2023) to allow for the tie-in and testing of an alternate suction source to the shared Unit 1 and Unit 2 (Units 1/2) 'A' and 'B' LPSW pumps. The alternate suction source to the shared Units 1/2 'A' and 'B' LPSW pumps is needed to permit draining of the condenser circulating water (CCW) system cross-connect header for the replacement of three CCW valves.

A regulatory audit was conducted from February 10 thru March 4, 2022 (ML22046A088). The supplement dated April 14, 2022, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 2, 2021 (86 FR 60481).

2.0 REGULATORY EVALUATION

2.1 Plant and System Description

Each Oconee unit is a two-loop pressurized water reactor (PWR) supplied by Babcock and Wilcox with a large dry containment. As stated in Section 1.2.2.2 of the Oconee Updated Final Safety Evaluation Report (UFSAR), Revision 28, (ML20189A066) the steam generators (SGs) in the two loops are vertical, straight tube units producing superheated steam at constant pressure. With the once-through design of the SGs, natural circulation flow is adequate to remove full decay heat without the use of reactor coolant pumps (RCPs). Each loop has two vertical, single speed centrifugal RCPs equipped with controlled leakage shaft seals. An electrically heated pressurizer establishes and maintains the reactor coolant system (RCS) pressure and provides a surge chamber and a water reserve to accommodate RCS volume changes during plant operation.

As described in the UFSAR, Section 6.2.1.1.1, the reactor building (RB) completely encloses the RCS to minimize release of radioactive material to the environment should a serious failure of the RCS occur. The RB structure designed for an internal pressure of 59 psig provides adequate biological shielding for both normal operation and accident situations.

The LPSW system description can be found in the UFSAR, Section 9.2.2.2.3. The LPSW system provides a heat sink for safety related components during a transient or accident. The LPSW system also provides this heat sink function during normal operation and normal shutdown for various components, including the reactor building cooling units (RBCU), low pressure injection (LPI) coolers, high pressure injection (HPI) pump motor coolers, and the motor driven emergency feedwater (EFW) pumps. In its LAR, the licensee stated that:

> The LPSW [s]ystem for Unit 1 and Unit 2 [Unit 1/2] is shared and consists of three LPSW pumps (i.e., 'A', 'B' and 'C') which can supply multiple combinations of pathways to supply required components. The shared Unit [1/2] pumps take suction from the 42-inch cross-connection between the condenser inlet headers of all three units; two LPSW pumps ('A' and 'B') are supplied by one suction branch line and the other pump ('C') is supplied by the other suction branch line. The LPSW system for Unit 3 consists of two LPSW pumps and like the Unit 1 and 2 pumps, also take their suction from the CCW 42-inch cross-connection header.

The CCW system description can be found in the UFSAR, Section 9.2.2.2.1. The CCW system provides for cooling of the condensers during normal operation. The system generally uses lake water as the ultimate heat sink for decay heat removal during cooldown of the plant. The CCW system is the suction source for other service water systems, including high pressure service water (HPSW), LPSW, protected service water (PSW), and standby shutdown facility (SSF) Auxiliary Service Water (ASW). In addition, CCW provides a heat sink for the recirculated cooling water system (RCW). The CCW system is designed to supply suction to the LPSW pumps from the 42-inch crossover header during normal operation and emergencies.

2.2 Licensee Proposed Changes

Current TS 3.7.7

The Limiting Condition for Operation (LCO) for TS 3.7.7 specifies that for the shared Units 1/2 LPSW system, three LPSW pumps are required to be operable. The LCO is modified by a Note

which requires only two LPSW pumps to be operable for the shared Units 1/2 LPSW system if either unit is defueled. The shared Units 1/2 LPSW system requires only two pumps to meet the single failure criterion provided that one of the units has been defueled and the following LPSW system loads on the defueled unit are isolated: RB cooling units, RB auxiliary coolers, component cooling, main turbine oil tank, RCPs and LPI. The LCO further requires that one flow path be operable for Unit 1 and one flow path be operable for Unit 2.

TS 3.7.7, Condition A, is the condition for one required LPSW pump inoperable. For Units 1 and 2, Condition A is entered when one of the three required LPSW pumps is inoperable unless Unit 1 or Unit 2 is defueled with the appropriate loads isolated. With Unit 1 or Unit 2 defueled with the appropriate loads isolated, Condition A would only be entered for Unit 1 or Unit 2 if two LPSW pumps are inoperable. Required Action A.1 specifies that action must be taken to restore the required LPSW pump to operable status within the completion time of 72 hours. The licensee is proposing to extend the completion time from 72 hours to 288 hours on a one-time basis during the Unit 2, Refuel 31 outage.

The licensee has proposed the following Note

> During Unit 2, Refuel 31 with Unit 2 defueled, appropriate LPSW loads secured, and contingent on implementation of the compensatory measures described in Attachment 1 of letter RA-22-0089 dated April 14, 2022, the Completion Time is 288 hours for the tie-in and testing of an alternate suction source to the shared Unit 1/2 LPSW Pumps A and B.

The proposed completion time extension is requested to install an temporary alternate LPSW suction source to the shared Units 1/2 LPSW system.

The alternate LPSW suction source will permit Oconee to operate Unit 1 while Unit 2 is defueled. In turn, this will support draining the CCW cross-connect header to replace three CCW valves without requiring both Unit 1 and 2 to be defueled.

The proposed changes on TS pages 3.7.7-2 and 3.7.7-3 are revised due to repagination.

2.3 Applicable Regulatory Requirements and Guidance

2.3.1 Regulatory Requirements

The regulation in 10 CFR 50.36(b) states, in part, “The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto.” In determining whether the proposed TS remedial actions should be granted, the Commission will apply the “reasonable assurance” standards of 10 CFR 50.40(a) and 50.57(a)(3).

The regulation in 10 CFR 50.36(c)(2) requires that TSs contain LCOs. The regulations in 10 CFR Part 50.36(c)(2)(i) states:

> Limiting conditions for operation [LCO] 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 regulations in 10 CFR 50.65(a)(4) states:

> Before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The scope of the assessment may be limited to structures, systems, and components that a risk-informed evaluation process has shown to be significant to public health and safety.

The regulations in 10 CFR 50.46(b) require that during a LOCA event, the following criteria are satisfied:

(1) *Peak cladding temperature*. The calculated maximum fuel element cladding temperature shall not exceed 2200° F.

(2) *Maximum cladding oxidation*. The calculated total oxidation of the cladding shall nowhere exceed 0.17 times the total cladding thickness before oxidation.

(3) *Maximum hydrogen generation*. The calculated total amount of hydrogen generated from the chemical reaction of the cladding with water or steam shall not exceed 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.

(4) *Coolable geometry*. Calculated changes in core geometry shall be such that the core remains amenable to cooling.

(5) *Long-term cooling*. After any calculated successful initial operation of the ECCS [emergency core cooling system], the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

The regulations in 10 CFR 50.55a(f)(4), “Inservice testing standards requirement for operating plants,” state that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) must meet the Inservice Testing (IST) requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components. The IST requirements for pumps and valves that are within the scope of the ASME OM Code but are not classified as ASME *Boiler and Pressure Vessel Code* (BPV Code) Class 1, Class 2, or Class 3 may be satisfied as an augmented IST program in accordance with 10 CFR 50.55a(f)(6)(ii) without requesting relief under 10 CFR 50.55a(f)(5) or alternatives under 10 CFR 50.55a(z). This use of an augmented IST program may be acceptable provided the basis for deviations from the ASME OM Code, as incorporated by reference in 10 CFR 50.55a, demonstrates an acceptable level of quality and safety, or that implementing the Code provisions would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, where documented and available for NRC review.

The regulations in 10 CFR 50.40(a) state that in determining whether to grant a license, the Commission will be guided by, among other things, consideration about whether "…the processes to be performed, the operating procedures, the facility and equipment, the use of the facility, and other technical specifications, or the proposals, in regard to any of the foregoing collectively provide reasonable assurance that the applicant will comply with the regulations in this chapter, including the regulations in part 20 of this chapter, and that the health and safety of the public will not be endangered."

The regulations in 10 CFR 50.57(a)(3) state that the Commission may issue an operating license upon finding that, among other things, "There is reasonable assurance (i) that the activities authorized by the operating license can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the regulations in this chapter."

The Atomic Energy Commission (AEC) issued the construction permits for Oconee on November 6, 1967. The plants' design approval for the construction phase was based on the proposed general design criteria (GDC) published by the AEC in the *Federal Register* (32 FR 10213) on July 11, 1967. Thus, the GDC that constitute the licensing basis for Oconee are those described in the UFSAR Chapter 3.1, "Conformance with NRC General Design Criteria," and in applicable UFSAR sections. Based on its review of the UFSAR and the licensee's submittal, the NRC staff identified the following UFSAR Chapter 3.1, "Conformance with NRC General Design Criteria," as being applicable to the proposed amendment:

UFSAR, Section 3.1.6, "Criterion 6 - Reactor Core Design (Category A)," states, in part:

> The reactor core shall be designed to function throughout its design lifetime without exceeding acceptable fuel damage limits which have been stipulated and justified. The core design, together with reliable process and decay heat removal systems, shall provide for this capability under all expected conditions of normal operation with appropriate margins for uncertainties and for transient situations which can be anticipated, including the effects of the loss of power to recirculation pumps, tripping out of a turbine generator set, isolation of the reactor from its primary heat sink, and loss of all off-site power.

UFSAR, Section 3.1.10, "Criterion 10 - Containment (Category A)," states, in part:

> Containment shall be provided. The containment structure shall be designed to sustain the initial effects of gross equipment failures, such as a large coolant boundary break, without loss of required integrity and, together with other engineered safety features as may be necessary, to retain for as long as the situation requires the functional capability to protect the public.

UFSAR, Section 3.1.41, "Criterion 41 – Engineered Safety Features Performance Capability (Category A)," states, in part:

> Engineered safety features such as Emergency Core Cooling and Containment Heat Removal Systems shall provide sufficient performance capability to accommodate partial loss of installed capacity and still fulfill the required safety function. As a minimum, each engineered safety feature shall provide this required safety function assuming a failure of a single active component.

UFSAR, Section 3.1.49, “Criterion 49 – Containment Design Basis (Category A),” states, in part:

> The containment structure, including access openings and penetrations, and any necessary containment heat removal systems shall be designed so that the containment structure can accommodate without exceeding the design leakage rate, the pressures and temperatures resulting from the largest credible energy release following a loss-of-coolant accident, including a considerable margin for effects from metal-water or other chemical reactions that could occur as a consequence of failure of Emergency Core Cooling Systems.

UFSAR, Section 3.1.52, “Criterion 52 – Containment Heat Removal Systems (Category A),” states, in part:

> Where active heat removal systems are needed under accident conditions to prevent exceeding containment design pressure, at least two systems, preferably of different principles, each with full capacity shall be provided.

2.3.2 Regulatory Guidance

Chapter 18, “Human Factors Engineering,” of NUREG-0800 (ML16125A114), describes the guidance used by NRC staff to conduct regulatory reviews of license amendments that address human factors topics. It directs NRC staff to applicable review criteria such as those included in NUREG-1764, “Guidance for the Review of Changes to Human Actions,” Revision 1, (ML072640413). NUREG-1764 describes how to assess changes to manual operator actions. It provides a risk-informed process to determine the level of NRC review necessary and provides the acceptance criteria for each level of review.

3.0 TECHNICAL EVALUATION

3.1 Accident Analysis

During the licensee proposed 288-hour completion time, the licensee could operate Unit 1 and Unit 3 in Mode 1, 2, 3, or 4, while Unit 2 is defueled. In this scenario, the current TS 3.7.7 requires two LPSW pumps operable for the shared Units 1/2 LPSW system, such that one LPSW pump is capable of mitigating the consequences of design basis accident (DBA) for Unit 1. The licensee is proposing to temporarily extend the Completion Time from 72 hours to 288 hours because only the shared Units 1/2 ‘C’ LPSW pump will be available for the mitigation of a DBA in Unit 1.

As described in ONS UFSAR Section 9.2.2.2.3, the worst-case DBA in Unit 1 is a LOCA in conjunction with loss of offsite power (LOOP). Therefore, in its April 14, 2022, supplement, the licensee provided accident analysis to confirm Unit 1 and Unit 3 would be able to safety shutdown and not exceed RB design parameters during a Unit 1 worst-case DBA, in conjunction with a loss of the shared Units 1/2 ‘C’ LPSW pump. The licensee’s accident analysis included the proposed compensatory measure to manually connect one of the Unit 3 LPSW pumps to supply Unit 1 RBCU and LPI system safety-related cooling loads through a beyond-design-basis cross-connect piping between the units. The licensee stated that the “time critical operator action” time to manually cross-connect Unit 3 LPSW system with the shared Units 1/2 LPSW system is 14.72 minutes, which includes the dispatch and local task time. The licensee stated that the cross-connect action time of 14.72 minutes has been verified using ONS procedure PT/0/A/0120/033.

The licensee's accident analysis includes the following scenarios.

- The Unit 1 RB parameters during a DBA LOCA in Unit 1 in Conjunction with LOOP
- The Unit 1 RB Sump Temperature
- The Unit 1 Net Positive Suction Head of the LPI and reactor building spray (RBS) pumps
- Temporary Loss of Unit 1 LPI Coolers
- Unit 3 Decay Heat Removal During DBA in Unit 1 in Conjunction with LOOP

3.1.1 RB Response During a DBA LOCA in Unit 1 in Conjunction with LOOP

The UFSAR Figures 6-36 and 6-37 show the analysis of record (AOR) RB pressure and temperature profiles. Since the cross-connect piping is a beyond-design-basis capability for mitigating a DBA which is a large cold-leg break LOCA, the RB cooling would stop during this event for 14.72 minutes and will be restored after this period. In its April 14, 2022, supplement, the licensee provided an evaluation and results of RB response for the following three cases of mitigating a large cold-leg break LOCA, assuming RB cooling is lost for 14.72 minutes:

(a) Case R – shared Units 1/2 'C' LPSW pump failure at t = 0 from LOCA initiation

(b) Case R1 – shared Units 1/2 'C' LPSW pump failure at t = 10,000 seconds from LOCA initiation. This is at the approximate time when the RB pressure and vapor temperature trends have reached their peak values after the sump recirculation mode has been entered.

(c) Case R2 – shared Units 1/2 'C' LPSW pump failure at t = 7 days from LOCA initiation. In the AOR, RBS system is terminated at this point in the transient. The termination of this system causes a decrease in the steam condensation in the RB atmosphere leading to an increase in the RB vapor temperature for a short duration.

The licensee used the same methodology and assumptions described in UFSAR Section 6.2.1.1.3, for analyzing the above cases. Figures 1 through 7 in the April 14, 2022, supplement show the RB pressure and temperature profiles for the LOCA scenarios with the shared Units 1/2 'C' LPSW pump failure for the above cases along with overlaid graphs of the AOR results in UFSAR Figures 6-36 and 6-37.

The result graphs for all three cases show that the RB peak pressure and vapor temperature values shown in UFSAR Figures 6-36 and 6-37 are not impacted, since the peak values occur before RBCU cooling is initiated in the AOR.

For Case R with the 'C' LPSW pump failure assumed to occur at t = 0, the time delay in restoring LPSW flow to the RBCUs of 14.72 minutes. This results in approximately 10 minutes (instead of the more limiting case of ~15 minutes) the RBCU cooling is lost because the RBCU cooling initiation is assumed to occur at t = 5 minutes from LOCA.

The NRC staff notes that even though the licensee did not analyze the more limiting case in which the shared Units 1/2 'C' LPSW pump fails at t = 5 minutes from LOCA, the NRC staff reviewed the RB temperature and pressure profile trend for Case R in the April 14, 2022, supplement, Figures 1 and 2 respectively, and finds that extending the loss of the shared Units 1/2 'C' LPSW pump for another 5 minutes would not significantly affect the downward

trend of the RB temperature and vapor temperature and would thus not affect the AOR peak RB pressure and vapor temperature.

The NRC staff finds the licensee's evaluation acceptable because, for all cases analyzed, the peak RB pressure and vapor temperature values are bounded by the AOR values shown in UFSAR Figures 6-36 and 6-37. The analyzed peak temperature remains bounded by the AOR equipment qualification temperature profile.

The AOR RB structural design temperature is 286ºF. The RB vapor temperature shown in Figure 6-36 is approximately 280ºF. This bounds the RB wall temperature. Thus, the NRC staff finds that RB structural design temperature will not be exceeded.

The NRC staff also finds the time when RB peak pressure and vapor temperature values are reached is well before the beginning into the LOCA sump recirculation phase. Therefore, any postulated failure affecting LPSW flow to the LPI coolers have no apparent impact at this early stage of the LOCA transient.

3.1.2 RB Sump Temperature Response

The UFSAR Section 6.1.3 states that the use of containment accident pressure (CAP) credit of 0.44 psi [pounds per square inch] in the AOR net positive suction head (NPSH) available (NPSHa) calculation for the RBS and LPI pumps from approximately 3,000 seconds to 30,000 seconds post-LOCA. The licensee developed a base case for comparison with the case in which the LPI coolers are temporarily unavailable. To develop this case, the licensee executed several large hot-leg break LOCA runs by varying the initial and boundary conditions to ensure that at least 0.44 psi of CAP would be available at the beginning of sump recirculation phase. The licensee stated that large RCS hot-leg break LOCA RB response produces more limiting results than the cold-leg break LOCA response for the sump temperature and the available CAP for the LPI and RBS systems pumps NPSHa. For the base case to be used for comparison, the licensee assumed the following initial conditions while all other conditions, such as mass and energy release and single failure are retained:

- Initial RB pressure = 15.9 psia (1.5 psig [pounds per square inch gage])
- Initial RB temperature = 152^{o}F
- RBCU capacity = 120x10^{6} Btu/hr (roughly two RBCUs operating at 75% capacity)
- LPSW temperature = 86.5^{o}F
- Borated water storage tank (BWST) water temperature = 105^{o}F

Through sensitivity analysis the licensee determined that assuming the shared Units 1/2 'C' LPSW pump failure at times greater than t = 0 from LOCA initiation produced results that are bounded by those with the shared Units 1/2 'C' LPSW pump failure at t = 0 assumption. Therefore, only results for 'C' LPSW pump failure at t = 0 transient analysis are presented. Similar to the large cold-leg break LOCA analysis, for this transient, the licensee assumed that the RBCU system is not available for 14.72 minutes and the actual cooling initiates at 5 minutes into the transient. Therefore, the actual cooling is lost for approximately 10 minutes.

In the April 14, 2022, supplement, Figure 8 shows the sump temperature profile for the hot-leg break LOCA base case overlaid by the profile of the case with the shared Units 1/2 'C' LPSW pump failure at time t = 0. At the beginning (2677 seconds) of the sump recirculation phase, the sump temperatures for the shared Units 1/2 'C' LPSW pump failure case and the base case

decreased to 242.3°F and 239.4°F, respectively, showing a maximum difference in temperature of 3°F between the two cases. The temperature difference decreases further into the transient because the restored RBCU and LPI cooling compensates for the difference and the two profiles converge.

The NRC staff notes that the licensee did not analyze a more limiting case in which the shared Units 1/2 'C' LPSW pump fails at t = 5 minutes from a hot-leg break LOCA so that the RBCU cooling flow is lost for 15 minutes approximately. However, NRC staff reviewed the sump temperature profiles comparison shown in Figure 8 and finds that extending the loss of the shared Units 1/2 'C' LPSW pump for another 5 minutes would not significantly affect the sump temperature profile and its trend at the beginning of the sump recirculation phase.

3.1.3 Net Positive Suction Head of the LPI and RBS pumps

The NPSHa at the pump suction is equal to static head at pump suction plus allowed CAP minus head loss in the strainer and pump inlet piping minus saturation pressure head at the sump temperature. The maximum CAP allowed for calculating the NPSH margin (NPSHa - NPSH required (NPSHr)) is the saturation pressure at the sump temperature. In the April 14, 2022, supplement, Figure 9 shows the RB pressure for the shared Units 1/2 'C' LPSW pump failure case and the base case. The licensee stated that the impact on the pressure profile for the shared Units 1/2 'C' LPSW pump failure case is due the degradation of the RBCUs capacity to remove energy from the RB for a 900 second interval during the injection phase from the BWST. The licensee stated that for the LPI pumps, the positive NPSH margin requirement for acceptable pump performance is met using the allowed CAP. Figure 8 shows that the sump temperature is continuously decreasing once entering in the sump recirculation phase, therefore the limiting point with respect to the maximum sump temperature and NPSHa is the point of switchover from the LPI pumps to the RBS pumps begin to take suction from the sump. Figure 9 shows that at the time of switchover, the RB pressure is at an inflection point after which it starts to increase. Based on the maximum sump temperature and the inflection point of the RB pressure, the NPSHa will be at its minimum value at the switchover point.

The following are the results of AOR CAP used and the NPSH and its margin at the switchover point:

RB CAP available based on the saturation pressure at sump temperature:

- AOR, CAP available = 0.44 psi
- Shared Units 1/2 'C' LPSW pump failure case, CAP allowed = 0.27 psi
- Reduction in CAP allowed = (0.44 – 0.27) = 0.17 psi = 0.4 ft water at 242°F.

For the shared Units 1/2 'C' LPSW pump failure case, the NPSHa is decreased by 0.4 ft from the licensee's current calculation of NPSHa. After this reduction, the licensee provided the following NPSHa values for this case for ONS Unit 1:

- RBS Pump A, NPSHa = 18.01 ft
- RBS Pump B, NPSHa = 17.64 ft

Table 1 below, reproduced from Table 1 in the April 14, 2022, supplement, provides the licensee's results for the NPSH margin for the ONS Unit 1 RBS pumps:

Table 1: NPSH Margin for RBS Pumps Based on 0.40 ft Reduction in CAP for the Units 1/2 LPSW Pump C Failure Case

RBS Pump	Pump Flow (gpm)	Available Head (ft)	Strainer Head Loss (ft)	NPSHa (ft)	NPSHr (ft)	NPSH Margin (NPSHa-NPSHr) (ft)
A	1197.88	18.11	0.1	18.01	17.25	0.76
B	1195.56	17.74	0.1	17.64	17.20	0.44

Based on the licensee's calculations provided in Table 1 of the April 14, 2022, supplement, the NRC staff finds there is sufficient NPSH margin, as shown in Table 1 above, for the RBS and LPI pumps to perform their intended function during a DBA LOCA in Unit 1, in conjunction with LOOP and a failure of the shared Units 1/2 'C' LPSW pump.

3.1.4 Temporary Loss of LPI Coolers

UFSAR Table 15-32 lists the transient and accident cases that may be impacted due to the unavailability of LPI system. In the April 14, 2022, supplement, the licensee stated that for some of these cases, the loss of LPI system is only credited during the cooldown portions of the dose consequences analysis, and its unavailability for a short duration (i.e.,14.72 minutes), will not impact these analyses. The NRC staff finds the transients and accidents listed in UFSAR Table 15-32 are not affected because the LPI flow is not credited for their mitigation.

UFSAR Section 15.14 addresses the LOCA acceptance criteria in 10 CFR 50.46(b)(1) through (b)(5). During the LOCA cold-leg safety injection phase, for the first four criteria (i.e., (b)(1) through (b)(4)) the LPI system is not credited. Therefore, the AOR for the first four criteria are not impacted.

To satisfy the 10 CFR 50.46(b)(5) criteria, the LPI system is credited in the LOCA long-term cooling analysis and to maintain the post-LOCA boric acid solubility during the sump recirculation phase. During the unavailability of the LPSW cooling flow through the LPI coolers for approximately 15 minutes in Unit 1, the LPI flow would continue ensuring adequate circulation to prevent boron concentration buildup.

The licensee stated that for long-term cooling during smaller break LOCAs, the LPI fluid temperature is important for the operation of the HPI pumps because the LPI system supplies cooling water to the HPI pump motor coolers. Two of the three HPI pumps may be aligned to take suction from the LPI system during the sump recirculation phase of the LOCA, leaving one HPI pump in reserve. If the sump fluid temperature exceeds 200ºF during the time LPI cooling is lost, operator action will secure the operating HPI pumps until LPI cooling is restored. The licensee stated that during this scenario, SG natural circulation cooling will be used.

The NRC staff finds that 10 CFR 50.46(b)(1) through (b)(4) criteria are not impacted because the LPI flow is not credited prior to the LOCA sump recirculation phase. For satisfying the long-term cooling 10 CFR 50.46(b)(5) criteria, the licensee's proposed methods of cooling using the HPI system and SG natural circulation cooling are acceptable per the ONS licensing basis.

3.1.5 Unit 3 Decay Heat Removal During DBA in Unit 1 in Conjunction with LOOP

In the April 14, 2022, supplement, the licensee provided an evaluation of decay heat removal capability in Unit 3 to bring it to Mode 5 in the scenario in which there is a LOOP in Unit 3 in

conjunction with a DBA in Unit 1, while Unit 1 is receiving cooling water through the cross-connect from one of the two Unit 3 LPSW pumps.

For Unit 1 experiencing a DBA, the licensee listed the required cooling water flow rates and the typical flow rates for the individual Unit 1 LPSW loads. The sum of the required and typical flow rates is 8,632 gpm [gallons per minute] and 13,650 gpm respectively.

For Unit 3, experiencing a LOOP, for performing a natural circulation cooldown to Mode 5, the licensee listed the following total flow rates necessary to meet the LPSW loads:

Total LPSW flow rate at time zero	= 10,050 gpm
Total LPSW flow rate when starting LPI	= 14,050 gpm

Sum of the maximum required Units 1 and 3 flow rates is 27,700 gpm (, i.e., 13,650 + 14,050 = 27,700 gpm).

Each of the Unit 3 pumps, 3A and 3B, has a design flow rate of 15,000 gpm (total 30,000 gpm) which bounds the maximum required Units 1 and 3 flow rate of 27,700 gpm. The licensee stated that an additional 3,500 gpm margin will be available because the following Unit 3 loads can be isolated at 3 hours after LOOP occurs:

- Unit 3 reactor building auxiliary coolers flow = 1,000 gpm
- Unit 3 RCP motor and bearing oil coolers flow = 1,500 gpm
- Unit 3 non-essential header flow = 1,000 gpm

The NRC staff finds that the Unit 3 LPSW pumps, 3A and 3B, have adequate capacity for decay heat removal to bring Unit 3 to Mode 5 in the presence of a LOOP in addition to supplying the flow to Unit 1 through the cross-connect tie.

3.1.6 NRC Staff Technical Conclusions

The licensee analyzed the shared Units 1/2 ‘C’ LPSW pump failure resulting in a loss of cooling flow to the RBCU and LPI system coolers during the proposed LCO 3.7.7, Completion Time for Condition A, Required Action A.1 of 288 hours, and an operator action time of 14.72 minutes to restore the flow during the worst scenario of mitigation of DBA LOCA in Unit 1 in conjunction with a LOOP. Based on the technical evaluations presented above, the NRC staff concludes the following:

- The peak RB pressure and vapor temperature values are bounded by the AOR values shown in UFSAR Figures 6-36 and 6-37.

- The peak RB vapor temperature remains bounded by the AOR equipment qualification temperature profile.

- The peak RB wall temperature is bounded by the AOR RB structural design temperature.

- Since the time when the peak RB pressure and vapor temperature values are reached is well before the time of the beginning of the LOCA sump recirculation phase, any postulated loss of the LPSW flow to the LPI coolers have no impact at the early stage of the LOCA transient.

- The maximum difference in the sump temperature profile between the shared Units 1/2 'C' LPSW pump failure case and the base case is +3°F. This difference decreases further into the transient time as the lost RBCU and LPI cooling flow becomes restored.

- The NPSH margin for the RBS pumps decreases but remains positive, and, therefore, pump performance is acceptable.

- To bring Unit 3 to Mode 5 during a LOOP, the Unit 3 LPSW pumps, 3A and 3B, have adequate capacity for Unit 3 decay heat removal and supply flow to Unit 1 through the cross-connect tie.

3.1.7 NRC Staff Regulatory Conclusions

Based on the above, the NRC staff concludes the following regarding the applicable regulatory requirements in Section 2:

- 10 CFR 50.46(b)(1) through (b)(5) criteria are satisfied, during a Unit 1 LOCA scenario.

- UFSAR, Section 3.1.6, "Criterion 6 – Reactor Core Design (Category A)" is satisfied because in the Unit 1 LOCA scenario, 10 CFR 50.46(b)(1) through (b)(5) criteria are satisfied, and adequate Unit 3 decay heat removal capacity would be available in a concurrent LOOP.

- UFSAR, Section 3.1.10, "Criterion 10 - Containment (Category A)," is satisfied because the Unit 1 RB integrity would be maintained during a LOCA, and the RB leakage would not exceed the AOR value because the peak RB pressure and vapor temperature are bounded by their AOR values.

- UFSAR, Section 3.1.41, "Criterion 41 – Engineered Safety Features Performance Capability (Category A)," is satisfied because during a LOCA in Unit 1, ECCS and RB heat removal system would adequately perform even with loss of LPSW heat removal for 14.72 minutes and would still fulfill the required safety function in the presence of a single failure of an active component.

- UFSAR, Section 3.1.49, "Criterion 49 – Containment Design Basis (Category A)," is satisfied because during a LOCA in Unit 1, RB heat removal system pumps would have adequate NPSH margin and therefore their performance would not be impacted for maintaining the RB pressure, vapor temperature, and leakage below their AOR values.
- UFSAR, Section 3.1.52, "Criterion 52 – Containment Heat Removal Systems (Category A)," is satisfied because during a LOCA in Unit 1, the fan coolers and the RBS system would be available for RB heat removal to maintain its internal pressure and vapor temperature below AOR values.

Based on the above, the NRC staff concludes the proposed Note extending the completion time to 288 hours is acceptable with regard to the accident analysis.

3.2 Mechanical Engineering and Inservice Testing Review

The licensee stated that the alternate LPSW suction source modification will be completed under 10 CFR 50.59. As such, the NRC staff did not review the alternate source modification package as part of this amendment. Considering the alternate source modification will provide an isolation function during the tie-in phase, and a source of LPSW during the testing phase, the NRC staff reviewed the mechanical engineering and IST aspects of the modification. The NRC staff focused its review on the IST of permanent, temporary, and current valves related to the proposed modification.

In its LAR, supplement, during the NRC audit, and in a May 4, 2022, clarification call (ML22124A205), the licensee discussed the proposed alternate suction source modification. The licensee explained that a new endbell at the inlet of the 1B condensate cooler will be installed and approximately 30 feet of 36-inch diameter pipe from the 1B condensate cooler to the shared Units 1/2 ‘A’ and ‘B’ LPSW pump suction header, the alternate suction source piping which will contain two new valves, CCW-518 and 1CCW-541. During Unit 2, Refuel 31 outage (O2R31) with no fuel in the Unit 2 reactor vessel (i.e., Unit 2 not in a TS mode), installation of the 36-inch line stop fitting (i.e., line stop) on the suction header between the suction line for the ‘A’ HPSW pump and ‘B’ LPSW pump will commence. Once the line stop fitting installation is complete, the shared Units 1/2 ‘A’ and ‘B’ LPSW pump suction header will be drained, and a piping “T” fitting will be installed at the shared Units 1/2 ‘A’ and ‘B’ LPSW pump suction header. The “T” fitting will connect the shared Units 1/2 ‘A’ and ‘B’ LPSW suction header to the new 36-inch alternate suction pipe from the 1B condensate cooler.

3.2.1 Licensee’s Evaluation

In its application, as supplemented, the licensee provided information regarding the modification to include CCW-518 and 1CCW-541 butterfly valves in the temporary alternate LPSW suction source configuration. The licensee provided the functions of the two valves, testing activities to demonstrate the capability of the two valves to perform their functions, and the applicability of the two valves to the IST program and the basis for that applicability.

As part of the alternate LPSW suction source piping, the licensee stated that ONS Engineering Change (EC) 419099 will provide for the installation of two new valves, CCW-518 and 1CCW- 541. The licensee stated that these valves are Velan 36-inch, flanged, triple offset butterfly valves with a manual Limitorque gearbox operator. The licensee specified that these valves are passive components that have no active safety function other than to provide a safety-related system pressure boundary. When installed in the closed position, there is no reliance on the valve seat to form a safety-related pressure boundary. The valves are installed to provide an isolation function while the new piping system is installed. When the alternate LPSW suction source piping is placed into service, the CCW-518 and 1CCW-541 valves will be placed in the open position and locked, providing a flow path to the suction for the shared Units 1/2 ‘A’ and ‘B’ LPSW pumps.

Following installation of the CCW-518 and 1CCW-541 valves, the Modification Test Plan (MTP) for EC 419099 will require a demonstration that the CCW-518 and 1CCW-541 valves can be opened and closed successfully with the manual gear operator. The MTP will also require an inservice leak test to be performed when the system is returned to service. Additionally, the MTP will verify the hydraulic performance of the alternate suction source piping system to meet the requirements for performance of the shared Units 1/2 ‘A’ and ‘B’ LPSW pumps.

During the operation of the alternate LPSW suction source the licensee stated, in its April 14, 2022 supplement, that the CCW-518 and 1CCW-541 valves will perform no active safety function and have no seat leakage requirement. As a result, the licensee considers these valves to be exempt from the ASME OM Code, 2004 Edition through 2006 Addenda, Subsection ISTC, “Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants,” based on paragraph ISTC-1200, “Exemptions,” subparagraph (c), which applies to valves used only for system or component maintenance.

With respect to the piping arrangement, after the temporary alternate LPSW suction source is removed, the licensee provided information in its April 14, 2022, supplement, regarding the CCW-518 valve that will remain installed in the piping system, including the functions of the valve, testing activities to demonstrate the capability of the valve to perform its functions, and the applicability of the valve to the IST program and the basis for that applicability.

Following the maintenance activity, the licensee stated that all of the piping for the alternate LPSW suction source will be removed with the exception of the CCW-518 valve and its associated piping tee assembly located at the east end of the shared Units 1/2 ‘A’ and ‘B’ LPSW pump suction header. After the piping is removed, the licensee will lock the CCW-518 valve in the closed position. Any valve seat leakage by the CCW-518 valve will be contained within the downstream safety-related piping tee.

For long-term plant operations with the CCW-518 valve closed and locked, the licensee stated in its April 14, 2022 supplement, that it plans to treat the CCW-518 valve as a passive component with no active safety function. The CCW-518 valve body will provide a safety-related system pressure boundary. The valve seat will not have a leakage limitation requirement. As a result, the licensee considers that the CCW-518 valve, based on its installation and use at Oconee, will be exempt from the IST program, as allowed by the ASME OM Code, 2004 Edition with 2006 Addenda, Subsection ISTC, paragraph ISTC-1200(c), for valves used only for system or component maintenance.

Regarding the initial valve installation, the licensee stated in its April 14, 2022 supplement, that the MTP for EC 419099 will require a demonstration that the CCW-518 valve can be opened and closed successfully with the manual gear operator. The MTP will also require an inservice leak test to be performed for the blind flanges which will be installed on the remaining piping tee when the alternate suction source piping has been removed. The licensee considered that there are no active safety-related functions that require additional testing of the CCW-518 valve.

The licensee stated that UFSAR Section 9.2.2.1 specifies that the LPSW system is designed such that no single component failure will impair emergency safeguards operation. ONS, Units 1 and 2, share three 15,000 gpm LPSW pumps. For Unit 3, there are two 15,000 gpm LPSW pumps. The LPSW-1095 valve provides the capability following a loss of LPSW on Units 1 and 2 or Unit 3 to allow either LPSW system to supply the essential loads. This manual cross-connect capability for a loss of LPSW is identified as a Time Critical Operator Action in the system Design Basis Document (DBD). The capability to cross-connect the Unit 3 LPSW system to support Unit 1 in the event that the remaining shared Units 1/2 ‘C’ LPSW pump becomes inoperable is a compensatory measure for the proposed change to temporarily extend the Completion Time for one required LPSW pump inoperable for Unit 1.

In its application, as supplemented, the licensee provided information regarding the LPSW-1095 valve assembly, including the type of valve and actuator, the valve operating method in the open and close directions, the stroke time of the valve, the operating history of the valve, any

safety-related functions or high safety significant functions not classified as safety-related, application of any IST requirements, and the periodic assessment of the capability of the valve to perform its functions as credited at Oconee.

The licensee stated the LPSW-1095 valve is a PermaSeat, 24-inch Class 150 valve with a manual operator. The valve is an Enertech butterfly valve, and the disk material is SA-351 Grade CF8M. The licensee reported that the valve is opened and closed by manipulating the chained handwheel attached to the actuator gearbox.

The licensee stated that ONS Design Basis Document OSS-0254.00-00-1039, "(Mech) Design Basis Specification for the Low-Pressure Service Water System," specifies that the LPSW-1095 manual valve is not active for UFSAR Chapter 15 events or other scoping events. Operation of the valve is identified as a Time Critical Operator Action in the referenced DBD. The LPSW-1095 valve should be opened within 60 minutes following a loss of LPSW on Units 1 and 2 or Unit 3 to allow either LPSW system to supply essential loads. Procedure PT/0/A/0120/033 is used to verify the Time Critical Operator Action response time for opening the LPSW-1095 valve with the most recent performance of this procedure reporting a completion time of 14.72 minutes. This time includes the operator dispatch to the valve in conjunction with the actual valve stroke time verification as performed in PT/0/A/0251/026, "LPSW Cross-Connect Flush." The licensee reported that the most recent valve stroke time verification for the LPSW-1095 valve resulted in a valve stroke time of 152.25 seconds [approximately 2.5 minutes].

The licensee stated that the LPSW-1095 valve was installed on September 7, 2005. The licensee provided the following maintenance history for the valve:

- A restraining device for the chain-operated valve handwheel was installed on May 9, 2011.
- Maintenance of the valve operator was required in 2012 due to the handwheel spinning freely with a grease leak.
- The valve was found not fully closed during hydraulic isolation on May 22, 2012. A worn segment gear was identified, and the condition was repaired by installing a new operator on June 4, 2012.
- A minor oil leak from the valve gearbox was reported on July 8, 2016, that required cleaning.

The licensee does not consider the LPSW-1095 valve to be within the scope of the current IST Program at Oconee. For example, the licensee indicated that the LPSW System DBD does not credit the valve with an active UFSAR Chapter 15 function, or event mitigation function. When the OM Code of Record for the IST Program at Oconee is updated, the licensee indicated that the LPSW-1095 valve will be evaluated for inclusion in the IST Program Plan for the next interval as a passive, normally closed manual valve that separates the shared Units 1/2 LPSW system from the Unit 3 LPSW system.

As noted, the LPSW System DBD identifies that the LPSW-1095 valve is the subject of a Time Critical Operator Action and should be opened following a loss of LPSW on Units 1 and 2 or Unit 3 to allow either LPSW system to supply the essential loads. Therefore, periodic testing is performed to monitor the performance of this Maintenance Rule (i.e., 10 CFR 50.65) function of the LPSW system for providing backup LPSW between the Units 1/2 and Unit 3 systems. This testing is performed under procedure PT/0/A/0251/026, "LPSW Cross-Connect Flush." The LPSW-1095 valve must be opened during the quarterly flush of the 24-inch LPSW cross-

connect between Unit 1/2 and Unit 3 for not only Maintenance Rule purposes, but also due to the ONS response to NRC Generic Letter 89-13, “Service Water System Problems Affecting Safety-Related Equipment.” Component acceptance is demonstrated by ensuring the valve cycles freely, without restriction. Every two years, the time required to open the valve is recorded, and this time is forwarded to the Emergency Operations Procedure (EOP) group at ONS for Time Critical Operator Action verification.

3.2.2 NRC Staff Evaluation

In response to the licensee’s application, as supplemented, the NRC staff reviewed the mechanical engineering and IST aspects of the temporary alternate LPSW suction source to be installed to support the CCW valves replacement. The NRC staff focused their review on the capability of the components to perform their safety functions during the different plant configuration during the 288 hours requested completion time for tie-in and testing.

As part of this maintenance activity, the licensee will install two butterfly valves (CCW-518 and 1CCW-541) as part of the temporary alternate LPSW suction source piping. The CCW-518 and 1CCW-541 valves are Velan 36-inch, flanged, triple offset butterfly valves each with a manual Limitorque gearbox operator. The CCW-518 valve will remain installed during long-term plant operations. The licensee will remove the 1CCW-541 valve along with the removal of the temporary alternate LPSW suction source when the CCW valve replacement activity is completed. As part of the evaluation of the licensee’s application, as supplemented, the NRC staff reviewed the functions of the currently installed LPSW-1095 valve, which provides the capability following a loss of LPSW on Units 1 and 2 or Unit 3 to allow either LPSW system to supply the essential loads

The installation process for the temporary alternate LPSW suction source will include initially installing the 1CCW-541 valve near the applicable cooler. With the 1CCW-541 valve closed, the licensee then will install piping to the location where the CCW-518 valve will be mounted. The licensee stated that the CCW-518 and 1CCW-541 valves are used merely to provide an isolation function while the new piping system is being installed. After the alternate LPSW suction source piping is confirmed as ready for operation, the licensee will lock the CCW-518 valve and 1CCW-541 valve in their open positions to provide a flow path to the suction for the shared Units 1/2 ‘A’ and ‘B’ LPSW pumps. The CCW-518 valve and 1CCW-541 valve do not have an active safety function and will remain locked open during the operation of the alternate LPSW suction source. As indicated in the April 14, 2022 supplement, the CCW-518 valve and 1CCW-541 valve only provide a safety-related pressure boundary function with respect to the valve body for each valve in the open position.

Upon completion of the CCW valve replacement activity, the licensee will remove the temporary alternate LPSW suction source piping including the 1CCW-541 valve. The licensee plans to retain the CCW-518 valve in the final piping system to allow for future maintenance activities. As described in the April 14, 2022 supplement, the licensee will lock closed the CCW-518 valve and install blind flanges downstream of the valve. The licensee will rely on the blind flanges as the safety-related pressure boundary for the system downstream of the CCW-518 valve. The NRC staff finds that the CCW-518 valve may be considered a valve that is used only for system or component maintenance because the CCW-518 valve will be locked closed and not relied upon to perform an isolation function in the closed position. As a result, the CCW-518 valve may be excluded from the IST Program at Oconee as allowed by ASME OM Code, Subsection ISTC, paragraph ISTC-1200(c).

As part of the installation activities, the licensee will demonstrate that the CCW-518 valve and 1CCW-541 valve can be opened and closed successfully with the manual gear operator. The licensee will perform an inservice leak test when the system is returned to service. The licensee will verify the hydraulic performance of the alternate LPSW suction source piping system to meet the requirements for the performance of the shared Units 1/2 'A' and 'B' LPSW pumps. Following removal of the temporary alternate LPSW suction source piping, the licensee will perform an inservice leak test of the blind flanges that provide the safety-related pressure boundary downstream of the CCW-518 valve.

The NRC staff reviewed the functions of the LPSW-1095 valve regarding its capability to allow LPSW flow between the Oconee units. The LPSW-1095 valve is an Enertech PermaSeat 24-inch butterfly valve with a manual operator. The licensee stated that it has not included the LPSW-1095 valve in the current ONS IST program, because the LPSW system DBD does not credit the LPSW-1095 valve with an active UFSAR Chapter 15 function, or event mitigation function. However, the licensee reported that the LPSW system DBD specifies that the LPSW-1095 valve is the subject of a Time Critical Operator Action, and should be opened following a loss of LPSW on Units 1 and 2, or Unit 3, to allow either LPSW system to supply the essential loads. The licensee specified that periodic testing is performed to monitor the performance of this function of the LPSW system. The licensee indicated that the LPSW-1095 valve is opened during the quarterly flush of the 24-inch LPSW cross-connect between Units 1/2 and Unit 3. The licensee also indicated that every 2 years, the time required to open the LPSW-1095 valve is provided to the Oconee Emergency Operating Procedures (EOP) group for evaluation. Since its installation in 2005, the licensee reported infrequent maintenance issues with the LPSW-1095 valve. When the OM Code of Record for the IST Program at Oconee is updated in accordance with 10 CFR 50.55a, the licensee indicated that the LPSW-1095 valve will be evaluated for inclusion in the IST Program Plan as a passive, normally closed manual valve that separates the Units 1/2 LPSW system from the Unit 3 system.

Based on the above, the NRC staff finds that the licensee's plans to test the CCW-518 valve and 1CCW-541 valve to demonstrate their capability to perform their safety function as part of the temporary alternate LPSW suction source at Oconee are reasonable based on the intended purpose of these valves. Further, the NRC staff finds that the long-term plans for the treatment of the CCW-518 valve are consistent with the ASME OM Code as a locked open valve to be used only for maintenance activities. With respect to the LPSW-1095 valve, the NRC staff finds that the periodic testing by the licensee provides reasonable assurance of the capability of the LPSW-1095 valve to perform its intended function.

3.2.3 NRC Staff Conclusion

As described above, the NRC staff concludes that the licensee has established reasonable plans to test the CCW-518 valve and 1CCW-541 valve to perform their safety functions as part of the temporary alternate LPSW suction source at Oconee. Further, the NRC staff concludes that the long-term plans for the treatment of the CCW-518 valve to be consistent with the ASME OM Code. With respect to the LPSW-1095 valve, the NRC staff concludes that the periodic verification of its performance capability by the licensee provides reasonable assurance of the capability of the LPSW-1095 valve to perform its intended function.

3.3 Plant Systems Review

The plant systems review focused on the Unit 3 LPSW cross-connect to the shared Units 1/2 LPSW header through LPSW-1095 valve. In its April 14, 2022, supplement, the licensee stated the use for this cross-connect is defense-in-depth and identified it as Compensatory Measure No. 1 to be used in the event the shared Units 1/2 'C' LPSW pump becomes inoperable during the temporarily extended completion time (288 hours).

3.3.1 Licensee's Evaluation

The licensee states the following in the LAR:

> The alternate suction source described in Section 3.1 above will be placed into service to meet the LCO of TS 3.7.7 while the CCW valves are replaced. However, prior to placing the alternate suction source into service to meet the LCO, only the shared Units 1 and 2 'C' LPSW pump will be OPERABLE to support Unit 1 (see Figure 5 of Attachment 4). The required window to complete the tie-in and perform a functional test of the alternate suction source is projected to require 288 hours, which exceeds the TS 3.7.7 Completion Time for Required Action A.1 of 72 hours. Although operability of the single Units 1 and 2 'C' LPSW Pump can provide for the specified safety function of the system for Unit 1, ONS has the capability to procedurally cross connect the ONS Unit 3 LPSW pumps to the ONS Unit 1 and 2 LPSW header by opening valve LPSW-1095 should the 'C' LPSW Pump become inoperable. This cross connect is the "ACTION/EXPECTED RESPONSE" for a loss of Unit 1 and 2 LPSW pumps in ONS procedure AP/1/A/1700/024, "Loss of LPSW.". . . This cross connect capability provides defense-in-depth during the proposed 288-hour temporary Completion Time of Require[d] Action A.1 with Unit 2 defueled and required loads isolated.

As stated in UFSAR Section 9.2.2, "Cooling Water Systems," LPSW system provides cooling water to RB cooling units, decay heat removal coolers, HPI pump motor bearing coolers, and motor-driven emergency feedwater pump motor air coolers. The RB cooling units provide containment heat removal and decay heat removal coolers provide cooling to LPI in RB emergency sump recirculation mode operation of low-pressure injection system following postulated LOCAs as discussed in UFSAR Chapter 6. Of transients and accidents analyzed in UFSAR Chapter 15, steam generator tube rupture and small LOCA credit high pressure injection system for inventory control during the initial phase and steam line break accident credits motor-driven emergency feedwater system.

The increase in risk that may result from extending TS 3.7.7, Condition A, Required Action A.1 from 72 hours to 288 hours depends on the capability of the Unit 3 LPSW pumps to compensate for a scenario where a transient or an accident occurs and the shared Units 1/2 'C' LPSW pump fails. In its April 14, 2022, LAR supplement, the licensee states the following:

> The hydraulic models for the LPSW system used to evaluate the LOCA/LOOP response are separate for the Unit 1/Unit 2 and Unit 3 systems. Within these analyses is an evaluation of various data for the effects of the two systems being cross connected that concludes there is no flow division away from the LOCA unit. The basic supposition is that all TS required pumps are available and a single failure (pump or electrical bus) occurs on the LOCA unit. Aside from flow rates, the analysis predicts the LPSW header

pressure for the LPSW system associated with the LOCA unit. Periodic performance testing shows that the normal header pressure is roughly the same for both systems. When Engineered Safety Features Actuation System (ESFAS) actuation occurs with the postulated single failure that results in one LPSW pump failing to start, it is assumed that the LPSW system associated with the LOCA unit will experience a slight lowering in header pressure. Thus, the LPSW system associated with the non-LOCA unit would reasonably be expected to provide some flow to the LOCA unit. This flow is not credited in any analysis since the LPSW systems are modeled independently. Note that engineering judgment is applied here, as the analysis does not assume the Unit 1/Unit 2 'A' and 'B' LPSW pumps are inoperable, along with a failure of the 'C' LPSW pump.

The licensee states that the configuration for the proposed change with Unit 1 in TS 3.7.7, Condition A (One required LPSW pump inoperable), and assuming a single failure of the remaining shared Units 1/2 'C' LPSW pump, results in an unanalyzed scenario relative to mitigating a DBA or transient because under normal or accident conditions one LPSW pump per unit must operate to supply loads. However, the licensee states that there is reasonable assurance that starting the non-running Unit 3 LPSW pump, as part of the Loss of LPSW Abnormal Procedure would make up for most of the flow loss when the systems are cross connected because Unit 2 will be defueled in conjunction with the proposed change with necessary loads isolated. The licensee expects the flow rates near those in the existing analyses when two LPSW pumps are operating for two units (in this case Units 1 and 3) with LPSW demands.

The licensee states that a periodic test is conducted that places the LPSW cross connect in service with the shared Units 1/2 LPSW system supplying all three units (i.e., the Unit 3 LPSW pumps are turned off). The licensee states that the test is successfully performed with regularity and header pressure is maintained well above what accident analysis predicts would exist during an event and that although during the test the shared Units 1/2 LPSW system supplies Unit 3, it would be expected that the two Unit 3 LPSW pumps could supply any two units since the cross connect piping is a 24" line with no check valves in the line because the pressure drop in the cross connect piping would be the same regardless of the direction of flow. Therefore, using engineering judgment, the licensee expects that two pumps on the Unit 3 LPSW system could carry the loads for any two units, when the third unit is defueled and appropriate loads isolated, as the case for the proposed change.

In its April 14, 2022 supplement, the licensee states that HPI pumps use LPSW as the normal means to cool the motor's upper thrust bearing and LPSW is backed up by HPSW, which will be supplied from the Elevated Water Storage Tank (EWST) if the HPSW pumps are not running. The licensee states that enough inventory exists in the EWST to support placing the LPSW cross-connect in service since the time to align is much shorter than the time before the EWST requires refilling.

The licensee states that LPSW also provides cooling water to the motor driven emergency feedwater pump motor air coolers and there is no backup; however, a turbine driven emergency feedwater pump exists that is also backed up by HPSW and would be available until the LPSW cross connect is placed in service. The licensee states that additional emergency feedwater (EFW) system redundancy includes, (a) ability to cross connect EFW systems manually between all three units and (b) full capacity SSF ASW pump capable of feeding all three unit's SGs simultaneously.

3.3.2 NRC Staff Evaluation

As provided in the licensee's April 14, 2022 supplement, the NRC staff finds that based on the licensee's evaluation, the non-running Unit 3 LPSW pump being started as part of the Loss of LPSW Abnormal Procedure, the periodic tests, and the licensee's engineering judgment; if a transient or an accident occurs and the shared Units 1/2 'C' LPSW pump fails, there is reasonable assurance that the cross-connect from Unit 3 LPSW pumps to Unit 1 would provide adequate flow for functions necessary to mitigate accidents.

As provided in the licensee's April 14, 2022 supplement, the NRC staff finds that if the shared Units 1/2 'C' LPSW pump fails, there is reasonable assurance that both high pressure injection pumps and EFW pumps would continue to be cooled from EWST water until the LPSW cross connect is placed in service because of the availability of EWST, turbine driven emergency feedwater pump, and other redundancies.

3.3.3 NRC Staff Conclusion

The NRC staff concludes that if the shared Units 1/2 'C' LPSW pump becomes inoperable, the compensatory measure provided to procedurally cross-connect the Unit 3 LPSW pumps to the shared Units 1/2 LPSW header and cooling from EWST water until the cross connect is placed in service would enable Unit 3 LPSW pumps to provide sufficient flow for functions necessary to mitigate accidents for Unit 1 when Unit 2 is defueled. Therefore, the NRC staff determines that there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change. Therefore, in accordance with 10 CFR 50.40(a) and 10 CFR 50.57(a)(3), the NRC staff concludes that the proposed extension of Completion Time for TS 3.7.7, Condition A, Required Action A.1 from 72 hours to 288 hours is acceptable.

3.4 Human Factors Review

3.4.1 Description of Personnel Actions

The activities which are scheduled during the proposed extended LCO will include procedural actions which differ from the current TS and LCO. These proposed changes include work performed under this LCO. The submittal also includes a compensatory measure for defense-in-depth to cross-connect Unit 3 to the shared Units 1/2 LPSW system.

The submittal provided the following list of activities with the projected allotted times that are scheduled to take place during the proposed temporary 288-hour TS 3.7.7 Action statement:

- Tag Out of LPSW Pumps 'A' and 'B' (enter TS 3.7.7 Action statement) – 6 hours
- Install Line Stop – 48 hours
- Drain 'A' and 'B' LPSW Header section of pipe – 12 hours
- Remove 'A' and 'B' LPSW Header blind flange at dead end of header pipe – 12 hours
- Install 36" valve to pipe Header – 12 hours
- Torque 36" valve – 18 hours
- Connect alternate suction pipe – 12 hours
- Torque connections – 18 hours
- Connect to 1B Condensate Cooler (i.e., water supply) – 24 hours
- Clear Tags, fill and vent 'A' and 'B' LPSW Header and alternate suction source line – 12 hours

- Test LPSW ‘A’ and ‘B’ Pumps – 18 hours

The allotted times presented in the submittal are each rounded to the nearest six-hour shift. These actions facilitate the replacement of three CCW valves (2CCW-41, CCW-72, CCW-73). The proposed change described affected systems and the associated actions and indicated that the changes were limited to actions directly affecting the LPSW system.

Additionally, the submittal discussed the availability of the procedural action to cross connect Unit 3 LPSW pumps to the shared Units 1/2 LPSW system. The licensee stated that ONS has the capability to cross connect the Unit 3 LPSW pumps to the shared Units 1/2 LPSW header. This connection is completed by opening valve LPSW-1095 should the shared Units 1/2 ‘C’ LPSW pump become inoperable and is done in response to a loss of the shared Units 1/2 LPSW pumps in ONS procedures. The submittal stated that this cross connect capability provides defense-in-depth during the proposed extended LCO completion time while Unit 2 is defueled and required loads are isolated.

3.4.2 Risk Assessment to Determine Human Factors Level of Review

The NRC staff reviewed the proposed changes and considered the human actions to tie-in and test the alternate suction source and, if needed, to cross connect Unit 3 LPSW to the shared Units 1/2 LPSW header. The proposed human actions occur during the refueling of Unit 2. The NRC staff reviewed Table A.2, “Generic PWR Human Actions That Are Risk Important,” in Appendix A of NUREG-1764 and verified that no actions from that table are included in the submittal.

The NRC staff considered available relevant risk information in the submittal. ONS provided the results of the risk associated with extending the completion time for one required LPSW pump inoperable (TS 3.7.7, Action A) during O2R31 from 72 hours to 288 hours on a temporary, one-time basis. The licensee’s evaluation included probabilistic risk assessment (PRA) results for internal events and fire. The licensee calculated the core damage frequency in these two PRA models and the results and determined the deltas between the proposed change as well as the baseline. From this, the total Incremental Conditional Core Damage Probability (ICCDP) was calculated. The application dated September 2, 2021, states the following:

> For both internal events and fire, Core Damage Frequency (CDF) results were obtained and deltas between the proposed configuration and baseline CDF values were then determined. From these delta values, a total Incremental Conditional Core Damage Probability (ICCDP) was calculated for the 216-hour period beyond the 72-hour allowed outage time that is being requested to perform the work.

The ONS internal events model resulted in an internal events ICCDP of 5.2E-8.

The NRC staff confirmed independently the licensee’s results by running a Standardized Plant Analysis Risk (SPAR) model for the proposed configuration. The NRC staff model results determined a change in risk of 2E-10, which confirms the licensee’s evaluation that the proposed 288-hour Completion time extension is not risk significant. Therefore, the NRC staff determined this approach to be acceptable.

Based on the review of Table A.2, in NUREG-1764 and range in which the ICCDP fall according to NUREG-1764, the NRC staff determined that a Level 3 review, the least stringent, human factors review was appropriate. Therefore, the NRC staff applied the criteria for a Level 3 review.

3.4.3 NRC Staff Evaluation

The licensee described the operator actions associated with the extended LCO. The NRC staff reviewed the list of proposed scheduled activities and verified that these actions are in the low-risk category by assessing them against the applicable tables in NUREG-1764. The NRC staff also considered the defense-in-depth actions (cross connecting the units), and based on the licensee's results and independent NRC staff results, the NRC staff finds the proposed 288-hour extension presents a minimal change in risk.

3.4.4 NRC Staff Conclusion

The NRC staff confirmed that the operator actions described in the amendment are low-risk, and, therefore, the staff conducted a Level 3 review which focused on ensuring that defense-in-depth is not degraded. The NRC staff finds that the existing operator actions contained in the current licensing basis continue to provide a reasonable means of defense-in-depth during the outage period. The NRC staff concludes there is not a significant increase in risk as a result of approving this amendment. Based on the above, the NRC staff concludes the requested change to TS 3.7.7 acceptable with regard to human factors engineering.

3.5 Technical Specification Branch Review

Proposed Changes to TS LCO 3.7.7, "Low Pressure Service Water (LPSW) System"
Condition A of TS LCO 3.7.7 addresses one required LPSW pump inoperable. The required action for Condition A is to restore required LPSW pump to operable status within 72 hours. The licensee proposed to add a note to extend the completion time to 288 hours during the Unit 2, Refuel 31 for the tie-in and testing of an alternate suction source to the shared Units 1/2 'A' and 'B' LPSW pumps. The additional time provided by the note is requested on a one-time temporary basis and is limited to when the Unit 2 is defueled, the appropriate LPSW loads are secured, and is contingent on implementation of the compensatory measures described in Attachment 1 to the licensee's April 14, 2022 supplement.

The NRC staff has reviewed the licensee's proposed compensatory measures. The proposed compensatory measures include ensuring the capability to cross-connect the Unit 3 LPSW system should a loss of all LPSW on Unit 1 occur and protecting essential equipment to prevent a loss of all LPSW condition and mitigate it should one transpire. The proposed compensatory measures ensure adequate protection of public health and safety while the licensee is conducting the modification by providing a heat sink for the removal of process and operating heat from safety related components during a transient or accident. The NRC staff finds that the compensatory measures are appropriate to reduce the risk of unnecessary plant transients, protect systems needed for accident mitigation, and raise operator awareness of necessary recovery actions should a loss of all LPSW on Unit 1 were to occur.

In the April 14, 2022 supplement, and as reflected in the TS Bases for TS LCO 3.7.7, the licensee clarified that the added note expires at 288 hours or upon completion of the tie-in and satisfactory testing of an alternate suction source to the shared Units 1/2 'A' and 'B' LPSW pumps, whichever comes first. Therefore, at the completion of the final tie-in and testing of the

alternate suction source, TS LCO 3.7.7 required action A.1 will be exited, as the LCO for Unit 1 would be considered met at that point in time. This will reduce the time the licensee is in Condition A to the minimum necessary to complete the modification, minimizing the overall risk associated with the modification.

The NRC staff concludes the proposed change acceptable because the licensee has appropriate compensatory measures in place to prevent and mitigate any unintended consequences resulting from the extended completion time. In addition, with the proposed one-time temporary note, TS LCO 3.7.7 Required Action A.1, continues to meet 10 CFR 50.36(c)(2) as the compensatory measures provide appropriate remedial action until the condition in the LCO can be met.

3.6 Risk Insights

The LAR was submitted following the guidance in Regulatory Guide (RG) 1.177, Revision 1, "An Approach for Plant Specific, Risk-Informed Decision Making: Technical Specifications" (ML100910008). During the acceptance review of the amendment, the NRC staff determined, in accordance with LIC-109, Revision 3, "Acceptance Review Procedures for Licensing Basis Changes" (ML20036C829) that the LAR should be reviewed as a Type 2 LAR as defined in LIC-206, Revision 1, "Integrated Risk-Informed Decision-Making for Licensing Reviews," (ML19263A645). A Type 2 application contains PRA information but is not reviewed as a risk-informed application in accordance with RG 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" (ML17317A256) and RG 1.200, Revision 3, "Acceptability of Probabilistic Risk Assessment Results for Risk-Informed Activities" (ML20238B871).

3.6.1 Licensee's Evaluation

In Section 3.3 of the enclosure to the LAR, the licensee described the risk insights that support the deterministic evaluation of the proposed one-time change to the LPSW pump system completion time extension. The licensee stated to obtain risk insights for the operating Unit 1, in the proposed configuration, the Oconee PRA models of record for fire and internal events were used. The licensee made modifications to the models to reflect the proposed configuration. For both fire and internal events, the licensee obtained core damage frequency (CDF) results and determined deltas between the proposed configuration and baseline CDF values. From these delta values, the licensee calculated a total ICCDP for the 216-hour period beyond the 72-hour allowed outage time that is being requested to perform the modification work.

The licensee concluded, in the application dated September 2, 2021, that:

> The design and licensing basis mitigation function of the LPSW System is not affected by the proposed change. The LPSW System capability for performing its specified safety function is the same during the proposed temporary Completion Time of 288 hours as it is during the existing Completion Time of 72 hours for TS 3.7.7, Condition A, Required Action A.1.
>
> The evaluation of the LPSW cross connect procedural action as defense-in-depth and the results of the risk insights described above provide assurance that the equipment required to safely shutdown the plant and mitigate the effects of a design basis accident will remain capable of performing their safety functions

when Unit 1/2 LPSW pumps ‘A’ and ‘B’ are out-of-service during the proposed temporary Completion Time.

3.6.2 NRC Staff Evaluation

The licensee applied RG 1.177 to gain risk insights for the proposed one-time increase in the completion time for the LPSW pump system from 72 to 288 hours. The NRC staff notes the following: (1) the LAR did not include a discussion using the three-tiered implementation approach discussed in RG 1.177 for a one-time completion time extension, (2) the LAR did not include a discussion of Oconee PRA technical adequacy based on RG 1.200, “Acceptability of Probabilistic Risk Assessment Results for Risk-Informed Activities,” which is identified in RG 1.177 as one acceptable approach for determining the adequacy of the PRA, (3) The discussion of the history of the peer reviews of the internal events PRA did not support a conclusion that all aspects of the PRA had been independently peer reviewed against all the internal events supporting requirements in American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) SA-b-2009, “Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications” and (4) the fire PRA has not yet been peer-reviewed. Given the notes above, and because this application was submitted with risk insights, and not risk-informed, the NRC staff can use the risk insights to support deterministic safety evaluation findings.

The NRC staff used the NRC’s SPAR model for the Oconee Nuclear Station to evaluate the qualitative risk insights associated with the licensee’s request. The results of the NRC staff’s independent assessment align with the licensee provided risk insights and supports the licensee’s conclusion that the requested increased completion time is not risk significant.

3.6.3 NRC Staff Conclusion

The licensee provided risk insights associated with the 216-hour period beyond the 72-hour allowed outage time that is being requested to perform the modification work. The results of the NRC staff’s independent assessment were consistent with the results reported by the licensee and below the quantitative change in risk acceptance guidelines in RG 1.177. Because this is not a risk-informed LAR, the internal events and fire PRA models used by the licensee to derive risk insights were not reviewed by NRC staff to determine their technical acceptability to support this SE. However, based on the licensee’s risk insights, as independently verified by the NRC staff using the SPAR model, the NRC staff concludes that the risk insights support the deterministic review findings made in this SE.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official was notified of the proposed issuance of the amendments on May 24, 2022. On May 27, 2022, the State official confirmed that the State of South Carolina had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change the requirements with respect to the installation or use of facility components 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 published in the *Federal Register* on November 2, 2021 (86 FR 60481), 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.

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Date: July 15, 2022

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 – ISSUANCE OF AMENDMENT NOS. 424, 426 AND 425, RE: REVISE TECHNICAL SPECIFICATION 3.7.7, "LOW PRESSURE SERVICE WATER (LPSW) SYSTEM" TO EXTEND THE COMPLETION TIME FOR ONE REQUIRED INOPERABLE LPSW PUMP ON A TEMPORARY BASIS (EPID L-2021-LLA-0157) DATED JULY 15, 2022

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NAME	BGreen	JWhitman	MWright
DATE	05/09/2022	04/05/2022	07/12/2022
OFFICE	NRR/DORL/LPL2-1/BC	NRR/DORL/LPL2-1/PM	
NAME	MMarkley	SWilliams	
DATE	07/15/2022	07/15/2022	

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