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

August 1, 2018

Mr. John Dent, Jr.
Vice President-Nuclear and CNO
Nebraska Public Power District
72676 648A Avenue
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATIONS TO ADOPT TECHNICAL SPECIFICATIONS TASK FORCE (TSTF) TRAVELER TSTF-542, REVISION 2, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (CAC NO. MG0138; EPID L-2017-LLA-0290)

Dear Mr. Dent:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 260 to Renewed Facility Operating License No. DPR-46 for the Cooper Nuclear Station. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 7, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17228A042), as supplemented by letter dated January 31, 2018 (ADAMS Accession No. ML18039A153).

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

Sincerely,

MO Banion for

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

Docket No. 50-298

Enclosures:
1. Amendment No. 260 to DPR-46
2. Safety Evaluation

cc: Listserv

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

NEBRASKA PUBLIC POWER DISTRICT

DOCKET NO. 50-298

COOPER NUCLEAR STATION

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 260
Renewed License No. DPR-46

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

   A. The application for amendment by Nebraska Public Power District (the licensee), dated August 7, 2017, as supplemented by letter dated January 31, 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, the provisions of the Act, and the rules and regulations of the Commission;

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

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-46 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 260, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented prior to the fall 2018 refueling outage (RE30).

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 Renewed Facility
Operating License No. DPR-46
and Technical Specifications

Date of Issuance: August 1, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 260

RENEWED FACILITY OPERATING LICENSE NO. DPR-46

COOPER NUCLEAR STATION

DOCKET NO. 50-298

Replace the following pages of the Renewed Facility Operating License No. DPR-46 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.

Renewed Facility Operating License

REMOVE	INSERT
-3-	-3-

Technical Specifications

REMOVE	INSERT	REMOVE	INSERT	REMOVE	INSERT
i	i	3.3-54	3.3-54	3.5-9	3.5-9
ii	ii	3.3-55	3.3-55	3.5-10	3.5-10
iii	iii	3.3-56	3.3-56	3.5-11	3.5-11
1.1-3	1.1-3	3.3-57	3.3-57	3.5-12	3.5-12
1.1-4	1.1-4	3.3-58	3.3-58	3.5-13	3.5-13
1.1-5	1.1-5	3.3-59	3.3-59	---	3.5-14
1.1-6	1.1-6	3.3-60	3.3-60	3.6-11	3.6-11
---	1.1-7	3.3-61	3.3-61	3.6-34	3.6-34
3.3-31	3.3-31	3.3-62	3.3-62	3.6-35	3.6-35
3.3-32	3.3-32	3.3-63	3.3-63	3.6-36	3-6-36
3.3-33	3.3-33	3.3-64	3.3-64	3.6-38	3.6-38
3.3-37	3.3-37	3.3-65	3.3-65	3.6-40	3.6-40
3.3-38	3.3-38	3.3-66	3.3-66	3.6-41	3.6-41
3.3-39	3.3-39	3.3-67	3.3-67	3.6-42	---
3.3-47	3.3-47	3.3-68	3.3-68	3.7-8	3.7-8
3.3-48	3.3-48	---	3.3-69	3.7-9	3.7-9
3.3-49	3.3-49	---	3.3-70	3.8-11	3.8-11
3.3-50	3.3-50	---	3.3-71	3.8-12	3.8-12
3.3-51	3.3-51	3.5-1	3.5-1	3.8-20	3.8-20
3.3-52	3.3-52	3.5-7	3.5-7	3.8-21	3.8-21
3.3-53	3.3-53	3.5-8	3.5-8	3.8-29	3.8-29
				3.8-30	3.8-30

(5) 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 operation of the facility.

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

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2419 megawatts (thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 260, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contain Safeguards Information protected under 10 CFR 73.21, are entitled: "Cooper Nuclear Station Safeguards Plan," submitted by letter dated May 17, 2006.

NPPD shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The NPPD CSP was approved by License Amendment No. 238 as supplemented by changes approved by License Amendments 244 and 249.

(4) Fire Protection

NPPD shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the license amendment request dated April 24, 2012 (and supplements dated July 12, 2012, January 14, 2013, February 12, 2013, March 13, 2013, June 13, 2013, December 12, 2013, January 17, 2014, February 18, 2014, and April 11, 2014), and as approved in the safety evaluation dated April 29, 2014. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if

TABLE OF CONTENTS

(continued)

(continued)

1.1 Definitions

DOSE EQUIVALENT I-131 (continued)	I-133, I-134, and I-135 actually present. The DOSE EQUIVALENT I-131 concentration is calculated as follows: DOSE EQUIVALENT I-131 = (I-131) + 0.0060 (I-132) + 0.17 (I-133) + 0.0010 (I-134) + 0.029 (I-135). The dose conversion factors used for this calculation are those listed in Federal Guidance Report (FGR) 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," 1989.
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 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.

(continued)

1.1 Definitions

DRAIN TIME (continued)

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.

INSERVICE TESTING PROGRAM

The INSERVICE TESTING PROGRAM is the licensee program that fulfills the requirements of 10 CFR 50.55a(f).

LEAKAGE

LEAKAGE shall be:

a. Identified LEAKAGE

1. LEAKAGE into the drywell, such as that from pump seals or valve packing, that is captured and conducted to a sump or collecting tank; or

2. LEAKAGE into the drywell atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE;

b. Unidentified LEAKAGE

All LEAKAGE into the drywell that is not identified LEAKAGE;

c. Total LEAKAGE

Sum of the identified and unidentified LEAKAGE;

d. Pressure Boundary LEAKAGE

LEAKAGE through a nonisolable fault in a Reactor Coolant System (RCS) component body, pipe wall, or vessel wall.

(continued)

1.1 Definitions

LINEAR HEAT GENERATION RATE (LHGR)	The LHGR shall be the heat generation rate per unit length of fuel rod. It is the integral of the heat flux over the heat transfer area associated with the unit length.
LOGIC SYSTEM FUNCTIONAL TEST	A LOGIC SYSTEM FUNCTIONAL TEST shall be a test of all logic components required for OPERABILITY of a logic circuit, from as close to the sensor as practicable up to, but not including, the actuated device, to verify OPERABILITY. The LOGIC SYSTEM FUNCTIONAL TEST may be performed by means of any series of sequential, overlapping, or total system steps so that the entire logic system is tested.
MINIMUM CRITICAL POWER RATIO (MCPR)	The MCPR shall be the smallest critical power ratio (CPR) that exists in the core for each class of fuel. The CPR is that power in the assembly that is calculated by application of the appropriate correlation(s) to cause some point in the assembly to experience boiling transition, divided by the actual assembly operating power.
MODE	A MODE shall correspond to any one inclusive combination of mode switch position, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.
OPERABLE – OPERABILITY	A system, subsystem, division, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, division, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)	The PTLR is the unit specific document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates, for the current reactor vessel fluence period. These pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.6.7.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 2419 MWt.

(continued)

1.1 Definitions

REACTOR PROTECTION SYSTEM (RPS) RESPONSE TIME	The RPS RESPONSE TIME shall be that time segment from the time the sensor contacts actuate to the time the scram solenoid valves deenergize.
SHUTDOWN MARGIN (SDM)	SDM shall be the amount of reactivity by which the reactor is subcritical or would be subcritical throughout the operating cycle assuming that: a. The reactor is xenon free; b. The moderator temperature is ≥ 68°F, corresponding to the most reactive state; and c. All control rods are fully inserted except for the single control rod of highest reactivity worth, which is assumed to be fully withdrawn. With control rods not capable of being fully inserted, the reactivity worth of these control rods must be accounted for in the determination of SDM.
THERMAL POWER	THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.
TURBINE BYPASS SYSTEM RESPONSE TIME	The TURBINE BYPASS SYSTEM RESPONSE TIME consists of two components: a. The time from initial movement of the main turbine stop valve or control valve until 80% of the turbine bypass capacity is established; and b. The time from initial movement of the main turbine stop valve or control valve until initial movement of the turbine bypass valve. 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.

Table 1.1-1 (page 1 of 1)
MODES

MODE	TITLE	REACTOR MODE SWITCH POSITION	AVERAGE REACTOR COOLANT TEMPERATURE (°F)
1	Power Operation	Run	NA
2	Startup	Refuel[(a)] or Startup/Hot Standby	NA
3	Hot Shutdown[(a)]	Shutdown	> 212
4	Cold Shutdown[(a)]	Shutdown	≤ 212
5	Refueling[(b)]	Shutdown or Refuel	NA

(a) All reactor vessel head closure bolts fully tensioned.

(b) One or more reactor vessel head closure bolts less than fully tensioned.

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, 2.b and 2.h. ---------- Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable. AND	1 hour from discovery of loss of initiation capability for feature(s) in both divisions (continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	B.2	----------NOTE---------- Only applicable for Functions 3.a and 3.b. ----------	
		Declare High Pressure Coolant Injection (HPCI) System inoperable.	1 hour from discovery of loss of HPCI 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.e, 2.c, 2.d, 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		
	C.2	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 3.3.5.1-1.	D.1	----------NOTE---------- Only applicable if HPCI pump suction is not aligned to the suppression pool. ----------	
		Declare HPCI System inoperable.	1 hour from discovery of loss of HPCI initiation capability
	AND		
	D.2.1	Place channel in trip.	24 hours
	OR		
	D.2.2	Align the HPCI pump suction to the suppression pool.	24 hours
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.d and 2.g. ----------	
		Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for subsystems in both divisions
	AND		

(continued)

Table 3.3.5.1-1 (page 1 of 6)
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. Core Spray System					
a. Reactor Vessel Water Level - Low Low Low (Level 1)	1,2,3	4[b]	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4[c][d] SR 3.3.5.1.5	≥ -113 inches
b. Drywell Pressure - High	1,2,3	4[b]	B	SR 3.3.5.1.2 SR 3.3.5.1.4[c][d] SR 3.3.5.1.5	≤ 1.84 psig
c. Reactor Pressure - Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 291 psig and ≤ 436 psig
d. Core Spray Pump Discharge Flow - Low (Bypass)	1,2,3	1 per pump	E	SR 3.3.5.1.2 SR 3.3.5.1.4[c][d] SR 3.3.5.1.5	≥ 1370 gpm
e. Core Spray Pump Start - Time Delay Relay	1,2,3	1 per pump	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 9 seconds and ≤ 11 seconds
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Vessel Water Level - Low Low Low (Level 1)	1,2,3	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4[c][d] SR 3.3.5.1.5	≥ -113 inches

(continued)

(a) [Deleted]

(b) Also required to initiate the associated diesel generator (DG).

(c) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(d) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The Limiting Trip Setpoint and the methodologies used to determine the as-found and the as-left tolerances are specified in the Technical Requirements Manual.

Table 3.3.5.1-1 (page 2 of 6)
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 System (continued)					
b. Drywell Pressure - High	1,2,3	4	B	SR 3.3.5.1.2 SR 3.3.5.1.4[c][d] SR 3.3.5.1.5	≤ 1.84 psig
c. Reactor Pressure - Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 291 psig and ≤ 436 psig
d. Reactor Pressure - Low (Recirculation Discharge Valve Permissive)	1[e],2[e], 3[e]	4	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 199 psig and ≤ 246 psig
e. Reactor Vessel Shroud Level - Level 0	1,2,3	2	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ -193.19 inches
f. Low Pressure Coolant Injection Pump Start - Time Delay Relay	1,2,3	1 per pump	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	
Pumps B,C					≥ 4.5 seconds and ≤ 5.5 seconds
Pumps A,D					≤ 0.5 second

(continued)

(a) [Deleted]

(c) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(d) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The Limiting Trip Setpoint and the methodologies used to determine the as-found and the as-left tolerances are specified in the Technical Requirements Manual.

(e) With associated recirculation pump discharge valve open.

Table 3.3.5.1-1 (page 3 of 6)
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 System (continued)					
g. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)	1,2,3	1 per subsystem	E	SR 3.3.5.1.2 SR 3.3.5.1.4[(c)(d)] SR 3.3.5.1.5	≥ 2107 gpm
h. Containment Pressure – High	1,2,3	4	B	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 2 psig
3. High Pressure Coolant Injection (HPCI) System					
a. Reactor Vessel Water Level - Low Low (Level 2)	1, 2[(f)], 3[(f)]	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4[(c)(d)] SR 3.3.5.1.5	≥ -42 inches
b. Drywell Pressure - High	1, 2[(f)], 3[(f)]	4	B	SR 3.3.5.1.2 SR 3.3.5.1.4[(c)(d)] SR 3.3.5.1.5	≤ 1.84 psig
c. Reactor Vessel Water Level - High (Level 8)	1, 2[(f)], 3[(f)]	2	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 54 inches
d. Emergency Condensate Storage Tank (ECST) Level - Low	1, 2[(f)], 3[(f)]	2	D	SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.5	≥ 23 inches
e. Suppression Pool Water Level - High	1, 2[(f)], 3[(f)]	2	D	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 4 inches

(continued)

(a) [Deleted]

(c) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(d) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Limiting Trip Setpoint (LTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the LTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (Nominal Trip Setpoint) to confirm channel performance. The Limiting Trip Setpoint and the methodologies used to determine the as-found and the as-left tolerances are specified in the Technical Requirements Manual.

(f) With reactor steam dome pressure >150 psig.

3.3 INSTRUMENTATION

3.3.5.3 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.3 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.3-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.3-1.

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 3.3.5.3-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	B.1	Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	AND		
	B.2	Calculate DRAIN TIME.	Immediately
C. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	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 3.3.5.3-1.	D.1 Restore channel to OPERABLE status.	24 hours
E. Required Action and associated Completion Time of Condition C or D not met.	E.1 Declare associated low pressure ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

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

SURVEILLANCE		FREQUENCY
SR 3.3.5.3.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.3.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.5.3-1 (page 1 of 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. Core Spray System					
a. Reactor Pressure - Low (Injection Permissive)	4,5	4[(a)]	C	SR 3.3.5.3.2	≤ 436 psig
b. Core Spray Pump Discharge Flow - Low (Bypass)	4,5	1 per pump[(a)]	D	SR 3.3.5.3.2	≥ 1370 gpm
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Pressure - Low (Injection Permissive)	4,5	4[(a)]	C	SR 3.3.5.3.2	≤ 436 psig
b. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)	4,5	1 per subsystem[(a)]	D	SR 3.3.5.3.2	≥ 2107 gpm
3. RHR System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	[(b)]	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 3 inches
4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low Low, Level 2	[(b)]	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ -42 inches

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

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

3.3 INSTRUMENTATION

3.3.6.1 Primary Containment Isolation Instrumentation

LCO 3.3.6.1 The primary containment isolation instrumentation for each Function in Table 3.3.6.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.6.1-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channels inoperable.	A.1 Place channel in trip.	12 hours for Functions 2.a, 2.b, 5.d, and 6.b AND 24 hours for Functions other than Functions 2.a, 2.b, 5.d, and 6.b
B. One or more Functions with isolation capability not maintained.	B.1 Restore isolation capability.	1 hour

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Enter the Condition referenced in Table 3.3.6.1-1 for the channel.	Immediately
D. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	D.1 Isolate associated main steam line (MSL). OR D.2.1 Be in MODE 3. AND D.2.2 Be in MODE 4.	12 hours 12 hours 36 hours
E. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	E.1 Be in MODE 2.	6 hours
F. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	F.1 Isolate the affected penetration flow path(s).	1 hour

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
G. As required by Required Action C.1 and referenced in Table 3.3.6.1-1. OR Required Action and associated Completion Time for Condition F not met.	G.1 AND G.2	Be in MODE 3. Be in MODE 4.	12 hours 36 hours
H. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	H.1 OR H.2	Declare associated standby liquid control (SLC) subsystem(s) inoperable. Isolate the Reactor Water Cleanup System.	1 hour 1 hour
I. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	I.1	Initiate action to restore channel to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

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

1. Refer to Table 3.3.6.1-1 to determine which SRs apply for each Primary Containment Isolation 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 for up to 6 hours provided the associated Function maintains isolation capability.

	SURVEILLANCE	FREQUENCY
SR 3.3.6.1.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.1.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.1.3	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.1.4	----------NOTE---------- For Function 2.d, radiation detectors are excluded. ---------- Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.1.5	Calibrate each radiation detector.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.1.6	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.6.1-1 (page 1 of 3)
Primary Containment 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
1. Main Steam Line Isolation					
a. Reactor Vessel Water Level - Low Low Low (Level 1)	1,2,3	2	D	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ -113 inches
b. Main Steam Line Pressure - Low	1	2	E	SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6	≥ 835 psig
c. Main Steam Line Flow - High	1,2,3	2 per MSL	D	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 142.7% rated steam flow
d. Condenser Vacuum - Low	1, 2[(a)], 3[(a)]	2	D	SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6	≥ 8 inches Hg vacuum
e. Main Steam Tunnel Temperature - High	1,2,3	2 per location	D	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
2. Primary Containment Isolation					
a. Reactor Vessel Water Level - Low (Level 3)	1,2,3	2	G	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 3 inches
b. Drywell Pressure - High	1,2,3	2	G	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 1.84 psig
c. Reactor Building Ventilation Exhaust Plenum Radiation - High	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 49 mR/hr
d. Main Steam Line Radiation - High	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ 3 times full power background
e. 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 3.3.6.1.4 SR 3.3.6.1.6	≥ -113 inches

(continued)

(a) With any turbine stop valve not closed.

Table 3.3.6.1-1 (page 2 of 3)
Primary Containment 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
3. High Pressure Coolant Injection (HPCI) System Isolation					
a. HPCI Steam Line Flow - High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 250% rated steam flow
b. HPCI Steam Line Flow - Time Delay Relays	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 6 seconds
c. HPCI Steam Supply Line Pressure - Low	1,2,3	2	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 107 psig
d. HPCI Steam Line Space Temperature - High	1,2,3	2 per location	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
4. Reactor Core Isolation Cooling (RCIC) System Isolation					
a. RCIC Steam Line Flow - High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 288% rated steam flow
b. RCIC Steam Line Flow - Time Delay Relays	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 6 seconds
c. RCIC Steam Supply Line Pressure - Low	1,2,3	2	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 61 psig
d. RCIC Steam Line Space Temperature - High	1,2,3	2 per location	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
5. Reactor Water Cleanup (RWCU) System Isolation					
a. RWCU Flow - High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 191% of Rated
b. RWCU System Space Temperature - High	1,2,3	2 per location	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
c. SLC System Initiation	1,2	1	H	SR 3.3.6.1.6	NA
d. Reactor Vessel Water Level - Low Low (Level 2)	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ - 42 inches

Table 3.3.6.1-1 (page 3 of 3)
Primary Containment 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
6. RHR Shutdown Cooling System Isolation					
a. Reactor Pressure - High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 72 psig
b. Reactor Vessel Water Level - Low (Level 3)	3	2	I	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 3 inches

3.3 INSTRUMENTATION

3.3.6.2 Secondary Containment Isolation Instrumentation

LCO 3.3.6.2 The secondary containment isolation instrumentation for each Function in Table 3.3.6.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.6.2-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Place channel in trip.	12 hours for Functions 1 and 2 AND 24 hours for Function 3
B. One or more Functions with secondary containment isolation capability not maintained.	B.1 Restore secondary containment isolation capability.	1 hour
C. Required Action and associated Completion Time of Condition A or B not met.	C.1.1 Isolate the associated secondary containment penetration flow path(s). OR	1 hour

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.1.2 Declare associated secondary containment isolation valves inoperable.	1 hour
	AND	
	C.2.1 Place the associated standby gas treatment (SGT) subsystem(s) in operation.	1 hour
	OR	
	C.2.2 Declare associated SGT subsystem(s) inoperable.	1 hour

SURVEILLANCE REQUIREMENTS

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

1. Refer to Table 3.3.6.2-1 to determine which SRs apply for each Secondary Containment Isolation 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 for up to 6 hours provided the associated Function maintains secondary containment isolation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.6.2.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMTNS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.6.2.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.2.3	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.2.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.6.2-1 (page 1 of 1)
Secondary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level - Low Low (Level 2)	1,2,3	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4	≥ - 42 inches
2. Drywell Pressure - High	1,2,3	2	SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4	≤ 1.84 psig
3. Reactor Building Ventilation Exhaust Plenum Radiation - High	1,2,3, (b)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4	≤ 49 mR/hr

(a) [Deleted]

(b) During movement of recently irradiated fuel assemblies in secondary containment.

3.3 INSTRUMENTATION

3.3.6.3 Low-Low Set (LLS) Instrumentation

LCO 3.3.6.3 The LLS valve instrumentation for each Function in Table 3.3.6.3-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One LLS valve inoperable due to inoperable channel(s).	A.1 Restore channel(s) to OPERABLE status.	24 hours
B. Required Action and associated Completion Time of Condition A not met. OR Two LLS valves inoperable due to inoperable channels.	B.1 Declare the associated LLS valve(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

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

1. Refer to Table 3.3.6.3-1 to determine which SRs apply for each 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 for up to 6 hours provided the associated Function maintains LLS initiation capability.

	SURVEILLANCE	FREQUENCY
SR 3.3.6.3.1	Perform CHANNEL FUNCTIONAL TEST for portion of the channel outside primary containment.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.3.2	----------NOTE---------- Only required to be performed prior to entering MODE 2 during each scheduled outage > 72 hours when entry is made into primary containment. --- Perform CHANNEL FUNCTIONAL TEST for portions of the channel inside primary containment.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.3.3	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.3.4	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.6.3.5	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.6.3-1 (page 1 of 1)
Low - Low Set Instrumentation

FUNCTION	REQUIRED CHANNELS PER FUNCTION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Pressure - High	1 per LLS valve	SR 3.3.6.3.3 SR 3.3.6.3.4 SR 3.3.6.3.5	≤ 1050 psig
2. Low - Low Set Pressure Setpoints	2 per LLS valve	SR 3.3.6.3.3 SR 3.3.6.3.4 SR 3.3.6.3.5	Low: Open ≥ 966.5 psig and ≤ 1010 psig Close ≥ 835 psig and ≤ 875.5 psig High: Open ≥ 996.5 psig and ≤ 1040 psig Close ≥ 835 psig and ≤ 875.5 psig
3. Discharge Line Pressure Switch	1 per SRV	SR 3.3.6.3.1 SR 3.3.6.3.2 SR 3.3.6.3.4 SR 3.3.6.3.5	≥ 25 psig and ≤ 55 psig

3.3 INSTRUMENTATION

3.3.7.1 Control Room Emergency Filter (CREF) System Instrumentation

LCO 3.3.7.1 The CREF System instrumentation for each Function in Table 3.3.7.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.7.1-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Place channel in trip.	12 hours for Functions 1 and 2 AND 24 hours for Function 3
B. One or more Functions with CREF System initiation capability not maintained.	B.1 Restore CREF System initiation capability.	1 hour
C. Required Action and associated Completion Time not met.	C.1 Initiate CREF System. OR C.2 Declare CREF System inoperable.	1 hour 1 hour

SURVEILLANCE REQUIREMENTS

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

1. Refer to Table 3.3.7.1-1 to determine which SRs apply for each CREF 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 for up to 6 hours provided the associated Function maintains CREF initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.7.1.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.7.1.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.7.1.3	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.7.1.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.7.1-1 (page 1 of 1)
Control Room Emergency Filter System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level - Low Low (Level 2)	1,2,3	2	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.3 SR 3.3.7.1.4	≥ - 42 inches
2. Drywell Pressure - High	1,2,3	2	SR 3.3.7.1.2 SR 3.3.7.1.3 SR 3.3.7.1.4	≤ 1.84 psig
3. Reactor Building Ventilation Exhaust Plenum Radiation - High	1,2,3, (b)	2	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.3 SR 3.3.7.1.4	≤ 49 mR/hr

(a) [Deleted]

(b) During movement of lately irradiated fuel assemblies in the secondary containment.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Function in Table 3.3.8.1-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
When the associated diesel generator is required to be OPERABLE by LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Restore channel to OPERABLE status.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Declare associated diesel generator (DG) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

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

1. Refer to Table 3.3.8.1-1 to determine which SRs apply for each LOP 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 for up to 2 hours provided the associated Function maintains DG initiation capability.

SURVEILLANCE		FREQUENCY
SR 3.3.8.1.1	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.2	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.1.3	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.8.1-1 (page 1 of 1)
Loss of Power Instrumentation

FUNCTION	REQUIRED CHANNELS PER BUS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)			
a. Bus Undervoltage	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 2185 V and ≤ 2415 V
b. Time Delay	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 0 seconds and ≤ 5 seconds
2. 4.16 kV Emergency Bus Normal Supply Undervoltage (Loss of Voltage)			
a. Bus - Tie Undervoltage	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 2185 V and ≤ 2415 V
b. Time Delay	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 0 seconds and ≤ 5 seconds
3. 4.16 kV Emergency Bus ESST Supply Undervoltage (Loss of Voltage)			
a. Bus - Tie Undervoltage	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 2185 V and ≤ 2415 V
b. Time Delay	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 0 seconds and ≤ 5 seconds
4. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)			
a. Bus Undervoltage	2	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 3828 V and ≤ 3932 V
b. Time Delay (LOCA)	2	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 6.7 seconds and ≤ 8.3 seconds
c. Time Delay (Non-LOCA)	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 11.2 seconds and ≤ 13.8 seconds
5. 4.16 kV Emergency Bus ESST Supply Undervoltage (Degraded Voltage)			
a. Bus Undervoltage	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 3828 V and ≤ 3932 V
b. Time Delay	1	SR 3.3.8.1.1 SR 3.3.8.1.2 SR 3.3.8.1.3	≥ 13.4 seconds and ≤ 16.6 seconds

3.3 INSTRUMENTATION

3.3.8.2 Reactor Protection System (RPS) Electric Power Monitoring

LCO 3.3.8.2 Two RPS electric power monitoring assemblies shall be OPERABLE for each inservice RPS motor generator set or alternate power supply.

APPLICABILITY: MODES 1 and 2,
MODE 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or both inservice power supplies with one electric power monitoring assembly inoperable.	A.1	Remove associated inservice power supply(s) from service.	72 hours
B. One or both inservice power supplies with both electric power monitoring assemblies inoperable.	B.1	Remove associated inservice power supply(s) from service.	1 hour
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1 or 2.	C.1	Be in MODE 3.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met in MODE 5 with any control rod withdrawn from a core cell containing one or more fuel assemblies.	D.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.8.2.1	Perform CHANNEL CALIBRATION. The Allowable Values shall be: a. Overvoltage ≤ 131 V with time delay set to ≤ 3.8 seconds. b. Undervoltage ≥ 109 V, with time delay set to ≤ 3.8 seconds. c. Underfrequency ≥ 57.2 Hz, with time delay set to ≤ 3.8 seconds.	In accordance with the Surveillance Frequency Control Program
SR 3.3.8.2.2	Perform a system functional test.	In accordance with the Surveillance Frequency Control Program

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 six safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI) and ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ 150 psig.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable. OR One LPCI pump in both LPCI subsystems inoperable.	A.1	Restore low pressure ECCS injection/spray subsystem(s) to operable status.	7 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 AND B.2	Be in MODE 3. Be in MODE 4.	12 hours 36 hours

(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 low pressure ECCS injection/spray subsystem shall be OPERABLE.

----------NOTE----------
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.

APPLICABILITY: MODES 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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1	Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	AND		
	C.2	Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	AND		
	C.3	Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1	----------NOTE---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
		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		

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. (continued)	D.2	Initiate action to establish secondary containment boundary.	Immediately
	AND		
	D.3	Initiate action to isolate each secondary containment penetration flow path or verify it can be manually isolated from the control room.	Immediately
	AND		
	D.4	Initiate action to verify one standby gas treatment subsystem is capable of being placed in operation.	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 ≥ 36 hours.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ 12 ft 7 inches.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.4	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.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.5	Operate the required ECCS injection/spray subsystem through the recirculation line for ≥ 10 minutes.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.6	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.7	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	In accordance with the Surveillance Frequency Control Program

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 Coolant Injection System is OPERABLE.	1 hour
	AND		
	A.2	Restore RCIC System to OPERABLE status.	14 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Reduce reactor steam dome pressure to ≤ 150 psig.	36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.5.3.1	Verify the RCIC System piping is filled with water from the pump discharge valve to the injection valve.	In accordance with the Surveillance Frequency Control Program
SR 3.5.3.2	Verify each RCIC System 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.	In accordance with the Surveillance Frequency Control Program
SR 3.5.3.3	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ----------	
	Verify, with reactor pressure ≤ 1020 psig and ≥ 920 psig, the RCIC pump can develop a flow rate ≥ 400 gpm against a system head corresponding to reactor pressure.	In accordance with the Surveillance Frequency Control Program
SR 3.5.3.4	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ----------	
	Verify, with reactor pressure ≤ 165 psig, the RCIC pump can develop a flow rate ≥ 400 gpm against a system head corresponding to reactor pressure.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.5.3.5	----------NOTES---------- 1. Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. 2. Vessel injection may be excluded. ---------- Verify the RCIC System actuates on an actual or simulated automatic initiation signal.	In accordance with the Surveillance Frequency Control Program

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. One or more penetration flowpaths with one or more MSIVs not within leakage rate limit.	D.1	Restore leakage rate to within limit.	8 hours
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.	12 hours
	AND		
	E.2	Be in MODE 4.	36 hours

3.6 CONTAINMENT SYSTEMS

3.6.4.1 Secondary Containment

LCO 3.6.4.1 The secondary containment shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Secondary containment inoperable in MODE 1, 2, or 3.	A.1	Restore secondary containment to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 AND B.2	Be in MODE 3. Be in MODE 4.	12 hours 36 hours
C. Secondary containment inoperable during movement of recently irradiated fuel assemblies in the secondary containment.	C.1	----------NOTE---------- LCO 3.0.3 is not applicable. ---------- Suspend movement of recently irradiated fuel assemblies in the secondary containment.	 Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.4.1.1	Verify secondary containment vacuum is ≥ 0.25 inch of vacuum water gauge.	In accordance with the Surveillance Frequency Control Program
SR 3.6.4.1.2	Verify all secondary containment equipment hatches are closed and sealed.	In accordance with the Surveillance Frequency Control Program
SR 3.6.4.1.3	Verify one secondary containment access door in each access opening is closed.	In accordance with the Surveillance Frequency Control Program
SR 3.6.4.1.4	Verify each SGT subsystem can maintain ≥ 0.25 inch of vacuum water gauge in the secondary containment for 1 hour at a flow rate ≤ 1780 cfm.	In accordance with the Surveillance Frequency Control Program

3.6 CONTAINMENT SYSTEMS

3.6.4.2 Secondary Containment Isolation Valves (SCIVs)

LCO 3.6.4.2 Each SCIV shall be OPERABLE.

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

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 SCIVs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more penetration flow paths with one SCIV inoperable.	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. AND	8 hours (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met during movement of recently irradiated fuel assemblies in the secondary containment.	D.1 ----------NOTE---------- LCO 3.0.3 is not applicable. ---------- Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.4.3 Standby Gas Treatment (SGT) System

LCO 3.6.4.3 Two SGT subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SGT subsystem inoperable.	A.1	Restore SGT subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, or 3.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Be in MODE 4.	36 hours
C. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the secondary containment.	----------NOTE---------- LCO 3.0.3 is not applicable. ----------		
	C.1	Place OPERABLE SGT subsystem in operation.	Immediately
	OR		
	C.2	Suspend movement of recently irradiated fuel assemblies in secondary containment.	Immediately

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two SGT subsystems inoperable in MODE 1, 2, or 3.	D.1 Enter LCO 3.0.3	Immediately
E. Two SGT subsystems inoperable during movement of recently irradiated fuel assemblies in the secondary containment.	E.1 ----------NOTE---------- LCO 3.0.3 is not applicable. ---------- Suspend movement of recently irradiated fuel assemblies in secondary containment.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.4.3.1	Operate each SGT subsystem for ≥ 10 continuous hours with heaters operating.	In accordance with the Surveillance Frequency Control Program
SR 3.6.4.3.2	Perform required SGT filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.6.4.3.3	Verify each SGT subsystem actuates on an actual or simulated initiation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.6.4.3.4	Verify the SGT units cross tie damper is in the correct position, and each SGT room air supply check valve and SGT dilution air shutoff valve can be opened.	In accordance with the Surveillance Frequency Control Program

3.7 PLANT SYSTEMS

3.7.4 Control Room Emergency Filter (CREF) System

LCO 3.7.4 The CREF System shall be OPERABLE.

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

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. CREF System inoperable for reasons other than Condition B.	A.1	Restore CREF System to OPERABLE status.	7 days
B. CREF System inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1	Initiate action to implement mitigating actions.	Immediately
	AND		
	B. 2	Verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits, and CRE occupants are protected from smoke hazards.	24 hours
	AND		
	B.3	Restore CRE boundary to OPERABLE status.	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 Be in MODE 3. AND C.2 Be in MODE 4.	12 hours 36 hours
D. Required Action and associated Completion Time of Condition A not met during movement of lately irradiated fuel assemblies in the secondary containment. OR CREF System inoperable due to an inoperable CRE boundary during movement of lately irradiated fuel assemblies in the secondary containment.	----------NOTE---------- LCO 3.0.3 is not applicable. ---------- D.1 Suspend movement of lately irradiated fuel assemblies in the secondary containment.	Immediately

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	----------NOTE---------- Enter applicable Condition and Required Actions of LCO 3.8.8, 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, inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies in the secondary containment.	Immediately
	AND	
	A.2.3 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS. AND	Immediately
	B.2 Suspend movement of irradiated fuel assemblies in secondary containment. AND	Immediately
	B.3 Initiate action to restore required DG to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTES---------- 1. The following SRs are not required to be performed: SR 3.8.1.3, and SR 3.8.1.9 through SR 3.8.1.11. 2. SR 3.8.1.11 is considered to be met without the ECCS initiation signals OPERABLE when the ECCS initiation signals are not required to be OPERABLE per Table 3.3.5.1-1. ---------- For AC sources required to be OPERABLE the SRs of Specification 3.8.1, except SR 3.8.1.8, are applicable.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 DC electrical power subsystems shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

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 irradiated fuel assemblies in the secondary containment.	Immediately
	AND	
	A.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.7 and SR 3.8.4.8. --- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1 SR 3.8.4.4 SR 3.8.4.7 SR 3.8.4.2 SR 3.8.4.5 SR 3.8.4.8 SR 3.8.4.3 SR 3.8.4.6	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Distribution Systems – Shutdown

LCO 3.8.8 The necessary portions of the AC and DC electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC or DC electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable. OR A.2.1 Suspend CORE ALTERATIONS. AND A.2.2 Suspend movement of irradiated fuel assemblies in the secondary containment. AND	Immediately Immediately Immediately (continued)

ACTIONS

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

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.8.1	Verify correct breaker alignments and voltage to required AC and DC electrical power distribution subsystems.	In accordance with the Surveillance Frequency Control Program

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 260 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-46

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By application dated August 7, 2017 (Reference 1), as supplemented by letter dated January 31, 2018 (Reference 2), Nebraska Public Power District (the licensee) requested to adopt Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control" (Reference 3), for Cooper Nuclear Station (CNS). The final safety evaluation (SE) for TSTF-542, Revision 2, was approved by the U.S. Nuclear Regulatory Commission (NRC, the Commission) 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 new and revised TSs providing alternative requirements for reactor pressure vessel (RPV) water inventory control (WIC). These alternative requirements would protect the TS Safety Limit 2.1.1.3, which states, "Reactor vessel water level shall be greater than the top of active irradiated fuel."

Additionally, a new definition, "DRAIN TIME," would be added to the CNS TSs, 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. A properly calculated DRAIN TIME is required for adequate licensee management of secondary containment requirements or mitigation of certain emergency core cooling system (ECCS) safety injection/spray systems during MODES 4 and 5.

The licensee has proposed several variations from the TS changes described in the applicable parts of TSTF-542, Revision 2, or the NRC-approved TSTF-542 SE. These are explained below in Section 2.2.5 and evaluated in Section 3.5 of this SE.

The supplemental letter dated January 31, 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 October 24, 2017 (82 FR 49238).

In an e-mail dated June 12, 2018 (Reference 5), the licensee requested to change the implementation period for the amendment. As a result, the NRC staff updated the implementation date for the license amendment to be prior to the fall 2018 refueling outage (RE30).

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 (>) 212 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 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 operation in MODE 4 (Cold Shutdown[1] – Reactor Mode Switch in Shutdown and average reactor coolant temperature less than or equal to (≤) 212 °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 (MODE 5), a large volume of water is available above the RPV (i.e., when the RPV head is removed, the water level is greater than or equal to (≥) 21 feet over the top of the RPV flange, and the spent fuel storage pool gates are 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 may be a potential for significant drainage paths from certain outage activities, human error, and other events when it is more likely to have some normally available equipment, instrumentation, and systems 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 in MODES 1 and 2. In comparison, operation in MODES 4 and 5 generally do not have the high pressure and temperature considered necessary for a LOCA from a high energy pipe failure.

---

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

Thus, while the potential sudden loss of large volumes of water from a LOCA are not expected in MODES 4 and 5, operators monitor for BWR RPV water level decrease from potential significant or unexpected drainage paths. These potential drainage paths in MODES 4 and 5 generally would require less water replacement capability to maintain water above TAF.

To address the potential for drain down during MODES 4 and 5, the current CNS 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 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 by deleting references to OPDRVs throughout the TSs.

2.2 Proposed TS Changes

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

Section 2.2.2 of the 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 Tale 3.3.5.1-1, (2) the proposed new TS 3.3.5.3, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation," including Table 3.3.5.3-1, and (3) the proposed revisions to TS 3.3.6.1, "Primary Containment Isolation Instrumentation," including Table 3.3.6.1-1 (evaluated below in SE Sections 3.2 and 3.4).

Section 2.2.3 of the SE describes the proposed revisions to TS 3.5, "Emergency Core Cooling Systems (ECCS) and Reactor Core Isolation Cooling (RCIC) System" (proposed to be titled, "Emergency Core Cooling Systems (ECCS), RPV Water Inventory Control, and Reactor Core Isolation Cooling (RCIC) System"), including the proposed revisions to TS 3.5.2 "ECCS – Shutdown," (proposed to be titled, "Reactor Pressure Vessel (RPV) Water Inventory Control") (evaluated below in SE Section 3.3).

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

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

2.2.1 Addition of DRAIN TIME Definition

The following definition of "DRAIN TIME" would be added to 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 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 TS 3.3, "Instrumentation"

The following subsections describe the existing and proposed changes to the CNS TS, Section 3.3, "Instrumentation."

2.2.2.1 TS 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation," and Table TS 3.3.5.1-1, "Emergency Core Cooling System Instrumentation"

Proposed changes to TS 3.3.5.1 include the deletion of Note 1 in Required Actions B.1, C.1, and E.1, which states:

"Only applicable in MODES 1, 2, and 3."

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 3.3.5.3, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation." MODES 4 and 5 applicability and associated requirements would be deleted for the following functions:

1. Core Spray System
   a. Reactor Vessel Water Level - Low Low Low (Level 1)
   c. Reactor Pressure - Low (Injection Permissive)
   d. Core Spray Pump Discharge Flow - Low (Bypass)
   e. Core Spray Pump Start - Time Delay Relay

2. Low Pressure Coolant Injection (LPCI) System
   a. Reactor Vessel Water Level - Low Low Low (Level 1)
   c. Reactor Pressure - Low (Injection Permissive)
   f. Low Pressure Coolant Injection Pump Start - Time Delay Relay (Pumps A, B, C, and D)
   g. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)

Table 3.3.5.1-1 Footnote (a), which states, "When the associated ECCS subsystem(s) are required to be OPERABLE per LCO [Limiting Condition for Operation] 3.5.2, 'ECCS - Shutdown,'" would be deleted and replaced with "[Deleted]."

2.2.2.2 New TS 3.3.5.3, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation"

The proposed new TS 3.3.5.3 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 3.3.5.3 is shown below:

3.3.5.3 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.3 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.3-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.3-1.

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 3.3.5.3-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	B.1 Declare 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 3.3.5.3-1.	C.1 Place channel in trip.	1 hour
D. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	D.1 Restore channel to OPERABLE status.	24 hours
E. Required Action and associated Completion Time of Condition C or D not met.	E.1 Declare associated low pressure ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

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

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

SURVEILLANCE		FREQUENCY
SR 3.3.5.3.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.3.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.5.3-1 (page 1 of 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. Core Spray System					
a. Reactor Pressure – Low (Injection Permissive)	4,5	4(a)	C	SR 3.3.5.3.2	≤ 436 psig
b. Core Spray Pump Discharge Flow - Low (Bypass)	4,5	1 per pump (a)	D	SR 3.3.5.3.2	≥ 1370 gpm
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Pressure - Low (Injection Permissive)	4,5	4(a)	C	SR 3.3.5.3.2	≤ 436 psig
b. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)	4,5	1 per subsystem (a)	D	SR 3.3.5.3.2	≥ 2107 gpm
3. RHR System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	(b)	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 3 inches
4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low Low, Level 2	(b)	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ -42 inches

a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel Water Inventory Control."
b) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

2.2.2.3 TS 3.3.6.1, "Primary Containment Isolation Instrumentation"

In TS Table 3.3.6.1-1, "Primary Containment Isolation Instrumentation," Function 6.b, RHR [Residual Heat Removal] Shutdown Cooling System Isolation, Reactor Vessel Water Level - Low (Level 3), the applicability in MODES 4 and 5 was proposed for deletion. Also, Footnote (b) to Table 3.3.6.1-1 was proposed to be deleted, as it is applicable only to Function 6.b during MODES 4 and 5. Footnote (b) is related to RHR SDC system integrity. This function would move to the new TS Table 3.3.5.3-1, Function 3.a, as shown in Section 2.2.2.2 of this SE.

In TS LCO 3.3.6.1, Required Action I.2 was proposed for deletion since it was associated with the isolation of RHR/SDC during MODES 4 and 5.

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

The title of CNS TS 3.5 would be revised from "Emergency Core Cooling System (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 CNS TS 3.5.2 would be revised from "ECCS – Shutdown" to "Reactor Pressure Vessel (RPV) Water Inventory Control," and TS 3.5.2 would be revised to read as follows:

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 low pressure ECCS injection/spray subsystem shall be OPERABLE.

----------NOTE----------
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.

APPLICABILITY: MODES 4 and 5

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION
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 secondary containment boundary is capable of being established in less than the DRAIN TIME. AND C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME. AND C.3 Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.	4 hours 4 hours 4 hours

D. DRAIN TIME < 8 hours.	D.1 ----------NOTE---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
	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 secondary containment boundary.	Immediately
	AND	
	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be manually isolated from the control room.	Immediately
	AND	
	D.4 Initiate action to verify one standby gas treatment subsystem is capable of being placed in operation.	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 ≥ 36 hours.	In accordance with the Surveillance Frequency Control Program

SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ 12 [feet] 7 inches.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.4	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.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.5	Operate the required ECCS injection/spray subsystem through the recirculation line for ≥ 10 minutes.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.6	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.7	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	In accordance with the Surveillance Frequency Control Program

2.2.4 Deletion of Reference to OPDRVs

In the application dated August 7, 2017 (Reference 1), the licensee proposed to revise current TS requirements related to "operations with a potential for draining the reactor vessel" or "OPDRVs," with new requirements on RPV WIC that will protect TS Safety Limit 2.1.1.3. To remain consistent with TSTF-542, all references to the term OPDRVs in the CNS TSs will be deleted. The TS location of these references are summarized as follows:

CNS TS LCO	Location of OPDRVs References
3.3.6.1, "Primary Containment Isolation Instrumentation"	Condition I (Required Action I.2) Table 3.3.6.1-1 Footnote (b)
3.3.6.2, "Secondary Containment Isolation Instrumentation"	Table 3.3.6.2-1 Footnote (a)
3.3.7.1, "Control Room Emergency Filter (CREF) System Instrumentation"	Table 3.3.7.1-1 Footnote (a)
3.6.1.3, "Primary Containment Isolation Valves (PCIVs)"	Condition F
3.6.4.1, "Secondary Containment"	Applicability, Condition C

3.6.4.2, "Secondary Containment Isolation Valves (SCIVs)"	Applicability, Condition D
3.6.4.3, "Standby Gas Treatment (SGT) System"	Applicability, Conditions C and E
3.7.4, "Control Room Emergency Filter (CREF) System"	Applicability, Condition D
3.8.2, "AC [Alternating Current] Sources – Shutdown"	Condition A (Required Action A.2.3) and Condition B (Required Action B.3)
3.8.5, "DC [Direct Current] Sources – Shutdown"	Condition A (Required Action A.2.3)
3.8.8, "Distribution Systems – Shutdown"	Condition A (Required Action A.2.3)

2.2.5 CNS Plant-Specific TSTF-542 TS Variations

In Section 2.2 of the application dated August 7, 2017, the licensee identified several CNS plant-specific TS variations from TSTF-542, Revision 2 (Reference 3), or the NRC-approved TSTF-542 SE (Reference 4). The licensee states that these variations do not affect the applicability of the TSTF-542 or the NRC staff's SE to the proposed license amendment. The staff has determined that the licensee's proposed variations can be characterized as either administrative or technical. Section 3.5 of this SE includes the staff's technical evaluation of each of these technical variations.

2.2.5.1 Variation 1, TS SR 3.5.2.3 Note (Section 2.2.6 of Reference 1)

The CNS TSs contain a note in SR 3.5.2.3 regarding realignment to the LPCI mode that is the same as the note in the Standard Technical Specification (STS) LCO 3.5.2. NUREG-1433, Revision 4 (References 6 and 7), contains the STSs for BWR/4 plants. The licensee proposes to relocate the note from the SR to the LCO section.

2.2.5.2 Variation 2, TS SR 3.5.2.1, Suppression Pool Water Level (Section 2.2.7 of Reference 1)

The current CNS SR 3.5.2.1 (new SR 3.5.2.2) verifies sufficient suppression pool water level for required ECCS injection/spray subsystems. The CNS SR is a combination of the TSTF-542 SR 3.5.2.2 and SR 3.5.2.3, which are for LPCI and Core Spray (CS), respectively. In addition, the option to use a condensate storage tank as a makeup source in TSTF-542 SR 3.5.2.3 does not exist in the CNS SR. This option was removed in the CNS Amendment No. 252 (Reference 8).

2.2.5.3 Variation 3, TS Table 3.3.5.3-1, Function 2.b, Channels per Function (Section 2.2.8 of Reference 1)

TSTF-542 Table 3.3.5.3-1, Function 2.b, "Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)," uses "1 per pump" for the required channels per function. The licensee proposes to use "subsystem" in place of "pump," as it is more appropriate because the instrument is associated with an LPCI subsystem that has two pumps, rather than an individual pump.

2.2.5.4 Variation 4, TS 3.6.1.3, Condition F (Section 2.2.9 of Reference 1)

The licensee proposes to delete CNS TS 3.6.1.3, Condition F, and both of its associated required actions. The Applicability for TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," is, in part, "[w]hen associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, 'Primary Containment Isolation Instrumentation.'" The licensee states this change is justified since OPDRV requirements would have been deleted, and MODES 4 and 5 PCIV requirements would have been relocated from TSs 3.3.6.1 and 3.6.1.3 to the proposed TS 3.3.5.3. Thus, there would no longer be any PCIVs required to be OPERABLE by TS 3.6.1.3 during MODES 4 or 5. These requirements would be addressed by the proposed TS 3.3.5.3 in their entirety.

2.2.5.5 Variation 5, Manual Initiation (Section 2.2.10 of Reference 1)

There are STS requirements on which TSTF-542 is based, related to "manual initiation," that do not appear in the CNS TSs. The STS Table 3.3.5.1-1 contains Functions 1.e and 2.h, "Manual Initiation," for CS and LPCI, respectively. The licensee states that "manual initiation" logic does not exist in the CNS design and thus, the functions, as well as the related TSTF-542 SRs 3.3.5.3.3 and 3.5.2.8, do not apply to CNS.

As an alternative, the licensee proposes that TS 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control," includes an SR 3.5.2.7 to verify that the CNS TS-required ECCS injection/spray subsystem can be manually operated through the manipulation of subsystem components from the main control room.

The licensee states that a manual operation of the required ECCS injection/spray subsystem for the control of reactor cavity or RPV inventory is a relatively simple evolution and involves the manipulation of a small number of components. These subsystem alignments can be performed by licensed operators from the main control room. The licensee further states that the alternative is justified by the fact that a draining event is a slow evolution when compared to a design basis LOCA, which is assumed to occur at full power, and thus, there is adequate time to take manual actions (i.e., hours versus minutes). Adequate time to take action is assured since the proposed TS 3.5.2, Condition E, prohibits plant conditions that result in drain times that are less than 1 hour. The licensee states that as a result, there is sufficient time for the licensed operators to take manual action to stop an unanticipated draining event, and to manually start an ECCS injection/spray subsystem or the additional method of water injection.

2.2.5.6 Variation 6, Channel Checks for Permissives and Bypass Functions (Section 2.2.10 of Reference 1)

The licensee states that CNS does not have the capability to perform channel checks for proposed Table 3.3.5.3-1, Functions 1.a, "Reactor Pressure - Low (Injection Permissive)," 1.b, "Core Spray Pump Discharge Flow - Low (Bypass)," 2.a, "Reactor Pressure - Low (Injection Permissive)," and 2.b, "Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)." The current CNS TSs do not include channel checks for these functions; therefore, no channel check SR was proposed to be added for these functions.

2.2.5.7 Variation 7, CS Pump Start-Time Delay (Section 2.2.11 of Reference 1)

The CNS TS Table 3.3.5.1-1 contains Function 1.e, "Core Spray Pump Start -Time Delay Relay," which does not appear in the STS table. The Function is required to be OPERABLE in MODES 1, 2, 3, 4, and 5. The licensee states that MODES 4 and 5 are proposed to be deleted from this Function as this is related to automatic ECCS initiation. This is the same justification as provided in TSTF-542 for STS Table 3.3.5.1-1, Function 2.f, "Low Pressure Coolant Injection Pump Start - Time Delay Relay."

2.3 Applicable Regulatory Requirements

The regulation at 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, "Technical specifications." 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. If any safety limit is exceeded, the reactor must be shut down. The licensee shall notify the Commission, review the matter, and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude recurrence. Operation must not be resumed until authorized by the Commission.

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. Per 10 CFR 50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

The regulation at 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 at 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.

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," whenever a holder of an operating license desires to amend the license, application for an amendment must be filed with the Commission fully describing the changes desired, and

following as far as applicable, the form prescribed for original applications. The technical information to be included in an application for an operating license is governed in particular by 10 CFR 50.34(b).

As described in 10 CFR 50.92(a), in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations that govern the issuance of initial licenses to the extent applicable and appropriate. The general considerations that guide the Commission include, as stated in 10 CFR 50.40(a), how the TSs provide reasonable assurance that the health and safety of the public will not be endangered. Also, to issue an operating license, of which TSs are a part, the Commission must make the findings of 10 CFR 50.57, "Issuance of operating license," including the 10 CFR 50.57(a)(3)(i) finding that there is reasonable assurance that the activities authorized by the operating license can be conducted without endangering the health and safety of the public.

NUREG-1433, Revision 4 (References 6 and 7), contains the STS for BWR/4 plants and is part of the regulatory standardization effort. The NRC staff has prepared STS for each of the light-water reactor (LWR) nuclear designs. The approved changes to the STS in TSTF-542 will be incorporated into future revisions of NUREG-1433, Volumes 1 and 2.

The NRC staff's guidance for review of TSs is in Section 16, Revision 3, "Technical Specifications," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," dated March 2010 (Reference 9).

2.3.1 CNS Applicable Regulatory Design Requirements

The CNS Updated Safety Analysis Report (USAR), Appendix F, "Conformance to AEC [Atomic Energy Commission] General Design Criteria," describes the degree of conformance to the 1967 proposed general design criteria, as described below.

The CNS USAR, Appendix F, states, in part, that:

> The proposed 70 General Design Criteria for Nuclear Power Plant Construction Permits were issued in July of 1967 to serve as a guide in the establishment of design criteria and bases for the design and construction of a nuclear power station. It is the purpose of this appendix to show that the design and construction of the Cooper Nuclear Station has been performed in accordance with these general design criteria.
>
> It should be recognized that these criteria, which appeared in the July 11, 1967 issue of the *Federal Register*, were issued in order to secure comments from the nuclear industry, and at that time had not yet been adopted as regulatory requirements. It was anticipated that revisions and clarifications would take place prior to such adoption.

The following criteria are related to this application and are found in the CNS USAR, Appendix F, Section 2.0, "Criterion Conformance."

Criterion 9 – Reactor Coolant Pressure Boundary

The reactor coolant pressure boundary shall be designed and constructed so as to have an exceedingly low probability of gross rupture or significant leakage throughout its design lifetime.

Criterion 12 – Instrumentation and Control Systems

Instrumentation and controls shall be provided as required to monitor and maintain variables within prescribed operating ranges.

Criterion 16 – Monitoring Reactor Coolant Pressure Boundary

Means shall be provided for monitoring the reactor coolant pressure boundary to detect leakage.

Criterion 37 – Engineering Safety Features Basis for Design

Engineered safety features shall be provided in the facility to back up the safety provided by the core design, the reactor coolant pressure boundary, and their protection systems. As a minimum, such engineered safety features shall be designed to cope with any size reactor coolant pressure boundary break up to and including the circumferential rupture of any pipe in that boundary assuming unobstructed discharge from both ends.

Criterion 41 – Engineered Safety Features Performance Capability

Engineered safety features such as emergency core cooling and containment heat removal systems shall provide sufficient performance capability to accommodate partial loss of installed capacity and still fulfill the required safety function. As a minimum, each engineered safety feature shall provide this required safety function assuming a failure of a single active component.

Criterion 44 – Emergency Core Cooling Systems Capability

At least two emergency core cooling systems, preferably of different design principles, each with a capability for accomplishing abundant emergency core cooling, shall be provided. Each emergency core cooling system and the core shall be designed to prevent fuel and clad damage that would interfere with the emergency core cooling function and to limit the clad metal-water reaction to negligible amounts for all sizes of breaks in the reactor coolant pressure boundary, including the double-ended rupture of the largest pipe. The performance of each emergency core cooling system shall be evaluated conservatively in each area of uncertainty. The systems shall not share active components and shall not share other features or components unless it can be demonstrated that (a) the capability of the shared feature or component to perform its required function can be readily ascertained during reactor operation, (b) failure of the shared feature or component does not initiate a loss-of-coolant

accident, and (c) capability of the shared feature or component to perform its required function is not impaired by the effects of a loss-of-coolant accident and is not lost during the entire period this function is required following the accident.

3.0 TECHNICAL EVALUATION

Section 2.2 of this SE identifies proposed TS changes, as described in the letters dated August 7, 2017, and January 31, 2018 (References 1 and 2), for the licensee to adopt TSTF-542, Revision 2. The following sections summarize the NRC staff's evaluation of each of these proposed changes.

3.1 NRC Staff Evaluation of Proposed DRAIN TIME Definition

As discussed in Section 2.2.1 above, 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. For the purpose of 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 in TSTF-542. Based on information furnished by the licensee in the application dated August 7, 2017, the NRC staff has determined that the licensee is appropriately adopting the principles of DRAIN TIME as specified in TSTF-542.

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 NRC 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 the RPV flange with fuel pool gates installed, and (3) water level above the 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 that depends 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 concludes 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 CNS TSs is acceptable.

3.2 NRC Staff Evaluation of Proposed TS 3.3.5.3, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation"

The purpose of the proposed new RPV WIC instrumentation is to support the requirements of revised TS LCO 3.5.2, and the proposed new definition of DRAIN TIME. There are

instrumentation and controls and their signal functions that are required for manual pump starts or required as a permissive or operational controls on the equipment of the systems that provide water injection capability, certain start commands, pump protection, and isolation functions. To consider the systems that provide water injection and isolation functions OPERABLE, these instruments are required to be OPERABLE, as described in Section 3.3 of this SE for revised TS 3.5.2. For CNS, reactor operators have alternate means, often requiring several more steps, to start and inject water than the simple push button start.

Specifically, the proposed new RPV WIC instrumentation supports operation of the CS and LPCI systems including manual starts 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 evaluation of TS 3.5.2 and the Bases for LCO 3.5.2.

3.2.1 NRC Staff Evaluation of Proposed TS 3.3.5.3 LCO and Applicability

In the application dated August 7, 2017 (Reference 1), the licensee proposed a new TS 3.3.5.3 to provide alternative instrumentation requirements to support manual initiation of the ECCS injection/spray subsystem required in revised TS 3.5.2, and automatic isolation of penetration flow paths that may be credited in the determination of DRAIN TIME. The current CNS TSs contain instrumentation requirements related to OPDRVs in TS Tables 3.3.5.1-1, 3.3.6.1-1, and 3.3.6.2-1, and TS 3.3.7.1. These requirements from TS Tables 3.3.5.1-1 and 3.3.6.1-1 would be consolidated into new TS 3.3.5.3.

The proposed LCO 3.3.5.3 would state:

> The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.3-1 shall be OPERABLE.

The proposed applicability would state:

> According to Table 3.3.5.3-1.

A table in TSTF-542 contains those instrumentation Functions needed to support manual initiation of the ECCS injection/spray subsystem required by LCO 3.5.2, and automatic isolation of penetration flow paths that may be credited in a calculation of DRAIN TIME. The Functions in CNS TS Table 3.3.5.3-1 are moved from existing TS 3.3.5.1 and TS 3.3.6.1 Functions that are required in MODES 4 or 5 or during OPDRVs. Creation of TS 3.3.5.3 places these Functions in a single location with requirements appropriate to support the safety function for TS 3.5.2.

As identified in Section 2.2.5.5 above (i.e., Variation 5), the CNS current design does not include a manual initiation logic for the CS or LPCI systems. Therefore, as an alternative, the licensee proposed to add SR 3.5.2.7 to TS 3.5.2 to verify that CS and LPCI systems can be manually operated through the manipulation of subsystem components from the main control room.

The NRC staff concluded that the licensee's proposed alternative is acceptable for CNS because either CS or LPCI (or both) subsystems would be available to perform the intended function to inject water into the RPV, which meets the intent of the NRC-approved TSTF-542.

3.2.2 NRC Staff Evaluation of Proposed TS 3.3.5.3 Actions

As discussed in Section 2.2.2.2 above, the NRC staff has reviewed the licensee's proposed new TS 3.3.5.3 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 evaluated as follows:

> Action A would be applicable when one or more instrument channels are inoperable from Table 3.3.5.3-1 and directs the licensee to immediately enter the Condition referenced in Table 3.3.5.3-1 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 an immediate re-calculation of DRAIN TIME, but automatic isolation of the affected penetration flow paths cannot be credited.
>
> Action C (concerning low reactor steam dome pressure injection permissive functions necessary for ECCS subsystem manual injection valve opening) would address an event in which the injection permissive is inoperable. The function must be placed in the trip condition within 1 hour. With the injection permissive function instrument in the trip condition, manual injection valve opening may now be performed using the preferred control board switches. This 1-hour completion time is acceptable because, despite the prevention of the preferred start method, 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 in that time. The time of 1 hour also provides a reasonable amount of time for evaluation and placing the channel in trip.
>
> Action D (concerning pump discharge flow bypass Functions) would address actions when 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. In this condition, the operator can take manual control of the pump and the injection. Similar to the justification in Action C, while this is not the preferred method, the CS and LPCI 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 have necessary repairs completed.
>
> Action E would apply if the required actions and associated completion times of Condition C or D were not met. If they were not met, then the associated low pressure ECCS injection/spray subsystem might be incapable of performing the intended function, and the CS/LPCI subsystem would be declared inoperable immediately.

These Actions direct the licensee to take appropriate actions as necessary, and immediately enter into the Conditions referenced in Table 3.3.5.3-1. 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. Therefore, the staff concludes that 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 drainage to the TAF and therefore, that the proposed Actions are acceptable.

3.2.3 NRC Staff Evaluation of Proposed TS 3.3.5.3 Surveillance Requirements

The proposed new TS 3.3.5.3 SRs include Channel Checks and Channel Functional Tests numbered SR 3.3.5.3.1 and SR 3.3.5.3.2, respectively. The NRC staff finds that these tests are sufficient and adequate, because they are essential to ensure that that the Functions of TS 3.3.5.3 are OPERABLE (i.e., capable of performing the specified safety function in support of TS 3.5.2, DRAIN TIME, and the protection from a potential drain down of the RPV in MODES 4 and 5). The NRC staff finds that the proposed SRs of LCO 3.3.5.3 are consistent with those described in Section 3.3.3 of TSTF-542, and concludes that these SRs satisfy 10 CFR 50.36(c)(3) by providing the specific SRs relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained.

SR 3.3.5.3.1 would require a Channel Check and applies to system isolation functions in TS Table 3.3.5.3-1 for RHR and RWCU. Performance of the Channel Check would ensure that a gross 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 related channels. A Channel Check is significant in assuring that there is a low probability of an undetected complete channel failure and is a key safety practice to verifying the instrumentation continues to operate properly between each Channel Functional Test. The frequency, in accordance with the Surveillance Frequency Control Program (SFCP), is consistent with the current requirements and supports operating shift situational awareness.

SR 3.3.5.3.2 would require a Channel Functional Test and applies to all functions in TS Table 3.3.5.3-1. A Channel Functional Test is the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify operability of all devices in the channel required for channel operability. It would be performed on each required channel to ensure that the entire channel will perform the intended function. The frequency would be in accordance with the SFCP. This is acceptable because it is consistent with the current requirements for these Functions. In addition, this SR could be included as part of a refueling activity, since during refueling outages, periods in MODES 4 and 5 are often 30 days or less.

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, therefore, there is no accident analysis on which to base the calculation of a setpoint. As noted in TSTF-542, the purpose of the functions is to allow ECCS manual initiation or to automatically isolate a penetration flow path, but no specific RPV water level is assumed for those actions. Therefore, the MODE 3 allowable value 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 TSs 3.3.5.1 and 3.3.6.1 continue to require the functions to be calibrated on an established interval. Also, there are no accident analysis assumptions on response time.

The NRC staff has determined that the MODE 3 allowable value and established calibration intervals are adequate to ensure the channel will respond with the required accuracy to allow manual initiation of the pumping systems to inject water and automatic isolation of penetration flow paths.

Based on the above, the NRC staff has concluded that the proposed SRs of LCO 3.3.5.3 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 NRC Staff Evaluation of Proposed Table 3.3.5.3-1, "RPV Water Inventory Control Instrumentation"

To support the requirements of proposed TS 3.5.2, the associated instrumentation requirements would be designated in TS Table 3.3.5.3-1. These instruments would be required to be OPERABLE if the systems that provide water injection and isolation functions were to be considered OPERABLE, as described in the NRC staff's evaluation of TS 3.5.2 (Section 3.3 below).

Proposed TS Table 3.3.5.3-1 specifies the instrumentation that shall be OPERABLE for each function in the table for MODES 4 and 5 (or other specified conditions), the required number of channels per function, conditions referenced from Required Action A.1, SRs for the functions, the allowable values, and footnotes concerning items in the table.

Proposed TS Table TS 3.3.5.3-1 presents details on the functions required to support the equipment and functions of TS 3.5.2. The NRC staff finds the presentation in this table to be acceptable, because this section 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., B, C, D) if the function is inoperable, the applicable SRs, the selection of the allowable values, and justification of differences between the current and proposed TS functions. This RPV WIC instrumentation set of requirements is acceptable, because it is adequate to ensure that the channels of instrumentation respond with the required accuracy permitting pump systems to operate to inject water when needed and isolating equipment when commanded to support the prevention of, or to mitigate, a potential RPV draining event.

Each of the ECCS subsystems in MODES 4 and 5 can be started by manual alignment of a small number of components. Automatic initiation of an ECCS injection/spray subsystem may be undesirable because it could lead to overflowing the RPV cavity due to injection rates of thousands of gallons per minute (gpm). Considering the action statements as the DRAIN TIME decreases (e.g., the proposed TS 3.5.2, Action E, prohibits plant conditions that could result in DRAIN TIMES less than 1 hour), there is sufficient 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. This is acceptable because a draining event evolves slowly, as compared to a design basis LOCA, which is assumed to occur at a significant power level.

3.2.4.1 NRC Staff Evaluation of Proposed Table 3.3.5.3-1 Functions

The signals for Table 3.3.5.3-1 Functions 1.a and 2.a, CS and LPCI systems, Reactor Pressure - Low (Injection Permissive), would be used as permissives and protection for these low pressure ECCS injection/spray subsystem manual initiation functions. This function (Reactor Pressure – Low (Injection Permissive)) would ensure that the reactor pressure has fallen to a value below these subsystems' maximum design pressures before permitting the operator to open the injection valves of the low pressure ECCS subsystems. Even though the reactor steam dome pressure is expected to be below the ECCS maximum design pumping pressure

during MODES 4 and 5, the Reactor Pressure - Low signals would be required to be OPERABLE and capable of permitting initiation of the ECCS. The proposed allowable value would be ≤ 436 pounds per square inch gauge (psig), with four required channels per function, as it is currently in CNS TS Table 3.3.5.1-1.

The minimum flow instruments in Table 3.3.5.3-1 Functions 1.b and 2.b, CS and LPCI systems, Pump Discharge Flow - Low (Bypass), were proposed to protect the associated low pressure ECCS pumps from overheating when the pump is operating and the associated injection valve is not fully open.

For LPCI, 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. The proposed required channels per function would be one per subsystem, as it is currently in CNS TS Table 3.3.5.1-1.

For CS, 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, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core. The proposed required channels per function is one per pump, as it is currently in CNS TS Table 3.3.5.1-1.

The proposed allowable values for Functions 1.b and 2.b are as follows (moved from CNS TS Table 3.3.5.1-1):

CS	≥ 1370 gpm
LPCI	≥ 2107 gpm

For Table 3.3.5.3-1 Function 3.a, RHR System Isolation, Reactor Vessel Water Level - Low, Level 3, the function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in the DRAIN TIME calculation. The proposed number of required instrument channels is two in one trip system. The condition that the RHR system integrity be maintained is a concept related to OPDRVs, so it is not carried over into TS 3.3.5.3 for RPV WIC instrumentation. Reactor Vessel Water Level – Low, Level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (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 allowable value was chosen to be the same as the Primary Containment Isolation Instrumentation Reactor Vessel Water Level - Low, Allowable Value (Function 6.b) from Table 3.3.6.1-1, which is ≥ 3 inches.

For Table 3.3.5.3-1 Function 4.a, RWCU System Isolation, Reactor Vessel Water Level – Low Low, Level 2, the function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in the DRAIN TIME calculation. The proposed number of required instrument channels is two in one trip system. Reactor Vessel Water Level - Low Low, Level 2 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level – Low Low, Level 2 Function are available, only two channels (both in the same trip system) are required to be OPERABLE. This proposed change is a new requirement in MODES 4 and 5 for the RWCU system. However,

the instrumentation function is the same as TS Table 3.3.6.1-1, Function 5.d, which contains the requirements for MODES 1, 2, and 3, with the same allowable value, ≥ - 42 inches.

The NRC staff finds that the proposed new LCO 3.3.5.3 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 that the licensee's proposed changes to LCO 3.3.5.3 are acceptable.

3.3 NRC 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 TS 3.5.2.

The proposed LCO 3.5.2 would state, in part:

> One low pressure ECCS injection/spray subsystem shall be OPERABLE.

"One low pressure ECCS injection/spray subsystem" would consist of either one CS subsystem or one LPCI subsystem. A CS subsystem consists of one motor-driven pump, piping, and valves to transfer water from the suppression pool to the RPV. An LPCI subsystem consists of one motor-driven pump, piping, and valves to transfer water from the suppression pool to the RPV.

The ECCS pumps are high-capacity pumps, with flow rates of thousands of gpm. Most RPV penetration flow paths would have a drain rate on the order of tens or hundreds of gpm. The manual initiation/start of an ECCS pump would provide the necessary water source to counter these expected drain rates. The LPCI subsystem is to be considered OPERABLE during alignment and operation for decay heat removal (DHR) if capable of being manually realigned and not otherwise inoperable. The DHR in MODES 4 and 5 is not affected by the proposed CNS TS change as these requirements on the number of SDC subsystems that must be OPERABLE and in operation to ensure adequate DHR from the core are unchanged. These requirements can be found in the CNS TS 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown," TS 3.9.7, "Residual Heat Removal (RHR) - High Water Level," and TS 3.9.8, "Residual Heat Removal (RHR) - Low Water Level." These CNS DHR requirements are similar to the STS and can be found in NUREG-1433 TS 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown," 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 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 low pressure ECCS injection/spray subsystem shall be OPERABLE." The proposed applicability for TS 3.5.2 is MODES 4 and 5.

The proposed LCO 3.5.2 note 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.

The addition of this note and removal of a similar note from existing SR 3.5.2.3 is evaluated in Section 3.5.1 of this SE (Variation 1).

The NRC staff reviewed the proposed TS 3.5.2, focusing on how the proposed changes maintain or establish requirements to ensure that the fuel remains covered with water during potential drain events. The proposed TS 3.5.2 contains Conditions A through E, which are based on either required ECCS injection/spray subsystem operability or DRAIN TIME. The current TS LCO states that two low pressure ECCS injection/spray subsystems shall be OPERABLE, whereas the proposed LCO 3.5.2 states that only one low pressure ECCS injection/spray subsystem shall be OPERABLE. This change is reflected in Condition A. The change from two low pressure ECCS injection/spray subsystems to one low pressure ECCS injection/spray subsystem is because this redundancy is not required for the applicable modes. With one ECCS injection/spray subsystem and nonsafety-related injection sources, defense-in-depth (DID) will be maintained. This DID 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 TS Safety Limit 2.1.1.3.

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 within the required completion time, operators shall immediately initiate action to establish a method of water injection capable of operating without offsite electrical power. 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, operators shall complete the following actions within a 4-hour completion time: (C.1) verify the secondary containment boundary is capable of being established in less than the DRAIN TIME, (C.2) verify each secondary containment penetration flow path is capable of being isolated less than the DRAIN TIME, and (C.3) verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME. The proposed Condition C provides adequate protection should the DRAIN TIME be < 36 hours and ≥ 8 hours because of the ability to establish secondary containment, isolate additional flow paths, and have the standby gas treatment subsystem capable of being placed in operations.

The proposed Condition D states that when DRAIN TIME < 8 hours, operators shall immediately complete the following actions: (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, (D.2) initiate action to establish secondary containment boundary, (D.3) initiate action to isolate

each secondary containment penetration flow path or verify it can be manually isolated from the control room, and (D.4) initiate action to verify one standby gas treatment subsystem is capable of being placed in operation. Additionally, there is a note stating that required 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 CNS TS for Condition D, which states "Required Action C.2 and associated Completion Time not met," is similar to proposed Condition D. The proposed Condition D provides adequate protection should the DRAIN TIME be < 8 hours because of the requirement for the ability to establish an additional method of water injection (without offsite electrical power), establish secondary containment, isolate additional flow paths, and have the standby gas treatment subsystem capable of being placed in operation.

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 CNS 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 evaluated the proposed changes to TS 3.5.2 and finds them acceptable based on the actions taken to mitigate the water level reaching the TS Safety Limit 2.1.1.3 (TAF) with the water sources available, and maintaining DRAIN TIME ≥ 36 hours. LCO 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 can be conducted without endangering the health and safety of the public and, therefore, they are acceptable.

3.3.1 NRC Staff Evaluation of Proposed TS 3.5.2 Surveillance Requirements

The proposed TS 3.5.2 SRs (described in Section 2.2.3 of the SE) include verification of DRAIN TIME, verification of water levels/volumes that support ECCS injection/spray subsystems, verification of water filled pipes, verification of correct valve positions for the required ECCS injection/spray subsystem, operation of the ECCS injection/spray subsystems 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 operated. Each of the seven 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 in accordance with the SFCP. This SR 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 three operator shifts). Changes in RPV level would necessitate recalculation of the DRAIN TIME.

SR 3.5.2.2: The suppression pool water level (≥ 12 feet, 7 inches) for a required ECCS injection/spray subsystem is required to be verified to ensure pump net positive suction head and vortex prevention is available for the ECCS injection/spray subsystem required to be OPERABLE by the LCO. Indications are available either locally or in the control room regarding suppression pool water level. This SR would be required to be performed in accordance with the SFCP.

SR 3.5.2.3: The SR to verify that the ECCS injection/spray subsystem piping is sufficiently filled with water would be retained from the current TS SR 3.5.2.2. The proposed change would update the SR to reflect the change to LCO 3.5.2, which would require, in part, one low pressure ECCS injection/spray subsystem to be OPERABLE instead of two. The wording would change from "Verify, for each required ECCS..." to "Verify, for the required ECCS...." This change would clarify the requirement to maintain consistency with the proposed LCO. Maintaining the pump discharge lines of the required ECCS injection/spray subsystem sufficiently full of water ensures that the ECCS subsystem will perform properly. This will also prevent water hammer following an ECCS initiation signal. The SR would be required to be performed in accordance with the SFCP.

SR 3.5.2.4: 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 (current SR 3.5.2.3). Similar to the change discussed above for proposed SR 3.5.2.3, changes to SR 3.5.2.4 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 the current SR, which states, "Verify each required ECCS injection/spray subsystem manual...." SR 3.5.2.4 would provide assurance that the proper flow path will be available for ECCS operation to support TS 3.5.2. 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. This SR would be required to be performed in accordance with the SFCP.

The existing note for current SR 3.5.2.3 (proposed to be SR 3.5.2.4) related to LPCI subsystem alignment for DHR would be deleted and a similar note added to the beginning of proposed LCO 3.5.2. This is evaluated in Section 3.5.1 of this SE.

SR 3.5.2.5: The required ECCS injection/spray subsystem would be required to be operated through its recirculation line for ≥ 10 minutes in accordance with the SFCP. This would demonstrate that the subsystem is capable of operation to support TS 3.5.2. Testing the ECCS injection/spray subsystem through the recirculation line is necessary to avoid overfilling the refueling cavity. The minimum operating time of 10 minutes is based on engineering judgement.

SR 3.5.2.6: 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 would be required to prevent RPV water inventory from dropping below the TAF should an unexpected draining event occur. This SR would be required to be performed in accordance with the SFCP.

SR 3.5.2.7: This SR would state, "Verify the required ECCS injection/spray subsystem can be manually operated." It would demonstrate that the required CS or LPCI subsystem could be manually initiated, using the associated pump and valve switches, to provide additional RPV water inventory, if needed. Vessel injection/spray may be excluded from the SR, per the existing note. This SR would be required to be performed in accordance with the SFCP.

The NRC staff evaluated each of these proposed SRs associated with the revised LCO 3.5.2 and concluded that they are appropriate for ensuring the operability of the equipment and instrumentation specified in LCO 3.5.2. The 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 is maintained.

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

TS LCO 3.3.5.1 currently states that, "[t]he 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 currently contains requirements for function operability during MODES 4 and 5 when the associated ECCS subsystem(s) are required to be OPERABLE. 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, MODES 4 and 5 requirements would be deleted:

1. CS System:
   - (a) Reactor Vessel Water Level - Low Low Low (Level 1)
   - (c) Reactor Pressure - Low (Injection Permissive)
   - (d) Core Spray Pump Discharge Flow - Low (Bypass)
   - (e) Core Spray Pump Start - Time Delay Relay

2. LPCI System:
   - (a) Reactor Vessel Water Level - Low Low Low (Level 1)
   - (c) Reactor Pressure - Low (Injection Permissive)
   - (f) Low Pressure Coolant Injection Pump Start - Time Delay Relay (Pumps A, B, C, and D)
   - (g) Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)

These functions would be deleted to support the consolidation of RPV WIC instrumentation requirements into proposed new TS 3.3.5.3. The requirements for Functions 1.c, 1.d, 2.c, and 2.g would be moved to proposed TS Table 3.3.5.3-1, as discussed in Section 3.2.4.1 of this SE.

For the other TS Table 3.3.5.1-1 Functions, 1.a, 1.e, 2.a, and 2.f, the MODES 4 and 5 requirements would not be retained. The CNS 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. The NRC staff finds the deletion of TS Table 3.3.5.1-1, Functions 1.a and 2.a, to be acceptable, because manual ECCS initiation is preferred over automatic initiation during MODES 4 and 5, and the operator would be able to use the most appropriately sized pumps if needed to mitigate a draining event.

The NRC staff finds the deletion of TS Table 3.3.5.1-1, Function 1.e and 2.f, to be acceptable for the CS and LPCI pump start time delay relays. These functions do not have an equivalent described in the STS. The purpose of the time delays is to stagger the automatic start of CS and LPCI 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 to start requiring the delay logic, the operator will control that ECCS pumps to start, one at a time as needed for WIC.

3.5 NRC Staff Evaluation of Proposed Technical Variations

The licensee proposed the following technical variations from the TS changes described in the TSTF-542 or the applicable parts of the NRC staff's SE for TSTF-542. The licensee stated in the application 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 3.5.2.3 Note

The CNS TSs contain a note in SR 3.5.2.3 regarding realignment to the LPCI mode, which is the same as the note in the STS LCO 3.5.2. The licensee proposes to relocate the note from the SR to the LCO section.

The current note for SR 3.5.2.3 states:

> One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

The proposed note added to LCO 3.5.2 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.

The NRC staff finds that adding the note to LCO 3.5.2 associated with the LPCI subsystem is appropriate. Without the note, the associated RHR pump would be declared inoperable, which would be contrary to the intent of the current note for SR 3.5.2.3, which allows the LPCI subsystem to be OPERABLE when aligned for DHR; therefore, this variation is acceptable.

3.5.2 Variation 2, TS SR 3.5.2.1, Suppression Pool Water Level

The current CNS SR 3.5.2.1 (new SR 3.5.2.2) verifies sufficient suppression pool water level for each required ECCS injection/spray subsystems. The CNS SR is a combination of the TSTF-542 SR 3.5.2.2 and SR 3.5.2.3, which are for LPCI and CS, respectively. In addition, the option for using a condensate storage tank as a makeup source in TSTF-542 SR 3.5.2.3 does not exist in the CNS SR. This option was removed in CNS TS Amendment No. 252 (Reference 8).

The NRC staff finds that because the condensate storage tank is no longer a TS option for LPCI and CS water injection, it does not need to be re-added as a requirement of TS per this approved traveler. Therefore, this variation is acceptable.

3.5.3 Variation 3, TS Table 3.3.5.3-1, Function 2.b, Channels per Function

TSTF-542, Table 3.3.5.3-1, Function 2.b, "Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)," uses "1 per pump" for the required channels per function, as it is more appropriate because the instrument is associated with an LPCI subsystem that has two pumps, rather than an individual pump.

The NRC staff reviewed this variation and determined that the existing licensing basis from CNS TS Table 3.3.5.1-1, Function 2.g is that the required channels per function is 1 per subsystem. The slight design differences between CNS (subsystem) and STS (pump) do not have an adverse impact associated with DRAIN TIME and automatic actions to the LPCI pump protection for overheating during low flow conditions. The licensee has chosen to retain the current licensing bases for these instruments, and, therefore, the NRC staff finds that the proposed variation is acceptable.

3.5.4 Variation 4, TS 3.6.1.3, Condition F

The licensee proposes to delete CNS TS 3.6.1.3, Condition F, and both of its associated required actions. The applicability for TS 3.6.1.3 is, in part, "[w]hen associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, 'Primary Containment Isolation Instrumentation.'" This change is justified since OPDRV requirements have been deleted, and MODES 4 and 5 PCIV requirements have been relocated from TSs 3.3.6.1 and 3.6.1.3 to the proposed TS 3.3.5.3. Thus, there are no longer any PCIVs required to be OPERABLE by TS 3.6.1.3 during MODES 4 or 5. These requirements are addressed by the proposed TS 3.3.5.3 in their entirety.

The NRC staff evaluated the licensee's proposed variation. Current CNS TS 3.6.1.3, Condition F, states, "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." CNS TS 3.6.1.3, Condition E, is similar to Condition F, but applies to MODES 1, 2, or 3. The staff determined that because the RPV WIC requirements would be consolidated into TSs 3.3.5.3 and 3.5.2, the MODES 4 and 5 requirements in TS 3.6.1.3 would no longer be applicable. Therefore, the NRC staff has determined that this variation is consistent with the requirements of TSTF-542 and is, therefore, acceptable.

3.5.5 Variation 5, Manual Initiation

There are STS requirements on which TSTF-542 is based, related to "manual initiation," that do not appear in the CNS TSs. The STS Table 3.3.5.1-1 contains Functions 1.e and 2.h, "Manual Initiation," for CS and LPCI, respectively. The "manual initiation" logic does not exist in the CNS design. These functions, as well as the related TSTF-542 SRs 3.3.5.3.3 and 3.5.2.8, do not apply to CNS.

As an alternative, the licensee proposes that TS 3.5.2 includes an SR 3.5.2.7 to verify that the CNS required ECCS injection/spray subsystem can be manually operated through the manipulation of subsystem components from the main control room.

The manual operation of the required ECCS injection/spray subsystem for the control of reactor cavity or RPV inventory is a relatively simple evolution and involves the manipulation of a small number of components. These subsystem alignments can be performed by licensed operators from the main control room. This alternative is justified by the fact that a draining event evolves slowly, as compared to a design basis LOCA, which is assumed to occur at full power, and thus, there is adequate time to take manual actions (i.e., hours versus minutes). Adequate time to take action is assured since the proposed TS 3.5.2, Condition E, prohibits plant conditions that result in DRAIN TIMES that are less than 1 hour. Therefore, there is sufficient time for the licensed operators to take manual action to stop an unanticipated draining event, and to manually start an ECCS injection/spray subsystem or the additional method of water injection.

The NRC staff reviewed the licensee proposed alternative and determined that, although CNS does not have the capability to start an ECCS subsystem with a single push button, the components that provide ECCS injection/spray into the RPV can be started from the main control room, as required, to support MODES 4 and 5 operations. The manipulation of low-pressure ECCS subsystem components from the main control room would be verified in accordance with the new SR 3.5.2.7. This SR would verify that the required CS or LPCI subsystem (including associated pump switches, and valve(s)) can be manually operated to provide additional RPV water inventory, if needed. Therefore, the NRC staff finds that this variation is acceptable.

3.5.6 Variation 6, Channel Checks for Permissives and Bypass Functions

CNS does not have the capability to perform channel checks for the following functions in proposed Table 3.3.5.3-1:

CS System:

Function 1.a, "Reactor Pressure – Low (Injection Permissive)
Function 1.b, "Core Spray Pump Discharge Flow – Low (Bypass)

LPCI System:

Function 2.a, "Reactor Pressure – Low (Injection Permissive)
Function 2.b, "Low Pressure Coolant Injection Pump Discharge Flow – Low (Bypass)

The current CNS TSs do not include channel checks for these functions; therefore, no channel check SR was added for these functions.

The NRC staff has determined that the above instrument functions do not have existing channel checks (TS Table 3.3.5.1-1) and no future channel checks were proposed for the instruments being relocated to new TS Table 3.3.5.3-1. Since channel checks for these functions have no impact on manual ECCS injection/spray capabilities for CS or LPCI, and the licensee will retain its current licensing basis for these instruments, the NRC staff has determined that the proposed variation is acceptable.

3.5.7 Variation 7, CS Pump Start-Time Delay

The CNS TS Table 3.3.5.1-1 contains Function 1.e, "Core Spray Pump Start-Time Delay Relay," that does not appear in the STS table. The function is required to be OPERABLE in MODES 1, 2, 3, 4, and 5. MODES 4 and 5 are proposed to be deleted from this function, as this is related to automatic ECCS initiation. This is the same justification as provided in the TSTF for STS Table 3.3.5.1-1, Function 2.f.

The NRC staff finds that electrical emergency bus staggering is unnecessary for manual operation. These Functions can be removed from the TS because the required ECCS subsystem is proposed to be started by manual operation. Therefore, the NRC staff has determined that the proposed variation is acceptable.

3.6 NRC Staff Evaluation of Proposed Deletion of References to OPDRVs Term

Section 2.2.4 above lists the numerous OPDRV references proposed for deletion. The proposed changes would replace the current specifications related to OPDRVs with revised specifications for RPV WIC. For example, the proposed changes would remove "operations with a potential for draining the reactor vessel," the acronym "OPDRVs," and Required Actions to "suspend 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 any 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 CNS TSs contain instrumentation requirements related to OPDRVs in four TSs. The proposed TS 3.3.5.3 consolidates the instrumentation requirements into a single location to simplify the presentation and provides requirements consistent with TS 3.5.2. The remaining TSs with OPDRVs requirements are for containment, containment isolation valves, standby gas treatment system, control room emergency filter system, and electrical sources. Each of these systems' requirements during OPDRVs were proposed for consolidation into a new TS 3.5.2 for RPV WIC, based on the appropriate plant conditions and calculated DRAIN TIME.

The NRC staff has 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 3.3.5.3, respectively) are a simplified alternative set of controls for ensuring water level is maintained above TS Safety Limit 2.1.1.3 (TAF); therefore, these changes are acceptable.

3.7 NRC Staff Evaluation of TS 3.10, "Special Operations," and TSTF-484, Revision 0, "Use of TS 3.10.1 for Scram Time Testing Activities"

The current CNS TS LCO 3.10.1, "Inservice Leak and Hydrostatic Testing Operation," allows performance of an inservice leak or hydrostatic test with the average reactor coolant temperature greater than 212 °F, while considering operational conditions to still be 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 212 °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. 225, dated October 23, 2006 (Reference 10), the NRC approved changes to CNS 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.'" However, per the proposed revised LCO 3.5.2, only one low pressure 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 because 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, DID will be maintained. The DID 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 TS Safety Limit 2.1.1.3 (TAF).

After considering the reasoning presented in this SE and reviewing the information in the SE enclosed with the NRC letter dated October 23, 2006 (Reference 10), the NRC staff determined that the LCOs 3.3.5.3 and 3.5.2 adopted as part of TSTF-542 are satisfactory and will, therefore, be acceptable even during application of LCO 3.10.1.

3.8 Technical Conclusion

CNS 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 RPV water level above the TAF ensures that the fuel cladding fission product barrier is protected during shutdown conditions. The proposed changes to the TSs evaluated within this SE 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., < 212 °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 accident that is postulated to occur during shutdown conditions (i.e., the fuel handling accident) does not involve a loss of inventory. Therefore, the equipment and instrumentation associated with the RPV WIC TSs do not provide detection or mitigation related to the design basis accident.

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 such that plant operators would have time to diagnose and mitigate an unplanned draining event. The NRC staff has determined that TS LCOs 3.5.2 and 3.3.5.3 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 3.3.5.3 provide remedial actions to be taken in the event the LCO is not satisfied, therefore meeting 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 TS Safety Limit 2.1.1.3.

The NRC staff evaluated the proposed DRAIN TIME definition, TS 3.5.2 (which contains the requirements for RPV WIC), and TS 3.3.5.3 (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 significant to public health and safety as evidenced by operating experience.

The licensee proposed to delete OPDRV references from the TS Applicability, Conditions, Required Actions, and Footnotes. The NRC staff has reviewed the proposed changes and determined that the deletion of OPDRV references, along with the corresponding editorial changes, are appropriate because the proposed TSs governing RPV WIC and the associated instrumentation, TS LCOs 3.5.2 and 3.3.5.3, respectively, are a clarified and simplified alternative set of controls for ensuring that water level is maintained above the TS Safety Limit 2.1.1.3.

The NRC staff reviewed the SRs associated with the revised TS LCO 3.5.2 and new LCO 3.3.5.3. The staff concludes that the proposed SRs in TS 3.5.2 are acceptable because they include verification of DRAIN TIME, verification of water levels/volumes that support ECCS injection/spray subsystems, verification of water filled pipes, verification of correct valve positions for the required ECCS injection/spray subsystem, operation of the ECCS injection/spray subsystems 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 operated. The staff concludes that the SRs proposed for TS 3.3.5.3 are sufficient and adequate, because they ensure that the functions are capable of performing their specified safety functions in support of TS 3.5.2, DRAIN TIME, and the protection from a potential drain down of the RPV 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 CNS changes against each of the unit applicable design requirements listed in Section 2.3.1 of this SE. The NRC staff concludes that the proposed changes for MODES 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 design criteria in that the CNS design requirements for instrumentation, reactor coolant leakage detection, the reactor coolant pressure boundary, and reactor coolant makeup are unaffected.

The regulation at 10 CFR 50.36(a)(1) states that a summary statement of the bases or reasons for such 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 dated August 7, 2017 (Reference 1). The NRC staff concludes that the TS Bases changes provided describe the bases for the affected TSs and follow the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 *Federal Register* 39132).

Additionally, the proposed TS changes were reviewed for technical clarity and consistency with the current CNS requirements for customary terminology and formatting. The NRC staff concluded that the proposed changes were consistent with TSTF-542, Revision 2 (Reference 3), and Section 16 of NUREG-0800 (Reference 9).

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Nebraska State official was notified of the proposed issuance of the amendment on July 5, 2018. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of 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, published in the Federal Register on October 24, 2017 (82 FR 49238), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

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

7.0 REFERENCES

1. Dent, John, Jr., Nebraska Public Power District, letter to U.S. Nuclear Regulatory Commission, "Application to Revise Technical Specifications to Adopt TSTF-542, Revision 2, 'Reactor Pressure Vessel Water Inventory Control,' Cooper Nuclear Station, Docket No. 50-298, License No. DPR-46," dated August 7, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17228A042).

2. Dent, John, Jr., Nebraska Public Power District, letter to U.S. Nuclear Regulatory Commission, "Response to Nuclear Regulatory Commission Request for Additional Information Regarding Application to Revise Technical Specifications to Adopt TSTF-542, Revision 2, 'Reactor Pressure Vessel Water Inventory Control,' Cooper Nuclear Station, Docket No. 50-298, License No. DPR-46," dated January 31, 2018 (ADAMS Accession No. ML18039A153).

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. Van Der Kamp, D. W., Cooper Nuclear Station, e-mail to Wengert, T., U.S. Nuclear Regulatory Commission, "TSTF-542 Implementation change request," dated June 12, 2018 (ADAMS Accession No. ML18171A161).

6. U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/4 Plants," NUREG-1433, Revision 4.0, Volume 1, Specifications, dated April 2012 (ADAMS Accession No. ML12104A192).

7. U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/4 Plants," NUREG-1433, Revision 4.0, Volume 2, Bases, dated April 2012 (ADAMS Accession No. ML12104A193).

8. Lingam, S. P., U.S. Nuclear Regulatory Commission, letter to Oscar A. Limpias, Nebraska Public Power District, "Cooper Nuclear Station – Issuance of Amendment Request to Delete Condensate Storage Tank as an Alternate Source of Makeup Water (TAC NO, MF 4716)," dated August 27, 2015 (ADAMS Accession No. ML15216A259).

9. U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants LWR Edition," NUREG-0800, Section 16, Revision 3, "Technical Specifications," dated March 2010 (ADAMS Accession No. ML100351425).

10. Benney, B., U.S. Nuclear Regulatory Commission, letter to Randall K. Edington, Nebraska Public Power District, "Cooper Nuclear Station - Issuance of Amendment Re: Technical Specification Change Request for TS 3.10.1, Scram Time Testing Activities (TAC No. MD2418)," dated October 23, 2006 (ADAMS Accession No. ML062790322).

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Date: August 1, 2018

SUBJECT: COOPER NUCLEAR STATION - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATIONS TO ADOPT TECHNICAL SPECIFICATIONS TASK FORCE (TSTF) TRAVELER TSTF-542, REVISION 2, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (CAC NO. MG0138; EPID L-2017-LLA-0290) DATED AUGUST 1, 2018

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ADAMS Accession No. ML18186A549 *by memo dated April 25, 2018 **by e-mail

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