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

March 3, 2015

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 1 - ISSUANCE OF AMENDMENT RE: REVISE TECHNICAL SPECIFICATIONS END STATES (TAC NO. MF1182)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 253 to Renewed Facility Operating License No. DPR-51 for Arkansas Nuclear One, Unit No. 1 (ANO-1). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated March 26, 2013, as supplemented by letters dated November 14, 2013, and August 19, October 22, and December 5, 2014.

The amendment modifies the ANO-1 TS requirements for end states associated with the implementation of the NRC-approved Topical Report BAW-2441-A, Revision 2, "Risk-Informed Justification for LCO End-State Changes," as well as Required Actions revised by a specific Note in TS Task Force change traveler (TSTF)-431, Revision 3, "Change in Technical Specifications End States (BAW-2441)."

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

Sincerely,

Andrea E. George, Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosures:
1. Amendment No. 253 to DPR-51
2. Safety Evaluation

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-313

ARKANSAS NUCLEAR ONE, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 253
Renewed License No. DPR-51

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated March 26, 2013, as supplemented by letters dated November 14, 2013, and August 19, October 22, and December 5, 2014, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

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

    (2) <u>Technical Specifications</u>

    The Technical Specifications contained in Appendix A, as revised through Amendment No. 253, are hereby incorporated in the renewed license. EOI shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented within 90 days from the date of issuance. In addition, the licensee shall incorporate the two commitments listed in Section 3.5 of the safety evaluation associated with this amendment in the next periodic update of the ANO-1 Safety Analysis Report, in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

E R. Oesterle

Eric R. Oesterle, Acting Chief
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: March 3, 2015

ATTACHMENT TO LICENSE AMENDMENT NO. 253

RENEWED FACILITY OPERATING LICENSE NO. DPR-51

DOCKET NO. 50-313

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

Operating License

REMOVE	INSERT
3	3

Technical Specifications

REMOVE	INSERT
3.3.5-1	3.3.5-1
3.3.6-1	3.3.6-1
3.4.6-1	3.4.6-1
3.4.15-2	3.4.15-2
3.5.4-1	3.5.4-1
----	3.5.4-2
3.6.2-3	3.6.2-3
3.6.3-3	3.6.3-3
----	3.6.3-4
3.6.4-1	3.6.4-1
3.7.7-1	3.7.7-1
3.7.9-1	3.7.9-1
3.7.9-2	3.7.9-2
3.7.9-3	3.7.9-3
3.7.10-1	3.7.10-1
3.8.1-4	3.8.1-4
3.8.1-5	3.8.1-5
3.8.1-6	3.8.1-6
3.8.4-1	3.8.4-1
3.8.4-2	3.8.4-2
3.8.7-2	3.8.7-2
3.8.9-1	3.8.9-1

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

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

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

(1) Maximum Power Level

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

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 253, are hereby incorporated in the renewed license. EOI shall operate the facility in accordance with the Technical Specifications.

(3) Safety Analysis Report

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

(4) Physical Protection

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

3.3 INSTRUMENTATION

3.3.5 Engineered Safeguards Actuation System (ESAS) Instrumentation

LCO 3.3.5 Three ESAS analog instrument channels for each Parameter in Table 3.3.5-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5-1.

ACTIONS

------------------------------------NOTE------------------------------------
Separate Condition entry is allowed for each Parameter.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Parameters with one analog instrument channel inoperable.	A.1 Place analog instrument channel in trip.	1 hour
B. One or more Parameters with more than one analog instrument channel inoperable. <u>OR</u> Required Action and associated Completion Time not met.	B.1 Be in MODE 3. <u>AND</u> B.2 --------------NOTE-------------- Only required for RCS Pressure - Low setpoint. ----------------------------------- Reduce RCS pressure < 1750 psig. <u>AND</u> B.3 --------------NOTES------------ 1. Only required for Reactor Building Pressure High setpoint and High High setpoint. 2. LCO 3.0.4.a is not applicable when entering Mode 4. ----------------------------------- Be in MODE 4.	6 hours 36 hours 12 hours

3.3 INSTRUMENTATION

3.3.6 Engineered Safeguards Actuation System (ESAS) Manual Initiation

LCO 3.3.6 Two manual initiation channels of each one of the ESAS Functions below shall be OPERABLE:

a. High Pressure Injection (channels 1 and 2);

b. Low Pressure Injection (channels 3 and 4);

c. Reactor Building (RB) Cooling (channels 5 and 6);

d. RB Spray (channels 7 and 8); and

e. Spray Additive (channels 9 and 10).

APPLICABILITY: MODES 1 and 2,
MODES 3 and 4 when associated engineered safeguards equipment is required to be OPERABLE.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more ESAS Functions with one channel inoperable.	A.1 Restore channel to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 ---NOTE--- LCO 3.0.4.a is not applicable when entering Mode 4. --- Be in MODE 4.	6 hours 12 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops – MODE 4

LCO 3.4.6 Two loops consisting of any combination of RCS loops and decay heat removal (DHR) loops shall be OPERABLE and one OPERABLE loop shall be in operation.

--NOTE--

All reactor coolant pumps (RCPs) and DHR pumps may be removed from operation for ≤ 1 hour provided:

a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

b. Core outlet temperature is maintained at less than or equal to a temperature which is 10°F below saturation temperature.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required loop inoperable.	A.1 --------------NOTE---------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Initiate action to restore a second loop to OPERABLE status.	 Immediately

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required reactor building atmosphere radioactivity monitor inoperable.	B.1.1 Analyze grab samples of the reactor building atmosphere.	Once per 24 hours
	<u>OR</u>	
	B.1.2 ----------------NOTE------------- Not required until 12 hours after establishment of steady state operation at or near operating pressure. -------------------------------------	
	Perform SR 3.4.13.1.	Once per 24 hours
	<u>AND</u>	
	B.2 Restore required reactor building atmosphere radioactivity monitor to OPERABLE status.	30 days
-----------------NOTE---------------- Only applicable when the reactor building atmosphere gaseous radiation monitor is the only OPERABLE monitor. --	C.1 Analyze grab samples of the reactor building atmosphere.	Once per 12 hours
	<u>AND</u>	
C. Reactor Building sump monitor inoperable.	C.2 Restore reactor building sump monitor to OPERABLE status.	7 days
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	D.2 --------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. -------------------------------------	
	Be in MODE 4.	12 hours
E. Both required monitors inoperable.	E.1 Enter LCO 3.0.3.	Immediately

3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

3.5.4 Borated Water Storage Tank (BWST)

LCO 3.5.4 The BWST shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. BWST boron concentration not within limits.	A.1 Restore BWST to OPERABLE status.	8 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	B.2 --------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------ Be in MODE 4.	12 hours
C. BWST water temperature not within limits.	C.1 Restore BWST to OPERABLE status.	8 hours
D. BWST inoperable for reasons other than Condition A or C.	D.1 Restore BWST to OPERABLE status.	1 hour
E. Required Action and associated Completion Time of Condition C or D not met.	E.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	E.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.4.1	-----------------------------NOTE----------------------------- Only required to be performed when ambient air temperature is < 40°F or > 110°F. --- Verify BWST borated water temperature is ≥ 40°F and ≤ 110°F.	24 hours
SR 3.5.4.2	Verify BWST borated water level is ≥ 38.4 feet and ≤ 42 feet.	7 days
SR 3.5.4.3	Verify BWST boron concentration is ≥ 2270 ppm and ≤ 2670 ppm.	7 days

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	B.2	Lock an OPERABLE door closed in the affected air lock.	24 hours
	<u>AND</u>		
	B.3	---------------NOTE-------------- Air lock doors in high radiation areas may be verified locked closed by administrative means. ------------------------------------- Verify an OPERABLE door is locked closed in the affected air lock.	 Once per 31 days
C. One or more reactor building air locks inoperable for reasons other than Condition A or B.	C.1	Initiate action to evaluate overall reactor building leakage rate per LCO 3.6.1.	Immediately
	<u>AND</u>		
	C.2	Verify a door is closed in the affected air lock.	1 hour
	<u>AND</u>		
	C.3	Restore air lock to OPERABLE status.	24 hours
D. Required Action and associated Completion Time not met.	D.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	D.2	---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Be in MODE 4.	 12 hours

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. ------------NOTE---------------- Only applicable to penetration flow paths with only one reactor building isolation valve and a closed system. ----------------------------------- One or more penetration flow paths with one reactor building isolation valve inoperable.	C.1	Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange.	72 hours
	AND		
	C.2	-------------NOTES------------- 1. Isolation devices in high radiation areas may be verified by use of administrative means. 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ----------------------------------- Verify the affected penetration flow path is isolated.	Once per 31 days
D. Required Action and associated Completion Time not met.	D.1	Be in MODE 3.	6 hours
	AND		
	D.2	---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.3.1	Verify each reactor building purge isolation valve is closed.	31 days
SR 3.6.3.2	-----------------------------NOTE----------------------------- Valves and blind flanges in high radiation areas may be verified by use of administrative means. --- Verify each reactor building isolation manual valve and blind flange that is located outside the reactor building and not locked, sealed, or otherwise secured, and is required to be closed during accident conditions is closed, except for reactor building isolation valves that are open under administrative controls.	31 days
SR 3.6.3.3	-----------------------------NOTE----------------------------- Valves and blind flanges in high radiation areas may be verified by use of administrative means. --- Verify each reactor building isolation manual valve and blind flange that is located inside the reactor building and not locked, sealed, or otherwise secured, and required to be closed during accident conditions is closed, except for reactor building isolation valves that are open under administrative controls.	Prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days
SR 3.6.3.4	Verify the isolation time of each automatic power operated reactor building isolation valve is within limits.	In accordance with the Inservice Testing Program
SR 3.6.3.5	Verify each automatic reactor building isolation valve that is not locked, sealed, or otherwise secured in position, actuates to the isolation position on an actual or simulated actuation signal.	18 months

3.6 REACTOR BUILDING SYSTEMS

3.6.4 Reactor Building Pressure

LCO 3.6.4 Reactor building pressure shall be ≥ -1.0 psig and ≤ +3.0 psig.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Reactor building pressure not within limits.	A.1 Restore reactor building pressure to within limits.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	AND	
	B.2 ---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.4.1 Verify reactor building pressure is ≥ -1.0 psig and ≤ +3.0 psig.	12 hours

3.7 PLANT SYSTEMS

3.7.7 Service Water System (SWS)

LCO 3.7.7 Two SWS loops shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SWS loop inoperable.	A.1 --------------NOTES-------------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for diesel generator made inoperable by SWS. 2. Enter Applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops - MODE 4," for decay heat removal made inoperable by SWS. --- Restore SWS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. <u>AND</u> B.2 --------------NOTE-------------- LCO 3.0.4.a is not applicable when entering Mode 4. --- Be in MODE 4.	6 hours 12 hours

3.7 PLANT SYSTEMS

3.7.9 Control Room Emergency Ventilation System (CREVS)

LCO 3.7.9 Two CREVS trains shall be OPERABLE.

---NOTES---

1. The control room envelope (CRE) boundary may be opened intermittently under administrative controls.

2. One CREVS train shall be capable of automatic actuation.

APPLICABILITY: MODES 1, 2, 3, 4,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREVS train inoperable for reasons other than Condition B.	A.1 Restore CREVS train to OPERABLE status.	7 days
B. One or more CREVS trains inoperable due to inoperable CRE boundary in MODES 1, 2, 3, or 4.	B.1 Initiate action to implement mitigating actions.	Immediately
	<u>AND</u>	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological, chemical, and smoke hazards will not exceed limits.	24 hours
	<u>AND</u>	
	B.3 Restore control room boundary to OPERABLE status.	90 days

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, 3, or 4.	C.1 Be in MODE 3. AND C.2 ---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Be in MODE 4.	6 hours 12 hours
D. Required Action and associated Completion Time of Condition A not met during movement of irradiated fuel assemblies.	D.1 Place OPERABLE CREVS train in emergency recirculation mode. OR D.2 Suspend movement of irradiated fuel assemblies.	Immediately Immediately
E. Two CREVS trains inoperable during movement of irradiated fuel assemblies. OR One or more CREVS trains inoperable due to an inoperable CRE boundary during movement of irradiated fuel assemblies.	E.1 Suspend movement of irradiated fuel assemblies.	Immediately
F. Two CREVS trains inoperable in MODE 1, 2, 3, or 4 for reasons other than Condition B.	F.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.9.1	Operate each CREVS train for ≥ 15 minutes.	31 days
SR 3.7.9.2	Perform required CREVS filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.7.9.3	Verify the CREVS automatically isolates the Control Room and switches into a recirculation mode of operation on an actual or simulated actuation signal.	18 months
SR 3.7.9.4	Perform required CRE unfiltered air inleakage testing in accordance with the Control Room Envelope Habitability Program.	In accordance with the Control Room Envelope Habitability Program.

3.7 PLANT SYSTEMS

3.7.10 Control Room Emergency Air Conditioning System (CREACS)

LCO 3.7.10 Two CREACS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREACS train inoperable.	A.1 Restore CREACS train to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1 Be in MODE 3. AND B.2 ---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Be in MODE 4.	6 hours 12 hours
C. Required Action and associated Completion Time of Condition A not met during movement of irradiated fuel assemblies.	C.1 Place OPERABLE CREACS train in operation. OR C.2 Suspend movement of irradiated fuel assemblies.	Immediately Immediately
D. Two CREACS trains inoperable during movement of irradiated fuel assemblies.	D.1 Suspend movement of irradiated fuel assemblies.	Immediately
E. Two CREACS trains inoperable during MODE 1, 2, 3, or 4.	E.1 Enter LCO 3.0.3.	Immediately

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. <u>AND</u> F.2 ---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------- Be in MODE 4.	6 hours 12 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.	7 days
SR 3.8.1.2	----------------------------NOTE---------------------------- All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. -- Verify each DG starts from standby conditions and, in ≤ 15 seconds achieves “ready-to-load” conditions.	 31 days

SURVEILLANCE		FREQUENCY
SR 3.8.1.3	------------------------------NOTES------------------------------ 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This Surveillance shall be conducted on only one DG at a time. 4. This SR shall be preceded by and follow, without shutdown, a successful performance of SR 3.8.1.2. --- Verify each DG is synchronized and loaded and operates for ≥ 60 minutes at a load ≥ 2475 kW and ≤ 2750 kW.	 31 days
SR 3.8.1.4	Verify each day tank contains ≥ 160 gallons of fuel oil.	31 days
SR 3.8.1.5	Check for and remove accumulated water from each day tank.	31 days
SR 3.8.1.6	Verify the fuel oil transfer system operates to transfer fuel oil from storage tanks to the day tank.	31 days
SR 3.8.1.7	------------------------------NOTE------------------------------ This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. --- Verify automatic transfer of AC power sources to the selected offsite circuit and manual transfer to the alternate required offsite circuit.	 18 months

SURVEILLANCE		FREQUENCY
SR 3.8.1.8	------------------------------NOTE------------------------------ All DG starts may be preceded by an engine prelube period. --- Verify on an actual or simulated loss of offsite power signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. achieves "ready-to-load" conditions in ≤ 15 seconds, 2. energizes permanently connected loads, 3. energizes auto-connected shutdown load through automatic load sequencing timers, and 4. supplies connected loads for ≥ 5 minutes.	18 months
SR 3.8.1.9	------------------------------NOTE------------------------------ All DG starts may be preceded by an engine prelube period. --- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal: a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: 1. achieves "ready-to-load" conditions in ≤ 15 seconds, 2. energizes permanently connected loads, 3. energizes auto-connected emergency loads through load sequencing timers, and 4. supplies connected loads for ≥ 5 minutes.	18 months

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources - Operating

LCO 3.8.4 Both DC electrical power subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One DC electrical power subsystem inoperable.	A.1 Restore DC electrical power subsystem to OPERABLE status.	8 hours
B. Required Action and Associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	AND	
	B.2 ---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. --------------------------------------- Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage.	7 days
SR 3.8.4.2	Verify each battery charger supplies ≥ 300 amps at greater than or equal to the minimum established float voltage for ≥ 8 hours. <u>OR</u> Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	18 months
SR 3.8.4.3	-------------------------------NOTE------------------------------ This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. --- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test or a modified performance discharge test.	 18 months

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	AND	
	B.2 ---------------NOTE--------------- LCO 3.0.4.a is not applicable when entering Mode 4. -------------------------------------	
	Be in MODE 4.	12 hours
C. Two or more of the four inverters required by LCO 3.8.7.a and LCO 3.8.7.b inoperable.	C.1 Be in MODE 3.	12 hours
	AND	
	C.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage, frequency, and alignment to associated 120 VAC buses RS1, RS2, RS3, and RS4.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems - Operating

LCO 3.8.9 Two AC, DC, and 120 VAC electrical power distribution subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more AC electrical power distribution subsystem(s) inoperable.	A.1 Restore AC electrical power distribution subsystem(s) to OPERABLE status.	8 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
B. One or more 120 VAC electrical power distribution subsystem(s) (RS1, RS2, RS3, RS4) inoperable.	B.1 Restore 120 VAC electrical power distribution subsystem(s) to OPERABLE status.	8 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem(s) inoperable.	C.1 Restore DC electrical power distribution subsystem(s) to OPERABLE status.	8 hours <u>AND</u> 16 hours from discovery of failure to meet LCO
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3. <u>AND</u> D.2 --------------NOTE-------------- LCO 3.0.4.a is not applicable when entering Mode 4. ------------------------------------ Be in MODE 4.	6 hours 12 hours

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 253 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-51

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 1

DOCKET NO. 50-313

1.0 INTRODUCTION

By application dated March 26, 2013, as supplemented by letters dated November 14, 2013, and August 19, October 22, and December 5, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML13085A282, ML13319A877, ML14231A370, ML14295A321, and ML14339A396, respectively), Entergy Operations, Inc. (Entergy, the licensee), submitted a license amendment request (LAR) to the U.S. Nuclear Regulatory Commission (NRC), which requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit No. 1 (ANO-1).

The proposed changes would revise the TS requirements for end states associated with the implementation of the NRC-approved Topical Report BAW-2441-A, Revision 2, "Risk-Informed Justification for LCO End-State Changes," dated September 2006 (ADAMS Accession No. ML062890078), as well as Required Actions revised by a specific Note in the approved TS Task Force (TSTF) change Traveler TSTF-431, Revision 3, "Change in Technical Specifications End States (BAW-2441)" (ADAMS Accession No. ML093570241). The supplemental letters dated November 14, 2013, and August 19, October 22, and December 5, 2014, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on July 23, 2013 (78 FR 44170).

An end state is a condition (usually an operational mode, as discussed below) that the reactor must be placed in if the TS required action(s) cannot be met. The end states are currently defined based on placing the unit into a mode or condition in which the TS limiting condition for operation (LCO) is not applicable. Mode 5 is the current end state for LCOs that are applicable in Modes 1 through 4. TS Actions End States modifications would permit, for some systems, entry into a hot shutdown (Mode 4) end state rather than a cold shutdown (Mode 5) end state.

Revision 4 of the "Standard Technical Specifications, Babcock and Wilcox Plants" (STS), issued April 2012 (ADAMS Accession No. ML12100A177), define six operational modes. Of specific relevance to TSTF-431 are Modes 4 and 5:

- Mode 1 - Power operation. The reactor is critical and thermal power is greater than 5 percent of the rated thermal power.
- Mode 2 – Startup. The reactor is critical and thermal power is less than or equal to 5 percent of the rated thermal power.
- Mode 3 - Hot standby. The reactor is subcritical and the average reactor coolant system (RCS) temperature is greater than or equal to 350 degrees Fahrenheit (°F) (for ANO-1, greater than or equal to 280 °F).
- Mode 4 - Hot shutdown. The reactor is subcritical and the average RCS temperature is greater than 200 °F and less than 350 °F (for ANO-1, less than or equal to 280 °F). The reactor vessel head closure bolts are fully tensioned.
- Mode 5 - Cold shutdown. The reactor is subcritical and the average RCS temperature is less than or equal to 200 °F. The reactor vessel head closure bolts are fully tensioned.
- Mode 6 – Refueling. The reactor in this mode is shut down and one or more reactor vessel head closure bolts are less than fully tensioned.

TSTF-431, Revision 3, generally allows a Mode 4 end state rather than a Mode 5 end state for selected initiating conditions in order to perform short-duration repairs which necessitate exiting the original Mode of operation. The affected STS LCOs stated in TSTF-431 are listed below, which are similar to those requested to be revised in the licensee's application:

3.3.5	Engineered Safety Feature Actuation System (ESF ACTUATION SIGNAL) Instrumentation
3.3.6	ESF ACTUATION SIGNAL Manual Initiation
3.4.6	Reactor Coolant System (RCS) Loops - MODE 4
3.4.15	RCS Leakage Detection Instrumentation
3.5.4	Borated Water Storage Tank (BWST)
3.6.2	Reactor Building Air Locks
3.6.3	Reactor Building Isolation Valves
3.6.4	Reactor Building Pressure
3.6.5	Reactor Building Air Temperature
3.6.6	Reactor Building Spray and Cooling Systems
3.7.7	Component Cooling Water System
3.7.8	Service Water System
3.7.9	Ultimate Heat Sink
3.7.10	Control Room Emergency Ventilation System (CREVS)
3.7.11	Control Room Emergency Air Temperature Control System (CREATCS)
3.8.1	AC [Alternating Current] Sources - Operating
3.8.4	DC [Direct Current] Sources - Operating

3.8.7 Inverters – Operating
3.8.9 Distribution Systems – Operating

2.0 REGULATORY EVALUATION

In Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical specifications," the NRC established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36(c), TSs are required to include items in the following five specific categories related to plant operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. However, the regulation does not specify the particular requirements to be included in a plant's TSs. The LCOs are the lowest functional capability, or performance levels, of equipment required for safe operation of the facility. When an LCO of a nuclear reactor is not met, the licensee shall follow any remedial actions permitted by the TS until the condition can be met or shall shut down the reactor.

NRC Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated July 1998 (ADAMS Accession No. ML003740133), describes a risk-informed approach acceptable to the NRC for assessing the nature and impact of proposed permanent licensing-basis changes by considering engineering issues and applying risk insights. This regulatory guide also provides risk acceptance guidelines for evaluating the results of such evaluations. RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," dated August 1998 (ADAMS Accession No. ML003740176), describes an acceptable risk-informed approach specifically for assessing proposed permanent allowed outage time (AOT) and surveillance test interval TS changes. This RG also provides risk acceptance guidelines for evaluating the results of such assessments. RG 1.177 identifies a three-tiered approach for the licensee's evaluation of the risk associated with a proposed Completion Time (CT) TS change. Per RG 1.177, the improved STS use the terminology "completion times" and "surveillance frequency," respectively, in place of "allowed outage time" and "surveillance test interval." The risk assessment provided in Topical Report BAW-2441-A, Revision 2, was done in accordance with RG 1.174 and RG 1.177.

The regulations in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," require that the reactor must be provided with an emergency core cooling system (ECCS) that must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents (LOCAs) conforms to the criteria set forth in 10 CFR 50.46(b).

Most of today's TS and the design basis analyses were developed under the perception that putting a plant in cold shutdown would result in the safest condition and the design basis analyses would bound credible shutdown accidents. In the late 1980s and early 1990s, the NRC and licensees recognized the potential significance of events occurring during shutdown conditions, and guidance was issued to improve shutdown operation. Since enactment of a shutdown rule was expected, almost all TS changes involving power operation, including a revised end-state requirement, were postponed (for example, see the Final Policy Statement on TS Improvements, published in the *Federal Register* on July 22, 1993 (58 FR 39136)).

However, in the mid-1990s, the Commission decided a shutdown rule was not necessary in light of industry improvements.

Controlling shutdown risk encompasses control of conditions that can cause potential initiating events and responses to those initiating events that do occur. Initiating events are a function of equipment malfunctions and human error. Responses to events are a function of plant sensitivity, ongoing activities, human error, defense-in-depth, and additional equipment malfunctions.

In practice, the risk during shutdown operations is often addressed via voluntary actions and application of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Section 50.65(a)(4) states, in part, that:

> Before performing maintenance activities....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.

RG 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants," dated May 2000 (ADAMS Accession No. ML003699426), provides guidance on implementing the provisions of 10 CFR 50.65(a)(4) by endorsing the revised Section 11 (published separately) of Nuclear Management and Resources Council (NUMARC) 93-01, Revision 2, "Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Nuclear Management and Resource Council, Revision 3, July 2000 (ADAMS Accession No. ML031500684). That section was subsequently incorporated into Revision 3 of NUMARC 93-01. However, Revision 3 has not yet been formally endorsed by the NRC.

2.1 Withdrawal of RG 1.182

During its review of the licensee's application, the NRC staff noted that RG 1.182 was withdrawn since it is redundant due to the inclusion of its subject matter in Revision 3 of RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," dated May 2012 (ADAMS Accession No. ML113610098). A notice of withdrawal of RG 1.182 was published in the *Federal Register* on November 27, 2012 (77 FR 70846). The *Federal Register* notice also stated that withdrawal of RG 1.182 neither altered any prior or existing licensing commitments based on its use, nor constituted backfitting as defined in 10 CFR 50.109 (the Backfit Rule) and was not otherwise inconsistent with the issue finality provisions in 10 CFR Part 52.

In addition, the NRC staff observed that RG 1.160 endorsed Revision 4A of NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," dated April 2011 (ADAMS Accession No. ML11116A198). NUMARC 93-01 provides methods that are acceptable to the NRC staff for complying with the provisions of 10 CFR 50.65. The model safety evaluation (SE) for the TSTF currently refers to the guidance in Revision 2 of the NUMARC 93-01.

By letter dated August 4, 2014 (ADAMS Accession No. ML14209A627), the NRC staff provided a request for information (RAI) in which it requested that Entergy confirm that ANO-1's current licensing basis adheres to the RG 1.160 guidance, confirm its commitment to the updated version of NUMARC 93-01, and confirm that the topical reports supporting its license amendment request (LAR) comply with NUMARC 93-01, Section 11.

In its supplemental letter dated August 19, 2014, Entergy responded to the NRC staff's RAI as follows:

> Entergy committed ANO-1 and [Arkansas Nuclear One, Unit 2 (ANO-2)] to follow the guidance established in TSTF-IG-07-01, Revision 1, "Implementation Guidance for TSTF-431, Revision 3, 'Change in Technical Specifications End States,' BAW-2441-A," and WCAP-16364-NP, Revision 2, "Implementation Guidance for Risk Informed Modification to Selected Required Action End States at Combustion Engineering NSSS Plants (TSTF-422)," respectively, as part of the original LARs.... Both guidance documents require plants adopting the end states TSTFs to commit to the guidance contained in Section 11 of NUMARC 93-01, Revision 3, for assessing risk associated with maintenance activities. RG 1.182 is referenced in both guidance documents only to state that RG 1.182 endorses NUMARC 93-01 as one acceptable approach to implement 10 CFR 50.65(a)(4), but is not otherwise mentioned.
>
> Topical Report BAW-2441, "Risked Informed Justification for LCO End State Changes," and the associated NRC SE do not reference RG 1.160, RG 1.182, or NUMARC 93-01, but do require a program be established to address 10 CFR 50.65(a)(4) Maintenance Rule aspects with respect to risk management. Similar to the aforementioned guidance for Combustion Engineering (CE) plants, Topical Report CENSPD-1186, "Technical Justification for the Risk Informed Modification to Selected Required Action End States for CEOG Member PWRs," and its associated NRC SE, references RG 1.182 with regard to its endorsement of [NUMARC] 93-01. Both Revisions 2 and 3 of the NUMARC are mentioned in the CE report. NUMARC 93-01, Revision 4A, incorporated additional guidance related to fire risk, equipment to be scoped in the Maintenance Rule, and the definition of "availability" was modified. The guidance included in RG 1.160, Revision 3, and NUMARC 93-01, Revision 4A, built upon and/or enhanced that provided in RG 1.182 or in previous revisions to the NUMARC; therefore, application of RG 1.160, Revision 3, and NUMARC 93-01, Revision 4A, does not result in inconsistencies with the intent of the topical reports, supporting topical report SEs, or the aforementioned TSTF end state implementation guidance.
>
> Entergy fleet procedure EN-DC-203, "Maintenance Rule Program", currently references NUMARC 93-01 and RG 1.160 as the base guidance documents for implementation of the Maintenance Rule at Entergy sites, which includes ANO-1 and ANO-2. Furthermore, the industry committed [...] through the Nuclear Energy Institute (NEI) to implement RG 1.160, Revision 3, which endorses NUMARC 93-01, Revision 4A. As a result, Entergy fleet procedure EN-OU-108, "Shutdown Safety Management Program (SSMP)," was revised with reference to [NUMARC] 93-01 to include qualitative risk guidance and risk management

actions (RMAs), such as those applicable to fire-related features which become unavailable during shutdown operational modes. ANO procedure COPD-024, "Risk Assessment Guidelines," was also revised to include comprehensive guidance related to fire risks and RMAs, and specifically discusses the guidance contained in NUMARC 93-01, Revision 4A.

The ANO end state LARs committed to Section 11 of NUMARC 93-01, Revision 3, with regard to assessing risk in support of the new Mode 4 end states delineated in the subject TSTFs. As stated previously, the ANO LARs also committed to the respective implementation guidance documents, which refer to Revision 3 of the NUMARC. Although the ANO Maintenance Rule program is currently based on [NUMARC] 93-01, Revision 4A, the aforementioned commitments are updated to reflect the intended guidance."

The licensee included, in Attachment 1 of its supplement dated August 19, 2014, an updated table of regulatory commitments regarding the LAR, which contains the revised regulatory commitments discussed in the licensee's RAI response above. Based on its review of the information provided by the licensee, and the licensee's commitment to utilize NUMARC 93-01, Revision 4A, the NRC staff concludes that the licensee's response has adequately addressed the NRC staff's concern. This regulatory commitment has been escalated to an obligation, and is required to be incorporated into the ANO-1 Safety Analysis Report (SAR) in the next update pursuant to 10 CFR 50.71(e). Please see Section 3.5 of this SE for further discussion of regulatory commitments.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

In its LAR, as supplemented, the licensee proposed the following TS changes:

TS 3.3.5, Engineered Safeguards Actuation System (ESAS) Instrumentation

Current TS 3.3.5 Required Action B.3 states:

---NOTE--
Only Required for Reactor Building Pressure High setpoint and High High Setpoint.

Be in MODE 5.

Revised TS 3.3.5 Required Action B.3 would state:

---NOTES---

1. Only Required for Reactor Building Pressure High setpoint and High High Setpoint.

2. LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.3.5 Required Action B.3 CT of "36 hours" would be revised to state "12 hours."

<u>TS 3.3.6, Engineered Safeguards Actuation System (ESAS) Manual Initiation</u>

Current TS 3.3.6 Required Action B.2 states:

Be in MODE 5.

Revised TS 3.3.6 Required Action B.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.3.6 Required Action B.2 CT of "36 hours" would be revised to state "12 hours."

<u>TS 3.4.6, RCS Loops – MODE 4</u>

Current TS 3.4.6 Required Action A.1 states:

Initiate action to restore a second loop to OPERABLE status.

<u>AND</u>

Revised TS 3.4.6 Required Action A.1 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Initiate action to restore a second loop to OPERABLE status.

Current TS 3.4.6 Required Action A.2 would be deleted.

TS 3.4.15, RCS Leakage Detection Instrumentation

Current TS 3.4.15 Required Action D.2 states:

Be in MODE 5.

Revised TS 3.4.15 Required Action D.2 would state:

--NOTE--
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.4.15 Required Action D.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.5.4, Borated Water Storage Tank (BWST)

Current TS 3.5.4 Condition A states:

BWST boron concentration not within limits.

OR

BWST water temperature not within limits.

Revised TS 3.5.4 Condition A would state:

BWST boron concentration not within limits.

New TS 3.5.4 Condition B would state:

Required Action and associated Completion Time of Condition A not met.

New TS 3.5.4 Required Action B.1 would state:

Be in MODE 3.

AND

The CT for new TS 3.5.4 Required Action B.1 would state "6 hours."

New TS 3.5.4 Required Action B.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

The CT for new TS 3.5.4 Required Action B.2 would state "12 hours."

New TS 3.5.4 Condition C would state:

BWST water temperature not within limits.

New TS 3.5.4 Required Action C.1 would state:

Restore BWST to OPERABLE status.

The CT for new TS 3.5.4 Required Action C.1 would state "8 hours."

Current TS 3.5.4 Condition B states:

BWST inoperable for reasons other than Condition A.

Revised TS 3.5.4 Condition B would be renumbered as Condition D and would state:

BWST inoperable for reasons other than Condition A or C.

Current TS 3.5.4 Required Action B.1 would be renumbered as Required Action D.1.

Current TS 3.5.4 Condition C states:

Required Action and associated Completion Time not met.

Revised TS 3.5.4 Condition C would be renumbered as Condition E and would state:

Required Action and associated Completion Time of Condition C or D not met.

Current TS 3.5.4 Required Actions C.1 and C.2 would be renumbered as Required Actions E.1 and E.2, respectively.

TS 3.6.2, Reactor Building Air Locks

Current TS 3.6.2 Required Action D.2 states:

Be in MODE 5.

Revised TS 3.6.2 Required Action D.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.6.2 Required Action D.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.6.3, Reactor Building Isolation Valves

Current TS 3.6.3 Required Action D.2 states:

Be in MODE 5.

Revised TS 3.6.3 Required Action D.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.6.3 Required Action D.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.6.4, Reactor Building Pressure

Current TS 3.6.4 Required Action B.2 states:

Be in MODE 5.

Revised TS 3.6.4 Required Action B.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.6.4 Required Action B.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.7.7, Service Water System (SWS)

Current TS 3.7.7 Required Action B.2 states:

Be in MODE 5.

Revised TS 3.7.7 Required Action B.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.7.7 Required Action B.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.7.9, Control Room Emergency Ventilation System (CREVS)

Current TS 3.7.9 Required Action C.2 states:

Be in MODE 5.

Revised TS 3.7.9 Required Action C.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.7.9 Required Action C.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.7.10, Control Room Emergency Air Conditioning System (CREACS)

Current TS 3.7.10 Required Action B.2 states:

Be in MODE 5.

Revised TS 3.7.10 Required Action B.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.7.10 Required Action B.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.8.1, AC Sources - Operating

Current TS 3.8.1 Required Action F.1 CT of "12 hours" would be revised to state "6 hours."

Current TS 3.8.1 Required Action F.2 states:

Be in MODE 5.

Revised TS 3.8.1 Required Action F.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.8.1 Required Action F.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.8.4, DC Sources - Operating

Current TS 3.8.4 Required Action B.1 CT of "12 hours" would be revised to state "6 hours."

Current TS 3.8.4 Required Action B.2 states:

Be in MODE 5.

Revised TS 3.8.4 Required Action B.2 would state:

---NOTE---
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.8.4 Required Action B.2 CT of "36 hours" would be revised to state "12 hours."

TS 3.8.7, Inverters - Operating

Current TS 3.8.7 Condition B states:

Required Action and associated Completion time not met.

OR

Two or more of the four inverters required by LCO 3.8.7.a and 3.8.7.b inoperable.

Revised TS 3.8.7 Condition B would state:

Required Action and associated Completion time not met.

Current TS 3.8.7 Required Action B.1 CT of "12 hours" would be revised to state "6 hours."

Current TS 3.8.7 Required Action B.2 states:

Be in MODE 5.

Revised TS 3.8.7 Required Action B.2 would state:

--NOTE--
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.8.7 Required Action B.2 CT of "36 hours" would be revised to state "12 hours."

New TS 3.8.7 Condition C would state:

Two or more of the four inverters required by LCO 3.8.7.a and 3.8.7.b inoperable.

New TS 3.8.7 Required Actions C.1 and C.2 would state:

C.1 Be in MODE 3.

<u>AND</u>

C.2 Be in MODE 5.

The CTs for new TS 3.8.7 Required Actions C.1 and C.2 would state "12 hours" and "36 hours," respectively.

TS 3.8.9, Distribution Systems - Operating

Current TS 3.8.9 Required Action D.1 CT of "12 hours" would be revised to state "6 hours."

Current TS 3.8.9 Required Action D.2 states:

Be in MODE 5.

Revised TS 3.8.9 Required Action D.2 would state:

--NOTE--
LCO 3.0.4.a is not applicable when entering Mode 4.

Be in MODE 4.

Current TS 3.8.9 Required Action D.2 CT of "36 hours" would be revised to state "12 hours."

3.2 Licensee's Optional Variations and Changes from the Model Application

In Section 2.2 of its LAR, the licensee stated that the proposed amendment is consistent with the STS changes described in TSTF-431, Revision 3; however, the licensee proposed the following variations and deviations from TSTF-431, Revision 3, as identified and justified by the licensee:

1. Changes may have required the movement of information from one TS page to another. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

2. STS 3.3.5 Required Action B.2.3 is equivalent to ANO-1 TS 3.3.5 Required Action B.3. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

3. STS 3.4.15 Required Action C.2 is equivalent to ANO-1 TS 3.3.5 Required Action D.2. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

4. STS 3.6.3 Action E is equivalent to ANO-1 TS 3.6.3 Action D. No other TSTF-431 related changes are affected. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

5. ANO-1 does not have a Containment Air Temperature specification (STS 3.6.5). Therefore, no TSTF-431 related changes related to Reactor Building Air Temperature are incorporated into the ANO-1 TSs. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

6. The Actions associated with ANO-1 TS 3.6.5, "Reactor Building Spray and Cooling System," differ significantly from the STS 3.6.6 version because the

ANO-1 licensing basis only requires one train of Reactor Building Spray and one train of Reactor Building Coolers in Modes 3 and 4. This difference was approved by the NRC in the ANO-1 conversion to STS on October 29, 2001 (based on NUREG-1430, Revision 1) (ADAMS Accession No. ML013090437). With regard to TSTF-431, an end state of Mode 4 is permitted for three scenarios: 1) one Reactor Building Spray train inoperable, 2) one Reactor Building Cooling train inoperable, or 3) one Reactor Building Spray train AND one Reactor Building Cooling train inoperable. In effect, at least one Reactor Building Spray train AND one Reactor Building Cooling train must remain operable to apply the Mode 4 end state.

Unlike the STS, ANO-1 TS 3.6.5 Action E permits both Reactor Building Spray trains to be inoperable OR both Reactor Building Cooling trains to be inoperable when in Modes 3 or 4 for up to 36 hours prior to requiring exiting the Modes of Applicability (i.e., cooldown to Mode 5). Requiring entry into Mode 5 with both trains inoperable on either system remains consistent with the STS and TSTF-431. As long as at least one Reactor Building Spray train AND one Reactor Building Cooling train remains operable in Modes 3 and 4, no further action is required. Because of this unique difference between the ANO-1 licensing basis and the STS, no changes associated with TSTF-431 are applicable to ANO-1 and, therefore, no changes to TS 3.6.5 are proposed. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

7. ANO-1 does not have a Component Cooling Water (CCW) system or specification (STS 3.7.7). Therefore, no TSTF-431 changes related to CCW are incorporated into the ANO-1 TSs. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

8. The ANO-1 Ultimate Heat Sink (Emergency Cooling Pond) does not include cooling towers; therefore, TSTF-431 related changes (reference STS 3.7.9) are not applicable to ANO-1 TS 3.7.8. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

9. STS 3.8.1 Required Action G.2 is equivalent to ANO-1 TS 3.3.5 Required Action F.2. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

10. [Note: Amendment No. 250 for TSTF-500, "DC Electrical Rewrite," was issued on November 24, 2014 (ADAMS Accession No. ML14254A133). Therefore, this portion of optional variation/deviation number 10 is not applicable and is not reproduced here.]

    In addition, STS 3.8.4 Required Action D.2 is equivalent to ANO-1 TS 3.3.5 Required Action B.2. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

11. ANO-1 TS 3.8.7, "Inverters – Operating," Action B envelops conditions where Action A is not met or when two or more required inverters are inoperable. The

STS does not contain the latter condition. In order to apply the TSTF-431 end state properly, Action B of ANO-1 TS 3.8.7 has been split into two separate actions, with the new Action B being equivalent to STS 3.8.7 Action B, and the TSTF-431 Mode 4 end state appropriately applied. New Action C envelops only the condition where two or more required inverters are inoperable and continues to require entry into Mode 5. These modifications retain the current ANO-1 allowances while permitting the adoption of TSTF-431 for conditions where only one required inverter is inoperable. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

The NRC staff provides an assessment of the licensee's Optional Changes and Variations in the appropriate sections for each TS in SE Section 3.4.

3.3 Risk Assessment

The objective of the Topical Report BAW-2441, Revision 2, risk assessment was to show that any risk increases associated with the proposed changes in TSs end-states are either negligible or negative (i.e., a net decrease in risk). The Topical Report documents a risk-informed analysis of the proposed TS change. Probabilistic risk assessment (PRA) results and insights were used, in combination with results of deterministic assessments, to identify and propose changes in "end states" for Babcock and Wilcox plants. This is in accordance with guidance provided in RG 1.174 and RG 1.177. The three-tiered approach for evaluating and monitoring the risk associated with a TS change described in RG 1.177, was followed. The first tier of the approach includes the assessment of the risk impact of the proposed change for comparison to acceptance guidelines consistent with the Commission's Safety Goal Policy Statement as documented in RG 1.174. In addition, the first tier aims at ensuring that there are no unacceptable temporary risk increases during the implementation of the proposed TSs change, such as when equipment is taken out of service. The second tier addresses the need to preclude potentially high-risk configurations which could result if equipment is taken out of service concurrently with the implementation of the proposed TSs changes. The third tier addresses the application of a configuration risk management program (CRMP), implemented to comply with 10 CFR 50.65 (a)(4) of the Maintenance Rule, for identifying risk-significant configurations resulting from maintenance-related activities and taking appropriate compensatory measures to avoid such configurations.

The risk assessment approach of Topical Report BAW-2441, Revision 2, was found acceptable in the NRC staff's SE for the topical report. The NRC staff concluded that the analyses described in BAW-2441 show that the three-tiered approach for allowing TSs changes are met as explained below:

- Risk Impact of the Proposed Change (Tier 1): The risk changes associated with the TSs changes in TSTF-431, in terms of mean yearly increases in core damage frequency (CDF) and large early release frequency (LERF), are risk neutral or risk beneficial. In addition, there are no significant temporary risk increases, as defined by RG 1.177 criteria, associated with the implementation of the TSs end-state changes.

- Avoidance of Risk-Significant Configurations (Tier 2): The performed risk analyses, which are based on single LCOs, show that there are no high-risk configurations associated with the TS end-state changes. The reliability of redundant trains is normally covered by a single LCO. To provide assurance that risk-significant plant equipment outage configurations will not occur when specific equipment is out of service, as part of the implementation of TSTF-431, TSTF-431, Revision 3, required the licensee to provide a regulatory commitment as part of its LAR to follow Section 11 of NUMARC 93-01, Revision 3, and to include guidance in appropriate plant procedures and/or administrative controls to preclude high-risk plant configurations when the plant is at the proposed end-state. The NRC staff has, in the time since TSTF-431, Revision 3 was found to be acceptable, now approved NUMARC 93-01, Revision 4-A. Please see Section 2.0 of this SE for a discussion on the adoption of NUMARC 93-01, Revision 4A, to evaluate plant risk. The licensee, in its supplement dated August 19, 2014, provided an updated list of regulatory commitments, which included the commitment described above. Because the staff has relied upon this commitment in a conclusion of its SE, the commitment has been elevated to an obligation, and upon issuance of the amendment, is required to be incorporated into the ANO-1 SAR in the next update pursuant to 10 CFR 50.71(e). Please see SE Section 4.0 for more information regarding regulatory commitments. The NRC staff concludes that the licensee's use of NUMARC 93-01, Revision 4A, is adequate for preventing risk-significant plant configurations.

- Configuration Risk Management (Tier 3): The licensee shall have a program, the CRMP, in place to comply with 10 CFR 50.65 (a)(4) to assess and manage the risk from proposed maintenance activities. This program can be used to support a licensee decision in selecting the appropriate actions to control risk for most cases in which a risk-informed TS is entered. When multiple LCOs occur, which affect trains in several systems, the plant's risk-informed CRMP, implemented in response to the Maintenance Rule 10 CFR 50.65 (a)(4), shall ensure that high-risk configurations are avoided.

The generic risk impact of the proposed end-state mode change was evaluated subject to the following assumptions:

1. The entry into the proposed end state is initiated by the inoperability of a single train of equipment or a restriction on a plant operational parameter, unless otherwise stated in the applicable technical specification.

2. The primary purpose of entering the end state is to correct the initiating condition and return to power as soon as practical.

3. Plant implementation guidance for the proposed end-state changes is developed to ensure that insights and assumptions made in the risk assessment are properly reflected in the plant-specific CRMP.

These assumptions are consistent with typical entries into Mode 4 for short duration repairs, which is the intended use of the TSs end-state changes.

Based on above, the NRC staff concluded that, for the TS-associated systems identified in Section 1.0 of this SE, going to Mode 4 (hot shutdown) instead of going to Mode 5 (cold shutdown) in order to carry out equipment repairs and then return to power, does not have an adverse effect on plant risk.

3.4 Staff Evaluation of TS Changes

TSTF-431, Revision 3, modifies certain Required Actions (for TS listed in Section 1.0 of this SE) to an end state of Mode 4 and includes a Note which states the following: "LCO 3.0.4.a is not applicable when entering MODE 4." In the case of these TS modifications, the use of LCO 3.0.4.a, which allows entry into a mode or other specified condition in the Applicability with the LCO not met when the associated Actions to be entered permit continued operation in the mode or other specified condition in the Applicability for an unlimited period of time, would be allowed unless otherwise stated. Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a mode or other specified condition provides an acceptable level of safety for continued operation. However, this is without regard to the status of the unit before or after the mode change, and entry into Mode 4 per TSTF-431, Revision 3, should only be made on a short-term basis in order to affect repairs with the goal of correcting the initiating condition and returning to power as soon as practical, not to remain in Mode 4 indefinitely.

Therefore, implementing modified end states requires adding a Note to the affected Required Actions to prevent the use of LCO 3.0.4.a when entering Mode 4 from Mode 5. This is done to avoid unit operation in a condition that should be prohibited by TS since LCO 3.0.4.a allows entry into a mode or other specified condition in the Applicability when the associated Actions to be entered permit continued operation in the mode or other specified condition in the Applicability for an unlimited period of time. Applying the allowance of LCO 3.0.4.a to modified end states was not analyzed in Topical Report BAW-2441-A, Revision 2; therefore, an appropriate limitation is applied by the addition of a Note to the affected TS Required Actions. Adding this Note into plant-specific TS requirements provides assurance that an inappropriate entry into Mode 4 utilizing the provisions of LCO 3.0.4.a is not made. Therefore, the NRC staff concludes that the inclusion of this Note is acceptable.

The following section provides the NRC staff evaluation of the impact of each proposed end-state change on defense-in-depth and safety margins as applied to the corresponding safety systems.

3.4.1 TS 3.3.5, Engineered Safeguards Actuation System (ESAS) Instrumentation

ESF ACTUATION SIGNAL instruments initiate high-pressure injection (HPI), low-pressure injection (LPI), Reactor Building (RB) spray and cooling, RB isolation, and onsite standby power source start. ESF ACTUATION SIGNAL also provides a signal to the Emergency Feedwater Isolation and Control (EFIC) System. This signal initiates emergency feedwater (EFW) when HPI is initiated. All functions associated with these systems, structures, and components can be initiated via operator action. This may be accomplished at the channel level or the individual component level.

LCO: Three ESAS analog instrument channels for each Parameter in Table 3.3.5-1 shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.3.5 Condition B, Required Action B.3 (variation number 2 from the model application as described in Section 2.2 of the LAR) and addresses only the RB High Pressure and RB High-High Pressure setpoints. Specifically, if one or more channels are inoperable or one channel is inoperable and the Required Action is not met, then the Mode 5 end state is prescribed within 36 hours subsequent to an initial cooldown to Mode 3 within 6 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.3 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: In Section 2.2 of the LAR, the licensee's variation number 2 states: "STS 3.3.5 Required Action B.2.3 is equivalent to ANO-1 TS 3.3.5 Required Action B.3. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1." The NRC staff concurs with the licensee's statement, and evaluated the proposed change for ANO-1 TS 3.3.5 Required Action B.3.

When operating in Mode 4, RCS thermal-hydraulic conditions are very different from those associated with a design-basis accident (DBA) (at-power). That is, the energy in the RCS is only that associated with decay heat in the core and the stored energy in the RCS components and RCS pressure is reduced (especially toward the lower end of the Mode 4 RCS temperature limits). This means that the likelihood of an initiating event occurring, for which ESAS would be required to provide mitigating functions, is greatly reduced when operating in Mode 4. Nonetheless, all redundant functions initiated by ESAS can be manually initiated to mitigate transients that will proceed more slowly and with reduced challenge to the reactor and Reactor Building systems than those associated with at-power operations. Also, when operating toward the lower end of Mode 4, with the steam generators (SGs) in operation and decay heat removal (DHR) not in operation, risk is reduced and the risk associated with DHR system operation is avoided. When operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR, than when operating in Mode 5. These include HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW systems. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.2 TS 3.3.6, Engineered Safeguards Actuation System (ESAS) Manual Initiation

The ESAS manual initiation capability allows the operator to actuate ESAS functions from the main control room in the absence of any other initiation condition. Manually actuated functions include HPI, LPI, RB Spray, RB Cooling, and Spray Additive. The ESAS manual initiation ensures that the control room operator can rapidly initiate Engineered Safety Features (ESF) functions at any time. In the absence of manual ESAS initiation capability, the operator can initiate any and all ESF functions individually at a lower level.

LCO: Two manual initiation channels of each one of the following ESAS functions shall be operable: HPI, LPI, RB Cooling, RB Spray, and Spray Additive functions.

Conditions Requiring Entry into End State: This proposed end-state change is associated with LCO 3.3.6 Condition B, Required Action B.2. Specifically, if one or more ESAS functions with one channel are inoperable and the Required Action and associated Completion Time are not met, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: When operating in Mode 4, the thermal-hydraulic conditions are very different than those associated with a DBA (at-power). That is, the energy in the RCS is only that associated with decay heat in the core and the stored energy in the RCS components and RCS pressure is reduced (especially toward the lower end of Mode 4). This means that the likelihood of an initiating event occurring, for which ESAS manual initiation would provide mitigating functions, is greatly reduced when operating in Mode 4. Nonetheless, all redundant functions initiated by ESAS manual initiation can be manually initiated via individual component controls. Therefore, transients, which will proceed more slowly and with reduced challenge to the reactor and RB systems than those associated with at-power operations, will be mitigated. Also, when operating toward the lower end of Mode 4, with the SGs in operation and DHR not in operation, risk is reduced (i.e., the risk associated with DHR being avoided). When operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR, than when operating in Mode 5. These include the HPI (for ANO-1, when any RCS cold-leg temperature greater than or equal to 350 °F) and EFW systems. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.3 TS 3.4.6, RCS Loops - MODE 4

The purpose of this LCO is to provide forced flow from at least one reactor coolant pump (RCP) or one DHR pump for core DHR and transport. This LCO allows the two loops that are required to be operable to consist of any combination of RCS or DHR system loops. Any one loop in operation provides enough flow to remove the decay heat from the core. The second loop that is required to be operable provides redundant paths for heat removal. An ancillary function of the RCS and/or DHR loops is to provide mixing of boron in the RCS.

LCO: Two loops consisting of any combination of RCS loops and DHR loops shall be OPERABLE and one OPERABLE loop shall be in operation.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.4.6 Condition A, Required Action A.2. Specifically, if one required loop is inoperable, then action is taken immediately to restore a second loop to operable status. If the remaining operable loop is a DHR loop, then entry into Mode 5 is required within 24 hours. Per Condition D, Required Action D.2, if a Required Action and Completion Time is not met, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: It is proposed that Required Action A.2 be deleted, and Required Action D.2 be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: When operating in Mode 4, if both RCS loops and one DHR loop are inoperable, the existing LCO requires cooldown to Mode 5. In this situation, SGs are available for core heat removal and transport via natural circulation (NC) in Mode 4 without the need for significant RCS heatup. Proceeding to Mode 5 makes few, if any, additional systems available for DHR (assuming a failure of the remaining DHR system). The one system that can be made available in Mode 5 to provide backup to the DHR system is the Borated Water Storage Tank (BWST). It can provide gravity draining to the RCS after cooldown to Mode 5 and subsequent RCS drain down and removal of SG primary-side manway covers. This would require a considerable time delay, during which reactor coolant temperature would be increasing. Given these considerations and the magnitude of feedwater systems available to feed the SGs, continued use of SGs for DHR in Mode 4 will adequately cool the core while avoiding the additional risk associated with DHR. Reactor coolant boron concentration will have been adjusted prior to cooldown to Mode 4 to provide 1 percent shutdown margin (SDM) at the target cooldown temperature. Thus, boron concentration adjustments would not be necessary; reactor coolant boron would be sufficiently mixed to an equilibrium concentration by this time. When operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR capability, than when operating in Mode 5. These include the HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW systems. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.4 TS 3.4.15, RCS Leakage Detection Instrumentation

One method of protection against high RCS leakage rates is the installation and use of instruments to rapidly detect extremely small leaks. This LCO requires instruments of diverse monitoring capabilities to be operable to provide a high degree of confidence that extremely small leaks are detected in time to allow actions to place the plant in a safe condition when RCS leakage indicates possible reactor coolant pressure boundary degradation. The LCO requirements are satisfied when monitors of diverse measurement means are available.

LCO: The following RCS leakage detection instrumentation shall be OPERABLE:

a. One reactor building sump monitor; and
b. One reactor building atmosphere radioactivity monitor (gaseous or particulate)

Conditions Requiring Entry into End State: This proposed end-state change is associated with LCO 3.4.15 Condition D, Required Action D.2 (see variation number 3 in Section 2.2 of the licensee's LAR). Specifically, if either the sump monitor or RB atmosphere radioactivity monitor are inoperable and cannot be restored to operability within 30 days, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action D.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: Due to reduced RCS pressures when operating in Mode 4, especially toward the lower end of Mode 4, the likelihood of occurrence of a LOCA is very small; LOCA-initiating event frequencies are reduced compared to at-power operation. Because of this and because the reactor is shut down with significant radionuclide decay having occurred, the probability of occurrence of a LOCA is decreased while the consequence of such an event is not increased. Additional instruments are available to provide secondary indication of a LOCA (e.g., additional RB radioactivity monitors, and grab samples of the RB atmosphere, humidity, temperature, and pressure). Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and the risk associated with DHR operation is avoided. When operating in Mode 4 (not on DHR) there are more mitigation systems such as HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW available to respond to initiating events that could challenge RCS inventory or DHR capability, than when operating in Mode 5. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.5 TS 3.5.4, Borated Water Storage Tank (BWST)

The BWST supports the ECCS and the RB spray system by providing a source of borated water for ECCS and RB spray pump operation. The BWST supplies two ECCS trains, each by a separate, redundant supply header. Each header also supplies one train of the RB spray system. A normally open, motor-operated isolation valve is provided in each header to allow the operator to isolate the BWST from the ECCS after the ECCS pump suction has been transferred to the RB sump following depletion of the BWST during a LOCA. The ECCS and the RB spray system are provided with recirculation lines that ensure each pump can maintain minimum flow requirements when operating at shutoff head conditions.

This LCO ensures that the BWST contains sufficient borated water to support the ECCS during the injection phase, sufficient water volume exists in the RB sump to support continued operation of the ECCS and RB spray pumps at the time of transfer to the recirculation mode of cooling, and the reactor remains subcritical following a LOCA. Insufficient water inventory in the BWST could result in insufficient cooling capacity of the ECCS when the transfer to the recirculation mode occurs. Improper boron concentrations could result in a reduction of SDM or excessive boric acid precipitation in the core following a LOCA, as well as excessive caustic stress corrosion of mechanical components and systems inside the RB.

LCO: The BWST shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.5.4 Condition C, Required Action C.2. Specifically, if boron concentration is not within limits for 8 hours, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action C.2, as it relates to the boron concentration requirement of this LCO, is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours. The end state associated with existing Required Action C.2 is proposed to be changed as follows:

1. Split existing Condition A into two conditions (A and C) such that boron concentration and water temperature are addressed separately (i.e., Condition A

would address boron concentration and Condition C would address water temperature). In either case, the Required Actions of A.1 and C.1 would be to restore the BWST to operable status within 8 hours. No change is being proposed for the water temperature requirement of the LCO, it is only being split out from Condition A with the same Required Action and Completion Time.

2. A new Condition B would address boron concentration not within limits and the Required Action and associated Completion Time of Condition A not met. Required Action B.1 would be to be in Mode 3 within 6 hours and B.2 would be to be in Mode 4 within 12 hours.

3. Existing Condition B would be renamed Condition D and would address BWST inoperable for reasons other than Conditions A or C with a Required Action D.1 to restore the BWST to operable status within 1 hour.

4. Existing Condition C would be renamed Condition E and would address the Required Action and associated Completion Time for Conditions C or D not met. It would have the Required Action to be in Mode 3 within 6 hours and Mode 5 within 36 hours.

Assessment: The limit for minimum boron concentration in the BWST was established to ensure that, following a DBA large-break LOCA (LBLOCA) with a minimum BWST level, the reactor will remain shut down in the cold condition following mixing of the BWST and RCS water volumes. Large-break LOCA accident analyses assume that all control rods remain withdrawn from the core. When operating in Mode 4, the control rods will either be inserted or the regulating rod groups will be inserted with one or more of the safety rod groups cocked and armed for automatic reactor protection system (RPS) insertion. Hence, all rods will not be withdrawn, should an initiating event occur. Also, given the highly unlikely possibility of a LBLOCA occurring, it can be assumed that all control rods will be inserted should an initiating event occur while in Mode 4. This provides for the reactor SDM to be very conservative, in excess of greater than or equal to 1 percent $\Delta k/k$. For these reasons, and the design basis assumptions that a) deviations in boron concentration will be relatively slow and small and that b) boric acid addition systems would normally be available (can be powered by onsite standby power sources), the NRC staff concludes that the change is acceptable.

3.4.6 TS 3.6.2, Reactor Building Air Locks

Reactor building air locks form part of the RB pressure boundary and provide a means for personnel access during all Modes of operation. As such, air lock integrity and leak tightness is essential for maintaining the RB leakage rate within limits in the event of a DBA. Each of the doors contains double gasketed seals and local leakage rate testing capability to ensure pressure integrity. To ensure a leak-tight seal, the air lock design uses pressure-seated doors (i.e., an increase in the RB internal pressure results in increased sealing force on each door).

LCO: Two Reactor Building air locks shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.6.2 Condition D, Required Action D.2. Specifically, if one or more RB air locks are inoperable, then restore the air lock to operable within 24 hours or Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action D.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: The energy that can be released to the RB when operating in Mode 4 is only a fraction of that associated with a DBA, thus RB pressure will be only slightly higher should a LOCA occur when operating in Mode 4 as compared to operating in Mode 5. Required Action C.2 requires at least one air lock door to be closed, which combined with reduced RB pressure should result in small RB air lock leakage. Also, significant radionuclide decay will have occurred due to plant shutdown. For these reasons, no increase in LERF is expected. In the unlikely event that at least one door cannot be closed, evaluation of the effect on plant risk and implementation of any required compensatory measures will be accomplished in accordance with 10 CFR 50.65. Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, because there are more mitigation systems such as HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW available to respond to initiating events that could challenge RCS inventory or DHR capability. In addition, the redundant RB spray and cooling systems required to be operable in Mode 4 but not in Mode 5, will be available to ensure that RB pressure remains low should a LOCA occur. Also, the likelihood of occurrence of a LOCA is very remote, thus the probability of occurrence of a LOCA is decreased while the consequence of such event is not increased. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.7 TS 3.6.3, Reactor Building Isolation Valves

The plant's RB isolation valves form part of the RB pressure boundary and provide a means for fluid penetrations not serving ECCS or ESAS DBA mitigation functions to be provided with two isolation barriers that are closed on an automatic isolation signal. These isolation devices consist of either passive devices or active (automatic) devices. Manual valves, de-activated automatic valves secured in their closed position (including check valves with flow through the valve secured), blind flanges, and closed systems are considered passive devices. Check valves, or other automatic valves designed to close following an accident without operator action, are considered active devices. Two barriers in series are provided for each penetration so that no single credible failure or malfunction of an active component can result in a loss of isolation or leakage that exceeds limits assumed in the safety analyses. One of these barriers may be a closed system. These barriers (typically RB isolation valves) make up the RB isolation system.

Reactor building isolation occurs upon receipt of a high RB pressure signal. The RB isolation signal closes automatic reactor building isolation valves in fluid penetrations not required for operation of engineered safeguard systems to prevent release of radiation to the environment in the event of a DBA. Also, upon receipt of a low RCS pressure signal, certain automatic reactor building isolation valves isolate. Other penetrations are isolated by the use of valves in the closed position or blind flanges. As a result, the RB isolation valves (and blind flanges) help ensure that the RB atmosphere will be isolated in the event of a release of radioactive material to the RB atmosphere from the RCS following a DBA.

LCO: Each Reactor Building isolation valve shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.6.3 Condition D, Required Action D.2 (see variation number 4 of Section 2.2 of the LAR). Specifically, if the Required Action and associated Completion Time cannot be met for penetration flow paths with inoperable isolation valves or RB purge valve leakage limits (Conditions A, B, and C and Required Actions A.1, A.2, B.1, C.1, and C.2), then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end-state associated with Required Action D.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: When in Mode 4 (not on DHR) there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR, than when operating in Mode 5. The redundant RB spray and RB cooling systems will be available to ensure that RBS pressure remains low should a LOCA occur. Because the energy that can be released to the RB when operating in Mode 4 is only a fraction of that associated with a DBA, RB pressure will be only slightly higher should a LOCA occur when operating in Mode 4 as compared to when operating in Mode 5. For these reasons, RB leakage associated with containment isolation valves is small, and with the plant shutdown, significant radionuclide decay will have occurred. Therefore, no increase in LERF is expected. Due to reduced RCS pressures when operating in Mode 4, especially toward the lower end of Mode 4, the likelihood of occurrence of a LOCA is very small (i.e., LOCA-initiating event frequencies are reduced compared to at-power operation). The probability of occurrence of a LOCA is decreased while the consequence of such an event is not increased. Thus, plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and risk associated with DHR operation is avoided. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.8 TS 3.6.4, Reactor Building Pressure

The RB pressure is limited during normal operation to preserve the initial conditions assumed in the accident analyses for a LOCA or steam line break (SLB). Additionally, keeping the RB pressure within the limits maintains the initial conditions assumed for the RB DBA and ECCS analyses.

The RB pressure is a process variable that is monitored and controlled. The RB pressure limits are derived from the input conditions used in the RB DBA and ECCS analyses. Should operation occur outside these limits coincident with a DBA, post-accident RB pressures and ECCS performance could exceed calculated values.

LCO: Reactor Building pressure shall be ≥ -1.0 psig and ≤ +3.0 psig.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.6.4 Condition B, Required Action B.2. Specifically, if RB pressure exceeds the limit and cannot be restored within 1 hour, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: The redundant RB spray and RB cooling systems will be available to ensure that RB pressure remains low should a LOCA occur. Because the energy that can be released to the RB when operating in Mode 4 is only a fraction of that associated with a DBA, RB pressure will be only slightly higher should a LOCA occur when operating in Mode 4 as compared to when operating in Mode 5. In such a situation, the margin to the RB design pressure will be large, on the order of several tens of pounds per square inch (psi). Also, the occurrence of a LOCA of any kind during operation in Mode 4 is considered highly unlikely. Additionally, since the plant is shutdown, allowing for significant radionuclide decay, no increase in LERF is expected should the LCO for high RB pressure be invoked while in Mode 4. This is especially germane considering that operations personnel will commence actions to restore RB pressure to within the limit immediately upon notification that it has exceeded the limit. RB vacuum conditions will not compromise RB integrity of large, dry RB of either pre-stressed or reinforced concrete designs. The risk associated with Mode 4 operation and RB pressure below the LCO low-pressure limit coincident with inadvertent RB spray actuation is considered to be so low as to be inconsequential (a search of available data bases found no record of this situation having occurred to date at any Babcock and Wilcox designed plants.). Also, operations personnel will commence actions to restore RB pressure to within the limit on notification that it has exceeded the limit.

Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and so risk associated with DHR operation is avoided. Also, when operating in Mode 4 (not on DHR) there are more mitigation systems such as HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW available to respond to an initiating event that could challenge RCS inventory or DHR, than when operating in Mode 5. These considerations ultimately lead to reduced challenges to the RB when operating in Mode 4 versus Mode 5. Based on the above analysis, the NRC staff concludes that the above requested change is acceptable.

3.4.9 TS 3.6.5, Reactor Building Spray and Cooling Systems

The licensee did not propose any changes to LCO 3.6.5 (similar to STS LCO 3.6.6, which is included in the TSTF-431 model application), as explained in variation number 6 in Section 2.2 of the LAR. Because LCO 3.6.5 requires only one train of RB spray and one train of RB coolers to be OPERABLE in Modes 3 and 4, and Condition E permits both RB spray trains or both RB cooling trains to be inoperable in Modes 3 or 4 for up to 36 hours, requiring entry into Mode 5 is consistent with the STS and TSTF-431. TSTF-431 requires at least one RB spray train and one RB cooling train operable in order to apply the Mode 4 end state.

Since the RB spray and cooling systems are required to be operable in Mode 4, these systems will be available, if needed, consistent with the analysis discussed above. Therefore, based on information provided by the licensee, the NRC staff concludes that no change is needed to LCO 3.6.5.

3.4.10 STS LCO 3.7.7, Component Cooling Water (CCW) System

The licensee's variation number 7 in LAR Section 2.2 states that

> ANO-1 does not have a CCW system or specification (STS 3.7.7). Therefore, no TSTF-431 changes related to CCW are incorporated into the ANO-1 TSs. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

The NRC staff's evaluation of a Mode 4 end state for the systems discussed in this SE does not rely on a CCW system as part of the basis for acceptability. Therefore, the NRC staff concludes that not having a CCW system has no effect on the technical conclusions of this SE, and is, therefore, acceptable.

3.4.11 TS 3.7.7, Service Water System (SWS)

This system provides cooling for equipment that supplies boron to the RCS (i.e., HPI and emergency boration system).

LCO: Two SWS loops shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.7.8 Condition B, Required Action B.2. Specifically, if an SWS loop becomes inoperable and cannot be restored within 72 hours, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.2 of this LCO is proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: In Mode 4, the stored energy of the reactor system would be only that associated with reduced decay heat energy and energy stored in the RCS components. Because of this, heat loads on the SWS will be greatly reduced from those associated with the design basis LOCA. Also, occurrence of a design basis LOCA is considered to be very unlikely to occur at anytime much less while operating in Mode 4. Indeed, the occurrence of a LOCA of any kind during operation in Mode 4 is considered highly unlikely. Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5 and risk associated with DHR operation is avoided. Also, when operating in Mode 4 (not on DHR) there are more mitigation systems such as HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW available to respond to an initiating events that could challenge RCS inventory or DHR capability, than when operating in Mode 5. These considerations ultimately lead to reduced challenges to the SWS when operating in Mode 4 versus Mode 5. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.12 STS 3.7.9, Ultimate Heat Sink (UHS)

The licensee's variation number 8 in LAR Section 2.2 states that

> The ANO-1 Ultimate Heat Sink (Emergency Cooling Pond) does not include cooling towers; therefore, TSTF-431 related changes (reference STS 3.7.9) are not applicable to ANO-1 TS 3.7.8. This difference does not invalidate the applicability of TSTF-431 and the model SE to ANO-1.

The NRC staff's evaluations of the Mode 4 end state for the systems discussed in this SE does not rely on an Emergency Cooling Pond system as part of the basis for acceptability. Therefore, the NRC staff concludes that not having an Emergency Cooling Pond has no effect on the technical conclusions of this SE, and is, therefore, acceptable.

3.4.13 TS 3.7.9, Control Room Emergency Ventilation System (CREVS)

The CREVS provides a protected environment from which operators can control the unit following an uncontrolled release of radioactivity or toxic gas (such as chlorine). The CREVS consists of two independent and redundant fan filter assemblies. Upon receipt of the activating signal(s), the normal control room ventilation system is automatically shut down and the CREVS can be manually started. The CREVS is designed to maintain the control room for 30 days of continuous occupancy after a DBA without exceeding a 5 rem whole body dose or its equivalent to any part of the body.

LCO: Two CREVS trains shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.7.9 Condition C, Required Action C.2. Specifically, if one train of CREVS becomes inoperable and cannot be restored within 7 days or two CREVS trains become inoperable (due to inoperable control room boundary) and cannot be restored within 24 hours, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action C.2 of this LCO is proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: This system would be required in the event the main control room was isolated. Such an isolation would be directly due to an uncontrolled release of radioactivity or toxic gas (e.g., chlorine). Uncontrolled release of radioactivity would be associated with a LOCA. A LOCA is considered highly unlikely to occur during Mode 4 operations. This is especially true of operations toward the lower end of Mode 4 while operating on SGs (DHR not in operation). Regardless of the CREVS status, the risks associated with Mode 4 are lower than the Mode 5 operating state. Relative to the uncontrolled release of toxic gas such as chlorine, this situation is the same as when operating in Mode 5 (i.e., frequencies for occurrence of these initiating events are the same in Mode 5 as Mode 4). Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5; risk associated with DHR operation is avoided. Also, when operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR, than when operating in Mode 5. These include the HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW systems. These considerations should ultimately lead to reduced challenges to CREVS when operating in Mode 4 versus Mode 5. Therefore, the NRC staff concludes that the change is acceptable.

3.4.14 TS 3.7.10, Control Room Emergency Air Conditioning System (CREACS)

The CREACS provides temperature control for the control room following isolation of the control room. The CREACS consists of two independent and redundant trains that provide cooling of recirculated control room air. A cooling coil and a water-cooled condensing unit are provided for each system to provide suitable temperature conditions in the control room for operating personnel and safety-related control equipment. Ductwork, dampers, and instrumentation also form part of the system. During operation, the CREACS maintains the temperature in a range consistent with personnel comfort and long-term equipment operation. The CREACS is a subsystem providing air temperature control for the control room.

LCO: Two CREACS trains shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.7.11 Condition B, Required Action B.2. Specifically, if a CREACS train becomes inoperable and cannot be restored within 30 days, then Mode 3 is prescribed within 6 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

Assessment: This system is required to be operable in the event the main control room was isolated. Such an isolation would be directly due to an uncontrolled release of radioactivity, chemicals, or toxic gas. Uncontrolled release of radioactivity would be associated with a LOCA. A LOCA is considered highly unlikely to occur during Mode 4 operations. This is especially true of operations toward the lower end of Mode 4 while operating on SGs (DHR not in operation). Relative to the uncontrolled release of chemicals, or toxic gas, this situation is the same as when operating in Mode 5, where frequencies for occurrence of these initiating events are the same in Mode 5 as in Mode 4. When operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR, than when operating in Mode 5. These include the HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW systems. This should ultimately lead to reduced challenges to CREACS when operating in Mode 4 versus Mode 5. Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5; risk associated with DHR operation is avoided. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.15 TS 3.8.1, AC Source - Operating

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal, and alternates) and the onsite standby power sources (emergency diesel generators (DGs)). ANO-1's design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safeguards systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two preferred offsite power sources and a single DG.

Offsite power is supplied to the unit switchyard from the transmission network by five transmission lines. From the switchyard, two electrically and physically separated offsite circuits provide AC power, through either the Startup Transformers or the Unit Auxiliary Transformer, to the 4.16-kiloVolt Engineered Safeguards buses.

LCO: The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and
b. Two diesel generators (DG) each capable of supplying one train of the onsite Class 1E AC Electrical Power Distribution System.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.8.1 Condition F, Required Action F.2. Specifically, if the Required Actions and associated Completion Times of Conditions A, B, C, D, or E cannot be met, then Mode 3 is prescribed within 12 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action F.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours.

In its LAR, the licensee did not propose any change to its current Required Action F.1 to be in Mode 3 in 12 hours. In an RAI dated October 28, 2013 (ADAMS Accession No. ML13301A675), the NRC staff requested additional information regarding the possible human factors impact of having unit operators enter two Required Actions (be in Mode 3 and be in Mode 4) with the same Completion Times (12 hours). In its RAI response dated November 14, 2013, the licensee stated that the 12-hour Completion Time is the original ANO-1 licensing basis for the subject TS, but acknowledged that a potential human factors concern may result with simultaneous Completion Times for entering Modes 3 and 4. The licensee proposed to revise the Completion Time for Required Action F.1 (be in Mode 3) to a more restrictive 6 hours. In the same supplement, the licensee provided new markups of the affected TS and TS Bases and clean (revised) TS pages for the affected TSs (LCOs 3.8.1, 3.8.4, 3.8.7, and 3.8.9).

Assessment: The initial conditions of DBA and transient analyses in the SAR assume ESF systems are operable. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, RCS, and RB design limits are not exceeded. During operations in Mode 4 there is always a need to assure power is available to systems, structures and components that support the critical safety functions. To this end, AC power sources are assured during occurrence of a loss-of-offsite power by operation of redundant load groups (trains). This situation is no different than when operating in Mode 4 or 5.

The operability requirements of the AC electrical power sources are predicated on initial assumptions of the accident analyses most notably design basis LOCAs. A design basis LOCA is considered highly unlikely to occur during at-power operations, much less during Mode 4; indeed, the occurrence of a LOCA of any kind during operation in Mode 4 is considered highly unlikely. This is especially true of operations toward the lower end of Mode 4 while operating on SGs (DHR not in operation). Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and risk associated with DHR operation is avoided. Also, when operating in Mode 4 there are more mitigation systems such as HPI (for ANO-1, when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW available to respond to initiating events that could challenge RCS inventory or DHR capability, than when operating in Mode 5. This consideration is particularly germane as it relates to loss of AC power sources because with the SGs operating in Mode 4, turbine-driven emergency feedwater pumps (TDEFWPs) are immediately available with SG pressure of 35 pounds per square inch gauge (psig) (at greater than or equal to 280 °F RCS temperature). These considerations ultimately lead to reduced challenges to CDF and LERF when operating in Mode 4 versus operations in Mode 5. The redundant nature of the AC power sources, including onsite standby power sources, provides for availability of AC power even if one source becomes inoperable.

Based on the licensee's RAI response as discussed above regarding the Required Action F.1 Completion Time, the NRC staff concludes that the licensee's revised Completion Time of 6 hours prevents a potential human factors concern and is more restrictive than 12 hours, and is, therefore, acceptable. Based on the above analysis, the NRC staff concludes that the end-state change for TS 3.8.1 is acceptable.

3.4.16 TS 3.8.4, DC Sources - Operating

The station direct current (DC) electrical power system provides the alternating current (AC) emergency power system with control power. It also provides both motive and control power to selected safety-related equipment and preferred AC vital bus power (via inverters). The DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The 125-Volt (V) DC electrical power system consists of two independent and redundant safety-related Class 1E DC electrical power subsystems (Red Train and Green Train). Each subsystem consists of one 125-V DC battery, the associated battery charger for each battery, a standby battery charger for each battery, and all the associated control equipment and interconnecting cabling. The need for DC power to support the ESFs is assured during a loss-of-offsite power by operation of one redundant train of station DC power as supported from the onsite standby power sources via the associated battery charger.

LCO: Both DC electrical subsystems shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.8.4 Condition B, Required Action B.2. Specifically, if one DC electrical power subsystem becomes inoperable and cannot be restored within 8 hours, then Mode 3 is prescribed within 12 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours. In addition, as discussed in Section 3.4.15 above, the licensee proposed a change to the Required Action B.1 Completion Time from 12 hours to 6 hours.

Assessment: The operability requirements of the DC electrical power sources are predicated on initial assumptions of the accident analyses most notably design basis LOCAs. A design basis LOCA is considered highly unlikely to occur during at-power operations, much less during Mode 4; indeed, the occurrence of a LOCA of any kind during operation in Mode 4 is considered highly unlikely. This is especially true of operations toward the lower end of Mode 4 while operating on SGs (DHR not in operation). Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and risk associated with DHR operation is avoided. Also, when operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge DHR, than when operating in Mode 5. These include the HPI and EFW systems. This consideration is particularly germane as it relates to loss of DC power sources (control and circuit breaker closure power for plant equipment) because with the SGs operating in Mode 4, TDEFWPs are immediately available with SG pressure of 35 psig (with RCS temperature greater than or equal to 280 °F). These considerations should ultimately lead to reduced challenges to CDF and LERF when operating in Mode 4 versus operations in Mode 5. The redundant nature of the DC power sources, provides for availability of DC power even if one source becomes inoperable.

The NRC staff concludes that the licensee's proposed change to Required Action B.1 to a Completion Time of 6 hours is more restrictive and prevents a potential human factors concern which may result with a 12-hour Completion Time for entry into both Mode 3 and Mode 4. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.17 TS 3.8.7, Inverters - Operating

The inverters are the preferred source of power for the 120 VAC [Volt alternating current] buses because of the stability and reliability they achieve. The function of the inverter is to provide AC electrical power to the bus. The inverters are normally powered from the 125-V DC electrical power system. The inverters, the preferred source of power for the 120-V AC buses because of their stability and reliability, provide an uninterruptible power source for the safety-significant instrumentation and controls, including RPS, ESAS, and the EFIC system.

The initial conditions of the DBA and transient analyses in the ANO-1 SAR, Chapter 14, "Safety Analysis," assume engineered safeguards systems are OPERABLE. The inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the safety-significant instrumentation and controls so that the fuel, RCS, and RB design limits are not exceeded.

LCO: The following inverters shall be OPERABLE:

a. Two Red Train inverters,
and
b. Two Green Train inverters.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.8.7 Condition B, Required Action B.2. Condition B states that if the Required Action and associated Completion Time are not met, or two or more of the four inverters required by LCO 3.8.7.a and LCO 3.8.7.b are inoperable, per Required Actions B.1 and B.2, Mode 3 is prescribed within 12 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action B.2 of this LCO is being proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours for Condition B "if Required Action and associated Completion Time not met." The other part of current Condition B, 'Two or more of the four inverters required by LCO 3.8.7.a and LCO 3.8.7.b inoperable,' is stated in a new Condition C. Per Required Actions C.1 and C.2, Mode 3 is prescribed within 12 hours and Mode 5 within 36 hours. In addition, as discussed in Section 3.4.15 above, the licensee proposed a change to the Required Action B.1 Completion Time from 12 hours to 6 hours.

Assessment: The operability requirements of the inverters are to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESF ACTUATION SIGNAL instrumentation and controls so that the fuel, RCS, and RB design limits are not exceeded in the event of a design basis LOCA. A design basis LOCA is considered highly unlikely to occur during at-power operations, much less during Mode 4; indeed, the occurrence of a LOCA of any kind during operation in Mode 4 is considered highly unlikely. This is especially true of operations at the lower end of Mode 4 while operating on SGs (DHR not in operation). Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and so risk associated with DHR operation is avoided. Also, when operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR capability, than when operating in Mode 5. These include the HPI (when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW systems. This consideration is particularly germane as it relates to loss of electrical power distribution systems because with the SGs operating in Mode 4, TDEFWPs are immediately available with a SG pressure of 35 psig (at RCS temperature greater than or equal to 280 °F). This consideration should ultimately lead to reduced challenges to CDF and LERF when operating in Mode 4 versus operations in Mode 5. The redundant nature of the AC vital bus electrical power distribution systems, including onsite standby power sources, provides for availability of electrical power even if one power distribution system becomes inoperable.

The NRC staff concludes that the licensee's proposed change to Required Action B.1 to a Completion Time of 6 hours is more restrictive and prevents a potential human factors concern which may result with a 12-hour Completion Time for entry into both Mode 3 and Mode 4. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.4.18 TS 3.8.9, Distribution Systems - Operating

The onsite Class 1E AC, DC, and AC vital bus electrical power distribution systems are divided by train into two redundant and independent AC, DC, and 120-V(Vital) AC bus electrical power distribution subsystems. The required power distribution systems ensure the availability of AC, DC, and VAC bus electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA.

Maintaining the train A and B, AC, DC, and VAC vital bus electrical power distribution subsystems operable ensures that the redundancy incorporated into the design of ESF is not defeated.

LCO: Two AC, DC, and 120-VAC electrical power distribution subsystems shall be OPERABLE.

Condition Requiring Entry into End State: This proposed end-state change is associated with LCO 3.8.9 Condition D, Required Action D.2. Specifically, if the required actions and associated Completion Times of Condition A (one or more AC electrical power distribution subsystems inoperable), Condition B (one or more 120-VAC vital buses inoperable) or Condition C (one or more DC electrical power distribution subsystems inoperable), cannot be met, then Mode 3 is prescribed within 12 hours and Mode 5 within 36 hours.

Proposed Modification for End-State Required Actions: The end state associated with Required Action D.2 of this LCO is proposed to be changed from Mode 5 within 36 hours to Mode 4 within 12 hours. In addition, as discussed in SE Section 3.4.15 above, the licensee proposed a change to the Required Action D.1 Completion Time from 12 hours to 6 hours.

Assessment: A single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor due to the redundancy in design. Providing for reactor shutdown is not a concern while operating in Mode 4. However, maintaining safe plant conditions is always a concern and requires that at least one redundant electrical distribution system be operable. This is assured by the redundant electrical distribution system design and the ability to power one of these systems via batteries backed by onsite standby power sources for DC distribution and AC vital buses, and onsite standby power sources for AC distribution. There is no difference in this situation whether the plant is operating in Mode 4 or 5.

The operability requirements of the AC, DC, and AC vital bus electrical power distribution systems are predicated on providing the necessary power to ESF systems so that the fuel, RCS, and RB design limits are not exceeded in the event of a design basis LOCA. A design basis LOCA is considered highly unlikely to occur during at-power operations, much less during Mode 4; indeed, the occurrence of a LOCA of any kind during operation in Mode 4 is considered highly unlikely. This is especially true of operations at the lower end of Mode 4 while operating on SGs (DHR not in operation). Plant risk is lower when operating in Mode 4 (not on DHR) than when operating in Mode 5, and so risk associated with DHR operation is avoided. Also, when operating in Mode 4, there are more mitigation systems available to respond to initiating events that could challenge RCS inventory or DHR, than when operating in Mode 5. These include the HPI (when any RCS cold-leg temperature is greater than or equal to 350 °F) and EFW systems. This consideration is particularly germane as it relates to loss of electrical power distribution systems because with the SGs operating in Mode 4, TDEFWPs are immediately available with SG pressure of 35 PSIG (with RCS temperature greater than or equal to 280 °F). This consideration should ultimately lead to reduced challenges to CDF and LERF when operating in Mode 4 versus operations in Mode 5. The redundant nature of the AC, DC, and AC vital bus electrical power distribution systems, including onsite standby power sources, provides for availability of electrical power even if one power distribution system becomes inoperable.

The NRC staff concludes that the licensee's proposed change to Required Action D.1 to a Completion Time of 6 hours is more restrictive and prevents a potential human factors concern which may result with a 12-hour Completion Time for entry into both Mode 3 and Mode 4. Based on the above analysis, the NRC staff concludes that the change is acceptable.

3.5 Regulatory Commitments

In its LAR dated March 26, 2013, the licensee provided regulatory commitments regarding implementation of TSTF-431, Revision 3. The licensee revised its regulatory commitments regarding NUMARC 93-01 guidance in its supplement dated August 19, 2014, as follows:

- Entergy will follow the guidance established in Section 11 of NUMARC 93-01, "Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Nuclear Management and Resource Council, Revision 4A, April 2011.
- Entergy will follow the guidance established in TSTF-IG-07-01, Revision 1, "Implementation Guidance for TSTF-431, Revision 3, 'Change in Technical Specifications End States,' BAW-2441-A," with the exception that Section 11 of NUMARC 93-01, Revision 4A, will be utilized to meet 10 CFR 50.65(a)(4) requirements in lieu of NUMARC 93-01, Revision 3.

As discussed in Section 4.4.1 of the NRC's Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-101, Revision 4, "License Amendment Review Procedures" (ADAMS Accession No. ML113200053), since commitments made by a licensee in support of a license amendment are not legally binding, the NRC staff's SE should not rely on commitments as a basis for any part of the NRC staff's approval of a proposed amendment. However, the staff may rely on a commitment if it is escalated into an obligation (e.g., license condition) or subsequently incorporated into a mandated licensing basis document (e.g., SAR). As discussed in this SE, the NRC staff has relied, in part, on the above commitments as part of the NRC staff's acceptance of the proposed amendment. Consistent with the guidance in NRR Office Instruction LIC-101, these actions, originally proposed as regulatory commitments, have been elevated to amendment implementation requirements for incorporation into the ANO-1 SAR. As such, the NRC staff has added the following words as a condition of the amendment (found on the implementation requirements section of the amendment issuance authority page) to ensure that the SAR is revised as part of the amendment implementation:

> The license amendment is effective as of its date of issuance and shall be implemented within 90 days from the date of issuance. In addition, the licensee shall incorporate the two commitments listed in Section 3.5 of the safety evaluation associated with this amendment in the next periodic update of the ANO-1 Safety Analysis Report, in accordance with 10 CFR 50.71(e).

The NRC staff notes that, following incorporation of the commitments listed above into the ANO-1 SAR, future changes will be subject to the provisions of 10 CFR 50.59.

3.6 TS Bases Changes

In the LAR, as supplemented, the licensee identified changes to the TS Bases for the proposed amendment. In identifying changes to the TS Bases, the licensee is not requesting that the NRC approve these changes to the TS Bases. The identified changes to the TS Bases are controlled by the licensee under TS 5.5.14, "Technical Specifications (TS) Bases Control Program," which states, in part, that:

> Licensees may make changes to Bases without prior NRC approval provided the changes do not involve either of the following:
>
> 1. A change in the TS incorporated in the license; or
>
> 2. A change to the updated SAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.

3.7 Summary

The NRC staff has reviewed Entergy's proposed adoption of TSTF-431, Revision 3, to modify the TSs requirements to permit an end state of hot shutdown Mode 4 with the implementation of Topical Report BAW-2441-A, Revision 2, and concludes that the changes are consistent with the approved Topical Report.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on July 23, 2013 (78 FR 44170). Accordingly, the amendment meets 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 amendment.

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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: R. Grover, NRR/DSS/STSB

Date: March 3, 2015.

March 3, 2015

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 1 - ISSUANCE OF AMENDMENT RE: AMENDMENT TO REVISE TECHNICAL SPECIFICATIONS END STATES (TAC NO. MF1182)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 253 to Renewed Facility Operating License No. DPR-51 for Arkansas Nuclear One, Unit No. 1 (ANO-1). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated March 26, 2013, as supplemented by letters dated November 14, 2013, and August 19, October 22, and December 5, 2014.

The amendment modifies the ANO-1 TS requirements for end states associated with the implementation of the NRC-approved Topical Report BAW-2441-A, Revision 2, "Risk-Informed Justification for LCO End-State Changes," as well as Required Actions revised by a specific Note in TS Task Force change traveler (TSTF)-431, Revision 3, "Change in Technical Specifications End States (BAW-2441)."

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

Sincerely,
/RA/

Andrea E. George, Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosures:
1. Amendment No. 253 to DPR-51
2. Safety Evaluation

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RidsNrrPMANO Resource
RidsRgn4MailCenter Resource
RGrover, NRR/DSS/STSB

ADAMS Accession No. ML15023A147 *via memo

OFFICE	NRR/DORL/LPL4-1/PM	NRR/DORL/LPL4-1/LA	NRR/DSS/STSB/BC
NAME	AGeorge	JBurkhardt	RElliott*
DATE	2/5/15	2/1/15	1/16/15
OFFICE	OGC – NLO	NRR/DORL/LPL4-1/BC(A)	NRR/DORL/LPL4-1/PM
NAME	AGhosh	EOesterle	AGeorge
DATE	2/25/15	3/2/15	3/3/15

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