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

November 7, 2018

Vice President, Operations
Entergy Operations, Inc.
River Bend Station
5485 US Highway 61
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATIONS TO ADOPT TSTF-542, REVISION 2, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (EPID L-2017-LLA-0383)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 193 to Facility Operating License No. NPF-47 for the River Bend Station, Unit 1. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated November 15, 2017, as supplemented by letter dated April 26, 2018.

The amendment replaces the existing requirements in the TSs related to "operations with a potential for draining the reactor vessel" with new requirements for reactor pressure vessel (RPV) water inventory control. These alternative requirements protect TS Safety Limit 2.1.1.3, which requires RPV water level to be greater than the top of active irradiated fuel.

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

Sincerely,

Lisa M. Regner, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-458

Enclosures:
1. Amendment No. 193 to NPF-47
2. Safety Evaluation

cc: Listserv

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

ENTERGY LOUISIANA, LLC

AND

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-458

RIVER BEND STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 193
License No. NPF-47

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated November 15, 2017, as supplemented by letter dated April 26, 2018, 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, as amended, 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 Facility Operating License No. NPF-47 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 193 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Robert J. Pascarelli, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: November 7, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 193

RIVER BEND STATION, UNIT 1

FACILITY OPERATING LICENSE NO. NPF-47

DOCKET NO. 50-458

Replace the following pages of the Facility Operating License No. NPF-47 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.

Facility Operating License

Remove	Insert
- 3 -	- 3 -

Technical Specifications

REMOVE	INSERT	REMOVE	INSERT
1.0-2a	1.0-2a	3.5-6	3.5-6
1.0-3	1.0-3	3.5-7	3.5-7
3.3-32	3.3-32	3.5-8	3.5-8
3.3-33	3.3-33	3.5-9	3.5-9
3.3-35	3.3-35	3.5-10	3.5-10
3.3-39	3.3-39	3.6-3	3.6-3
3.3-40	3.3-40	3.6-6	3.6-6
3.3-41	3.3-41	3.6-9	3.6-9
3.3-42	3.3-42	3.6-14	3.6-14
3.3-43	3.3-43	3.6-31	3.6-31
----	3.3-43a	3.7-5	3.7-5
----	3.3-43b	3.7-6	3.7-6
----	3.3-43c	3.7-7	3.7-7
----	3.3-43d	3.7-9	3.7-9
----	3.3-43e	3.7-10	3.7-10
3.3-44	3.3-44	3.7-11	3.7-11
3.3-45	3.3-45	3.8-18	3.8-18
3.3-46	3.3-46	3.8-19	3.8-19
3.3-47	3.3-47	3.8-29	3.8-29
3.3-57	3.3-57	3.8-37	3.8-37
3.3-71	3.3-71	3.8-42	3.8-42
3.5-1	3.5-1		

(3) EOI, pursuant to the Act and 10 CFR Part 70, to receive, possess and to use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

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

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

(6) EOI, pursuant to the Act and 10 CFR Parts 30, 40 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 license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

EOI is authorized to operate the facility at reactor core power levels not in excess of 3091 megawatts thermal (100% rated power) in accordance with the conditions specified herein. The items identified in Attachment 1 to this license shall be completed as specified. Attachment 1 is hereby incorporated into this license.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 193 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

1.1 Definitions (continued)

DRAIN TIME

The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:

a. The water inventory above the TAF is divided by the limiting drain rate;

b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error), for all penetration flow paths below the TAF except:

1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or

3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation devices without offsite power.

c. The penetration flow paths required to be evaluated per paragraph b) are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;

(continued)

1.1 Definitions (continued)

DRAIN TIME (continued)	d. No additional draining events occur; and e. Realistic cross-sectional areas and drain rates are used. A bounding DRAIN TIME may be used in lieu of a calculated value.
EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME	The ECCS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ECCS initiation setpoint at the channel sensor until the ECCS equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.
END OF CYCLE RECIRCULATION PUMP TRIP (EOC-RPT) SYSTEM RESPONSE TIME	The EOC-RPT SYSTEM RESPONSE TIME shall be that time interval from initial movement of the associated turbine stop valve or the turbine control valve to complete suppression of the electric arc between the fully open contacts of the recirculation pump circuit breaker. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.
ISOLATION SYSTEM RESPONSE TIME	The ISOLATION SYSTEM RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its isolation initiation setpoint at the channel sensor until the isolation valves travel to their required positions. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

(continued)

3.3 INSTRUMENTATION

3.3.5.1 Emergency Core Cooling System (ECCS) Instrumentation

LCO 3.3.5.1 The ECCS instrumentation for each Function in Table 3.3.5.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.1-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.1-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	B.1 ----------NOTE---------- Only applicable for Functions 1.a, 1.b, 2.a and 2.b. ----------	
	Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for feature(s) in both divisions
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 ----------NOTE---------- Only applicable for Functions 3.a and 3.b. ----------	
	Declare High Pressure Core Spray (HPCS) System inoperable.	1 hour from discovery of loss of HPCS initiation capability
	AND	
	B.3 Place channel in trip.	24 hours
C. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	C.1 ----------NOTE---------- Only applicable for Functions 1.c, 1.d, 1.e, 2.c, 2.d, and 2.e. ----------	
	Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for feature(s) in both divisions
	AND	
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	E.1 ----------NOTE---------- Only applicable for Functions 1.f, 1.g, and 2.f. ----------	
	Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for feature(s) in both divisions
	AND	
	E.2 Restore channel to OPERABLE status.	7 days
F. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	F.1 Declare Automatic Depressurization System (ADS) valves inoperable.	1 hour from discovery of loss of ADS initiation capability in both trip systems
	AND	

(continued)

Table 3.3.5.1-1 (page 1 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Low Pressure Coolant Injection-A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems					
a. Reactor Vessel Water Level – Low Low Low, Level 1	1,2,3	2[a]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ -147 inches
b. Drywell Pressure – High	1,2,3	2[a]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 1.88 psid
c. LPCS Pump Start – Time Delay Relay	1,2,3	1	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≥ 1.8 seconds and ≤ 2.2 seconds
d. LPCI Pump A Start – Time Delay Relay	1,2,3	1	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≥ 6.3 seconds and ≤ 7.7 seconds
e. Reactor Vessel Pressure – Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 472 psig and ≤ 502 psig
f. LPCS Pump Discharge Flow – Low (Bypass)	1,2,3	1	E	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 750 gpm
g. LPCI Pump A Discharge Flow – Low (Bypass)	1,2,3	1	E	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 900 gpm
h. Manual Initiation	1,2,3	1 per system	C	SR 3.3.5.1.6	NA

(continued)

(a) Also required to initiate the associated diesel generator.

Table 3.3.5.1-1 (page 2 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. LPCI B and LPCI C Subsystems					
a. Reactor Vessel Water Level – Low Low Low, Level 1	1,2,3	2[a]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ -147 Inches
b. Drywell Pressure – High	1,2,3	2[a]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 1.88 psid
c. LPCI Pump B Start – Time Delay Relay	1,2,3	1	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≥ 6.3 seconds and ≤ 7.7 seconds
d. LPCI Pump C Start – Time Delay Relay	1,2,3	1	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≥ 1.8 seconds and ≤ 2.2 seconds
e. Reactor Vessel Pressure – Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 472 psig and ≤ 502 psig
f. LPCI Pump B and LPCI Pump C Discharge Flow – Low (Bypass)	1,2,3	1 per pump	E	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 900 gpm
g. Manual Initiation	1,2,3	1	C	SR 3.3.5.1.6	NA

(continued)

(a) Also required to initiate the associated diesel generator.

Table 3.3.5.1-1 (page 3 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. High Pressure Core Spray (HPCS) System					
a. Reactor Vessel Water Level – Low Low, Level 2	1,2,3	4[a]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ -47 inches
b. Drywell Pressure – High	1,2,3	4[a]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 1.88 psid
c. Reactor Vessel Water Level – High, Level 8	1,2,3	2	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 55 inches
d. Condensate Storage Tank Level – Low	1,2,3	2	D	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ -4.5 inches
e. Suppression Pool Water Level – High	1,2,3	2	D	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 8 inches
f. HPCS Pump Discharge Pressure – High (Bypass)	1,2,3	1	E	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 275 psig
g. HPCS System Flow Rate – Low (Bypass)	1,2,3	1	E	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 710 gpm
h. Manual Initiation	1,2,3	1	C	SR 3.3.5.1.6	NA

(continued)

(a) Also required to initiate the associated diesel generator.

Table 3.3.5.1-1 (page 4 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
4. Automatic Depressurization System (ADS) Trip System A					
a. Reactor Vessel Water Level – Low Low Low, Level 1	1,2(b),3(b)	2	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ -147 inches
b. Drywell Pressure – High	1,2(b),3(b)	2	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 1.88 psid
c. ADS Initiation Timer	1,2(b),3(b)	1	G	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≤ 117 seconds
d. Reactor Vessel Water Level – Low, Level 3 (Confirmatory)	1,2(b),3(b)	1	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 8.7 inches
e. LPCS Pump Discharge Pressure – High	1,2(b),3(b)	2	G	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 130 psig
f. LPCI Pump A Discharge Pressure – High	1,2(b),3(b)	2	G	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 120 psig
g. ADS Bypass Timer (High Drywell Pressure)	1,2(b),3(b)	2	G	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≤ 5.5 minutes
h. Manual Initiation	1,2(b),3(b)	2 per system	G	SR 3.3.5.1.6	NA

(continued)

(b) With reactor steam dome pressure > 100 psig.

Table 3.3.5.1-1 (page 5 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
5. ADS Trip System B					
a. Reactor Vessel Water Level – Low Low Low, Level 1	1,2(b),3(b)	2	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ -147 Inches
b. Drywell Pressure – High	1,2(b),3(b)	2	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≤ 1.88 psid
c. ADS Initiation Timer	1,2(b),3(b)	1	G	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≤ 117 seconds
d. Reactor Vessel Water Level – Low, Level 3 (Confirmatory)	1,2(b),3(b)	1	F	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 8.7 Inches
e. LPCI Pumps B & C Discharge Pressure – High	1,2(b),3(b)	2 per pump	G	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 120 psig
f. ADS Bypass Timer (High Drywell Pressure)	1,2(b),3(b)	2	G	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.6	≤ 5.5 minutes
g. Manual Initiation	1,2(b),3(b)	2 per system	G	SR 3.3.5.1.6	NA

(b) With reactor steam dome pressure > 100 psig.

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.2-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	B.1 Declare associated penetration flow path(s) incapable of automatic isolation. AND B.2 Calculate DRAIN TIME.	Immediately Immediately
C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	C.1 Place channel in trip.	1 hour

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	D.1 Declare HPCS system inoperable OR D.2 Align the HPCS pump suction to the suppression pool.	1 hour 1 hour
E. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	E.1 Restore channel to OPERABLE status.	24 hours
F. Required Action and associated Completion Time of Condition C, D, or E not met.	F.1 Declare associated ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------

Refer to Table 3.3.5.2-1 to determine which SRs apply for each ECCS function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.5.2.3	Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months

Table 3.3.5.2-1 (page 1 of 2)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Low Pressure Coolant Injection A (LPCI) and Low Pressure Core Spray (LPCS) Subsytems					
a. Reactor Vessel Pressure – Low (Injection Permissive)	4, 5	4[a]	C	SR 3.3.5.2.1 SR 3.3.5.2.2	≤ 502 psig
b. LPCS Pump Discharge Flow – Low (Bypass)	4, 5	1[a]	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 750 gpm
c. LPCI Pump A Discharge Flow – Low (Bypass)	4, 5	1[a]	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 900 gpm
d. Manual Initiation	4, 5	1 per system[a]	E	SR 3.3.5.2.3	NA
2. LPCI B and LPCI C Subsytems					
a. Reactor Vessel Pressure – Low (Injection Permissive)	4, 5	4[a]	C	SR 3.3.5.2.1 SR 3.3.5.2.2	≤ 502 psig
b. LPCI Pump B and LPCI Pump C Discharge Flow – Low (Bypass)	4, 5	1 per pump[a]	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 900 gpm
c. Manual Initiation	4, 5	1 per system[a]	E	SR 3.3.5.2.3	NA

(continued)

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control.

Table 3.3.5.2-1 (page 2 of 2)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. High Pressure Core Spray (HPCS) System					
a. Condensate Storage Tank Level – Low	4[b],5[b]	2[a]	D	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ -4.5 inches
b. HPCS Pump Discharge Pressure – High (Bypass)	4, 5	1[a]	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 275 psig
c. HPCS System Flow Rate – Low (Bypass)	4, 5	1[a]	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 710 gpm
4. RHR System Isolation					
a. Reactor Vessel Water Level – Low (Level 3)	(c)	2 in one trip system	B	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 8.7 inches
5. Reactor water Cleanup (RWCU) System Isolation					
a. Reactor Water Level – Low, Low (Level 2)	(c)	2 in one trip system	B	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ -47 inches

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control."

(b) When HPCS is OPERABLE for compliance with LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control" and aligned to the condensate storage tank.

(c) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.5.3 Reactor Core Isolation Cooling (RCIC) System Instrumentation

LCO 3.3.5.3 The RCIC System instrumentation for each Function in Table 3.3.5.3-1 shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.3-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	B.1 Declare RCIC System inoperable. AND B.2 Place channel in trip.	1 hour from discovery of loss of RCIC initiation capability 24 hours
C. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	C.1 Restore channel to OPERABLE status.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	D.1 ----------NOTE---------- Only applicable if RCIC pump suction is not aligned to the suppression pool. ----------	
	Declare RCIC System inoperable.	1 hour from discovery of loss of RCIC initiation capability
	AND	
	D.2.1 Place channel in trip.	24 hours
	OR	
	D.2.2 Align RCIC pump suction to the suppression pool.	24 hours
E. Required Action and associated Completion Time of Condition B, C, or D not met.	E.1 Declare RCIC System inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. Refer to Table 3.3.5.3-1 to determine which SRs apply for each RCIC Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed as follows: (a) for up to 6 hours for Functions 2 and 5; and (b) for up to 6 hours for Functions 1, 3, and 4 provided the associated Function maintains RCIC initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.5.3.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.5.3.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.5.3.3	Calibrate the trip units.	92 days
SR 3.3.5.3.4	Perform CHANNEL CALIBRATION.	24 months
SR 3.3.5.3.5	Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months

Table 3.3.5.3-1 (page 1 of 1)
Reactor Core Isolation Cooling System Instrumentation

FUNCTION	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level – Low Low, Level 2	4	B	SR 3.3.5.3.1 SR 3.3.5.3.2 SR 3.3.5.3.3 SR 3.3.5.3.4 SR 3.3.5.3.5	≥ -47 inches
2. Reactor Vessel Water Level – High, Level 8	2	C	SR 3.3.5.3.1 SR 3.3.5.3.2 SR 3.3.5.3.3 SR 3.3.5.3.4 SR 3.3.5.3.5	≤ 52 inches
3. Condensate Storage Tank Level – Low	2	D	SR 3.3.5.3.1 SR 3.3.5.3.2 SR 3.3.5.3.3 SR 3.3.5.3.4 SR 3.3.5.3.5	≥ -4.5 inches
4. Suppression Pool Water Level – High	2	D	SR 3.3.5.3.1 SR 3.3.5.3.2 SR 3.3.5.3.3 SR 3.3.5.3.4 SR 3.3.5.3.5	≤ 8 inches
5. Manual Initiation	1	C	SR 3.3.5.3.5	NA

Table 3.3.6.1-1 (page 5 of 5)
Primary Containment and Drywell Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
5. RHR System Isolation					
a. RHR Equipment Room Ambient Temperature – High	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ 121.1°F
b. Reactor Vessel Water Level – Low, Level 3	1,2,3[c]	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.5 SR 3.3.6.1.6	≥ 8.7 Inches
	3[d]	2	J	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.5 SR 3.3.6.1.6	≥ 8.7 inches
c. Reactor Vessel Water Level - Low Low Low, Level 1	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.5 SR 3.3.6.1.6	≥ -147 Inches
d. Reactor Steam Dome Pressure - High	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ 150 psig
e. Drywell Pressure – High	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ 1.88 psid
f. Manual Initiation	1,2,3	2	G	SR 3.3.6.1.6	NA

(c) With reactor steam dome pressure greater than or equal to the RHR cut-in permissive pressure.

(d) With reactor steam dome pressure less than the RHR cut-in permissive pressure.

Table 3.3.7.1-1 (page 1 of 1)
Control Room Fresh Air System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1.	Reactor Vessel Water Level - Low Low, Level 2	1,2,3	2	B	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.3 SR 3.3.7.1.4 SR 3.3.7.1.5	≥ -47 inches
2.	Drywell Pressure - High	1,2,3	2	C	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.3 SR 3.3.7.1.4 SR 3.3.7.1.5	≤ 1.88 psid
3.	Control Room Local Intake Ventilation Radiation Monitors	1,2, 3[a]	1	D	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.4 SR 3.3.7.1.5	$\leq 0.97 \times 10^{-5}$ μCi/cc

(a) During movement of recently irradiated fuel assemblies in the primary containment or fuel building.

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.1 ECCS -Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of seven safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ 100 psig.

ACTIONS

----------NOTE----------
LCO 3.0.4.b is not applicable to HPCS.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days
B. High Pressure Core Spray (HPCS) System inoperable.	B.1 Verify by administrative means RCIC System is OPERABLE when RCIC is required to be OPERABLE. AND B.2 Restore HPCS System to OPERABLE status.	1 hour 14 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

AND

One ECCS injection/spray subsystem shall be OPERABLE.

APPLICABILITY: MODE 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without offsite electrical power.	Immediately
C. DRAIN TIME < 36 hours and ≥ 8 hours	C.1 Verify primary containment boundary is capable of being established in less than the DRAIN TIME. AND C.2 Verify each primary containment penetration flow path is capable of being isolated within the DRAIN TIME.	4 hours 4 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. DRAIN TIME < 8 hours.	----------NOTE---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
	D.1 Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND	
	D.2 Initiate action to establish primary containment boundary.	Immediately
	AND	
	D.3 Initiate action to isolate each primary containment penetration flow path or verify it can be manually isolated from the control room.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME is ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required low pressure ECCS injection/spray subsystem, the suppression pool water level is ≥ 13 ft 3 inches.	12 hours
SR 3.5.2.3	Verify, for the required High Pressure Core Spray (HPCS) System, the: a. Suppression pool water level is ≥ 13 ft 3 inches; or b. Condensate storage tank water level is ≥ 11 ft 1 inch.	12 hours
SR 3.5.2.4	Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.	31 days
SR 3.5.2.5	----------NOTES---------- 1. A low pressure coolant injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned and not otherwise inoperable. 2. Not required to be met for system vent flow paths opened under administrative control. ---------- Verify, for the required ECCS injection/spray subsystem, each manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	 31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.6	Operate the required ECCS injection/spray subsystem for ≥ 10 minutes	92 days
SR 3.5.2.7	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated actuation signal.	24 months
SR 3.5.2.8	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required LPCI or LPCS subsystem actuates on a manual initiation signal, or the required HPCS subsystem can be manually operated.	24 months

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.3 RCIC System

LCO 3.5.3 The RCIC System shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

----------NOTE----------
LCO 3.0.4.b is not applicable to RCIC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCIC System inoperable.	A.1 Verify by administrative means High Pressure Core Spray System is OPERABLE. AND A.2 Restore RCIC System to OPERABLE status.	1 hour 14 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Reduce reactor steam dome pressure to ≤ 150 psig.	12 hours 36 hours

3.6 CONTAINMENT SYSTEMS

3.6.1.2 Primary Containment Air Locks

LCO 3.6.1.2 Two primary containment air locks shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the primary containment.

ACTIONS

----------NOTES----------

1. Entry and exit is permissible to perform repairs of the affected air lock components.
2. Separate Condition entry is allowed for each air lock.
3. Enter applicable Conditions and Required Actions of LCO 3.6.1.1, "Primary Containment-Operating," when air lock leakage results in exceeding overall containment leakage rate acceptance criteria in MODES 1, 2, and 3.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more primary containment air locks with one primary containment air lock door inoperable.	----------NOTES---------- 1. Required Actions A.1, A.2, and A.3 are not applicable if both doors in the same air lock are inoperable and Condition C is entered. 2. Entry and exit is permissible for 7 days under administrative controls if both air locks are inoperable. ----------	(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.3 Restore air lock to OPERABLE status.	24 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, or 3.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours
E. Required Action and associated Completion Time of Condition A, B, or C not met during movement of recently irradiated fuel assemblies in the primary containment.	E.1 Suspend movement of recently irradiated fuel assemblies in the primary containment.	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.1.3 Primary Containment Isolation Valves (PCIVs)

LCO 3.6.1.3 Each PCIV shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTIONS

----------NOTES----------

1. Penetration flow paths may be unisolated intermittently under administrative controls.
2. Separate Condition entry is allowed for each penetration flow path.
3. Enter applicable Conditions and Required Actions for systems made inoperable by PCIVs.
4. Enter applicable Conditions and Required Actions of LCO 3.6.1.1, "Primary Containment-Operating," when PCIV leakage results in exceeding overall containment leakage rate acceptance criteria, in MODES 1, 2, and 3.

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.3 Perform SR 3.6.1.3.5 for the resilient seal purge valves closed to comply with Required Action D.1.	Once per 92 days
E. Required Action and associated Completion Time of Condition A, B, C, or D not met in MODE 1, 2, or 3.	E.1 Be in MODE 3. AND E.2 Be in MODE 4.	12 hours 36 hours

3.6 CONTAINMENT SYSTEMS

3.6.1.10 Primary Containment-Shutdown

LCO 3.6.1.10 Primary containment shall be OPERABLE.

APPLICABILITY: During movement of recently irradiated fuel assemblies in the primary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Primary containment inoperable.	A.1 Suspend movement of recently irradiated fuel assemblies in the primary containment.	Immediately

3.7 PLANT SYSTEM

3.7.2 Control Room Fresh Air (CRFA) System

LCO 3.7.2 Two CRFA subsystems shall be OPERABLE.

----------NOTE----------
The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the primary containment, or fuel building.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CRFA subsystem inoperable for reasons other than Condition B.	A.1 Restore CRFA subsystem to OPERABLE status.	7 days
B. One or more CRFA subsystems inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1 Initiate action to implement mitigating actions. AND B.2 Verify mitigating actions ensure CRE occupant exposures to radiological, chemical, and smoke hazards will not exceed limits. AND B.3 Restore CRE boundary to OPERABLE status.	Immediately 24 hours 90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and Associated Completion Time of Condition A or B not met in MODE 1, 2, or 3.	C.1 ----------NOTE---------- LCO 3.0.4.a is not applicable when entering MODE 3. ---------- Be in MODE 3.	12 hours
D. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the primary containment or fuel building.	----------NOTE---------- LCO 3.0.3 is not applicable. ---------- D.1 Place OPERABLE CRFA subsystem in emergency mode.	Immediately
	OR	
	D.2 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	Immediately
E. Two CRFA subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B.	E.1 ----------NOTE---------- LCO 3.0.4.a is not applicable when entering MODE 3. ---------- Be in MODE 3.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Two CRFA subsystems inoperable during movement of recently irradiated fuel assemblies in the primary containment or fuel building. OR One or more CRFA subsystems inoperable due to inoperable CRE boundary during movement of recently irradiated fuel assemblies in the primary containment or fuel building.	F.1 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.2.1	Operate each CRFA subsystem for ≥ 15 continuous minutes.	31 days
SR 3.7.2.2	Perform required CRFA filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.7.2.3	Verify each CRFA subsystem actuates on an actual or simulated initiation signal.	24 months

(continued)

3.7 PLANT SYSTEMS

3.7.3 Control Room Air Conditioning (AC) System

LCO 3.7.3 Two control room AC subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the primary containment or fuel building.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One control room AC subsystem inoperable.	A.1 Restore control room AC subsystem to OPERABLE status.	30 days
B. Two control room AC subsystems inoperable.	B.1 Verify control room area temperature ≤ 104°F. AND B.2 Restore one control room AC subsystem to OPERABLE status.	Once per 4 hours 7 days
C. Required Action and Associated Completion Time of Condition A or B not met in MODE 1, 2, or 3.	C.1 ----------NOTE---------- LCO 3.0.4.a is not applicable when entering MODE 3. ---------- Be in MODE 3.	 12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the primary containment or fuel building.	----------NOTE---------- LCO 3.0.3 is not applicable. ---------- D.1 Place OPERABLE control room AC subsystem in operation. <u>OR</u> D.2 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	 Immediately Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition B not met during movement of recently irradiated fuel assemblies in the primary containment or fuel building.	E.1 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.3.1	Verify each control room AC subsystem has the capability to remove the assumed heat load.	24 months

ACTIONS

----------NOTE----------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO Item a not met.	----------NOTE---------- Enter applicable Condition and Required Actions of LCO 3.8.10, when any required division is de-energized as a result of Condition A. ----------	
	A.1 Declare affected required feature(s) with no offsite power available from a required circuit inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	Immediately
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. LCO Item b not met.	B.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	B.2 Suspend movement of recently irradiated fuel assemblies in primary containment and fuel building.	Immediately
	AND	
	B.3 Initiate action to restore required DG to OPERABLE status.	Immediately
C. LCO Item c not met.	C.1 Declare High Pressure Core Spray System and Standby Service Water System pump 2C inoperable.	72 hours

ACTIONS

----------NOTE----------

LCO 3.0.3 is not applicable

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC electrical power subsystems inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of recently irradiated fuel assemblies in the primary containment and fuel building.	Immediately
	AND	
	A.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Initiate action to restore required inverters to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct inverter voltage, frequency, and alignments to required AC vital buses.	7 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution subsystems to OPERABLE status. AND A.2.4 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems.	7 days

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 193 TO

FACILITY OPERATING LICENSE NO. NPF-47

ENTERGY OPERATIONS, INC.

RIVER BEND STATION, UNIT 1

DOCKET NO. 50-458

1.0 INTRODUCTION

By application dated November 15, 2017 (Reference 1), and supplemented by letter dated April 26, 2018 (Reference 2), Entergy Operations, Inc. (Entergy, the licensee), requested to adopt Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control" (Reference 3), for the River Bend Station, Unit 1 (RBS). Traveler TSTF-542, Revision 2, was approved by the U.S. Nuclear Regulatory Commission (NRC) on December 20, 2016 (Reference 4).

The proposed changes would replace existing technical specification (TS) requirements associated with "operations with a potential for draining the reactor vessel" (OPDRVs) with revised TSs providing alternative requirements for reactor pressure vessel (RPV) water inventory control (WIC). These alternative requirements would protect the RBS TS Safety Limit 2.1.1.3, which states "[r]eactor vessel water level shall be greater than the top of active irradiated fuel."

Additionally, a new definition, "DRAIN TIME," would be added to the RBS TS Section 1.1, "Definitions." DRAIN TIME would establish requirements for the licensee to make RPV water level inventory determinations and to calculate RPV water inventory drain rates for Modes 4 and 5 outage-related activities. Adequate licensee management of primary containment requirements or emergency core cooling system (ECCS) safety injection and spray systems during Modes 4 and 5 requires a properly calculated DRAIN TIME.

The licensee proposed several RBS plant-specific variations from the TS changes described in the applicable parts of TSTF-542, Revision 2, or the NRC-approved TSTF-542 safety evaluation (SE). These are explained in Section 2.2.5 and evaluated in Section 3.5 of this SE.

The supplemental letter dated April 26, 2018, 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 January 30, 2018 (83 FR 4292).

2.0 REGULATORY EVALUATION

2.1 System Description

The boiling-water reactor (BWR) RPVs have a number of penetrations located below the top of active irradiated fuel (TAF). These penetrations provide entry for control rods, recirculation flow, reactor water cleanup (RWCU), and shutdown cooling (SDC). Since these penetrations are below the TAF, this creates a potential to drain the reactor vessel water inventory and lose effective core cooling. The loss of water inventory and effective core cooling can potentially lead to fuel cladding failure and radioactive release.

During operation in Mode 1 (Power Operation - Reactor Mode Switch in Run), Mode 2 (Startup - Reactor Mode Switch in Refuel[1] or Startup/Hot Standby), and Mode 3 (Hot Shutdown[1] - Reactor Mode Switch in Shutdown and average reactor coolant temperature greater than (>) 200 degrees Fahrenheit (°F)), the TSs for instrumentation and ECCS require operability of sufficient equipment to ensure large quantities of water will be injected into the vessel should the water level decrease below the preselected value. These requirements are designed to mitigate the effects of a loss-of-coolant accident (LOCA), but also provide protection for other accidents and transients that involve a water inventory loss.

During BWR operation in Mode 4 (Cold Shutdown[1] - Reactor Mode Switch in Shutdown and average reactor coolant temperature less than or equal to (≤) 200 °F), and Mode 5 (Refueling[2] - Reactor Mode Switch in Shutdown or Refuel), the pressures and temperatures that could cause a LOCA are not present. During certain phases of refueling (i.e., Mode 5), a large volume of water is available above the RPV (i.e., the RPV head is removed, the water level is greater than or equal to (≥) 23 feet over the top of the RPV flange, and the reactor cavity to steam dryer gate removed.

The large volume of water available in and above the RPV (during much of the time when in Mode 5) provides time for operator detection and manual operator action to stop and mitigate an RPV draining event. However, at other times during a refueling outage, such as during cold shutdown (Mode 4) or refueling (Mode 5), there is a potential for significant drainage paths from certain outage activities, human error, and other events when it is more likely that normally-available equipment, instrumentation, and systems are inoperable due to maintenance and outage activities. There may not be as much time for operator action as compared to times when there are large volumes of water above the RPV.

Operation in Modes 1, 2, and 3 typically have high temperatures and pressures, especially Modes 1 and 2. By comparison, Modes 4 and 5 generally do not have the high pressure and temperature considered necessary for a LOCA from a high-energy pipe failure. Thus, while the potential sudden loss of large volumes of water from a LOCA are not expected, operators monitor for BWR RPV water level decrease from potentially significant or unexpected drainage paths. These potential drainage paths in Modes 4 and 5 generally require less water replacement capability to maintain water above the TAF.

To address the drain down potential during Modes 4 and 5, the current RBS TSs contain specifications that are applicable during an OPDRV, or require suspension of OPDRVs if certain equipment is inoperable. The term OPDRV is not specifically defined in the TSs and historically

---

[1] All reactor vessel head closure bolts fully tensioned.

[2] One or more reactor vessel head closure bolts less than fully tensioned

has been subject to inconsistent application by licensees. The proposed TS changes discussed in this SE are intended to resolve any ambiguity by creating a new RPV WIC TS with attendant equipment operability requirements, required actions and surveillance requirements (SRs), and deleting references to OPDRVs throughout the RBS TSs.

2.2 Proposed TS Changes

Section 2.2.1 of this SE describes the proposed addition of a new definition, "DRAIN TIME" (evaluated below in Section 3.1).

Section 2.2.2 of this SE describes: (1) the proposed revisions to TS 3.3, "Instrumentation," including the proposed revisions to TS 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation," including Table 3.3.5.1-1; (2) the proposed new TS 3.3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation," including Table 3.3.5.2-1; (3) the proposed renumbering of existing TS 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation" to TS 3.3.5.3, and (4) the proposed revision to TS 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation," including Table 3.3.6.1-1. These sections are evaluated in Sections 3.2 and 3.4 of this SE.

Section 2.2.3 of this SE describes the proposed revisions to TS 3.5, "Emergency Core Cooling Systems (ECCS) and Reactor Core Isolation Cooling (RCIC) System," which would be renamed "Emergency Core Cooling Systems (ECCS), RPV Water Inventory Control, and Reactor Core Isolation Cooling (RCIC) System." Additionally, this section includes proposed revisions to TS 3.5.2 "ECCS–Shutdown," which would be renamed "Reactor Pressure Vessel (RPV) Water Inventory Control" (evaluated in Section 3.3.1 of this SE).

Section 2.2.4 of this SE describes the proposed deletion of existing TS references to OPDRVs (evaluated in Section 3.6 of this SE).

Section 2.2.5 of this SE describes RBS plant-specific variations to TSTF-542, Revision 2 (evaluated in Section 3.5 of this SE).

2.2.1 Addition of DRAIN TIME Definition

The following definition of "DRAIN TIME" would be added to RBS TS Section 1.1, "Definitions":

> The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:
>
> a. The water inventory above the TAF is divided by the limiting drain rate;
>
> b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error), for all penetration flow paths below the TAF except:
>
> 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other

devices that prevent flow of reactor coolant through the penetration flow paths;

2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or

3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation device without offsite power.

c. The penetration flow paths required to be evaluated per paragraph b) are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;

d. No additional draining events occur; and

e. Realistic cross-sectional areas and drain rates are used.

A bounding DRAIN TIME may be used in lieu of a calculated value.

2.2.2 Modifications to TS 3.3, "Instrumentation"

The following subsections describe the proposed changes to the RBS TS Section 3.3, "Instrumentation."

2.2.2.1 TS 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation"

Proposed changes to TS 3.3.5.1 include the deletion of Note 1 in Required Actions B.1, B.2, C.1, and E.1, which states, "[o]nly applicable in MODES 1, 2 and 3." As a result, the numbering for Note 2 would be removed with no change to the wording of the note.

For Table 3.3.5.1-1, the applicability in MODES 4 and 5 was proposed for deletion because the instrumentation requirements during shutdown would be consolidated into the new TS 3.3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation." MODES 4 and 5 applicability and associated requirements would be deleted for the following functions:

1. Low Pressure Coolant Injection - A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems;

   a. Reactor Vessel Water Level - Low Low Low, Level 1
   c. LPCS Pump Start - Time Delay Relay
   d. LPCI Pump A Start - Time Delay Relay
   e. Reactor Vessel Pressure - Low (Injection Permissive)
   f. LPCS Pump Discharge Flow - Low (Bypass)

g. LPCI Pump A Discharge Flow - Low (Bypass)
h. Manual Initiation

2. LPCI B and LPCI C Subsystems;

a. Reactor Vessel Water Level - Low Low Low, Level 1
c. LPCI Pump B Start - Time Delay Relay
d. LPCI Pump C Start - Time Delay Relay
e. Reactor Vessel Pressure - Low (Injection Permissive)
f. LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)
g. Manual Initiation

3. High Pressure Core Spray (HPCS) System;

a. Reactor Vessel Water Level - Low Low, Level 2
c. Reactor Vessel Water Level - High, Level 8
d. Condensate Storage Tank Level - Low
f. HPCS Pump Discharge Pressure – High (Bypass)
g. HPCS System Flow Rate - Low (Bypass)
h. Manual Initiation

In TS Table 3.3.5.1-1, Footnote (a), which states, "When associated subsystem(s) are required to be OPERABLE," would be deleted. Also, Footnote (c), which states, "When HPCS is OPERABLE for compliance with LCO [Limiting Condition for Operation] 3.5.2, 'ECCS - Shutdown,' and aligned to the condensate storage tank while tank water level is not within the limit of SR 3.5.2.2," would be deleted. As a result, existing Footnote (b) would be renumbered as (a), and existing Footnote (d) would be renumbered as (b).

2.2.2.2 New TS 3.3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation"

The proposed new TS 3.3.5.2 would contain existing ECCS and primary containment isolation instrumentation functions that are relocated from TSs 3.3.5.1 and 3.3.6.1, as well as new TS requirements. The proposed new TS 3.3.5.2 is shown below:

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.2-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	B.1 Declare associated penetration flow path(s) incapable of automatic isolation. AND B.2 Calculate DRAIN TIME.	Immediately Immediately
C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	C.1 Place channel in trip.	1 hour
D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	D.1 Declare HPCS system inoperable. OR D.2 Align the HPCS pump suction to the suppression pool.	1 hour 1 hour
E. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	E.1 Restore channel to OPERABLE status.	24 hours
F. Required Action and associated Completion Time of Condition C, D, or E not met.	F.1 Declare associated ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------
Refer to Table 3.3.5.2-1 to determine which SRs apply for each ECCS Function.

SURVEILLANCE	FREQUENCY
SR 3.3.5.2.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.5.2.2 Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.5.2.3 Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months

Table 3.3.5.2-1
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Low Pressure Coolant Injection A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems					
a. Reactor Vessel Pressure – Low (Injection Permissive)	4, 5	4(a)	C	SR 3.3.5.2.1 SR 3.3.5.2.2	≤ 502 psig
b. LPCS Pump Discharge Flow – Low (Bypass)	4, 5	1(a)	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 750 gpm
c. LPCI Pump A Discharge Flow – Low (Bypass)	4, 5	1(a)	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 900 gpm
d. Manual Initiation	4, 5	1 per system (a)	E	SR 3.3.5.2.3	NA
2. LPCI B and LPCI C Subsystems					
a. Reactor Vessel Pressure – Low (Injection Permissive)	4, 5	4(a)	C	SR 3.3.5.2.1 SR 3.3.5.2.2	≤ 502 psig
b. LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)	4, 5	1 per pump (a)	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 900 gpm
c. Manual Initiation	4, 5	1 per system (a)	E	SR 3.3.5.2.3	NA

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. High Pressure Core Spray (HPCS) System					
a. Condensate Storage Tank Level – Low	4(b), 5(b)	2(a)	D	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ - 4.5 inches
b. HPCS Pump Discharge Pressure – High (Bypass)	4, 5	1(a)	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 275 psig
c. HPCS System Flow Rate – Low (Bypass)	4, 5	1(a)	E	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 710 gpm
4. RHR System Isolation					
a. Reactor Vessel Water Level – Low, (Level 3)	(c)	2 in one trip system	B	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ 8.7 inches
5. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level – Low, Low (Level 2)	(c)	2 in one trip system	B	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ - 47 inches

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control."

(b) When HPCS is OPERABLE for compliance with LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control," and aligned to the condensate storage tank.

(c) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

2.2.2.3 Modified TS 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation"

The existing TS 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation," and its subsections would be renumbered to TS 3.3.5.3 in order to maintain the TS numbering conventions.

2.2.2.4 Modified TS 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation"

In RBS TS Table 3.3.6.1-1, the following function was proposed to be deleted for Modes 4 and 5 since it is associated with OPDRVs. The applicability for Modes 1, 2, and 3 is maintained in Table 3.3.6.1-1 for this function.

5. RHR System Isolation

b. Reactor Vessel Water Level – Low, Level 3

Additionally, Footnote (e) for Table 3.3.6.1-1, "Only one trip system required in MODES 4 and 5 with RHR [Residual Heat Removal] Shutdown Cooling System integrity maintained," is proposed to be deleted due to the reference to OPDRVs.

2.2.3 Modified TS Section 3.5, "Emergency Core Cooling System (ECCS) and Reactor Core Isolation Cooling (RCIC) System"

The title of RBS TS Section 3.5 would be revised from "Emergency Core Cooling Systems (ECCS) and Reactor Core Isolation Cooling (RCIC) System" to "Emergency Core Cooling Systems (ECCS), RPV Water Inventory Control, and Reactor Core Isolation Cooling (RCIC) System."

The title of RBS TS Section 3.5.2 would be revised from "ECCS – Shutdown" to "Reactor Pressure Vessel (RPV) Water Inventory Control." Also, TS 3.5.2 would be revised as follows:

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

<u>AND</u>

One ECCS injection/spray subsystem shall be OPERABLE.

APPLICABILITY: MODES 4 and 5

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without offsite electrical power.	Immediately
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1 Verify primary containment boundary is capable of being established in less than the DRAIN TIME. AND C.2 Verify each primary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours 4 hours
D. DRAIN TIME < 8 hours.	----------NOTE---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ---------- D.1 Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours. AND D.2 Initiate action to establish primary containment boundary. AND D.3 Initiate action to isolate each primary containment penetration flow path or verify it can be manually isolated from the control room.	 Immediately Immediately Immediately

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

The proposed SRs for TS 3.5.2 are shown below:

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required low pressure ECCS injection/spray subsystem, the suppression pool water level is ≥13 ft 3 inches.	12 hours
SR 3.5.2.3	Verify, for the required High Pressure Core Spray (HPCS) System, the: a. Suppression pool water level is ≥ 13 ft 3 inches; or b. Condensate storage tank available water volume is ≥ 11 ft 1 inch.	12 hours
SR 3.5.2.4	Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.	31 days

SURVEILLANCE		FREQUENCY
SR 3.5.2.5	----------NOTES---------- 1. A low pressure coolant injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal, if capable of manually realigned and not otherwise inoperable. 2. Not required to be met for system vent flow paths opened under administrative control. ---------- Verify, for the required ECCS injection/spray subsystem, each manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.5.2.6	Operate the required ECCS injection/spray subsystem for ≥ 10 minutes.	92 days
SR 3.5.2.7	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.8	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required LPCI or LPCS subsystem actuates on a manual initiation signal, or the required HPCS subsystem can be manually operated.	24 months

2.2.4 Deletion of References to OPDRVs

In the license amendment request (LAR) dated November 15, 2017, the licensee proposed to delete references to OPDRVs throughout the TSs because:

(1) the TSs contain one or more OPDRVs references, such as, the conditional Applicability "during operations with a potential for draining the reactor vessel," or

(2) if certain conditions are not met, the required actions direct the licensee to:
   (a) initiate action to suspend OPDRVs,
   (b) initiate action to suspend operations with a potential for draining the reactor, or
   (c) initiate action to suspend operations with a potential for draining the reactor vessel (OPDRVs).

The following table lists these TSs and the affected sections:

LCO	Location of OPDRVs Reference
3.3.6.1, "Primary Containment and Drywell Isolation"	Table 3.3.6.1-1, Footnote (e) (see also SE Section 2.2.2.4)
3.3.7.1, "Control Room Fresh Air System Instrumentation"	Table 3.3.7.1-1, "Control Room Fresh Air System Instrumentation" Footnote (a)
3.6.1.2, "Primary Containment Air Locks"	Applicability, Condition E
3.6.1.3, "Primary Containment Isolation Valves (PCIVs)"	Applicability - deletion of, "MODES 4 and 5 for RHR Shutdown Cooling System suction from the reactor vessel isolation valves when associated isolation instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation," Function 5.b", Condition F
3.6.1.10, "Primary Containment-Shutdown"	Applicability, Condition A
3.7.2, "Control Room Fresh Air (CRFA) System"	Applicability, Condition D, Condition F
3.7.3, "Control Room Air Conditioning [A/C] System"	Applicability, Condition D, Condition E
3.8.2, "AC Sources-Shutdown"	Required Actions A.2.3, B.3
3.8.5, "DC Sources-Shutdown"	Required Actions A.2.3
3.8.8, "Inverters-Shutdown"	Required Actions A.2.3
3.8.10, "Distribution Systems-Shutdown"	Required Actions A.2.3

2.2.5 RBS Plant-Specific TSTF-542 TS Variations

In Attachment 1, Section 2.2 of the LAR dated November 15, 2017, the licensee identified several plant-specific TS variations from TSTF-542, Revision 2 (Reference 3), or from the NRC-approved TSTF-542 SE (Reference 4). The licensee stated that these variations do not affect the applicability of TSTF-542 or the NRC staff's SE to the proposed license amendment. Section 3.5 of this SE includes the staff's evaluation of each of these technical variations.

<u>Variation 1, TS SR 3.5.2.5, Recirculation Line</u>

The licensee stated:

> The RBS TS 3.5.2 SR 3.5.2.5 (updated to be SR 3.5.2.6) will not include the wording, "through the recirculation line" that is provided in the TSTF-542 markup of SR 3.5.2.6. This wording is not implemented to avoid confusion that the ECCS systems must be operated through the Reactor Recirculation lines rather than the ECCS test return lines.

Variation 2, LPCI Alignment Note

The licensee stated, in part:

> The RBS TS contains a Note in TS 3.5.2 Surveillance Requirement 3.5.2.4 regarding realignment to the Low Pressure Coolant Injection mode. However, this note is located in the LCO statement of ISTS [Improved Standard Technical Specifications] 3.5.2. The note is updated in the RBS TS to reflect the changes made by the TSTF-542 ISTS markup; however the location of the note is maintained in the Surveillance Requirement.

Variation 3, TS Table 3.3.5.1-1, Functions 1.c and 2.d, LPCI/LPCS Start-time Delay Relay

The licensee stated:

> Table 3.3.5.1-1 of the RBS TS currently contains requirements for Function 1.c, LPCS Pump Start-Time Delay Relay and for Function 2.d, LPCI Pump C Start-Time Delay Relay, which are not included in the ISTS. In accordance with the justification included in TSTF-542, applicability to modes 4 and 5 are removed in accordance with the evaluation provided in TSTF-542. These functions are no longer required in modes 4 and 5 due to the relatively slow transient of unexpected drain events. Sufficient time is permitted for operators to mitigate such a transient.

Variation 4, TS Table 3.3.5.1-1, Function 2.e, RPV Pressure versus ISTS Dome Pressure

The licensee stated:

> Function 2.e listed in [T]able 3.3.5.1-1, Reactor Vessel Pressure – Low (Injection Permissive), is listed as applicable in modes 4 and 5 while the corresponding ISTS Function, 2.d, Reactor Steam Dome Pressure – Low (Injection Permissive), is not [only Modes 1, 2, and 3]. In accordance with the justification included in TSTF-542, applicability to modes 4 and 5 are deleted because the instrumentation requirements during shutdown are being consolidated into the new TS 3.3.5.2.

Variation 5, TS Table 3.3.5.2-1, HPCS RPV Water Level 8 and Manual Initiation

The licensee stated:

> Table 3.3.5.2-1 is revised to reflect the RBS design. [Specifically,] Function 3, High Pressure Core Spray (HPCS) System, Function 3.a, "Reactor Vessel Water Level - High, Level 8," and Function 3.e, "Manual initiation," that appear in TSTF-542 are not included in the proposed Technical Specifications. This corrects an error in TSTF-542 that affects the BWR/5 and BWR/6 ECCS instrumentation requirements.

Variation 6, TS LCO 3.5.2, Required Actions C.3 and D.4, Standby Gas Treatment Subsystem

The licensee stated:

> Required Actions C.3 and D.4 listed in the ISTS LCO 3.5.2 are not applicable to RBS. The Standby Gas Treatment Subsystem is external to the primary containment and is not required for the operability of primary containment. Therefore, Required Actions C.3 and D.4 will not be incorporated into the TS.

Variation 7, TS LCO 3.5.2, Required Action D.3, Primary Containment Air Lock

The licensee stated:

> Required Action D.3 listed in the current RBS TS LCO 3.5.2 will be removed because the ISTS action D.2 to establish primary containment will require that the primary containment air lock boundary be secured for completion. This action is no longer necessary.

Variation 8, TS LCO 3.6.1.2, "Primary Containment Air Lock," Condition E and Required Action E.2

The licensee stated:

> RBS TS LCO 3.6.1.2 Primary Containment Air Locks is currently applicable during OPDRV activities. This Applicability statement is removed along with the Condition E Required Action E.2 to suspend OPDRVs. The new drain time requirements of TS LCO 3.5.2 will preclude RPV Water Inventory Control activities with Drain Time <36 hours when at least one door in each Primary Containment Air Lock cannot be closed to restore Primary Containment. No additional Primary Containment Air Lock requirements are required.

In addition, Condition E is being deleted and the subsequent conditions relettered, since Condition E is no longer used.

Variation 9, TS 3.6.4.1, Secondary Containment–Operating

The licensee stated:

> RBS TS 3.6.4.1, Secondary Containment-Operating, is not affected by this TS change because there are no current OPDRV requirements for secondary containment. [Secondary Containment] in the ISTS refers to the RBS Primary Containment. Rather, RBS TS 3.6.1.10 Primary Containment-Shutdown is revised to remove OPDRV LCO Applicability requirement similar to the ISTS markup of TS 3.6.4.1.

Variation 10, TS 3.6.4.2, Secondary Containment Isolation Dampers (SCIDs) and Fuel Building Isolation Dampers (FBIDs)

The licensee stated:

> RBS TS 3.6.4.2, Secondary Containment Isolation Dampers (SCIDs) and Fuel Building Isolation Dampers (FBIDs), like TS 3.6.4.1 above are not affected by this TS change because there are no current OPDRV requirements. The current RBS Secondary Containment Isolation TS does not contain OPDRV requirements because [Secondary Containment] as described in the ISTS refers to the RBS Primary Containment. The OPDRV requirements similar to those listed in the current ISTS for TS 3.6.4.2 are correlated with the current RBS TS requirements in TS 3.6.1.3, Primary Containment Isolation Valves (PCIVs). RBS TS 3.6.1.3 is revised to remove applicability to modes 4 and 5 because the applicability of LCO 3.3.6.1 Function 5.b during modes 4 and 5 has been eliminated in accordance with the TSTF-542 markup. Condition F of TS 3.6.1.3 has also been removed in its entirety as there are no longer any required actions for PCIVs to be operable during Mode 4 or 5. Primary containment operability requirements during modes 4 and 5 are established by new RBS TS 3.5.2.

Variation 11, TS 3.6.4.3, Standby Gas Treatment (SGT) System

The licensee stated:

> RBS TS 3.6.4.3, Standby Gas Treatment (SGT) System, is not affected by this TS change because there are no current OPDRV requirements related to the SGT system. The SGT System is not required during RPV Water Inventory Control activities because the Standby Gas Treatment Subsystem is external to the Primary Containment and is not required for Primary Containment Operability.

2.3 Applicable Regulatory Requirements

The regulation in Title 10 of the *Code of Federal Regulations* (10 CFR), section 50.36(a)(1), requires an applicant for an operating license to include in the application proposed TSs in accordance with the requirements of 10 CFR 50.36. The applicant must also include in the application, a "summary statement of the bases or reasons for such specifications, other than those covering administrative controls." However, per 10 CFR 50.36(a)(1), these TS Bases "shall not become part of the technical specifications."

As required by 10 CFR 50.36(c)(1)(i)(A), TSs will include items in the following categories:

> (1) Safety limits, limiting safety system settings, and limiting control settings. (i)(A) Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity.

As required by 10 CFR 50.36(c)(2)(i), the TSs will include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility.

The regulation in 10 CFR 50.36(c)(2)(ii) requires licensees to establish TS LCOs for items meeting one or more of the listed criteria. Specifically, Criterion 4, "A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety," supports the establishment of LCOs for RPV WIC due to insights gained via operating experience.

The regulation in 10 CFR 50.36(c)(3) requires TSs to include items in the category of SRs, which are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

The NRC staff's guidance for review of TSs is in Chapter 16, "Technical Specifications," of NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (SRP), dated March 2010 (Reference 5).

NUREG-1434, Revision 4, Standard Technical Specifications, General Electric BWR/ Plants, Volume 1, Specifications and Volume 2, Bases (Reference 6 and 7), contains the STS for BWR/6 plants and is part of the regulatory standardization effort. The NRC staff has prepared STS for each of the LWR nuclear designs.

2.3.1 Applicable Design Requirements

The RBS Updated Safety Analysis Report (USAR) Section 3.1. "Conformance with NRC General Design Criteria," describes an evaluation of the design bases of the RBS as measured against the NRC General Design Criteria (GDC) for Nuclear Power Plants, Appendix A to 10 CFR Part 50. The following criteria from the RBS USAR are related to this LAR.

> Criterion 13 - Instrumentation and Control
>
> Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the RCPB, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.
>
> Criterion 14 - Reactor Coolant Pressure Boundary (RCPB)
>
> The RCPB shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.
>
> Criterion 30 Quality of Reactor Coolant Pressure Boundary
>
> Components that are part of the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practical. Means shall be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage.

Criterion 33 Reactor Coolant Makeup

A system to supply reactor coolant makeup for protection against small breaks in the RCPB shall be provided. The system safety function shall be to assure that specified acceptable fuel design limits are not exceeded as a result of reactor coolant loss due to leakage from the RCPB and rupture of small piping or other small components which are part of the boundary. The system shall be designed to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished using the piping, pumps, and valves used to maintain coolant inventory during normal reactor operation.

Criterion 35 Emergency Core Cooling

A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

3.0 TECHNICAL EVALUATION

Section 2.2 of this SE lists the proposed TS changes, as included in the licensee's letters dated November 15, 2017, and April 26, 2018 (References 1 and 2, respectively). The following sections summarize the NRC staff's evaluation of each of these proposed changes.

3.1 Staff Evaluation of Proposed "DRAIN TIME" Definition

As discussed in Section 2.2.1 of this SE, the "DRAIN TIME" is the time it would take the RPV water inventory to drain from the current level to the TAF assuming the most limiting of the RPV penetrations flow paths with the largest flow rate, or a combination of penetration flow paths that could open due to a common mode failure were to open and the licensee took no mitigating action.

The NRC staff reviewed the proposed DRAIN TIME definition from TSTF-542, Revision 2. For the purpose of NRC staff considerations, the term "break" describes a pathway for water to drain from the RPV that has not been prescribed in the "DRAIN TIME" definition proposed in TSTF-542. Based on information furnished by the licensee, the NRC staff has determined that the licensee is appropriately adopting the principles of DRAIN TIME as specified in TSTF-542, Revsion 2.

The NRC staff has reasonable assurance that the licensee will include all RPV penetrations below the TAF in the determination of DRAIN TIME as potential pathways. As part of this evaluation, the staff reviewed requests for additional information used during the development of TSTF-542, Revision 2, which provided examples of bounding DRAIN TIME calculations for three examples: (1) water level at or below the RPV flange; (2) water level above RPV flange with fuel pool gates installed, and; (3) water level above RPV flange with fuel pool gates removed. The DRAIN TIME is calculated by taking the water inventory above the break and dividing by the limiting drain rate until the TAF is reached. The limiting drain rate is a variable parameter depending on the break size and the reduction of elevation head above the break

location during the drain down event. The discharge point will depend on the lowest potential drain point for each RPV penetration flow path on a plant-specific basis. This calculation provides a conservative approach to determining the DRAIN TIME of the RPV.

The NRC staff concluded that the licensee will use methods resulting in conservative calculations to determine RPV DRAIN TIME, thereby, protecting TS Safety Limit 2.1.1.3, which meets the requirements of 10 CFR 50.36(c)(3). Based on these considerations, the NRC staff has determined that the licensee's proposed addition of the "DRAIN TIME" definition to the RBS TSs is acceptable.

3.2 Staff Evaluation of Proposed TS 3.3.5.2, "Reactor Pressure Vessel Water (RPV) Inventory Control Instrumentation"

The current TS 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation," is renumbered as TS 3.3.5.3. This achieves consistency within the RBS TS, and, thus, the NRC staff finds this acceptable.

The purpose of the proposed new TS 3.3.5.2 regarding RPV WIC instrumentation is to support the requirements of the new TS LCO 3.5.2, and the proposed new definition of DRAIN TIME. There are instrumentation and controls that are required for manual pump starts or required as a permissive for operational controls on the equipment of the systems that provide water injection capability, certain start commands, pump protection, and isolation functions. These instruments are required to be operable if the systems that provide water injection and isolation functions are to be considered operable, as described in Section 3.3 of this SE for revised TS 3.5.2.

For RBS, reactor operators have alternate means, often requiring several more steps, to start and inject water than the preferred simple push button start, but these can still be accomplished within the timeframes assumed in the development of TSTF-542, Revision 2. For RBS, operators have manual push buttons that automatically align reactor injection for Modes 1, 2, and 3 (LPCS, LPCI, and HPCS subsystem). RBS proposed to maintain manual push buttons that automatically align reactor injection for Modes 4 and 5 for LPCS and LPCI only (HPCS will use manual alignment of components if injection is needed).

Specifically, the proposed new TS 3.3.5.2 supports operation of LPCI A, LPCI B, and LPCI C, LPCS, and HPCS, including manual alignment for HPCS when needed, as well as, the system isolation of the RHR system and the RWCU system. The equipment involved with each of these systems is described in the NRC staff's evaluation of TS 3.5.2 and the licensee's Bases for LCO 3.5.2.

3.2.1 Staff Evaluation of Proposed TS 3.3.5.2 LCO and Applicability

In the LAR dated November 17, 2017 (Reference 1), the licensee proposed a new TS 3.3.5.2 to provide alternative instrumentation requirements to support manual alignment of the ECCS injection/spray subsystem and for automatic isolation of penetration flow paths that may be credited in the determination of DRAIN TIME. The current TSs contain instrumentation requirements related to OPDRVs in TS Tables 3.3.5.1-1, 3.3.6.1-1, and 3.3.7.1-1. The requirements from TS Tables 3.3.5.1-1 and 3.3.6.1-1 would be consolidated into the new TS 3.3.5.2. The OPDRVs requirements in Table 3.3.7.1-1 would be deleted as discussed in Section 3.6 of this SE.

The proposed LCO 3.3.5.2 would state:

> The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

The proposed Applicability would state:

> According to Table 3.3.5.2-1.

Revision 2 of TSTF-542 specifies TS Table 3.3.5.2-1 to contain those instrumentation functions needed to support manual alignment of the ECCS injection/spray subsystem required by LCO 3.5.2, and for automatic isolation of penetration flow paths that may be credited in a calculation of DRAIN TIME. The functions that are required in Modes 4 or 5, or during OPDRVs, are relocated to TS Table 3.3.5.2-1 from existing TS 3.3.5.1 and TS 3.3.6.1. New TS 3.3.5.2 places these functions in a single location with requirements appropriate to support the safety function for TS 3.5.2. If plant-specific design and TSs require different functions to support manual initiation of an ECCS subsystem, those functions should be included in TS 3.3.5.2.

The NRC staff concluded that the licensee's proposed alternative is acceptable for RBS since either the HPCS, LPCS, or LPCI (or all three) subsystems would be available to perform the intended function to inject water into the RPV; therefore, the intent of the NRC-approved TSTF-542, Revision 2, is met.

3.2.2 Staff Evaluation of Proposed TS 3.3.5.2 Actions

As discussed in Section 2.2.2.2 above, the NRC staff reviewed the licensee's proposed new TS 3.3.5.2 Actions to determine whether they provide effective remedial measures when one or more instrument channels are inoperable and cannot complete the required function in the normal manner. The Actions are described as follows.

> Action A would be applicable when one or more instrument channels are inoperable from Table 3.3.5.2-1 and directs the licensee to immediately enter the Condition referenced in Table 3.3.5.2-1 for that channel.
>
> Action B (concerning the RHR system isolation and RWCU system isolation functions) would be applicable when automatic isolation of the associated penetration flow path is credited as a path for potential drainage in calculating DRAIN TIME. If the instrumentation is inoperable, Required Action B.1 directs an immediate declaration that the associated penetration flow path(s) are incapable of automatic isolation. Required Action B.2 requires a recalculation of DRAIN TIME, but automatic isolation of the affected penetration flow paths cannot be credited.
>
> Action C (concerning LPCS and LPCI reactor pressure low permissive functions necessary for ECCS subsystem manual alignment) addresses an event in which the permissive is inoperable and manual start of ECCS using the control board switches is prevented. The function must be placed in the trip condition within 1 hour. With the permissive function instrument in the trip condition, manual pump injection may now be performed using the preferred control board switches. This 1-hour completion time is acceptable since the reactor operator can take manual control of the pump and the injection valve to inject water into the RPV and achieve the safety function. The 1-hour

timeframe also allows reasonable time for evaluation and placement of the channel in trip.

Action D (concerning loss of adequate water supply for the HPCS system), addresses an event in which there is an inadequate water supply. The instrumentation functions have the ability to detect a low-water setpoint in the condensate storage tank (CST) and actuate valves to realign the HPCS suction water source to the suppression pool. The CST Level – Low Function indicates multiple, inoperable channels within the same function resulting in a loss of the automatic ability to swap suction to the suppression pool. The HPCS system must be declared inoperable within 1 hour, or the HPCS pump suction must be realigned to the suppression pool, since, if realigned, the function is already performed. The 1-hour completion time is acceptable since it provides the operators with sufficient time to restore level in the CST or align the HPCS pump suction to the suppression pool.

Action E (concerning LPCS/LPCI/HPCS pump discharge flow bypass functions, HPCS discharge pressure high pressure - bypass function) addresses an event in which the bypass is inoperable and there is a risk that the associated ECCS pump could overheat when the pump is operating and the associated injection valve is not fully open. Also Action E (concerning LPCS/LPCI Manual Initiation Function) addresses an event in which the control room manual push button is inoperable. In these conditions, the operator can take manual control of the pump and the injection valve. Similar to the justification for Action C, while this is not the preferred method, the ECCS subsystem pumps can be started manually and the valves can be opened manually. The 24-hour completion time is acceptable, because the functions can be performed manually and it allows time for the operator to evaluate and make necessary repairs.

Action F would apply if the Required Action and associated Completion Time of Condition C, D, or E are not met. If they are not met, then the associated ECCS injection/spray subsystem may be incapable of performing its intended function, and the ECCS subsystem must be declared inoperable immediately. These Actions direct the licensee to take appropriate actions and enter immediately into the Conditions referenced in Table 3.3.5.2-1.

The NRC staff has determined that these actions satisfy the requirements of 10 CFR 50.36(c)(2)(i) by providing a remedial action permitted by the TSs until the LCO can be met. The staff has concluded there is reasonable assurance that the licensee will take appropriate actions during an unexpected drain event to either prevent or to mitigate RPV water level being lowered to the TAF and, therefore, the proposed actions are acceptable.

3.2.3 Staff Evaluation of Proposed TS 3.3.5.2 Surveillance Requirements

The proposed new TS 3.3.5.2 SRs include Channel Checks, Channel Functional Tests, and Logic System Functional Tests numbered SR 3.3.5.2.1, SR 3.3.5.2.2, and SR 3.3.5.2.3, respectively.

The NRC staff finds that these tests are adequate, because they will ensure that the TS 3.3.5.2 instrumentation is capable of performing the specified safety function for TS 3.5.2, and protecting the RPV from a potential drain down in Modes 4 and 5. The NRC staff finds that the proposed SRs of LCO 3.3.5.2, as described in Section 3.3.3 of TSTF-542, Revision 2, are acceptable, and concludes that these SRs satisfy 10 CFR 50.36(c)(3) by providing specific SRs

relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained.

Surveillance Requirement 3.3.5.2.1 would require a Channel Check and applies to all functions, except manual initiation functions. Performance of the channel check ensures that a failure of instrumentation has not occurred. A channel check is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the instrument channels could be an indication of excessive instrument drift in one of the channels or other malfunction. A channel check guarantees that undetected channel failure is limited; thus, it is key to verifying the instrumentation continues to operate properly between each channel functional test. The Frequency of 12 hours is based upon operating experience that demonstrates channel failure is rare.

Surveillance Requirement 3.3.5.2.2 would require a Channel Functional Test and applies to all functions, except manual initiation functions. A Channel Functional Test is performed on each required channel to ensure that the entire channel will perform the intended function. The test injects a simulated signal into the channel as close to the sensor as practicable to verify operability of all devices in the channel required for channel operability. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This is acceptable because all of the other required contacts of the relay are verified by other TSs and non-TSs. Any setpoint adjustment shall be consistent with the assumptions of the current plant-specific setpoint methodology. The Frequency of 92 days is based upon operating experience that demonstrates channel failure is rare.

Surveillance Requirement 3.3.5.2.3 requires a Logic System Functional Test that demonstrates the operability of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.2 overlaps with this surveillance to complete testing of the assumed safety function. The 24-month Frequency is based on operating experience, which has shown that these components usually pass the surveillance when performed at the 24-month Frequency. The LPCI/LPCS subsystem functional manual initiation signal testing performed in proposed SR 3.5.2.8 overlaps this surveillance to complete testing of the assumed safety function.

Revision 2 of TSTF-542 did not include SRs to verify or adjust the instrument setpoint derived from the allowable value using a channel calibration or a surveillance to calibrate the trip unit. This is because a draining event in Modes 4 or 5 is not an analyzed accident and there is no accident analysis on which to base the calculation of a setpoint. The purpose of the functions is to allow ECCS manual alignment or to automatically isolate a penetration flow path, but no specific RPV water level is assumed for those actions. Therefore, the allowable value for Mode 3 was chosen for use in Modes 4 and 5 as it will perform the desired function. Calibrating the functions in Modes 4 and 5 is not necessary, as TS 3.3.5.1 and TS 3.3.6.1 continue to require the functions to be calibrated on an established interval. The NRC staff has determined that the Mode 3 allowable value and established calibration intervals are adequate to ensure that the channel responds with the required pumping systems to inject water when needed and isolation equipment to perform when commanded.

Emergency Core Cooling System Response Time (RBS TS 3.5.1, "ECCS-Operating," SR 3.5.1.4) and Isolation System Response Time (RBS TS 3.3.6.1, "Primary Containment and

Drywell Isolation Instrumentation," SR 3.3.6.1.7) testing ensures that the individual channel response times are less than or equal to the maximum values assumed in the accident analysis. Proposed TS 3.3.5.2 does not include SRs for ECCS Response Time testing and Isolation System Response Time testing. This is acceptable because the purpose of these tests is to ensure that the individual channel response times are less than or equal to the maximum values assumed in the accident analysis, but a draining event in Mode 4 or 5 is not an analyzed accident and, therefore, there are no accident analysis assumptions on response time and there are alternate manual methods for achieving the safety function. A potential draining event in Modes 4 and 5 is a slower event than a LOCA. More significant protective actions are required as the calculated DRAIN TIME decreases.

Based on the above, the NRC staff concludes that the proposed SRs of LCO 3.3.5.2 satisfy 10 CFR 50.36(c)(3) by providing the specific SRs relating to test, calibration, or inspection to assure that the necessary operability of systems and components is maintained and are, therefore, acceptable.

3.2.4 Staff Evaluation of Proposed Table 3.3.5.2-1, "RPV Water Inventory Control Instrumentation"

In order to support the requirements of proposed TS 3.5.2, the associated instrumentation requirements are designated in TS Table 3.3.5.2-1. These instruments are required to be operable if the systems that provide water injection and isolation functions are considered operable as described in the NRC staff's evaluation of TS 3.5.2 (Section 3.3 of this SE).

The NRC staff finds this table acceptable because it sufficiently discusses the purpose of the functions, the applicability, the number of required channels, the references to the Condition to be entered by letter (e.g., A, B, C) if the function is inoperable, the applicable SRs, the selection of the allowable value, and justification of differences between the existing and proposed TS functions.

The RPV WIC Instrumentation is able to respond with the required accuracy, permit pump systems to inject water when needed, and activate isolation equipment when signaled to prevent or mitigate a potential RPV draining event. It is, therefore, acceptable to meet its intended functions.

The LPCI and LPCS ECCS subsystems in Modes 4 and 5 can be started by manual push button and each of the ECCS subsystems (including HPCS) in Modes 4 and 5 can be started by aligning a small number of components. Automatic initiation of an ECCS injection/spray subsystem is undesirable because it injects thousands of gallons per minute (gpm) into the RPV cavity and could lead to overflow and other damage. Thus, there is adequate time for the reactor operators to take manual action to stop the draining event, and to manually start an ECCS injection/spray subsystem or additional method of water injection as needed.

Consequently, there is no need for automatic initiation of ECCS to respond to an unexpected draining event. The NRC staff finds this is acceptable, because a draining event is a slow evolution when compared to a design basis LOCA assumed to occur at a significant power level.

3.2.4.1 Staff Evaluation of Proposed Table 3.3.5.2-1 Functions

The signals from Table 3.3.5.2-1, Functions 1.a and 2.a, LPCS and LPCI Systems, Reactor Vessel Pressure - Low (Injection Permissive), are used as permissives for the low pressure ECCS subsystems. This ensures that, prior to opening the injection valves of the low pressure ECCS subsystems, the reactor pressure has fallen to a value below these subsystems' maximum design pressure. The Reactor Vessel Pressure - Low signals are initiated from four pressure transmitters that sense the reactor dome pressure. The proposed allowable value would be ≤ 502 pounds per square inch gauge (psig), with four required channels per function, as it is currently in RBS TS Table 3.3.5.1-1. The proposed allowable value is revised to eliminate the low pressure limit and to retain the high pressure limit. Even though during Modes 4 and 5 the reactor pressure is expected to virtually always be below the ECCS maximum design pumping pressure, the Reactor Vessel Pressure – Low signals are required to be operable and capable of permitting initiation of the ECCS.

The TS Table 3.3.5.2-1 includes Functions 1.b, 1.c, and 2.b, corresponding to LPCS and LPCI systems, LPCI and Low Pressure Core Spray Pump Discharge Flow - Low (Bypass). These instruments are provided to protect the associated low pressure ECCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump. One flow transmitter per ECCS pump is used to detect the associated subsystems' flow rates. The logic is arranged such that each transmitter causes its associated minimum flow valve to open. The logic will close the minimum flow valve once the closure setpoint is exceeded. The LPCI minimum flow valves are time delayed such that the valves will not open for 10 seconds after the switches detect low flow. The time delay is provided to limit reactor vessel inventory loss during the startup of the RHR Shutdown Cooling Mode (for RHR A and RHR B). The Pump Discharge Flow - Low allowable value is high enough to ensure that the pump flow rate is sufficient to protect the pump, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core.

For LPCS Function 1.b, the existing allowable value is ≥ 750 gpm with one required channel per function, as indicated in RBS TS Table 3.3.5.1-1. The proposed allowable value remains as ≥ 750 psig with one required channel per function.

For LPCI A subsystem, Function 1.c, the existing allowable value is ≥ 900 gpm with one required channel per function, as indicated in RBS TS Table 3.3.5.1-1. The proposed allowable value remains as ≥ 900 psig with one required channel per function.

For LPCI B and C subsystems, Function 2.b, the existing allowable value is ≥ 900 gpm with one required channel per pump, as indicated in RBS TS Table 3.3.5.1-1. The proposed allowable value remains as ≥ 900 psig and the proposed number of required channels per function remains one per pump.

For TS Table 3.3.5.2-1, Functions 1.d and 2.c, LPCS and LPCI Systems Manual Initiation, the manual initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. There is one push button for each division of low pressure ECCS (i.e., Division 1 ECCS, LPCS and LPCI A; Division 2 ECCS, LPCI B and LPCI C). The only manual initiation function required to be operable is that associated with the ECCS subsystem required to be operable by LCO 3.5.2. There is no allowable value for this function since the channels are mechanically actuated based solely on the position of the push buttons. The proposed required number of channels per function remains one from TS Table 3.3.5.1-1.

For TS Table 3.3.5.2-1, Functions 3.a, HPCS System, Condensate Storage Tank Level – Low, the low level signal in the CST indicates the unavailability of an adequate supply of makeup water from the normal source. Normally, the suction valves between HPCS and the CST are open and water for HPCS injection would be taken from the CST. However, if the water level in the CST falls below a preselected level, first the suppression pool suction valve automatically opens, and then the CST suction valve automatically closes. This ensures that an adequate supply of makeup water is available to the HPCS pump. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valve must be open before the CST suction valve automatically closes.

Condensate Storage Tank Level - Low signals are initiated from two-level transmitters. The Condensate Storage Tank Level - Low Function Allowable Value is high enough to ensure adequate pump suction head while water is being taken from the CST. Two channels of the Condensate Storage Tank Level - Low Function are only required to be operable when the HPCS is required to be operable to fulfill the requirements of LCO 3.5.2, and the HPCS is aligned to the CST. The existing allowable value is ≥ -4.5 inches with two required channels per function, as indicated in RBS TS Table 3.3.5.1-1.

For TS Table 3.3.5.2-1, Functions 3.b and 3.c, HPCS System, HPCS Pump Discharge Pressure - High (Bypass) and HPCS System Flow Rate - Low (Bypass), the minimum flow instruments are provided to protect the HPCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow and high pump discharge pressure are sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump or the discharge pressure is low (indicating the HPCS pump is not operating). One flow transmitter is used to detect the HPCS System's flow rate.

The setpoint for the HPCS high pressure function high allowable value is set high enough to ensure that the valve will not open when the pump is not operating. The existing allowable value is ≥ 275 psig with one required channel per function, as described in RBS TS Table 3.3.5.1-1. The proposed allowable value remains at ≥ 275 psig with one required channel per function.

The setpoint for HPCS low flow function is high enough to ensure that pump flow rate is sufficient to protect the pump, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core. The existing allowable value is ≥ 710 gpm with one required channel per function, as described in RBS TS Table 3.3.5.1-1. The proposed allowable value remains at ≥ 710 gpm with one required channel per function.

The TS Table 3.3.5.2-1, Function 4, RHR System Isolation, Reactor Vessel Water Level - Low, Level 3, is only required to be operable when automatic isolation of the associated RHR system penetration flow path is credited in calculating DRAIN TIME. The definition of DRAIN TIME allows crediting the closing of penetration flow paths that are capable of being automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. Reactor Vessel Water Level - Low, Level 3 signals are initiated from four level transmitters (two per trip system) that sense the difference between the reference leg and the variable leg in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level - Low, Level 3 Function are available, only two channels (all in the same trip system) are required to be operable. The existing allowable value is ≥ 8.7 inches with two required channels per function, as described in RBS TS Table 3.3.6.1-1. The proposed

allowable value remains at ≥ 8.7 inches and the proposed number of required channels per function is changed to two channels in one trip system.

The TS Table 3.3.5.2-1 Function 5.a, RWCU System Isolation, Reactor Vessel Water Level - Low Low, Level 2, is only required to be operable when automatic isolation of the associated RWCU system penetration flow path is credited in calculating DRAIN TIME. The definition of DRAIN TIME allows crediting the closing of penetration flow paths that are capable of being automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. Reactor Vessel Water Level - Low Low, Level 2 is initiated from two channels per trip system that sense the difference between the pressure in the reference leg and variable leg in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level - Low, Level 2 Function are available, only two channels (all in the same trip system) are required to be operable. The existing allowable value is ≥ - 47 inches with two required channels per function, as described in RBS TS Table 3.3.6.1-1. The proposed allowable value remains at ≥ - 47 inches and the proposed required number of channels per function is changed to two channels in one trip system.

The NRC staff finds that proposed LCO 3.3.5.2 correctly specifies the lowest functional capability or performance levels of equipment required for safe operation of the facility. There is reasonable assurance that the required actions to be taken when the LCO is not met are adequate to protect the health and safety of the public. This meets the requirements of 10 CFR 50.36(c)(2)(i) and, therefore, the staff has determined the licensee's proposed changes to LCO 3.3.5.2 are acceptable.

3.3 Staff Evaluation of TS 3.5.2 – "Reactor Pressure Vessel (RPV) Water Inventory Control"

The NRC staff reviewed the water sources that would be applicable to the proposed new TS 3.5.2.

The licensee's proposed TS LCO 3.5.2 would state, in part;

> One ECCS injection/spray subsystem shall be OPERABLE.

One ECCS injection/spray subsystem is defined as either one of the three LPCI subsystems (LPCI A, LPCI B, or LPCI C), one LPCS system, or one HPCS system. The LPCI subsystem and the LPCS system consist of one motor-driven pump, piping, and valves to transfer water from the suppression pool to the RPV. The HPCS system consists of one motor-driven pump, piping, and valves to transfer water from the suppression pool or CST to the RPV.

The ECCS pumps are high-capacity pumps with flow rates of thousands of gpm. Most RPV penetration flow paths have a drain rate on the order of tens or hundreds of gpm. The manual alignment and start of an ECCS pump provides the necessary water source to counter these expected drain rates. The LPCI subsystem (only LPCI A or LPCI B subsystems) are to be considered operable during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable (proposed SR 3.5.2.5, Note 1). Decay heat removal in Modes 4 and 5 is not affected by the proposed TSTF-542 changes since the required number of RHR SDC subsystems to be operable and in operation to ensure adequate decay heat removal from the core are unchanged. These requirements can be found in the RBS TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System-Cold Shutdown"; TS 3.9.7, "Reactor Pressure Vessel (RPV) Water Level - New Fuel or Control Rods"; TS 3.9.8,

"Residual Heat Removal (RHR)-High Water Level"; and TS 3.9.9, "Residual Heat Removal (RHR)-Low Water Level."

The RBS TS decay heat removal requirements are similar to the standard technical specifications (STSs) and can be found in NUREG-1434, TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown," TS 3.9.7, "[Reactor Pressure Vessel (RPV)] Water Level - New Fuel or Control Rods," TS 3.9.8, "Residual Heat Removal (RHR) - High Water Level," and TS 3.9.9, "Residual Heat Removal (RHR) - Low Water Level." Based on these considerations, the NRC staff finds that the water sources identified by the RBS TS changes provide reasonable assurance that the lowest functional capability required for safe operation is maintained and the safety limit is protected.

The proposed TS LCO 3.5.2 contains two parts. The first part states that "DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours," and the second part states, "[o]ne ECCS injection/spray subsystem shall be OPERABLE. The proposed applicability for TS 3.5.2 is Modes 4 and 5.

The NRC staff reviewed the proposed TS 3.5.2, focusing on ensuring that the fuel remains covered with water and on the changes made compared to the current TS. The proposed TS 3.5.2 contains Conditions A through E based on either required ECCS injection/spray subsystem operability or DRAIN TIME.

The current TS LCO states that "[t]wo ECCS injection/spray subsystems shall be OPERABLE," whereas the proposed LCO 3.5.2 states that only "[o]ne ECCS injection/spray subsystem shall be OPERABLE." This change is reflected in Condition A. The change from two ECCS injection/spray subsystems to one ECCS injection/spray subsystem is being made because this redundancy is not required. With one ECCS injection/spray subsystem and nonsafety-related injection sources, defense-in-depth will be maintained. The defense-in-depth measure is consistent with other events considered during shutdown with no additional single failure assumed. The DRAIN TIME controls, in addition to the required ECCS injection/spray subsystem, provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

The proposed Modes 4 and 5 applicability of TS 3.5.2 is appropriate given that the TS requirements on ECCS in Modes 1, 2, and 3 will be unaffected.

The proposed Condition A states that if the required ECCS injection/spray subsystem is inoperable, it is to be restored to operable status within 4 hours.

The proposed Condition B states that if Condition A is not met, a method of water injection capable of operating without offsite electrical power shall be established immediately. The proposed Condition B provides adequate assurance of an available water source should Condition A not be met within the 4-hour completion time.

The proposed Condition C states that for a DRAIN TIME < 36 hours and ≥ 8 hours, to (Required Action C.1) verify the primary containment boundary is capable of being established in less than the DRAIN TIME, and (Required Action C.2) verify each primary containment penetration flow path is capable of being isolated less than the DRAIN TIME all with a completion time of 4 hours. The proposed Condition C provides adequate protection should the DRAIN TIME be < 36 hours and ≥ 8 hours because of the ability to establish primary containment and isolate additional flow paths.

The proposed Condition D states that when DRAIN TIME < 8 hours to (Required Action D.1), immediately initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours, and (Required Action D.2) immediately initiate action to establish primary containment boundary, and (Required Action D.3) immediately initiate action to isolate each primary containment penetration flow path or verify it can be manually isolated from the control room. Additionally, there is a Note stating that "[r]equired ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power," which is similar to proposed Condition B. The current RBS TS for Condition D is similar to the proposed Condition D for when Required Action C.2 is not met. The proposed Condition D provides adequate protection should the DRAIN TIME be < 8 hours because of the ability to establish additional method of water injection (without offsite electrical power), establish primary containment and isolate additional flow paths.

The proposed Condition E states that when the required action and associated completion time of Condition C or D is not met, or the DRAIN TIME is < 1 hour, then immediately initiate action to restore DRAIN TIME to ≥ 36 hours. The proposed Condition E is new, as it is not present in the current RBS TS. The proposed Condition E is acceptable as it provides the necessary step to restore the DRAIN TIME to ≥ 36 hours should the other conditions not be met, or if the DRAIN TIME is < 1 hour.

The NRC staff reviewed the proposed changes to TS 3.5.2 and finds them acceptable based on the actions taken to mitigate the water level reaching the TAF with the water sources available and maintaining DRAIN TIME ≥ 36 hours. The LCO correctly specifies the lowest functional capability or performance levels of equipment required for safe operation of the facility. There is reasonable assurance that the required actions to be taken when the LCO is not met can be conducted without endangering the health and safety of the public and, therefore, the proposed changes are acceptable.

3.3.1 Staff Evaluation of Proposed TS 3.5.2 Surveillances Requirements

The proposed TS 3.5.2 SRs include:

- verification of DRAIN TIME,
- verification of water levels/volumes that support LPCS system and LPCI injection subsystems,
- verification of water levels/volumes that support HPCS system,
- verification of water filled pipes to preclude water hammer events,
- verification of correct valve positions for the required ECCS injection/spray subsystem,
- operations of ECCS injection/spray systems through the recirculation line,
- verification of valves credited for automatic isolation actuated to the isolation position, and
- verification that the required ECCS injection/spray subsystem can be manually initiated or operated.

Each of the eight SRs are described below.

- SR 3.5.2.1: The DRAIN TIME would be determined or calculated, and required to be verified to be ≥ 36 hours with a Frequency of 12 hours. The Frequency of 12 hours is sufficient in view of indications of RPV water level available to the operator. This

surveillance would verify that the LCO for DRAIN TIME is met. Numerous indications of changes in RPV level are available to the operator. The period of 36 hours is considered reasonable to identify and initiate action to mitigate draining of reactor coolant (normally 3 operator shifts). Changes in RPV level would necessitate recalculation of the DRAIN TIME.

- SR 3.5.2.2: The suppression pool water level (≥ 13 feet 3 inches) for a required low pressure ECCS injection/spray subsystem is required to be verified to ensure that pump net positive suction head and vortex prevention is available for the LPCI/LPCS subsystem required to be operable by the LCO. Indications are available either locally or in the control room regarding suppression pool water level. The frequency for SR 3.5.2.2 is 12 hours. The 12-hour frequency was developed considering operating experience related to suppression pool and CST water level variations and instrument drift during the applicable Modes. Furthermore, the 12-hour frequency is considered adequate in view of the other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool water level condition.

- SR 3.5.2.3: The suppression pool water level (≥ 13 feet 3 inches) or CST level (≥ 11 feet 1 inch) for a required HPCS system is required to be verified to ensure pump net positive suction head and vortex prevention is available for the HPCS subsystem required to be operable by the LCO. Indications are available either locally or in the control room regarding suppression pool water level and CST water level. The frequency for SR 3.5.2.3 is 12 hours. The 12-hour frequency was developed considering operating experience related to suppression pool and CST water level variations and instrument drift during the applicable Modes. Furthermore, the 12-hour frequency is considered adequate in view of the other indications and alarms available in the control room to alert the operator to an abnormal suppression pool or CST water level condition.

- SR 3.5.2.4: The SR to verify the ECCS injection/spray subsystem piping is sufficiently filled with water would be retained from the existing TS 3.5.2. The proposed change updates the SR to reflect the change to LCO 3.5.2, which requires, in part, one ECCS injection/spray subsystem to be operable instead of two. The SR 3.5.2.4 wording changed from "Verify, for each required ECCS..." to "Verify, for the required ECCS..." This change clarifies the requirement to maintain consistency with the proposed LCO. The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the required ECCS injection/spray subsystems full of water ensures that the ECCS subsystem will perform properly. This may also prevent a water hammer event following an ECCS initiation signal. The frequency for SR 3.5.2.3 is 31 days. The 31-day frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation and operating experience.

- SR 3.5.2.5: The SR to verify the correct alignment for manual, power operated, and automatic valves in the required ECCS subsystem flow path would be retained from the existing TS 3.5.2. Similar to the change discussed above for proposed SR 3.5.2.4, changes to SR 3.5.2.5 would clarify a proposed requirement for LCO 3.5.2. The proposed SR wording, "Verify, for the required ECCS injection/spray subsystem, each manual..." would replace "Verify each required ECCS

injection/spray subsystem manual..." Verifying the correct alignment for manual, power operated, and automatic valves in the required ECCS subsystem flow paths provides assurance that the proper flow paths will be available for ECCS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a non-accident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The frequency for SR 3.5.2.5 is 31 days. The 31-day frequency is appropriate because the valves are operated under procedural control and the probability of being mispositioned during this time period is low.

This SR includes two Notes, which states:

1. A low pressure coolant injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned and not otherwise inoperable.

2. Not required to be met for system vent flow paths opened under administrative control.

Note 1 is included to clarify the condition of operability of a LPCI system when operating in a decay heat removal Mode. Note 2 provides for administratively controlling the system vent flow paths while maintaining compliance with this SR.

- SR 3.5.2.6: The required ECCS injection/spray subsystem would be required to be operated for ≥ 10 minutes in accordance with the 92-day frequency. This would demonstrate that the subsystem is capable of operation to support TS 3.5.2, RPV WIC. The minimum operating time of 10 minutes is based on engineering judgement. The performance frequency of 92 days is consistent with similar at-power testing required by SR 3.5.1.7 (ECCS-Operating).

- SR 3.5.2.7: Verification that each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated RPV water level isolation signal is required to prevent RPV water inventory from dropping below the TAF should an unexpected draining event occur. The frequency for SR 3.5.2.7 is 24 months. The 24-month frequency is based on the need to perform this surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the surveillance was performed with the reactor at power. Operating experience has shown these components usually pass the surveillance when performed at the 24-month frequency.

- SR 3.5.2.8: This SR would state, "Verify the required LPCI or LPCS subsystem actuated on a manual injection signal, or the required HPCS subsystem can be manually operated." The required ECCS subsystem is required to have a manual start capability. This surveillance verifies that a manual initiation signal will cause the

required LPCI subsystem or LPCS subsystem to start and operate as designed, including pump startup and actuation of all automatic valves to their required positions. The HPCS subsystem is verified to start manually from a standby configuration, and includes the ability to override the RPV Level 8 injection valve isolation. The manual initiation push button for the HPCS subsystem is not used to satisfy this SR (see Variation 5, Sections 2.2.5 and 3.5 of this SE. The frequency for SR 3.5.2.8 is 24 months. The 24-month frequency is based on the need to perform the surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the surveillance was performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24-month frequency, which is based on the refueling cycle. This SR is modified by a Note that excludes vessel injection/spray during the surveillance. Since all active components are testable and full flow can be demonstrated by recirculation through the test line, coolant injection into the RPV is not required during the surveillance.

The NRC staff evaluated each of these proposed SRs associated with the proposed LCO 3.5.2 and concluded that they are appropriate to ensure the operability of the equipment and instrumentation specified in LCO 3.5.2. The NRC staff concluded that each of the proposed SRs are acceptable since they meet the requirements of 10 CFR 50.36(c)(2)(ii) regarding insights gained via operating experience and 10 CFR 50.36(c)(3) for SRs by ensuring that the necessary quality of systems and components are maintained.

3.4 Staff Evaluation of TS Table 3.3.5.1-1, "Emergency Core Cooling System Instrumentation"

TS LCO 3.3.5.1 currently states that, "The ECCS instrumentation for each Function in Table 3.3.5.1-1 shall be OPERABLE," with the applicability as stated in the table. Table 3.3.5.1-1 contains requirements for function operability during Modes 4 and 5 when the associated ECCS subsystem(s) are required to be operable per LCO 3.5.2, "ECCS-Shutdown." Conforming changes were proposed for the Actions table of LCO 3.3.5.1 as well.

For the following functions in Table 3.3.5.1-1, the requirements during Mode 4 and 5 would be either completely deleted or relocated to the proposed Table 3.3.5.2-1:

FUNCTION	FUNCTIONS DELETED	FUNCTION RELOCATED TO TABLE 3.3.5.2-1
1. Low Pressure Coolant Injection - A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems		
a. Reactor Vessel Water Level - Low Low Low, Level 1	Yes	
c. LPCS Pump Start - Time Delay Relay	Yes	
d. LPCI Pump A Start - Time Delay Relay	Yes	
e. Reactor Vessel Pressure - Low (Injection Permissive)	No	Function 1.a
f. LPCS Pump Discharge Flow - Low (Bypass)	No	Function 1.b
g. LPCI Pump A Discharge Flow - Low (Bypass)	No	Function 1.c
h. Manual Initiation	No	Function 1.d

FUNCTION	FUNCTIONS DELETED	FUNCTION RELOCATED TO TABLE 3.3.5.2-1
2. LPCI B and LPCI C Subsystems		
a. Reactor Vessel Water Level - Low Low Low, Level 1	Yes	
c. LPCI Pump B Start - Time Delay Relay	Yes	
d. LPCI Pump C Start - Time Delay Relay	Yes	
e. Reactor Vessel Pressure - Low (Injection Permissive)	No	Function 2.a
f. LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)	No	Function 2.b
g. Manual Initiation	No	Function 2.c
3. High Pressure Core Spray (HPCS) System		
a. Reactor Vessel Water Level - Low Low, Level 2	Yes	
c. Reactor Vessel Water Level - High, Level 8	Yes	
d. Condensate Storage Tank Level - Low	No	Function 3.a
f. HPCS Pump Discharge Pressure - High (Bypass)	No	Function 3.b
g. HPCS System Flow Rate - Low (Bypass)	No	Function 3.c
h. Manual Initiation	Yes	

As shown in the table above, nine functions would be deleted completely to support the consolidation of RPV WIC Instrumentation requirements into proposed new TS 3.3.5.2. The other ten functions would be moved to the proposed TS Table 3.3.5.2-1, as discussed in Section 3.2.4.1 of this SE.

The RBS TSs currently require automatic initiation of ECCS pumps on low reactor vessel water level. However, in Modes 4 and 5, automatic initiation of ECCS pumps could result in overfilling the refueling cavity or water flowing into the main steam lines, potentially damaging plant equipment.

For TS Table 3.3.5.1-1, two footnotes are deleted. Footnote (a), which states, "When associated subsystem(s) are required to be OPERABLE," and Footnote (c), which states, "When HPCS is OPERABLE for compliance with LCO 3.5.2, 'ECCS-Shutdown,' and aligned to the condensate storage tank while tank water level is not within the limits of SR 3.5.2.2," are to be removed.

The NRC staff finds it acceptable to delete TS Table 3.3.5.1-1 Functions 1.a, 2.a, and 3.a and associated Footnote (a) because manual ECCS alignment is preferred over automatic initiation during Modes 4 and 5, and the operator would be able to use other, more appropriately sized pumps if needed to mitigate a draining event. The NRC staff finds it acceptable to delete TS Table 3.3.5.1-1 Footnote (c) because this is no longer needed in this table (in accordance with TSTF-542, Revision 2, for Modes 4 and 5), since a similar note is added to TS Table 3.3.5.2-1 as Footnote (b).

In addition, the NRC staff finds the deletion of TS Table 3.3.5.1-1 Functions 1.c, 1.d, 2.c, and 2.d acceptable for the LPCS/LPCI A and B pump start time delay relays. The purpose of these time delays is to stagger the automatic start of ECCS pumps thus limiting the starting transients on the emergency buses. The staggered starting of ECCS pumps is unnecessary for

manual ECCS operation because unlike automatic starts, which initiate all of the ECCS pumps requiring the delay logic, the operator will control which ECCS pumps to start as needed for water inventory control. The deletion of Functions 1.c and 2.d, LPCI/LPCS Start-time Delay Relay are further described in Section 3.5.3 of this SE (Variation 3).

The deletion of Manual Initiation, Function 3.h, and HPCS Vessel Water High Level 8 interlock (Function 3.c) are evaluated in Variation 5 in Section 3.5.5 of this SE.

3.5 Staff Evaluation of Proposed Technical Variations

The licensee proposed the following technical variations from the TS changes described in TSTF-542 or the applicable parts of the NRC staff's SE for TSTF-542. The licensee stated in the LAR that these variations do not affect the applicability of TSTF-542 or the NRC staff's SE for TSTF-542 to the proposed license amendment. The NRC staff evaluated each variation below.

3.5.1 Variation 1, TS SR 3.5.2.5, Recirculation Line

The RBS TS 3.5.2, SR 3.5.2.5 (updated to be SR 3.5.2.6), will not include the wording, "through the recirculation line" that is provided in the TSTF-542 markup of SR 3.5.2.6. This wording is not implemented to avoid confusion that the ECCS systems must be operated through the reactor recirculation lines rather than the ECCS test return lines.

The NRC staff has determined that the deletion of the phrase "through the recirculation line" is acceptable since the intent of this SR was to verify pump LPCI, LPCS, and HPCS flow is available to mitigate a drain down event. For example, flow verification can be performed through the recirculation line and/or minimum flow lines to the suppression loop to avoid overfilling the reactor cavity. Therefore, the NRC staff concludes that Variation 1 is acceptable.

3.5.2 Variation 2, LPCI Alignment Note

The RBS TS contains a Note in TS 3.5.2, SR 3.5.2.4, regarding realignment to the LPCI Mode. However, this Note is located in the LCO statement of ISTS 3.5.2. The Note is updated in the RBS TS to reflect the changes made by the TSTF-542 ISTS markup; however the location of the Note is maintained in the SR. The SR 3.5.2.5 proposed Note 1 states:

> A low pressure coolant injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned and not otherwise inoperable.

Revision 2 of TSTF-542 proposed Note for LCO 3.5.2 is identical to SR 3.5.2.5, Note 1. The NRC staff finds that the TSTF-542 Note, which is located in the TS so as to apply to all of revised TS 3.5.2, and the Note that is proposed to be located only in TS SR 3.5.2.4, are identical, and finds this location acceptable since it serves that same purpose, which is to ensure the LPCI system is operable while in RHR SDC operations under the conditions noted above. Therefore, the NRC staff concludes that Variation 2 is acceptable.

3.5.3 Variation 3, TS Table 3.3.5.1-1, Functions 1.c and 2.d, LPCI/LPCS Start-time Delay Relay

The RBS TS Table 3.3.5.1-1 currently contains requirements for Function 1.c, LPCS Pump Start-Time Delay Relay, and for Function 2.d, LPCI Pump C Start-Time Delay Relay, that are not included in the ISTS. These functions are no longer required in Modes 4 and 5 due to the relatively slow transient of unexpected drain events. Sufficient time is permitted for operators to mitigate such a transient. Therefore, statements concerning applicability to Modes 4 and 5 are removed in accordance with the evaluation provided in TSTF-542, Revision 2.

The NRC staff finds that the LPCI/LPCS pump start time delay relay logic is unnecessary given the new requirements set forth in TSTF-542, DRAIN TIME and WIC. The purpose of the time delay relays is to stagger the start of the ECCS pumps, thus limiting the starting transients on the 4.16 kilovolt (kV) essential buses. This time delay is unnecessary for manual operation since the systems are manually started and operators will prevent overloading the essential buses; therefore, this function can be removed from the TS and the NRC staff concludes that Variation 3 is acceptable.

3.5.4 Variation 4, TS Table 3.3.5.1-1, Function 2.e, RPV Pressure versus ISTS Dome Pressure

Function 2.e listed in RBS TS Table 3.3.5.1-1, Reactor Vessel Pressure – Low (Injection Permissive), is listed as applicable in Modes 4 and 5 while the corresponding ISTS Function 2.d, Reactor Steam Dome Pressure – Low (Injection Permissive) is not (only applicable in Modes 1, 2, and 3). In accordance with the justification included in TSTF-542, applicability to Modes 4 and 5 is deleted because the instrumentation requirements during shutdown are consolidated into the new TS 3.3.5.2.

The NRC staff finds that the instrumentation Mode difference for TS Table 3.3.5.2-1, Function 2.e, (STS – Modes 1, 2, and 3 versus RBS Modes 1-5), which are part of the existing license, is an acceptable variation and it does not change the conclusion that TSTF-542 is applicable to the RBS TS. RBS will include this injection permissive function in the proposed TS Table 3.3.5.2-1 as Function 2.a (Modes 4 and 5), since this function is needed to support of manual operations of the LCPI B and C subsystems. Therefore, the NRC staff concludes that Variation 4 is acceptable.

3.5.5 Variation 5, TS Table 3.3.5.2-1, HPCS RPV Water Level 8 and Manual Initiation

The TS Table 3.3.5.2-1 is revised to reflect the RBS design. Function 3, "High Pressure Core Spray (HPCS) System," Function 3.a, "Reactor Vessel Water Level - High, Level 8," and Function 3.e, "Manual initiation," that appear in TSTF-542 are not included in the proposed Technical Specifications. This corrects an error in TSTF-542 that affects the BWR/5 and BWR/6 ECCS instrumentation requirements.

The purpose of the manual initiation function is to allow manual actuation of the ECCS subsystem required by TS 3.5.2 to mitigate a draining event. The Reactor Vessel Water Level - High, Level 8 signal prevents overfilling of the reactor vessel into the main steam lines by closing the HPCS injection valves when the water level is above the Level 8 setpoint. Therefore, if HPCS is the required ECCS subsystem and the water level is above Level 8, which is typically the case during refueling, manually actuating Function 3.e will not inject water into

the reactor vessel. This is not the desired response. If the Level 8 function is retained in Table 3.3.5.2-1, the function would need to be rendered inoperable in order to inject water when the water level is above Level 8. This would not be consistent with including the function in Table 3.3.5.2-1.

RBS has the capability to manually start the HPCS pump and to open the HPCS injection valve if needed, not utilizing Functions 3.a and 3.e. If it is desired to inject water into the reactor pressure vessel using HPCS, the reactor operator can follow procedural steps to take manual control of the pump and the injection valve to add inventory. If the water level is above Level 8, then manual override of the Level 8 function can be performed to allow the HPCS injection valve to be opened. These actions can be performed from the control room and can be accomplished well within the 1-hour minimum DRAIN TIME limit, which is specified in TSTF-542, TS 3.3.5.2, Condition E. Consequently, Functions 3.a and 3.e instrumentations are not needed to actuate the HPCS subsystem components to mitigate a draining event.

The ability to override the HPCS Level 8 isolation is already part of the BWR Emergency Operating Procedures and is practiced during operator training. Therefore, SR 3.5.2.8 is revised to assure that the HPCS manual start capability (including the HPCS Level 8 isolation override feature) is tested.

The NRC staff finds that proposed HPCS Manual Initiation Function and HPCS Vessel Water Level 8 Function can be deleted. Table 3.3.5.2-1, Functions 3.a, and 3.e, as described in TSTF-542, Revision 2, are not needed to actuate the HPCS subsystem components to mitigate a draining event, and are not included in the proposed RBS TS Table 3.3.5.2-1. As mentioned before, the ability to override the HPCS Level 8 isolation is already part of the RBS emergency operating procedures. The manual initiation functions for the other low pressure subsystems are maintained. Therefore, the NRC staff concludes that deletion of the Manual Initiation and RPV Water Level 8 functions for HPCS is acceptable.

In addition, the NRC staff finds that TSTF-542, TS 3.3.5.2, Condition E and associated Required Actions E.1 and E.2, which are associated with the HPCS Level 8 instrumentation, are no longer needed and are, therefore, deleted since the Level 8 function can be intentionally defeated, by procedure, to allow the HPCS injection valve to be opened, if needed to control inventory. Therefore, the NRC staff concludes that Variation 5 is acceptable.

3.5.6 Variation 6, TS LCO 3.5.2, Required Actions C.3 and D.4, Standby Gas Treatment Subsystem

Required Actions C.3 and D.4, listed in the ISTS LCO 3.5.2, are not applicable to RBS. The Standby Gas Treatment Subsystem is external to the primary containment and is not required for the operability of primary containment. Therefore, Required Actions C.3 and D.4 will not be incorporated into the RBS TS.

The RBS primary containment consists of a free standing steel cylinder with an ellipsoidal dome. The RBS free-standing containment does not have a standby gas treatment subsystem that is part of the existing license. In Modes 4 and 5, the probability and consequences of a LOCA are reduced due to the pressure and temperature limitations in these modes. Therefore, maintaining primary containment operable is not required in Modes 4 or 5 to ensure a control volume, except for situations where significant releases of radioactive material are possible, such as during movement of recently irradiated fuel assemblies, or during operations with a

potential for draining the reactor vessel. TSTF-542 removes the requirements for a standard BWR/6 to require secondary containment to be operable for OPDRVs.

The NRC concludes this variation does not change the conclusion of TSTF-542; therefore, TS LCO 3.5.2, Required Actions C.3 and D.4 can be deleted. The NRC staff concludes that Variation 6 is acceptable.

3.5.7 Variation 7, TS LCO 3.5.2, Required Action D.3, Primary Containment Air Lock

Required Action D.3 listed in the current RBS TS LCO 3.5.2 will be removed because the ISTS Action D.2, to establish primary containment, requires that the primary containment air lock boundary be secured for completion. Thus, LCO 3.5.2 is no longer necessary.

Existing TS LCO 3.5.2, Actions D.3 states:

> Initiate action to close one door in each primary containment air lock.

This variation is equivalent to current TS requirements for the Primary Containment Air Locks, therefore, deletion of Required Action D.3 is consistent with the treatment of other containment boundaries as discussed in Section 3.4.2, "Other Proposed Changes - Containment, Containment Isolation Valves, and Standby Gas Treatment Requirements," of the justification for TSTF-542, Revision 2 (Reference 3). The NRC staff finds that this difference does not alter the conclusion that the proposed change is applicable to RBS Unit 1; therefore, existing Required Action D.3 for TS LCO 3.5.2 can be deleted. The NRC staff therefore concludes that Variation 7 is acceptable.

3.5.8 Variation 8, TS LCO 3.6.1.2, "Primary Containment Air Lock," Primary Containment Air Lock, Condition E and Required Action E.2

The RBS TS LCO 3.6.1.2, Primary Containment Air Locks, is currently applicable during OPDRV activities. This applicability statement is removed along with the Condition E, Required Action E.2 to suspend OPDRVs. The new DRAIN TIME requirements of TS LCO 3.5.2 will preclude RPV Water Inventory Control activities with a DRAIN TIME less than 36 hours when at least one door in each primary containment air lock cannot be closed to restore primary containment. There are no additional primary containment air lock requirements.

The NRC staff finds that this variation is equivalent to the current TS requirements for the Primary Containment Air Locks, and Condition E and Required Action E.2 deletion is consistent with the treatment of other containment boundaries as discussed in Section 3.4.2, "Other Proposed Changes - Containment, Containment Isolation Valves, and Standby Gas Treatment Requirements," of the justification for TSTF-542, Revision 2. The NRC staff finds that this difference does not alter the conclusion that the proposed change is applicable to RBS; therefore, existing Required Action E.2 for TS LCO 3.6.1.2 can be deleted, and the NRC staff concludes that Variation 8 is acceptable.

3.5.9 Variation 9, TS 3.6.4.1, "Secondary Containment-Operating"

The RBS TS 3.6.4.1, "Secondary Containment-Operating," is not affected by this TS change because there are no current OPDRV requirements for secondary containment. The current RBS secondary containment isolation TS does not contain OPDRV requirements because secondary containment as described in the ISTS refers to the RBS primary containment. Thus,

RBS TS 3.6.1.10, "Primary Containment-Shutdown," is revised to remove OPDRV LCO applicability requirement similar to the ISTS markup of TS 3.6.4.1.

The NRC staff finds that this variation is equivalent to current TS requirements for the Primary Containment-Operating and is consistent with the treatment of other containment boundaries as discussed in Section 3.4.2, "Other Proposed Changes - Containment, Containment Isolation Valves, and Standby Gas Treatment Requirements," of the justification for TSTF-542, Revision 2. Proposed LCO 3.5.2, Conditions C and D and their associated Required Actions have requirements for primary containment and primary containment penetrations for DRAIN TIMES between 36 hours and 8 hours. The NRC staff finds that this difference does not alter the conclusion that the proposed change is applicable to RBS. Therefore, the NRC staff concludes that Variation 9 is acceptable.

3.5.10 Variation 10, TS 3.6.4.2, "Secondary Containment Isolation Dampers (SCIDs) and Fuel Building Isolation Dampers (FBIDs)"

The RBS TS 3.6.4.2, "Secondary Containment Isolation Dampers (SCIDs) and Fuel Building Isolation Dampers (FBIDs)," like TS 3.6.4.1 (Variation 9) above is not affected by this TS change because there are no current OPDRV requirements. The current RBS secondary containment isolation TS does not contain OPDRV requirements because secondary containment, as described in the ISTS, refers to the RBS primary containment. The OPDRV requirements, similar to those listed in the current ISTS for TS 3.6.4.2, are correlated with the current RBS TS requirements in TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)." RBS TS 3.6.1.3 is revised to remove applicability to Modes 4 and 5 because the applicability of LCO 3.3.6.1, Function 5.b, during Modes 4 and 5 has been eliminated in accordance with the TSTF-542 markup. Condition F of TS 3.6.1.3 has also been removed in its entirety as there are no longer required actions for PCIVs to be operable during Mode 4 or 5. Primary containment operability requirements during Modes 4 and 5 are established by new RBS TS 3.5.2.

Specifically, for TS LCO 3.6.1.3, the following Applicability is deleted.

> MODES 4 and 5 for RHR Shutdown Cooling System suction from the reactor vessel isolation valves when associated isolation instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation," Function 5.b.

The NRC staff finds that this variation is acceptable since the current RBS secondary containment isolation TS does not contain OPDRV requirements because secondary containment, as described in the ISTS, refers to the RBS primary containment. Primary containment operability requirements during Modes 4 and 5 are established by new RBS TS LCO 3.5.2 and TS Table 3.3.5.2-1 (RHR - Function 4.a and RWCU - Function 5.a). Therefore, the NRC staff concludes that Variation 10 is acceptable.

3.5.11 Variation 11, TS 3.6.4.3, "Standby Gas Treatment (SGT) System"

RBS TS 3.6.4.3, "Standby Gas Treatment (SGT) System," is not affected by this TS change because there are no current OPDRV requirements related to the SGT system. The SGT system is not required during RPV WIC activities because the Standby Gas Treatment Subsystem is external to the primary containment and is not required for primary containment operability. As previously noted in Variation 6, the RBS primary containment consists of a free standing steel cylinder with an ellipsoidal dome. The plant has a free standing containment and

does not have a SGT subsystem that is part of the existing license. TSTF-542, Revision 2, removes the requirements for a standard BWR/6 to required secondary containment to be operable for OPDRVs. The NRC staff finds that this variation is acceptable and does not change the conclusion of TSTF-542; therefore, existing TS LCO 3.6.4.3 is unaffected. The NRC staff concludes that Variation 11 is acceptable.

3.6 Staff Evaluation of Proposed Deletion of Reference to OPDRVs

Sections 2.2.2.4 and 2.2.4 of this SE lists numerous OPDRVs references proposed for deletion. The proposed changes replace the existing specifications related to OPDRVs with revised specifications for RPV WIC. For example, the proposed change removes:

- Only one trip system required in MODES 4 and 5 with RHR Shutdown Cooling System Integrity maintained during operations with a potential for draining the reactor vessel (OPDRVs).
- Initiate action to suspend OPDRVs.
- MODES 4 and 5 for RHR Shutdown Cooling System suction from the reactor vessel isolation valves when associated isolation instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation," Function 5.b.
- Required Action and associated Completion Time of Condition A, B, C, or D not met for PCIV(s) required to be OPERABLE during MODE 4 or 5.
- Initiate action to restore valve(s) to OPERABLE status or during OPDRVs.
- Initiate action to suspend operations with a potential for draining the reactor vessel (OPDRVs).

The term OPDRVs is not specifically defined in the TSs and historically has been subject to inconsistent application by licensees. The changes discussed in this SE are intended to resolve ambiguity by creating a new RPV WIC TS with attendant equipment operability requirements, required actions and SRs; and deleting references to OPDRVs throughout the TS.

The current RBS TSs contain instrumentation requirements related to OPDRVs in three separate TSs. The proposed TS 3.3.5.2 consolidates the instrumentation requirements into a single location to simplify the presentation and provide requirements consistent with TS 3.5.2. The remaining TSs with OPDRVs requirements are for Primary Containment Air Locks, Primary Containment Isolation Valves (PCIVs), Primary Containment-Shutdown, Control Room Fresh Air (CRFA) System, Control Room AC System, AC Sources-Shutdown, DC Sources-Shutdown, Inverters-Shutdown, and Distribution Systems-Shutdown. Each of these systems' requirements during OPDRVs were proposed for consolidation into revised TS 3.5.2 for RPV WIC based on the appropriate plant conditions and calculated DRAIN TIME.

The NRC staff determined that the deletion of OPDRVs references, along with the corresponding editorial and titles changes, are appropriate because the proposed TSs governing RPV WIC and the associated instrumentation, TSs 3.5.2 and 3.3.5.2, respectively,

are a simplified alternative set of controls for ensuring water level is maintained above the TAF and, therefore, these changes are acceptable.

3.7 Staff Evaluation of TS 3.10, Special Operations and TSTF-484, Revision 0

The current RBS TS LCO 3.10.1, "Inservice Leak and Hydrostatic Testing Operations," allows performance of an inservice leak or hydrostatic test with the average reactor coolant temperature greater than 200 °F, while in Mode 4, provided certain secondary containment LCOs are met.

TSTF-484, Revision 0, "Use of TS 3.10.1 for Scram Time Testing Activities," revised LCO 3.10.1 to expand its scope to include operations where temperature exceeds 200 °F: (1) as a consequence of maintaining adequate reactor pressure for an inservice leak or hydrostatic test, or (2) as a consequence of maintaining adequate reactor pressure for control rod scram time testing initiated in conjunction with an inservice leak or hydrostatic test.

By Amendment No. 170, dated January 5, 2017 (Reference 8), the NRC approved changes to RBS TS LCO 3.10.1 in accordance with TSTF-484. The NRC staff's SE for this amendment stated, in part, that "two low-pressure emergency core cooling systems (ECCS) injected/spray subsystems are required to be operable in Mode 4 by TS 3.5.2, ECCS-Shutdown." For RBS, the ECCS injection/spray subsystems are defined as three LPCI subsystems, the LPCS system, and the HPCS system. However, per the proposed new LCO 3.5.2, only "one ECCS injection/spray subsystem" would be required to be operable in Mode 4.

The NRC staff has determined that changing from two ECCS injection/spray subsystems to one ECCS injection/spray subsystem is acceptable because, as stated previously in Section 3.3 of this SE, this level of redundancy is not required, even during application of LCO 3.10.1. When the licensee applies LCO 3.10.1 at the end of a refueling outage, an exceptionally large volume of water is present in the reactor vessel since the vessel is nearly water solid. There is much more water in the reactor vessel than is present during power operation and more than is present during most of an outage. Small leaks from the reactor coolant system would be detected by inspections before a significant loss of inventory occurred. In the event of a large reactor coolant system leak, the RPV would rapidly depressurize and allow operation of the low pressure ECCS. At low decay heat values, and near Mode 4 conditions, the stored energy in the reactor core will be very low. Therefore, the reasoning that operators would have time to respond with manual actions to start any ECCS pumps and properly align valves for injection from the control room remains valid.

As stated previously in Section 3.3 of this SE, with one ECCS injection/spray subsystem and nonsafety-related injection sources, defense-in-depth will be maintained. The defense-in-depth measure is consistent with other events considered during shutdown with no additional single failure assumed. The DRAIN TIME controls, in addition to the required ECCS injection/spray subsystem, provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

As discussed above, the NRC staff determined that LCOs 3.3.5.2 and 3.5.2, adopted as part of TSTF-542, are satisfactory and will be acceptable even during application of the special operations provided in LCO 3.10.1.

3.8 Technical Conclusion

The RBS TS Safety Limit 2.1.1.3 requires that "[r]eactor vessel water level shall be greater than the top of active irradiated fuel." Maintaining water level above the TAF ensures that the fuel cladding fission product barrier is protected during shutdown conditions. The proposed changes to the TSs establish new LCO requirements that address the preventive and mitigative equipment and associated instrumentation that provide an alternative means to support the TS Safety Limit 2.1.1.3 during Modes 4 and 5 operations.

The reactor coolant system is at a low operating temperature (i.e., < 200 °F) and is depressurized during Modes 4 and 5 conditions. An event involving a loss of inventory while in the shutdown condition does not exceed the capacity of one ECCS subsystem. The accidents that are postulated to occur during shutdown conditions (i.e., the Fuel Handling Accident (USAR Section 15.7.4) and Radioactive Gas Waste System Leak or Failure (USAR Section 15.7.1), do not involve a loss of inventory. Therefore, the equipment and instrumentation associated with the reactor vessel WIC TS do not provide detection or mitigation related to these design basis accidents.

The proposed TS LCO 3.5.2 contains requirements for operability of one ECCS subsystem along with requirements to maintain a sufficiently long DRAIN TIME so that plant operators would have time to diagnose and mitigate an unplanned draining event. The NRC staff has determined that LCOs 3.5.2 and 3.3.5.2 provide for the lowest functional capability or performance levels of equipment required for safe operation of the facility, and therefore, meet the LCO requirements of 10 CFR 50.36(c)(2)(i).

Additionally, the revised TS LCOs 3.5.2 and 3.3.5.2 provide remedial actions to be taken in the event the LCO is not satisfied and, therefore, meet the requirements of 10 CFR 50.36(c)(2)(i).

The NRC staff finds that the proposed Action statements provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

The NRC staff evaluated the proposed Drain Time definition, TS 3.5.2 (which contains the requirements for RPV WIC), and TS 3.3.5.2 (which contains the requirements for instrumentation necessary to support TS 3.5.2). Based on the considerations discussed above, the NRC staff concludes that the proposed revisions are acceptable because they consolidate and clarify the RPV WIC requirements, which meet 10 CFR 50.36(c)(2)(ii), Criterion 4, to establish LCOs for structures, systems, or components that are significant to public health and safety as shown by operating experience.

The licensee proposed to delete OPDRV references from the TS applicability descriptions, conditions, required actions, and footnotes. The NRC staff has reviewed the proposed changes and determined that the deletion of OPDRVs references, along with the corresponding editorial changes, are appropriate because the proposed TSs governing RPV WIC and the associated instrumentation, TSs 3.5.2 and 3.3.5.2, respectively, are a clarified and simplified alternative set of controls for ensuring that water level is maintained above the TAF.

The NRC staff reviewed the SRs associated with the revised TS LCO 3.5.2 and new LCO 3.3.5.2. The NRC staff finds that the proposed TS SRs in TS 3.5.2 are acceptable because they:

- Support TS 3.5.2 DRAIN TIME requirements,
- Assure that water inventory is available for ECCS injection/spray subsystem RPV injection and pump performance,
- Ensure ECCS injection/spray subsystems are adequately filled (mitigates effects of gas accumulation or voiding),
- Ensure ECCS injection/spray subsystems have verified valve positions to support RPV injection,
- Ensure ECCS injection/spray subsystems have verified pumps to provide adequate flow to support drain time and RPV injection,
- Ensure ECCS injection/spray subsystems have verified automatic isolation, and that
- ECCS injection/spray subsystems can be manually operated to inject via main control room push buttons (LPCS/LPCI subsystems) or pump and valve hand switches (HPCS).

The NRC staff finds that the three SRs proposed for TS 3.3.5.2 are adequate, because they ensure that the functions are capable of performing their specified safety functions in support of TS 3.5.2 and protecting the RPV from a potential drain down in Modes 4 and 5. Therefore, the NRC staff concludes that the proposed SRs satisfy 10 CFR 50.36(c)(3).

The NRC staff evaluated the proposed changes against each of the applicable design requirements listed in Section 2.3.1 of this SE. The NRC staff concludes that the proposed changes for Mode 4 and 5 operations, as they relate to the proposed TS changes for the new DRAIN TIME definition and the removal of OPDRV references, remain consistent with the GDCs in that the RBS design requirements for instrumentation, reactor coolant leakage detection, the reactor coolant pressure boundary, and reactor coolant makeup are unaffected.

The regulation in 10 CFR 50.36(a)(1) states that a summary statement of the bases or reasons for the technical specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the TSs. In accordance with this requirement, the licensee provided TS Bases changes in the proposed license amendment request (Reference 1).

Additionally, the proposed TS changes were reviewed for technical clarity and consistency with the existing RBS requirements for customary terminology and formatting. The NRC staff found that the proposed changes were consistent with TSTF-542, Revision 2 (Reference 3) and Chapter 16 of NUREG-0800 (Reference 5).

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State official was notified of the proposed issuance of the amendment on September 24, 2018. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility components located within the restricted area as defined in 10 CFR Part 20 and changes SRs. 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 January 30, 2018 (83 FR 4292). Accordingly, the amendment meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the 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.

7.0 REFERENCES

1. Maguire, W. F., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control,' River Bend Station - Unit 1, Docket No. 50-458, License No. NPF-47," dated November 15, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17319A898).

2. Maguire, W. F., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Supplement to Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control,' River Bend Station, Unit 1, Docket No. 50-458, License No. NPF-47," dated April 26, 2018 (ADAMS Accession No. ML18116A646).

3. Technical Specifications Task Force, letter to U.S. Nuclear Regulatory Commission, "Response to NRC Request for Additional Information Regarding TSTF-542, Revision 1, 'Reactor Pressure Vessel Water Inventory Control,' and Submittal of Revision 2," dated March 14, 2016 (ADAMS Accession No. ML16074A448).

4. Klein, A. R., U.S. Nuclear Regulatory Commission, letter to Technical Specifications Task Force, "Final Safety Evaluation of Technical Specifications Task Force Traveler TSTF-542, Revision 2, 'Reactor Pressure Vessel Water Inventory Control' (TAC No. MF3487)," dated December 20, 2016 (ADAMS Accession No. ML16343B008).

5. U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," NUREG-0800, Chapter 16, "Technical Specifications," dated March 2010 (ADAMS Accession No. ML100351425).

6. U.S. Nuclear Regulatory Commission, "Standard Technical Specification, General Electric BWR/6 Plants, NUREG-1434, Revision 4.0, Volume 1, Specifications, April 2012 (ADAMS Accession No. ML12104A195).

7. U.S. Nuclear Regulatory Commission, "Standard Technical Specification, General Electric BWR/6 Plants, NUREG-1434, Revision 4.0, Volume 2, Bases, April 2012 (ADAMS Accession No. ML12104A196).

8. Wang, A. B., U.S. Nuclear Regulatory Commission, letter to Vice President, Operations, Entergy Operation, Inc., "River Bend Station, Unit 1 - Issuance of Amendment Re: Technical Specification Task Force (TSTF) Improved Standard Technical Specifications Change Traveler, TSTF-484, "Use if TS 3.10.1 for Scram Time Testing Activities" (TAC No. ME4431) (ADAMS Accession No. ML102790122).

Principal Contributors: Diana Woodyatt, NRR
Khadijah West, NRR
Daniel Warner, NRR
Larry Wheeler, NRR

Date: November 7, 2018

SUBJECT: RIVER BEND STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATIONS TO ADOPT TSTF-542, REVISION 2, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (EPID L-2017-LLA-0383) DATED NOVEMBER 7, 2018

DISTRIBUTION:
PUBLIC
PM File Copy
RidsACRS_MailCTR Resource
RidsNrrDeEicb Resource
RidsNrrDorlLpl4 Resource
RidsNrrDssSrxb Resource
RidsNrrDssStsb Resource
RidsNrrLAPBlechman Resource
RidsNrrPMRiverBend Resource
RidsRgn4MailCenter Resource
RHaskell, NRR
MHoncharik, NRR
DWarner, NRR
LWheeler, NRR
KWest, NRR
DWoodyatt, NRR

ADAMS Accession No. ML18267A341 *** by memo**

OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DSS/STSB/BC*
NAME	LRegner	PBlechman w/ comments	VCusumano
DATE	10/30/2018	10/30/2018	8/21/2018
OFFICE	OGC – NLO*	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM
NAME	STurk	RPascarelli	LRegner
DATE	10/15/2018	11/7/2018	11/7/2018

OFFICIAL RECORD COPY