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

October 30, 2018

Mr. Peter P. Sena, III
President and Chief Nuclear Officer
PSEG Nuclear LLC – N09
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION - ISSUANCE OF AMENDMENT NO. 213 RE: REVISE TECHNICAL SPECIFICATIONS TO ADOPT TSTF-542, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (EPID L-2017-LLA-0352)

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 213 to Renewed Facility Operating License No. NPF-57 for the Hope Creek Generating Station. This amendment consists of changes to the technical specifications in response to your application dated September 21, 2017, as supplemented by letters dated June 27, 2018; July 19, 2018; and September 6, 2018. The amendment revises the technical specifications to adopt Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

A copy of the related safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

James Kim

James Kim, Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosures:
1. Amendment No. 213 to Renewed License No. NPF-57
2. Safety Evaluation

cc: Listserv

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

PSEG NUCLEAR LLC

DOCKET NO. 50-354

HOPE CREEK GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 213
Renewed License No. NPF-57

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

   A. The application for amendment filed by PSEG Nuclear LLC dated September 21, 2017, as supplemented by letters dated June 27, 2018; July 19, 2018; and September 6, 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 set forth in 10 CFR Chapter I;

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-57 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 213, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented prior to entering OPCON 4 for the next Hope Creek refueling outage schedule for fall 2019 (H1R22).

FOR THE NUCLEAR REGULATORY COMMISSION

James G. Danna, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility Operating License and Technical Specifications

Date of Issuance: October 30, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 213

HOPE CREEK GENERATING STATION

RENEWED FACILITY OPERATING LICENSE NO. NPF-57

DOCKET NO. 50-354

Replace the following page of the Renewed Facility Operating License with the revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove	Insert
3	3

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
i	i
x	x
xi	xi
xviii	xviii
xix	xix
1-2	1-2
---	1-2a
3/4 3-16a	3/4 3-16a
3/4 3-31	3/4 3-31
3/4 3-33	3/4 3-33
3/4 3-34	3/4 3-34
3/4 3-35	3/4 3-35
3/4 3-39	3/4 3-39
3/4 3-40	3/4 3-40
3/4 3-64	3/4 3-64
3/4 3-67	3/4 3-67
---	3/4 3-111
---	3/4 3-112
---	3/4 3-113
---	3/4 3-114
---	3/4 3-115
3/4 5-1	3/4 5-1
3/4 5-2	3/4 5-2
3/4 5-3	3/4 5-3
3/4 5-4	3/4 5-4
3/4 5-5	3/4 5-5
3/4 5-6	3/4 5-6
3/4 5-6a	3/4 5-6a
3/4 5-7	3/4 5-7
3/4 5-8	3/4 5-8

3/4 5-9	3/4 5-9
3/4 6-47	3/4 6-47
3/4 6-49	3/4 6-49
3/4 6-51	3/4 6-51
3/4 6-52a	3/4 6-52a
3/4 7-6	3/4 7-6
3/4 7-6a	3/4 7-6a
3/4 7-8a	3/4 7-8a
3/4 8-11	3/4 8-11
3/4 8-17	3/4 8-17
3/4 8-23	3/4 8-23

reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

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

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

(6) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility. Mechanical disassembly of the GE14i isotope test assemblies containing Cobalt-60 is not considered separation.

(7) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Part 30, to intentionally produce, possess, receive, transfer, and use Cobalt-60.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

PSEG Nuclear LLC is authorized to operate the facility at reactor core power levels not in excess of 3902 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 213, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

SECTION

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

CORE ALTERATION

1.7 CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. The following exceptions are not considered to be CORE ALTERATIONS:

a. Movement of source range monitors, local power range monitors, intermediate range monitors, traversing incore probes, or special movable detectors (including undervessel replacement), and

b. Control rod movement, provided there are no fuel assemblies in the associated core cell.

Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.

1.8 DELETED

CORE OPERATING LIMITS REPORT

1.9 The CORE OPERATING LIMITS REPORT is the unit-specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Specification 6.9.1.9. Plant operation within these limits is addressed in individual specifications.

CRITICAL POWER RATIO

1.10 The CRITICAL POWER RATIO (CPR) shall be the ratio of that power in the assembly which is calculated by application of the applicable NRC- approved critical power correlation to cause some point in the assembly to experience boiling transition, divided by the actual assembly operating power.

DOSE EQUIVALENT I-131

1.11 DOSE EQUIVALENT I-131 shall be that concentration of I-131, microcuries per gram, which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites."

DRAIN TIME

1.11.1 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.

$\bar{E}$-AVERAGE DISINTEGRATION ENERGY

1.12 $\bar{E}$ shall be the average, weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling, of the sum of the average beta and gamma energies per disintegration, in MeV, for isotopes, with half lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant.

TABLE 3.3.2-1 (Continued)

NOTES

* When handling recently irradiated fuel in the secondary containment.

** When any turbine stop valve is greater than 90% open and/or when the key-locked bypass switch is in the Norm position.

Below 20% of RATED THERMAL POWER the Main Steamline Radiation Monitor setpoints shall not exceed the values determined using normal full power background radiation levels with the hydrogen water chemistry (HWC) system shut down. After reaching 20% of RATED THERMAL POWER the normal full power background radiation level and associated trip setpoints may be increased to levels previously measured during full power operation with hydrogen injection. Prior to decreasing below 20% of RATED THERMAL POWER the background level and associated setpoint shall be returned to the normal full power values. If the Main Steamline Radiation Monitor setpoints have been increased for HWC operation and a power reduction event occurs so that the reactor power is below 20% of RATED THERMAL POWER without the required setpoint change, control rod motion shall be suspended (except for scram or other emergency actions) until the necessary setpoint adjustment is made.

(a) A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the trip system in the tripped condition provided at least one other OPERABLE channel in the same trip system is monitoring that parameter.

(b) Also trips and isolates the mechanical vacuum pumps.

(c) Also starts the Filtration, Recirculation and Ventilation System (FRVS).

(d) DELETED

(e) Sensors arranged per valve group, not per trip system.

(f) Closes only RWCU system isolation valve(s) HV-F001 and HV-F004.

(g) Requires system steam supply pressure-low coincident with drywell pressure-high to close turbine exhaust vacuum breaker valves.

(h) Manual isolation closes HV-F008 only, and only following manual or automatic initiation of the RCIC system.

(i) Manual isolation closes HV-F003 and HV-F042 only, and only following manual or automatic initiation of the HPCI system.

(j) Trip functions common to RPS instrumentation.

TABLE 4.3.2.1-1 (Continued)

ISOLATION ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

* When handling recently irradiated fuel in the secondary containment.
** When any turbine stop valve is greater than 90% open and/or when the key-locked bypass switch is in the Norm position.
(a) Manual initiation switches shall be tested in accordance with the Surveillance Frequency Control Program. All other circuitry associated with manual initiation shall receive a CHANNEL FUNCTIONAL TEST in accordance with the Surveillance Frequency Control Program as part of circuitry required to be tested for automatic system isolation.
(b) Each train or logic channel shall be tested in accordance with the Surveillance Frequency Control Program.
(c) Frequencies are specified in the Surveillance Frequency Control Program unless otherwise noted in the table.

TABLE 3.3.3-1

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

TRIP FUNCTION		MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION[a]	APPLICABLE OPERATIONAL CONDITIONS	ACTION
1.	CORE SPRAY SYSTEM			
	a. Reactor Vessel Water Level - Low Low Low, Level 1	2[b][e]	1, 2, 3	30
	b. Drywell Pressure - High	2[b][e]	1, 2, 3	30
	c. Reactor Vessel Pressure - Low (Permissive)	4/division[f]	1, 2, 3	31
	d. Core Spray Pump Discharge Flow - Low (Bypass)	1/subsystem	1, 2, 3	37
	e. Core Spray Pump Start Time Delay - Normal Power	1/subsystem	1, 2, 3	31
	f. Core Spray Pump Start Time Delay - Emergency Power	1/subsystem	1, 2, 3	31
	g. Manual Initiation	1/division[b][g]	1, 2, 3	33
2.	LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM			
	a. Reactor Vessel Water Level - Low Low Low, Level 1	2/valve	1, 2, 3	30
	b. Drywell Pressure - High	2/valve	1, 2, 3	30
	c. Reactor Vessel Pressure - Low (Permissive)	1/valve	1, 2, 3	31
	d. LPCI Pump Discharge Flow - Low (Bypass)	1/pump	1, 2, 3	37
	e. LPCI Pump Start Time Delay - Normal Power	1/pump[i]	1, 2, 3	31
	f. Manual Initiation	1/subsystem	1, 2, 3	33
3.	HIGH PRESSURE COOLANT INJECTION SYSTEM#			
	a. Reactor Vessel Water Level - Low Low Level 2	4	1, 2, 3	34
	b. Drywell Pressure - High	4	1, 2, 3	34
	c. Condensate Storage Tank Level - Low	2[c]	1, 2, 3	35
	d. Suppression Pool Water Level - High	2[c]	1, 2, 3	35
	e. Reactor Vessel Water Level - High, Level 8	4[d]	1, 2, 3	31
	f. HPCI Pump Discharge Flow - Low (Bypass)	1	1, 2, 3	37
	g. Manual Initiation	1/system	1, 2, 3	33
4.	AUTOMATIC DEPRESSURIZATION SYSTEM##			
	a. Reactor Vessel Water Level - Low Low Low, Level 1	4	1, 2, 3	30
	b. Drywell Pressure - High	4	1, 2, 3	30
	c. ADS Timer	2	1, 2, 3	31
	d. Core Spray Pump Discharge Pressure - High (Permissive)	1/pump	1, 2, 3	31

TABLE 3.3.3-1 (Cont'd)
EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION[(a)]	APPLICABLE OPERATIONAL CONDITIONS	ACTION
4. AUTOMATIC DEPRESSURIZATION SYSTEM##			
e. RHR LPCI Mode Pump Discharge Pressure - High (Permissive)	2/pump	1, 2, 3	31
f. Reactor Vessel Water Level - Low, Level 3 (Permissive)	2	1, 2, 3	31
g. ADS Drywell Pressure Bypass Timer	4	1, 2, 3	31
h. ADS Manual Inhibit Switch	2	1, 2, 3	31
i. Manual Initiation	4	1, 2, 3	33

	TOTAL NO. OF CHANNELS(h)	CHANNELS TO TRIP(h)	MINIMUM CHANNELS OPERABLE(h)	APPLICABLE OPERATIONAL CONDITIONS	ACTION
5. LOSS OF POWER					
1. 4.16 kv Emergency Bus Under-voltage (Loss of Voltage)	4/bus	2/bus	3/bus	1, 2, 3, 4**, 5**	36
2. 4.16 kv Emergency Bus Under-voltage (Degraded Voltage)	2/source/ bus	2/source/ bus	2/source/ bus	1, 2, 3, 4**, 5**	36

(a) A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the trip system in the tripped condition provided at least one OPERABLE channel in the same trip system is monitoring that parameter.
(b) Also actuates the associated emergency diesel generators.
(c) One trip system. Provides signal to HPCI pump suction valve only.
(d) Provides a signal to trip HPCI pump turbine only.
(e) In divisions 1 and 2, the two sensors are associated with each pump and valve combination. In divisions 3 and 4, the two sensors are associated with each pump only.
(f) Division 1 and 2 only.
(g) In divisions 1 and 2, manual initiation is associated with each pump and valve combination; in divisions 3 and 4, manual initiation is associated with each pump only.
(h) Each voltage detector is a channel.
(I) Start time delay is applicable to LPCI Pump C and D only.
* Deleted.
** Required when ESF equipment is required to be OPERABLE.
# Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 200 psig.
Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 100 psig.

TABLE 3.3.3-1 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

ACTION

ACTION 30 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement:

a. With one channel inoperable, place the inoperable channel in the tripped condition within 24 hours or declare the associated system inoperable.

b. With more than one channel inoperable, declare the associated system inoperable.

ACTION 31 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, declare the associated ECCS inoperable within 24 hours.

ACTION 32 - Deleted

ACTION 33 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, restore the inoperable channel to OPERABLE status within 24 hours or declare the associated ECCS inoperable.

ACTION 34 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement:

a. For one channel inoperable, place the inoperable channel in the tripped condition within 24 hours or declare the HPCI system inoperable.

b. With more than one channel inoperable, declare the HPCI system inoperable.

ACTION 35 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, place at least one inoperable channel in the tripped condition within 24 hours or declare the HPCI system inoperable.

ACTION 36 - With the number of OPERABLE channels one less than the Total Number of Channels, place the inoperable channel in the tripped condition within 1 hour; operation may then continue until performance of the next required CHANNEL FUNCTIONAL TEST.

ACTION 37 - With the number of OPERABLE channels less than required by the Minimum OPERABLE channels per Trip Function requirement, open the minimum flow bypass valve within one hour. Restore the inoperable channel to OPERABLE status within 7 days or declare the associated ECCS inoperable.

TABLE 4.3.3.1-1

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK [a]	CHANNEL FUNCTIONAL TEST [a]	CHANNEL CALIBRATION [a]	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. CORE SPRAY SYSTEM				
a. Reactor Vessel Water Level – Low Low Low, Level 1				1, 2, 3
b. Drywell Pressure - High				1, 2, 3
c. Reactor Vessel Pressure - Low				1, 2, 3
d. Core Spray Pump Discharge Flow - Low (Bypass)				1, 2, 3
e. Core Spray Pump Start Time Delay - Normal Power	NA			1, 2, 3
f. Core Spray Pump Start Time Delay - Emergency Power	NA			1, 2, 3
g. Manual Initiation	NA		NA	1, 2, 3
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM				
a. Reactor Vessel Water Level – Low Low Low, Level 1				1, 2, 3
b. Drywell Pressure - High				1, 2, 3
c. Reactor Vessel Pressure – Low (Permissive)				1, 2, 3
d. LPCI Pump Discharge Flow - Low (Bypass)				1, 2, 3
e. LPCI Pump Start Time Delay - Normal Power	NA			1, 2, 3
f. Manual Initiation	NA		NA	1, 2, 3
3. HIGH PRESSURE COOLANT INJECTION SYSTEM[#]				
a. Reactor Vessel Water Level – Low Low, Level 2				1, 2, 3
b. Drywell Pressure - High				1, 2, 3
c. Condensate Storage Tank Level - Low				1, 2, 3
d. Suppression Pool Water Level - High				1, 2, 3
e. Reactor Vessel Water Level - High, Level 8				1, 2, 3
f. HPCI Pump Discharge Flow – Low (Bypass)				1, 2, 3
g. Manual Initiation	NA		NA	1, 2, 3

TABLE 4.3.3.1-1 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK [a]	CHANNEL FUNCTIONAL TEST [a]	CHANNEL CALIBRATION [a]	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
4. AUTOMATIC DEPRESSURIZATION SYSTEM##				
a. Reactor Vessel Water Level – Low Low Low, Level 1				1, 2, 3
b. Drywell Pressure - High				1, 2, 3
c. ADS Timer	NA			1, 2, 3
d. Core Spray Pump Discharge Pressure - High				1, 2, 3
e. RHR LPCI Mode Pump Discharge Pressure –High				1, 2, 3
f. Reactor Vessel Water Level - Low, Level 3				1, 2, 3
g. ADS Drywell Pressure Bypass Timer	NA			1, 2, 3
h. ADS Manual Inhibit Switch	NA		NA	1, 2, 3
i. Manual initiation	NA		NA	1, 2, 3
5. LOSS OF POWER				
a. 4.16 kv Emergency Bus Under-voltage (Loss of Voltage)	NA	NA		1, 2, 3, 4**, 5**
b. 4.16 kv Emergency Bus Under-voltage (Degraded Voltage)				1, 2, 3, 4**, 5**

(a) Frequencies are specified in the Surveillance Frequency Control Program unless otherwise noted in the table.
* Deleted
** Required OPERABLE when ESF equipment is required to be OPERABLE.
# Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 200 psig.
Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 100 psig.

TABLE 3.3.7.1-1 (Continued)

RADIATION MONITORING INSTRUMENTATION

TABLE NOTATION

* When recently irradiated fuel is being handled in the secondary containment.

** Activates control room emergency filtration system.

*** When the offgas treatment system is operating.

With fuel in the new fuel storage vault.

With fuel in the spent fuel storage pool.

(a) Alarm only.

(b) Alarm setpoint to be set in accordance with Specification 3.11.2.7.

TABLE 4.3.7.1-1 (Continued)

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATION

(a) Frequencies are specified in the Surveillance Frequency Control Program unless otherwise noted in the table.

With fuel in the new fuel storage vault.

With fuel in the spent fuel storage pool.

* When recently irradiated fuel is being handled in the secondary containment.

** When the offgas treatment system is operating.

INSTRUMENTATION

3/4.3.12 RPV WATER INVENTORY CONTROL INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.12 The RPV Water Inventory Control (WIC) actuation instrumentation channels shown in Table 3.3.12-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.12-1

ACTION:

a. With one or more channels inoperable, take the ACTION referenced in Table 3.3.12-1 for the channel immediately.

SURVEILLANCE REQUIREMENTS

4.3.12 Each RPV WIC actuation instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and LOGIC SYSTEM FUNCTIONAL TEST at the frequencies shown in Table 4.3.12.1-1.

TABLE 3.3.12-1
RPV WATER INVENTORY CONTROL INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTIONS
1. CORE SPRAY SYSTEM			
a. Reactor Vessel Pressure - Low (Permissive)	4/division[(a)(c)]	4, 5	83
b. Core Spray Pump Discharge Flow - Low (Bypass)	1/subsystem[(a)]	4, 5	84
c. Manual Initiation	1/division[(a)]	4, 5	84
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM			
a. Reactor Vessel Pressure-Low (Permissive)	1/valve[(a)]	4, 5	83
b. LPCI Pump Discharge Flow - Low (Bypass)	1/pump[(a)(d)]	4, 5	84
c. Manual Initiation	1/subsystem[(a)]	4, 5	84
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION			
a. Reactor Vessel Water Level – Low, Level 3	2/Valve	(b)	85
4. REACTOR WATER CLEANUP SYSTEM ISOLATION			
a. Reactor Vessel Water Level - Low Low, Level 2	2/Valve	(b)	85

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

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

(c) Division 1 and 2 only.

(d) Function not required to be OPERABLE while associated pump is operating in decay heat removal when minimum flow valve is closed and deactivated.

TABLE 3.3.12-1 (Continued)

RPV WATER INVENTORY CONTROL INSTRUMENTATION

ACTION

ACTION 83 - Place the channel in trip within 1 hour. Otherwise, immediately declare the associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 84 - Restore the channel to OPERABLE status within 24 hours. Otherwise, immediately declare the associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 85 - Declare the associated flow path(s) incapable of automatic isolation and calculate DRAIN TIME immediately.

TABLE 3.3.12-2
RPV WATER INVENTORY CONTROL INSTRUMENTATION SETPOINTS

TRIP FUNCTION		ALLOWABLE VALUE
1.	CORE SPRAY SYSTEM	
a.	Reactor Vessel Pressure – Low (Permissive)	≤ 481 psig
b.	Core Spray Pump Discharge Flow - Low (Bypass)	≥ 650 gpm
c.	Manual Initiation	N.A.
2.	LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM	
a.	Reactor Vessel Pressure – Low (Permissive)	≤ 460 psig
b.	LPCI Pump Discharge Flow – Low (Bypass)	≥ 1100 gpm
c.	Manual Initiation	N.A.
3.	RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION	
a.	Reactor Vessel Water Level - Low, Level 3	≥ 11 inches
4.	REACTOR WATER CLEANUP SYSTEM ISOLATION	
a.	Reactor Vessel Water Level - Low Low, - Level 2	≥ -45 inches

TABLE 4.3.12.1-1

RPV WATER INVENTORY CONTROL INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK[(a)]	CHANNEL FUNCTIONAL TEST[(a)]	LOGIC SYSTEM FUNCTIONAL TEST [(a)]	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
1. CORE SPRAY SYSTEM				
a. Reactor Vessel Pressure - Low (Permissive)			N.A.	4, 5
b. Core Spray Pump Discharge Flow - Low (Bypass)			N.A.	4, 5
c. Manual Initiation	N.A.	N.A.		4, 5
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM				
a. Reactor Vessel Pressure-Low (Permissive)			N.A.	4, 5
b. LPCI Pump Discharge Flow - Low (Bypass)			N.A.	4, 5
c. Manual Initiation	N.A.	N.A.		4, 5
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION				
a. Reactor Vessel Water Level – Low, Level 3			N.A.	(b)
4. REACTOR WATER CLEANUP SYSTEM ISOLATION				
a. Reactor Vessel Water Level - Low Low, Level 2			N.A.	(b)

(a) Frequencies are specified in the Surveillance Frequency Control Program unless otherwise noted in the table.

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

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND RPV WATER INVENTORY CONTROL

3/4.5.1 ECCS - OPERATING

LIMITING CONDITION FOR OPERATION

3.5.1 The emergency core cooling systems shall be OPERABLE with:

a. The core spray system (CSS) consisting of two subsystems with each subsystem comprised of:

1. Two OPERABLE core spray pumps, and

2. An OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water through the spray sparger to the reactor vessel.

b. The low pressure coolant injection (LPCI) system of the residual heat removal system consisting of four subsystems with each subsystem comprised of:

1. One OPERABLE LPCI pump, and

2. An OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel.

c. The high pressure coolant injection (HPCI) system consisting of:

1. One OPERABLE HPCI pump, and

2. An OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel.

d. The automatic depressurization system (ADS) with five OPERABLE ADS valves.

APPLICABILITY: OPERATIONAL CONDITION 1, 2*,** #, and 3*,**,##.

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* The HPCI system is not required to be OPERABLE when reactor steam dome pressure is less than or equal to 200 psig.

** The ADS is not required to be OPERABLE when reactor steam dome pressure is less than or equal to 100 psig.

\# See Special Test Exception 3.10.6.

Two LPCI subsystems of the RHR system may be inoperable in that they are aligned in the shutdown cooling mode when the reactor vessel pressure is less than the RHR shutdown cooling permissive setpoint.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION:

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

a. For the Core Spray system:

1. With one core spray subsystem inoperable, provided that at least two LPCI subsystem are OPERABLE, restore the inoperable core spray subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With both core spray subsystems inoperable, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

b. For the LPCI system:

1. With one LPCI subsystem inoperable, provided that at least one core spray subsystem is OPERABLE, restore the inoperable LPCI subsystem to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With two LPCI subsystems inoperable, provided that at least one core spray subsystem is operable, restore at least one LPCI subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

3. With three LPCI subsystems inoperable, provided that both core spray subsystems are OPERABLE, restore at least two LPCI subsystems to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

4. With all four LPCI subsystems inoperable, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.*

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* Whenever two or more RHR subsystems are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

c. For the HPCI system, provided the Core Spray System, the LPCI system, the ADS and the RCIC system are OPERABLE:

1. With the HPCI system inoperable, restore the HPCI system to OPERABLE status within 14 days or be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to ≤ 200 psig within the following 24 hours.

2. With the HPCI system inoperable and either one LPCI subsystem or one CSS subsystem inoperable, restore the HPCI system to operable status within 72 hours or restore the LPCI subsystem/CSS subsystem to operable status within 72 hours. Otherwise, be in HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to ≤ 200 psig in the next 24 hours.

d. For the ADS:

1. With one of the above required ADS valves inoperable, provided the HPCI system, the core spray system and the LPCI system are OPERABLE, restore the inoperable ADS valve to OPERABLE status within 14 days or be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to ≤ 100 psig within the next 24 hours.

2. With two or more of the above required ADS valves inoperable, be in at least HOT SHUTDOWN within 12 hours and reduce reactor steam dome pressure to ≤ 100 psig within the next 24 hours.

e. With a CSS and/or LPCI header ΔP instrumentation channel inoperable, restore the inoperable channel to OPERABLE status within 7 days or determine the ECCS header ΔP locally at least once per 12 hours; otherwise, declare the associated ECCS subsystem inoperable.

f. The discharge line "keep filled" alarm instrumentation associated with a LPCI and/or CSS subsystem(s) may be in an inoperable status for up to 6 hours for required surveillance testing* provided that the "keep filled" alarm instrumentation associated with at least one LPCI or CSS subsystem serviced by the affected "keep filled" system remains OPERABLE; otherwise, perform Surveillance Requirement 4.5.1.a.1.a.

g. In the event an ECCS system is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

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* This includes testing of the "Reactor Coolant System Interface Valves Leakage Pressure Monitors" associated with LPCI and CSS in accordance with Surveillance 4.4.3.2.3

SURVEILLANCE REQUIREMENTS

4.5.1 The emergency core cooling systems shall be demonstrated OPERABLE by:

a. In accordance with the Surveillance Frequency Control Program:

1. For the core spray system, the LPCI system, and the HPCI system:

a) Verifying by venting at the high point vents that the system piping from the pump discharge valve to the system isolation valve is filled with water.

b) Verifying that each valve, manual, power operated or automatic, in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct* position.

c) Verify the RHR System cross tie valves on the discharge side of the pumps are closed and power, if any, is removed from the valve operators.

2. For the HPCI system, verifying that the HPCI pump flow controller is in the correct position.

b. Verifying that, when tested pursuant to the INSERVICE TESTING PROGRAM:

1. The two core spray system pumps in each subsystem together develop a flow of at least 6150 gpm against a test line pressure corresponding to a reactor vessel pressure of ≥105 psi above suppression pool pressure.

2. Each LPCI pump in each subsystem develops a flow of at least 10,000 gpm against a test line pressure corresponding to a reactor vessel to primary containment differential pressure of ≥20 psid.

3. The HPCI pump develops a flow of at least 5600 gpm against a test line pressure corresponding to a reactor vessel pressure of 1000 psig when steam is being supplied to the turbine at 1000, +20, -80 psig.**

c. In accordance with the Surveillance Frequency Control Program:

1. For the core spray system, the LPCI system, and the HPCI system, performing a system functional test which includes simulated automatic actuation of the system throughout its emergency operating sequence and verifying that each automatic valve in the flow path actuates to its correct position. Actual injection of coolant into the reactor vessel may be excluded from this test.

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* Except that an automatic valve capable of automatic return to its ECCS position when an ECCS signal is present may be in position for another mode of operation.

** The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test.

2. For the HPCI system, verifying that:

   a) The system develops a flow of at least 5600 gpm against a test line pressure corresponding to a reactor vessel pressure of ≥200 psig, when steam is being supplied to the turbine at 200 + 15, -0 psig.**

   b) The suction is automatically transferred from the condensate storage tank to the suppression chamber on a condensate storage tank water level - low signal and on a suppression chamber - water level high signal.

3. Performing a CHANNEL CALIBRATION of the CSS, and LPCI system discharge line "keep filled" alarm instrumentation.

4. Performing a CHANNEL CALIBRATION of the CSS header ΔP instrumentation and verifying the setpoint to be ≤ the allowable value of 4.4 psid.

5. Performing a CHANNEL CALIBRATION of the LPCI header ΔP instrumentation and verifying the setpoint to be ≤ the allowable value of 1.0 psid.

d. For the ADS:

1. In accordance with the Surveillance Frequency Control Program, performing a CHANNEL FUNCTIONAL TEST of the Primary Containment Instrument Gas System low-low pressure alarm system.

2. In accordance with the Surveillance Frequency Control Program:

   a) Performing a system functional test which includes simulated automatic actuation of the system throughout its emergency operating sequence, but excluding actual valve actuation.

   b) Verify that when tested pursuant to the INSERVICE TESTING PROGRAM, that each ADS valve is capable of being opened.

   c) Performing a CHANNEL CALIBRATION of the Primary Containment Instrument Gas System low-low pressure alarm system and verifying an alarm setpoint of 85 ± 2 psig on decreasing pressure.

** The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test.

3/4 5.2 RPV WATER INVENTORY CONTROL

LIMITING CONDITION FOR OPERATION

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

AND

At least one of the following low pressure ECCS subsystems shall be OPERABLE:

a. Core spray system subsystem with a subsystem comprised of:

1. Two OPERABLE core spray pumps, and

2. An OPERABLE flow path capable of taking suction from at least one of the following water sources and transferring the water through the spray sparger to the reactor vessel:

a) From the suppression chamber, or

b) When the suppression chamber water level is less than the limit or is drained, from the condensate storage tank containing at least 135,000 available gallons of water.

b. Low pressure coolant injection (LPCI) system subsystem with a subsystem comprised of:

1. One OPERABLE LPCI pump, and

2. An OPERABLE flow path capable of taking suction from the suppression chamber** and transferring the water to the reactor vessel.

APPLICABILITY: OPERATIONAL CONDITION 4 and 5.

ACTION:

a. With none of the above low pressure ECCS subsystems OPERABLE, immediately suspend CORE ALTERATIONS and restore a subsystem to OPERABLE status within 4 hours. Otherwise, immediately initiate action to establish a method of water injection capable of operating without offsite electrical power.

b. Deleted.

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* Deleted.

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

LIMITING CONDITION FOR OPERATION (Continued)

ACTION:

c. With DRAIN TIME < 36 hours and ≥ 8 hours, within 4 hours:

1. Verify secondary containment boundary is capable of being established in less than the DRAIN TIME, AND

2. Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME, AND

3. Verify one Filtration, Recirculation and Ventilation (FRVS) ventilation unit is capable of being placed in operation in less than the DRAIN TIME.

Otherwise, immediately initiate action to restore DRAIN TIME to ≥ 36 hours.

d. With DRAIN TIME < 8 hours and ≥ 1 hour, immediately:

1. Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours*** AND,

2. Initiate action to establish secondary containment boundary, AND

3. Initiate action to isolate each secondary containment penetration flow path or verify it can be manually isolated from the control room, AND

4. Initiate action to verify one FRVS ventilation unit is capable of being placed in operation.

Otherwise, immediately initiate action to restore DRAIN TIME to ≥ 36 hours.

e. With DRAIN TIME < 1 hour, immediately initiate action to restore DRAIN TIME to ≥ 36 hours.

*** Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power.

SURVEILLANCE REQUIREMENTS

4.5.2.1 Verify DRAIN TIME ≥ 36 hours in accordance with the Surveillance Frequency Control Program.

4.5.2.2 Verify, for a required low pressure coolant injection (LPCI) subsystem, the suppression chamber indicated water level is ≥ 5.0 inches in accordance with the Surveillance Frequency Control Program.

4.5.2.3 Verify, for a required Core Spray (CS) subsystem, the Suppression chamber indicated water level is ≥ 5.0 inches or condensate storage tank contains at least 135,000 available gallons of water in accordance with the Surveillance Frequency Control Program.

4.5.2.4 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.

4.5.2.5 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. #

4.5.2.6 Operate the required ECCS injection/spray subsystem through the recirculation line for ≥ 10 minutes, in accordance with the Surveillance Frequency Control Program.

4.5.2.7 Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal, in accordance with the Surveillance Frequency Control Program.

4.5.2.8 Verify the required ECCS injection/spray subsystem actuates on a manual initiation signal, in accordance with the Surveillance Frequency Control Program. ##

Except that an automatic valve capable of automatic return to its ECCS position when an ECCS signal is present may be in position for another mode of operation.

Vessel injection/spray may be excluded.

3/4.5.3 SUPPRESSION CHAMBER

LIMITING CONDITION FOR OPERATION

3.5.3 The suppression chamber shall be OPERABLE:

a. In OPERATIONAL CONDITION 1, 2 and 3 with an indicated water level of at least 74.5".

b. Deleted

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2 and 3.

ACTION:

a. In OPERATIONAL CONDITION 1, 2 or 3 with the suppression chamber water level less than the above limit, restore the water level to within the limit within 1 hour or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. Deleted

SURVEILLANCE REQUIREMENTS

4.5.3.1 The suppression chamber shall be determined OPERABLE by verifying the water level to be greater than or equal to:

a. 74.5" in accordance with the Surveillance Frequency Control Program in OPERATIONAL CONDITIONS 1, 2, and 3.

4.5.3.2 Deleted

CONTAINMENT SYSTEMS

3/4.6.5 SECONDARY CONTAINMENT

SECONDARY CONTAINMENT INTEGRITY

LIMITING CONDITION FOR OPERATION

3.6.5.1 SECONDARY CONTAINMENT INTEGRITY shall be maintained.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3 and *.

ACTION:

Without SECONDARY CONTAINMENT INTEGRITY:

a. In OPERATIONAL CONDITION 1, 2 or 3, restore SECONDARY CONTAINMENT INTEGRITY within 4 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In Operational Condition *, suspend handling of recently irradiated fuel in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.1 SECONDARY CONTAINMENT INTEGRITY shall be demonstrated by:

a. Verifying in accordance with the Surveillance Frequency Control Program that the reactor building is at a negative pressure.

b. Verifying in accordance with the Surveillance Frequency Control Program that:

1. All secondary containment equipment hatches and blowout panels are closed and sealed.

2. a. For double door arrangements, at least one door in each access to the secondary containment is closed.

b. For single door arrangements, the door in each access to the secondary containment is closed except for routine entry and exit.

3. All secondary containment penetrations not capable of being closed by OPERABLE secondary containment automatic isolation dampers/valves and required to be closed during accident conditions are closed by valves, blind flanges, or deactivated automatic dampers/valves secured in position.

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* When recently irradiated fuel is being handled in the secondary containment.

SECONDARY CONTAINMENT AUTOMATIC ISOLATION DAMPERS

LIMITING CONDITION FOR OPERATION

3.6.5.2 The secondary containment ventilation system (RBVS) automatic isolation dampers shown in Table 3.6.5.2-1 shall be OPERABLE with isolation times less than or equal to the times shown in Table 3.6.5.2-1.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3 and *.

ACTION:

With one or more of the secondary containment ventilation system automatic isolation dampers shown in Table 3.6.5.2-1 inoperable, maintain at least one isolation damper OPERABLE in each affected penetration that is open and within 8 hours either:

a. Restore the inoperable dampers to OPERABLE status, or

b. Isolate each affected penetration by use of at least one deactivated damper secured in the isolation position, or

c. Isolate each affected penetration by use of at least one closed manual valve or blind flange.

Otherwise, in OPERATIONAL CONDITION 1, 2 or 3, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

Otherwise, in Operational Condition *, suspend handling of recently irradiated fuel in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.2 Each secondary containment ventilation system automatic isolation damper shown in Table 3.6.5.2-1 shall be demonstrated OPERABLE:

a Prior to returning the damper to service after maintenance, repair or replacement work is performed on the damper or its associated actuator, control or power circuit by cycling the damper through at least one complete cycle of full travel and verifying the specified isolation time.

b. In accordance with the Surveillance Frequency Control Program by verifying that on a containment isolation test signal each isolation damper actuates to its isolation position.

c. By verifying the isolation time to be within its limit in accordance with the Surveillance Frequency Control Program.

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* When recently irradiated fuel is being handled in the secondary containment.

CONTAINMENT SYSTEMS

3.6.5.3 FILTRATION, RECIRCULATION AND VENTILATION SYSTEM (FRVS)

FRVS VENTILATION SUBSYSTEM

LIMITING CONDITION FOR OPERATION

3.6.5.3.1 Two FRVS ventilation units shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3 and *.

ACTION:

a. With one of the above required FRVS ventilation units inoperable, restore the inoperable unit to OPERABLE status within 7 days, or:

   1. In OPERATIONAL CONDITION 1, 2 or 3, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

   2. In Operational Condition *, place the OPERABLE FRVS ventilation unit in operation or suspend handling of recently irradiated fuel in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

b. With both ventilation units inoperable in Operational Condition *, suspend handling of recently irradiated fuel in the secondary containment. The provisions of Specification 3.0.3. are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.3.1 Each of the two ventilation units shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying that the water seal bucket traps have a water seal and making up any evaporative losses by filling the traps to the overflow.

b. In accordance with the Surveillance Frequency Control Program by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the subsystem operates for at least 15 minutes.

---

* When recently irradiated fuel is being handled in the secondary containment.

CONTAINMENT SYSTEMS

3.6.5.3 FILTRATION, RECIRCULATION AND VENTILATION SYSTEM (FRVS)

FRVS RECIRCULATION SUBSYSTEM

LIMITING CONDITION FOR OPERATION

3.6.5.3.2 Six FRVS recirculation units shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3 and *.

ACTION:

a. With one or two of the above required FRVS recirculation units inoperable, restore all the inoperable unit(s) to OPERABLE status within 7 days, or:

   1. In OPERATIONAL CONDITION 1, 2, or 3, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

   2. In Operational Condition*, suspend handling of recently irradiated fuel in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

b. With three or more of the above required FRVS recirculation units inoperable in Operational Condition *, suspend handling of recently irradiated fuel in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

c. With three or more of the above required FRVS recirculation units inoperable in OPERATIONAL CONDITION 1, 2, or 3, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

SURVEILLANCE REQUIREMENTS

4.6.5.3.2 Each of the six FRVS recirculation units shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying that the water seal bucket traps have a water seal and making up any evaporative losses by filling the traps to the overflow.

b. In accordance with the Surveillance Frequency Control Program by initiating, from the control room, flow through the HEPA filters and verifying that the subsystem operates for at least 15 minutes.

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* When recently irradiated fuel is being handled in the secondary containment.

PLANT SYSTEMS

3/4.7.2 CONTROL ROOM SYSTEMS

CONTROL ROOM EMERGENCY FILTRATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.2.1 Two control room emergency filtration system subsystems shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, and *.

ACTION:

a. In OPERATIONAL CONDITION 1, 2 or 3

1. With one control room emergency filtration subsystem inoperable for reasons other than Condition a.2, restore the inoperable subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With one or more control room emergency filtration subsystems inoperable due to an inoperable control room envelope (CRE) boundary##,

a. Immediately, initiate action to implement mitigating actions; and

b. Within 24 hours, verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed the limits and actions to mitigate exposure to smoke hazards are taken; and

c. Within 90 days, restore the CRE boundary to operable status;

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION *:

1. With one control room emergency filtration subsystem inoperable for reasons other than Condition b.3, restore the inoperable subsystem to OPERABLE status within 7 days or initiate and maintain operation of the OPERABLE subsystem in the pressurization/recirculation mode of operation.

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* When recently irradiated fuel is being handled in the secondary containment.

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

LIMITING CONDITION FOR OPERATION (continued)

2. With both control room emergency filtration subsystems inoperable for reasons other than Condition b.3, suspend handling of recently irradiated fuel in the secondary containment.

3. With one or more control room emergency filtration subsystems inoperable due to an inoperable CRE boundary##, immediately suspend handling of recently irradiated fuel.

c. The provisions of Specification 3.0.3 are not applicable in OPERATIONAL CONDITION*.

SURVEILLANCE REQUIREMENTS

4.7.2.1.1 Each control room emergency filtration subsystem shall be demonstrated OPERABLE:

a. DELETED

b. In accordance with the Surveillance Frequency Control Program by verifying that the subsystem operates for at least 15 continuous minutes with the heaters on.

---

* When recently irradiated fuel is being handled in the secondary containment.

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

PLANT SYSTEMS

CONTROL ROOM AIR CONDITIONING (AC) SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.2.2 Two control room AC subsystems shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, and *.

ACTION:

a. In OPERATIONAL CONDITION 1, 2 or 3:

1. With one control room AC subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With two control room AC subsystems inoperable:

a. Verify control room air temperature is less than 90°F at least once per 4 hours; and

b. Restore one control room AC subsystem to OPERABLE status within 72 hours.

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION *:

1. With one control room AC subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 30 days; or place the OPERABLE control room AC subsystem in operation; or immediately suspend movement of recently irradiated fuel assemblies in the secondary containment.

2. With two control room AC subsystems inoperable, immediately suspend movement of recently irradiated fuel assemblies in the secondary containment.

3. The provisions of Specification 3.0.3 are not applicable in Operational Condition *.

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* When recently irradiated fuel is being handled in the secondary containment.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES – SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and

b. Two diesel generators, one of which shall be diesel generator A or diesel generator B, each with:

1. A separate fuel oil day tank containing a minimum of 360 gallons of fuel.

2. A fuel storage system consisting of two storage tanks containing a minimum of 44,800 gallons of fuel.

3. A separate fuel transfer pump for each storage tank.

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5 and *.

ACTION:

a. With less than the above required A.C. electrical power sources OPERABLE, suspend CORE ALTERATIONS, handling of recently irradiated fuel in the secondary containment, and crane operations over the spent fuel storage pool when fuel assemblies are stored therein. In addition, when in OPERATIONAL CONDITION 5 with the water level less than 22'-2" above the reactor pressure vessel flange, immediately initiate corrective action to restore the required power sources to OPERABLE status as soon as practical.

b. The provisions of Specification 3.0.3 are not applicable.

c. With one fuel oil transfer pump inoperable, realign the flowpath of the affected tank to the tank with the remaining operable fuel oil transfer pump within 48 hours and restore the inoperable transfer pump to OPERABLE status within 14 days, otherwise declare the affected emergency diesel generator (EDG) inoperable. This variance may be applied to only one EDG at a time.

SURVEILLANCE REQUIREMENTS

4.8.1.2 At least the above required A.C. electrical power sources shall be demonstrated OPERABLE per Surveillance Requirements 4.8.1.1.1, 4.8.1.1.2, and 4.8.1.1.3, except for the requirement of 4.8.1.1.2.a.5.

* When handling recently irradiated fuel in the secondary containment.

ELECTRICAL POWER SYSTEMS

D.C. SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.8.2.2 As a minimum, two of the following four channels of the D.C. electrical power sources, one of which shall be channel A or channel B, shall be OPERABLE with:

a. Channel A, consisting of:
   1. 125 volt battery 1AD411
   2. 125 volt full capacity charger# 1AD413 or 1AD414

b. Channel B, consisting of:
   1. 125 volt battery 1BD411
   2. 125 volt full capacity charger# 1BD413 or 1BD414.

c. Channel C, consisting of:
   1. 125 volt battery 1CD411
   2. 125 volt full capacity charger# 1CD413 or 1CD414
   3. 125 volt battery 1CD447
   4. 125 volt full capacity charger 1CD444

d. Channel D, consisting of:
   1. 125 volt battery 1DD411
   2. 125 volt full capacity charger# 1DD413 or 1DD414
   3. 125 volt battery 1DD447
   4. 125 volt full capacity charger 1DD444

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5 and *.

ACTION:

a. With less than two channels of the above required D.C. electrical power sources OPERABLE, suspend CORE ALTERATIONS and handling of recently irradiated fuel in the secondary containment.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.8.2.2 At least the above required battery and charger shall be demonstrated OPERABLE per Surveillance Requirement 4.8.2.1.

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* When handling recently irradiated fuel in the secondary containment.

\# Only one full capacity charger per battery is required for the channel to be OPERABLE.

LIMITING CONDITION FOR OPERATION (Continued)

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5 and *.

ACTION:

a. With less than two channels of the above required A.C. distribution system energized, suspend CORE ALTERATIONS and handling of recently irradiated fuel in the secondary containment.

b. With less than two channels of the above required D.C. distribution system energized, suspend CORE ALTERATIONS and handling of recently irradiated fuel in the secondary containment.

c. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.8.3.2 At least the above required power distribution system channels shall be determined energized in accordance with the Surveillance Frequency Control Program by verifying correct breaker/switch alignment and voltage on the busses/MCCs/panels.

* When handling recently irradiated fuel in the secondary containment.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 213

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-57

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By application dated September 21, 2017 (Reference 1), as supplemented by letters dated June 27, 2018 (Reference 2); July 19, 2018 (Reference 3); and September 6, 2018 (Reference 8), PSEG Nuclear LLC (PSEG or the licensee) requested to adopt Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control" (Reference 4), which changes the Technical Specifications (TSs) for Hope Creek Generating Station (Hope Creek). Traveler TSTF-542, Revision 2, was approved by the U.S. Nuclear Regulatory Commission (NRC or the Commission) on December 20, 2016 (Reference 5).

The proposed changes would replace existing TS requirements associated with "operations with a potential for draining the reactor vessel" (OPDRVs) with revised TSs providing an alternative requirement for reactor pressure vessel (RPV) water inventory control (WIC). These alternative requirements would protect Safety Limit 2.1.4. Hope Creek TS 2.0, "Safety Limits and Limiting Safety System Settings," Section 2.1.4, states that the reactor vessel water level shall be above the top of the active irradiated fuel for Operational Conditions 3, 4, and 5. If the reactor vessel water level is at or below the top of the active irradiated fuel, TS required actions are to initiate the emergency core cooling system (ECCS) to restore the water level after depressurizing the reactor vessel, if required. Safety Limit 2.1.4 is maintained through the TS limiting condition for operation (LCO), applicability, actions, and notes. The Hope Creek TSs require certain safety systems to be operable during OPDRVs.

Additionally, a new definition, "Drain Time," would be added to the Hope Creek TSs, Section 1.0, "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 Operational Conditions 4 and 5 outage-related activities. Adequate licensee management of secondary containment requirements or mitigation of certain ECCS safety injection/spray systems during Operational Conditions 4 and 5 requires a properly calculated drain time.

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 safety evaluation (SE). These are explained below in Section 2.2.6 and evaluated in Section 3.7 of this SE.

The supplements, dated June 27, 2018; July 19, 2018; and September 6, 2018, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on January 30, 2018 (83 FR 4294).

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 fuel (TAF). These penetrations provide entry for control rods, recirculation flow, reactor water cleanup (RWCU), and shutdown cooling. 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 Operational Conditions 1 (Power Operation – Mode Switch Position in Run), 2 (Startup - Mode Switch Position in Startup/Hot Standby), and 3 (Hot Shutdown – Mode Switch Position in Shutdown and average reactor coolant temperature > 200 degrees Fahrenheit (°F)), the TSs for instrumentation and ECCS require operability of sufficient equipment to ensure large quantities of water will be injected into the vessel, should the water level decrease below the pre-selected value. These requirements are designed to mitigate the effects of a loss-of-coolant accident (LOCA) but also provide protection for other accidents and transients that involve a water inventory loss.

During BWR operation in Operational Conditions 4 (Cold Shutdown – Mode Switch Position in Shutdown and average reactor coolant temperature ≤ 200 °F) and 5 (Refueling – Mode Switch Position in Shutdown or Refuel [1]), the pressures and temperatures that could cause a LOCA are not present. During certain phases of refueling (Operational Condition 5), a large volume of water is available above the RPV (i.e., the RPV head is removed, the water level is ≥ 22 feet 2 inches over the top of the RPV flange (reference existing Hope Creek TSs 3/4.9.8 and 3/4.9.11).

The large volume of water available in and above the RPV (during much of the time when in Operational Condition 5) provides time for operator detection and manual operator action to stop and mitigate an RPV draining event. However, typically at other times during a refueling outage, during Cold Shutdown (Operational Condition 4) or Refueling (Operational Condition 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.

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

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

To address the draindown potential during Operational Conditions 4 and 5, the current Hope Creek 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 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 delete references to OPDRVs throughout the TSs.

2.2 Proposed TS Changes

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

Section 2.2.2 describes TS 3/4.3, "Instrumentation," revisions. This includes changes to the following:

- TS Table 3.3.2-1, "Isolation Actuation Instrumentation"
- TS Table 4.3.2.1-1, "Isolation Actuation Instrumentation Surveillance Requirements"
- TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation"
- TS Table 4.3.3.1-1, "Emergency Core Cooling System Actuation Instrumentation Surveillance Requirements."
- Table 3.3.7.1-1, "Radiation Monitoring Instrumentation"
- Table 4.3.7.1-1, "Radiation Monitoring Instrumentation Surveillance Requirements"

Section 2.2.2 also includes the following new section and tables:

- TS 3/4.3.12, "RPV Water Inventory Control Instrumentation"
- TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation"
- TS Table 3.3.12-2, "RPV Water Inventory Control Instrumentation Setpoints"
- TS Table 4.3.12.1-1, "RPV Water Inventory Control Instrumentation Surveillance Requirements"

Section 2.2.3 describes TS 3/4.5, "Emergency Core Cooling System," revisions. These include changes to the following:

- TS 3/4.5.2, "ECCS - Shutdown"
- TS 3/4.5.2 Limiting Condition for Operation"
- TS 4.5.2 Surveillance Requirements"

Section 2.2.4 describes TS 3/4.5.3, "Suppression Chamber," and Section 2.2.5 describes the deletion of OPDRV references.

Section 2.2.6 describes Hope Creek plant-specific variations to TSTF-542, Revision 2 (evaluated in Section 3.7 of this SE).

2.2.1 Addition of "Drain Time" Definition

Reference 1 includes the following definition of "Drain Time" that would be added to Hope Creek TS 1.0, "Definitions."

> 1.11.1 The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:
>
> a) The water inventory above the TAF is divided by the limiting drain rate;
>
> b) The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error), for all penetration flow paths below the TAF except:
>
> 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;
>
> 2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or
>
> 3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation device without offsite power.
>
> c) The penetration flow paths required to be evaluated per paragraph b) are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;
>
> d) No additional draining events occur; and
>
> e) Realistic cross-sectional areas and drain rates are used.

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

2.2.2 Changes to TS 3/4.3, "Instrumentation"

The following subsections describe the existing and proposed changes to the Hope Creek TS Section 3/4.3, "Instrumentation."

2.2.2.1 Changes to TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation"

In TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," the licensee proposed to delete requirements applicable during Operational Conditions 4 and 5 for the following trip functions:

1. Core Spray System

   (a) Reactor Vessel Water Level - Low Low Low, Level 1
   (c) Reactor Vessel Pressure - Low (Permissive)
   (d) Core Spray Pump Discharge Flow - Low (Bypass)
   (e) Core Spray Pump Start Time Delay - Normal Power
   (f) Core Spray Pump Start Time Delay - Emergency Power
   (g) Manual Initiation

2. Low Pressure Coolant Injection Mode of RHR System

   (a) Reactor Vessel Water Level - Low Low Low, Level 1
   (c) Reactor Vessel Pressure - Low (Permissive)
   (d) LPCI Pump Discharge Flow - Low (Bypass)
   (e) LPCI Pump Start Time Delay - Normal Power
   (f) Manual Initiation

Footnote '*' is proposed to be modified. The existing footnote, which states, "When the system is required to be OPERABLE per Specification 3.5.2," would be replaced by "Deleted."

TS Table 3.3.3-1, Action 32, which states, "With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, place the inoperable channel in the tripped condition within 24 hours," would be replaced by "Deleted."

2.2.2.2 Changes to TS Table 4.3.3.1-1, "Emergency Core Cooling System Actuation Instrumentation Surveillance Requirements"

In TS Table 4.3.3.1-1, "Emergency Core Cooling System Actuation Instrumentation Surveillance Requirements," the licensee proposed to delete SRs applicable during Operational Conditions 4 and 5 for the following trip functions:

1. Core Spray System

   (a) Reactor Vessel Water Level - Low Low Low, Level 1
   (c) Reactor Vessel Pressure - Low (Permissive)
   (d) Core Spray Pump Discharge Flow - Low (Bypass)

(e) Core Spray Pump Start Time Delay - Normal Power
(f) Core Spray Pump Start Time Delay - Emergency Power
(g) Manual Initiation

2. Low Pressure Coolant Injection Mode of RHR System

(a) Reactor Vessel Water Level - Low Low Low, Level 1
(c) Reactor Vessel Pressure - Low
(d) LPCI Pump Discharge Flow - Low (Bypass)
(e) LPCI Pump Start Time Delay - Normal Power
(f) Manual Initiation

Footnote '*' would also be modified. The existing footnote, which states, "When the system is required to be OPERABLE per Specification 3.5.2," would be replaced by "Deleted."

2.2.2.3 Insertion of New TS 3/4.3.12, "RPV Water Inventory Control Instrumentation"

The proposed new TS 3/4.3.12 is as follows:

INSTRUMENTATION

3/4.3.12 RPV WATER INVENTORY CONTROL INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.12 The RPV Water Inventory Control (WIC) actuation instrumentation channels shown in Table 3.3.12-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.12-1

ACTION:

a. With one or more channels inoperable, take the ACTION referenced in Table 3.3.12-1 for the channel immediately.

SURVEILLANCE REQUIREMENTS

4.3.12 Each RPV WIC actuation instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and LOGIC SYSTEM FUNCTIONAL TEST at the frequencies shown in Table 4.3.12.1-1.

2.2.2.4 Insertion of New TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation"

The proposed new TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation," is shown below with applicable footnotes:

TABLE 3.3.12-1
RPV WATER INVENTORY CONTROL INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTIONS
1. CORE SPRAY SYSTEM			
a. Reactor Vessel Pressure - Low (Permissive)	4/division [a][c]	4, 5	83
b. Core Spray Pump Discharge Flow - Low (Bypass)	1/subsystem [a]	4, 5	84
c. Manual Initiation	1/division [a]	4, 5	84
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM			
a. Reactor Vessel Pressure - Low (Permissive)	1/valve [a]	4, 5	83
b. LPCI Pump Discharge Flow - Low (Bypass)	1/pump [a][d]	4, 5	84
c. Manual Initiation	1/subsystem [a]	4, 5	84
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION			
a. Reactor Vessel Water Level - Low, Level 3	2/Valve	(b)	85
4. REACTOR WATER CLEANUP SYSTEM ISOLATION			
a. Reactor Vessel Water Level - Low Low, Level 2	2/Valve	(b)	85

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

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

(c) Division 1 and 2 only.

(d) Function not required to be OPERABLE while associated pump is operating in decay heat removal when minimum flow valve is closed and deactivated.

2.2.2.5 Insertion of New TS Table 3.3.12-1, "Action Statements"

The proposed new TS Table 3.3.12-1 Actions are shown below:

TABLE 3.3.12-1 (Continued)
RPV WATER INVENTORY CONTROL INSTRUMENTATION ACTION

ACTION 83 – Place the channel in trip within 1 hour. Otherwise, immediately declare the associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 84 – Restore the channel to OPERABLE status within 24 hours. Otherwise, immediately declare the associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 85 – Declare the associated flow path(s) incapable of automatic isolation and calculated DRAIN TIME immediately.

2.2.2.6 Insertion of New TS Table 3.3.12-2, "RPV Water Inventory Control Instrumentation Setpoints"

The proposed new TS Table 3.3.12-2, "RPV Water Inventory Control Instrumentation Setpoints," is shown below:

TRIP FUNCTION	ALLOWABLE VALUE
1. CORE SPRAY SYSTEM	
a. Reactor Vessel Pressure - Low (Permissive)	≤ 481 psig
b. Core Spray Pump Discharge Flow - Low (Bypass)	≥ 650 gpm
c. Manual Initiation	N.A.
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM	
a. Reactor Vessel Pressure - Low (Permissive)	≤ 460 psig
b. LPCI Pump Discharge Flow - Low (Bypass)	≥ 1100 gpm
c. Manual Initiation	N.A.
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION	
a. Reactor Vessel Water Level - Low, Level 3	≥ 11 inches
4. REACTOR WATER CLEANUP SYSTEM ISOLATION	
a. Reactor Vessel Water Level - Low Low, - Level 2	≥ - 45 inches

2.2.2.7 Insertion of New TS Table 4.3.12.1-1, "RPV Water Inventory Control Instrumentation Surveillance Requirements"

The proposed new TS Table 4.3.12.1-1, "RPV Water Inventory Control Instrumentation Surveillance Requirements," is shown below:

TABLE 4.3.12.1-1
RPV WATER INVENTORY CONTROL INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK [a]	CHANNEL FUNCTIONAL TEST [a]	LOGIC SYSTEM FUNCTIONAL TEST [a]	OPERATIONAL CONDITION FOR WHICH SURVEILLANCE REQUIRED
1 CORE SPRAY SYSTEM				
a. Reactor Vessel Pressure - Low (Permissive)			N.A.	4, 5
b. Core Spray Pump Discharge Flow - Low (Bypass)			N.A.	4, 5
c. Manual Initiation	N.A.	N.A.		4, 5

2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM				
a. Reactor Vessel Pressure - Low (Permissive)			N.A.	4, 5
b. LPCI Pump Discharge Flow - Low (Bypass)			N.A.	4, 5
c. Manual Initiation	N.A.	N.A		4, 5
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION				
a. Reactor Vessel Water Level - Low, Level 3			N.A	(b)
4. REACTOR WATER CLEANUP SYSTEM ISOLATION				
a. Reactor Vessel Water Level - Low Low, Level 2			N.A	(b)

(a) Frequencies are specified in the Surveillance Frequency Control Program unless otherwise noted in the table.

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

2.2.3 Changes to TS 3/4.5, "Emergency Core Cooling Systems"

The title of TS 3/4.5, "Emergency Core Cooling Systems," would be changed to "Emergency Core Cooling Systems (ECCS) and RPV Water Inventory Control"

2.2.3.1 Changes to TS 3/4.5.2, "ECCS - Shutdown"

The following subsection describes the proposed changes to the Hope Creek TS Section 3/4.5.2, "ECCS - Shutdown."

The title of TS 3/4.5.2 would be changed from "ECCS - Shutdown" to "RPV Water Inventory Control."

2.2.3.1.1 Changes to TS 3/4.5.2 LCO

The proposed changes to TS 3.5.2 are as follows:

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

AND

At least one of the following low pressure ECCS subsystems shall be OPERABLE:

a. Core spray system subsystem with a subsystem comprised of:

1. Two OPERABLE core spray pumps, and

2. An OPERABLE flow path capable of taking suction from at least one of the following water sources and transferring the water through the spray sparger to the reactor vessel:

   a) From the suppression chamber, or

   b) When the suppression chamber water level is less than the limit or is drained, from the condensate storage tank containing at least 135,000 available gallons of water.

b. Low pressure coolant injection (LPCI) system subsystem with a subsystem comprised of:

1. One OPERABLE LPCI pump, and
2. An OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel. **

APPLICABILITY: OPERATIONAL CONDITION 4 and 5.

ACTION:

a. With none of the above low pressure ECCS subsystems OPERABLE, immediately suspend CORE ALTERATIONS and restore a subsystem to OPERABLE status within 4 hours. Otherwise, immediately initiate action to establish a method of water injection capable of operating without offsite electrical power.

b. Deleted.

c. With DRAIN TIME < 36 hours and ≥ 8 hours, within 4 hours:

   1. Verify secondary containment boundary is capable of being established in less than the DRAIN TIME, AND
   2. Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME, AND
   3. Verify one Filtration, Recirculation and Ventilation (FRVS) ventilation unit is capable of being placed in operation in less than the DRAIN TIME.

   Otherwise, immediately initiate action to restore DRAIN TIME to ≥ 36 hours.

d. With DRAIN TIME < 8 hours, immediately:

   1. Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours*** AND,
   2. Initiate action to establish secondary containment boundary, AND

3. Initiate action to isolate each secondary containment penetration flow path or verify it can be manually isolated from the control room, AND
4. Initiate action to verify one FRVS ventilation unit is capable of being placed in operation.

Otherwise, immediately initiate action to restore DRAIN TIME to ≥ 36 hours.

e. With DRAIN TIME < 1 hour, immediately initiate action to restore DRAIN TIME to ≥ 36 hours.

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* Deleted.

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

***Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power.

In addition, the proposed change to TS LCO 3.5.2 would remove existing Action b and Footnote '*' associated with Applicability Operational Condition 5, which currently state:

> Action b: With both of the above required subsystems inoperable, suspend CORE ALTERATIONS and all operations with a potential for draining the reactor vessel. Restore at least one subsystem to OPERABLE status within 4 hours or establish SECONDARY CONTAINMENT INTEGRITY within the next 8 hours.
>
> Footnote '*': The ECCS is not required to be OPERABLE provided that the reactor vessel head is removed, the cavity is flooded, the spent fuel pool gates are removed, and water level is maintained within the limits of Specifications 3.9.8 and 3.9.9.

Both LCO 3.5.2 Action b and Footnote '*' would be replaced with "Deleted."

2.2.3.1.2 Changes to TS 4.5.2 SRs

The proposed changes to TS SR 4.5.2 for Hope Creek would replace existing SRs 4.5.2.1 and 4.5.2.2 as follows:

> 4.5.2.1 Verify DRAIN TIME ≥ 36 hours in accordance with the Surveillance Frequency Control Program.
>
> 4.5.2.2 Verify, for a required low pressure coolant injection (LPCI) subsystem, the suppression chamber water level is ≥ 5.0 inches in accordance with the Surveillance Frequency Control Program.

The proposed changes to TS 4.5.2 for Hope Creek would add six new SRs:

4.5.2.3 Verify, for a required Core Spray (CS) subsystem, the Suppression chamber indicated water level is ≥ 5.0 inches or condensate storage tank contains at least 135,000 available gallons of water in accordance with the Surveillance Frequency Control Program.

4.5.2.4 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.

4.5.2.5 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. #

4.5.2.6 Operate the required ECCS injection/spray subsystem through the recirculation line for ≥ 10 minutes, in accordance with the Surveillance Frequency Control Program.

4.5.2.7 Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal, in accordance with the Surveillance Frequency Control Program.

4.5.2.8 Verify the required ECCS injection/spray subsystem actuates on a manual initiation signal, in accordance with the Surveillance Frequency Control Program. ##

The proposed changes to TS SR 4.5.2 for Hope Creek would add two new SR footnotes:

Except that an automatic valve capable of automatic return to its ECCS position when an ECCS signal is present may be in position for another mode of operation.

Vessel injection/spray may be excluded.

2.2.4 Changes to TS 3/4.5.3, "Suppression Chamber"

TS 3/4.5.3, "Suppression Chamber," is revised to remove the references to Operational Conditions 4 and 5. Specifically, 3.5.3 LCO b, Action b, LCO Footnote '*', SR 4.5.3.1 part b, and SR 4.5.3.2 are deleted. TS 3.5.3 LCO and SR 4.5.3 are shown below:

LIMITING CONDITION FOR OPERATION

3.5.3 The suppression chamber shall be OPERABLE:

a. In OPERATIONAL CONDITION 1, 2 and 3 with an indicated water level of at least 74.5".

b. Deleted

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2 and 3.

ACTION:

a. In OPERATIONAL CONDITION 1, 2 or 3 with the suppression chamber water level less than the above limit, restore the water level to within the limit within 1 hour or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. Deleted

SURVEILLANCE REQUIREMENTS

4.5.3.1 The suppression chamber shall be determined OPERABLE by verifying the water level to be greater than or equal to:

a. 74.5" in accordance with the Surveillance Frequency Control Program in OPERATIONAL CONDITIONS 1, 2, and 3.

4.5.3.2 Deleted

2.2.5 Deletion of Reference to OPDRV Term

The licensee proposed to delete references to OPDRVs (or terms related to OPDRVs) throughout the Hope Creek TSs. These TSs contain one or more OPDRV references such as, "and during operations with a potential for draining the reactor vessel" or "and operations with a potential for draining the reactor vessel." The following table is a list of these TSs and their affected sections:

Hope Creek LCO	Location of OPDRV References
TS Table 3.3.2-1, "Isolation Actuation Instrumentation"	Note *
TS Table 4.3.2.1-1, "Isolation Actuation Instrumentation Surveillance Requirements"	Note *
TS Table 3.3.7.1-1, "Radiation Monitoring Instrumentation"	Note *
TS Table 4.3.7.1-1, "Radiation Monitoring Instrumentation Surveillance Requirements"	Note *
TS 3/4.6.5.1, "Secondary Containment Integrity"	Action b, Footnote *
TS 3/4.6.5.2, "Secondary Containment Automatic Isolation Dampers"	Action, Footnote *
TS 3/4.6.5.3.1, "FRVS Ventilation Subsystem"	Action a.2, Action b, Footnote *
TS 3/4.6.5.3.2, "FRVS Recirculation Subsystem"	Action a.2, Action b, Footnote *
TS 3/4.7.2.1, "Control Room Emergency Filtration System"	Action b.2, Action b.3, Footnote *
TS 3/4.7.2.2, "Control Room Air Conditioning (AC) System"	Action b.1, Action b.2, Footnote *
TS 3/4.8.1.2, "A.C. Sources – Shutdown"	Action a
TS 3/4.8.2.2, "D.C. Sources – Shutdown"	Action a
TS 3/4.8.3.2, "Distribution – Shutdown"	Action a, Action b

2.2.6 Hope Creek Plant-Specific TSTF-542 TS Variations

In Section 2.2 of Attachment 1 (Reference 1), the licensee identified several Hope Creek plant-specific TS variations from TSTF-542, Revision 2 (Reference 4), or the NRC-approved TSTF-542 SE (Reference 5). The licensee stated in the LAR that these variations do not affect the applicability of TSTF-542 or the NRC staff's SE to the proposed license amendment. Section 3.7 of this SE includes the staff's evaluation of each of these technical variations.

2.2.6.1 Variation 1, TS Operational Conditions

The Standard Technical Specifications (STS) Table 1.1-1 defines Modes of Operation for STS plants (1 through 5), while Hope Creek TS Table 1.2 defines Operational Conditions (1 through 5). The differences in the definitions of Operational Conditions 4 and 5 versus Modes 4 and 5 are as follows:

- Hope Creek has an Average Reactor Coolant Temperature limit of ≤ 140 °F for Operational Condition 5, Refueling, and STS does not.
- Hope Creek has notes that describe allowances for repositioning the reactor mode switch and refers to Special Test Exception TS 3.10.1, 3.10.3 and 3.10.8, while STS does not.

2.2.6.2 Variation 2, TS Table 3.3.12-1, Actions 83, 84, and 85

Proposed TS Table 3.3.12-1 for RPV WIC Instrumentation presents the TS actions in a manner consistent with the format of the current Hope Creek TSs. TS Action 83 combines TSTF-542 TS 3.3.5.2 Required Actions C.1 and E.1 in a single action statement. Similarly, TS Action 84 combines TSTF-542 TS 3.3.5.2 Required Actions D.1 and E.1, and TS Action 85 combines TSTF-542 TS 3.3.5.2 Required Actions B.1 and B.2.

2.2.6.3 Variation 3, TS Table 3.3.3-1, Action 32

In Hope Creek TS Table 3.3.3-1 for ECCS Actuation Instrumentation, TS Action 32 applies only in Operational Conditions 4 and 5. Therefore, consistent with the removal of Operational Conditions 4 and 5 requirements from the ECCS Actuation Instrumentation TS, TS Action 32 is being deleted.

2.2.6.4 Variation 4, TS Table 3.3.12-1, New Note (c)

Note (c) is being added to TS Table 3.3.12-1 for the Core Spray Reactor Vessel Pressure Low (Permissive) trip function. Note (c) clarifies that the trip function is only required for Divisions 1 and 2. The note is included in the current TS Table 3.3.3-1 for ECCS Actuation Instrumentation.

2.2.6.5 Variation 5, TS SR 4.5.2.5, Modified Note

Proposed SR 4.5.2.5 would be modified by a note permitting automatic valves capable of automatic return to their ECCS position when an ECCS signal is present to be in position for another mode of operation. The note is included in current SR 4.5.1.a.1.b and is consistent with the STS Bases for SR 3.5.2.5.

2.2.6.6 Variation 6, TS Table 3.3.12-1, LPCI and Decay Heat Removal Alignment

PSEG is proposing to add a Note (d) to TS Table 3.3.12-1 (RPV WIC Instrumentation) function to clarify the intent of allowing credit for an operable Low Pressure Coolant Injection (LPCI) subsystem when it is aligned and operating in the decay heat removal mode of residual heat removal (RHR).

2.2.6.7 Variation 7, TS Index Correction

During the development of this LAR to adopt TSTF-542, Revision 2, an administrative error was identified within the TS Index. As part of Hope Creek License Amendment No. 146, TS Definition 1.13, Emergency Core Cooling System (ECCS) Response Time, was relocated to TS page 1-3.

2.2.6.8 Variation 8, TS 3.5.3, Suppression Chamber and Core Alterations

To align with NUREG-1433, Revision 4, and consistent with TSTF-542, Revision 2, PSEG proposes to revise TS 3.5.3, "Suppression Chamber," to remove TS requirements associated with Operational Conditions 4 and 5 since they are redundant to the requirements and intent of the newly proposed TS Section 3.5.2, "RPV Water Inventory Control."

Specifically, TS LCO 3.5.3.b is addressed in newly proposed TS LCO 3.5.2 and its associated SRs 4.5.2.2 and 4.5.2.3. In Operational Conditions 4 and 5, TS LCO 3.5.3.b requires a minimum indicated suppression chamber water level of 5.0 inches, except that the suppression chamber level may be less than the limit, provided that:

1. No operations are performed that have a potential for draining the reactor vessel,
2. The reactor mode switch is locked in the Shutdown or Refuel position,
3. The condensate storage tank contains at least 135,000 available gallons of water, and
4. The core spray (CS) system is operable per Specification 3.5.2 with an operable flow path capable of taking suction from the condensate storage tank and transferring the water through the spray sparger to the reactor vessel.

With LCO 3.5.3.b not met, TS Action 3.5.3.b requires core alterations and operations that have a potential for draining the reactor vessel to be suspended, the reactor mode switch to be locked in the shutdown position, and secondary containment integrity to be established within 8 hours.

The minimum required suppression chamber water level in TS LCO 3.5.3.b and SR 4.5.3.2 is made redundant by proposed SR 4.5.2.2 for LPCI subsystems and 4.5.2.3 for CS subsystems, which are consistent with TSTF-542. Removal of the TS Action 3.5.3.b requirement to suspend operations that have a potential for draining the reactor vessel is consistent with the proposed addition of drain time requirements to TS LCO 3.5.2. The TS Action 3.5.3.b requirement to establish secondary containment integrity within 8 hours is made redundant by proposed TS Actions 3.5.2.c and 3.5.2.d for drain times not meeting LCO 3.5.2, which are consistent with TSTF-542.

TS Action 3.5.3.b is currently modified by a note stating that the suppression chamber is not required to be operable in Operational Condition 5, provided that the reactor vessel head is removed, the cavity is flooded or being flooded from the suppression pool, the spent fuel pool gates are removed when the cavity is flooded, and the water level is maintained within the limits

of Specifications 3.9.8 and 3.9.9. Removal of this note is consistent with the proposed addition of drain time requirements to TS LCO 3.5.2 and the removal of the similar allowance from STS 3.5.2 applicability for Mode 5.

The removal of TS 3.5.3 requirements related to core alterations and reactor mode switch position is addressed in Variation 13 below.

2.2.6.9 Variation 9, TS Table 3.3.3-1, "CS System Pump Start Delay Time"

Current Hope Creek TS Table 3.3.3-1 includes Trip Functions 1e and 1f, Core Spray Pump Start Delay Time – Normal Power and Core Spray Pump Start Delay Time – Emergency Power, respectively, which are required to be operable in Operational Conditions 1, 2, 3, 4, and 5. The purpose of the delay times is to stagger the automatic start of the CS pumps, limiting starting transients on their associated 4.16 kV emergency buses. This staggering is unnecessary for manual operation. Therefore, these functions applicable in Operational Conditions 4 and 5 are being removed from Table 3.3.3-1 and are not being included in the proposed TS Table 3.3.12-1 for RPV WIC instrumentation.

2.2.6.10 Variation 10, TS Table 3.3.12-1, Note (a)

The Hope Creek Core Spray Reactor Vessel Pressure - Low (Permissive) is initiated from four pressure transmitters each in two divisions. The low pressure permissive for each division is provided in one-out-of-two-taken-twice logic. Manual initiation of each CS subsystem requires the low pressure permissive from the associated division.

The Hope Creek LPCI Reactor Vessel Pressure - Low (Permissive) is initiated from a pressure switch downstream of each LPCI injection valve. Manual initiation of each LPCI subsystem requires the low pressure permissive from the associated pressure switch.

Note (a) is, therefore, being added to proposed TS Table 3.3.12-1 for the CS and LPCI Reactor Vessel Pressure Low (Permissive) trip functions. Note (a) states that the Minimum Operable Channels per Trip Function requirement applies to those functions associated with an ECCS subsystem required to be operable by LCO 3.5.2, "RPV Water Inventory Control."

2.2.6.11 Variation 11, Filtration, Recirculation, and Ventilation System (FRVS)

The FRVS consists of two subsystems that are required to perform post-accident, safety-related functions. The FRVS recirculation system recirculates the Reactor Building air through filters for cleanup. This subsystem is the initial cleanup system before discharge is made via the FRVS ventilation subsystem. The FRVS maintains the Reactor Building at a negative pressure with respect to the outdoors. A single FRVS ventilation subsystem is capable of maintaining the Reactor Building at a negative pressure with respect to the environment and filter gaseous releases in Operational Conditions 4 and 5. FRVS requirements are contained in proposed TS Actions 3.5.2.c and 3.5.2.d and are consistent with the requirements for the standby gas treatment system in TSTF-542.

2.2.6.12 Variation 12, TS LCO 3.5.2, Action b Deletion

In Reference 1, the licensee stated that in alignment with TSTF-542, Revision 2, Proposed Safety Basis (Section 3.1.2), the existing Hope Creek TS 3.5.2 requirement to suspend core alterations as an action for ECCS inoperability is no longer warranted since there are no

postulated events associated with core alterations that are prevented or mitigated by the proposed RPV WIC requirements. In addition, loss of RPV inventory events is not initiated by core alteration operations. Refueling LCOs 3.9.1, Reactor Mode Switch; 3.9.2, Instrumentation; 3.9.3, Control Rod Position; and 3.9.8, Water Level - Reactor Vessel, provide requirements to ensure safe operation during core alterations, including required water level above the RPV flange. Therefore, PSEG proposes to delete TS 3.5.2, Action 'b' in its entirety, including the action relating to core alterations.

In Reference 2, the licensee stated that the TS requirement for suspending core alterations has been reinstated by adding it into the newly proposed LCO 3.5.2, Action a, which now states:

> With none of the above low pressure ECCS subsystems OPERABLE, immediately suspend CORE ALTERATIONS and restore a subsystem to OPERABLE status within 4 hours. Otherwise, immediately initiate action to establish a method of water injection capable of operating without offsite electrical power.

2.2.6.13 Variation 13, TS LCO 3.5.3, Mode Switch to Locked

Variations 8 and 13 are related.

To align with NUREG-1433, Revision 4, and fully implement TSTF-542, Revision 2, PSEG proposes to revise TS 3.5.3, "Suppression Chamber," to remove TS requirements associated with Operational Conditions 4 and 5. As discussed above in Variation 8 (Section 2.2.6.8 of this SE), the requirements in TS 3.5.3 related to OPDRVs and actions to suspend OPDRVs are redundant to the requirements and intent of the newly proposed TS Section 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)."

LCO 3.5.3.b also requires the reactor mode switch to be locked in the shutdown or refuel position when suppression chamber water level is less than TS limits in Operational Conditions 4 and 5. By definition, the reactor mode switch is in shutdown or refuel in Operational Conditions 4 and 5. The requirement to lock the mode switch in either position is an administrative control, rather than an element in the lowest functional capability or performance levels of equipment required for safe operation of the facility required to be included in the TSs.

The TS Action 3.5.3.b requirement to lock the reactor mode switch in the shutdown position is not required because it does not provide compensatory measures for suppression chamber water level less than TS limits. The TS Action 3.5.3.b requirement to suspend core alterations is not required because Refueling Operations LCOs 3.9.1, Reactor Mode Switch; 3.9.2, Instrumentation; 3.9.3, Control Rod Position; and 3.9.8, Water Level - Reactor Vessel, provide requirements to ensure safe operation during core alterations.

2.2.6.14 Variation 14, Core Spray Manual Initiation

In Reference 8, the licensee revised TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation," Trip Function 1.c – Core Spray System Manual Initiation, as it was proposed in References 1 and 2. The minimum operable channels per trip function is changed from "1/subsystem" to "1/division."

2.3 Applicable Regulatory Requirements

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

As required, in part, by 10 CFR 50.36(c):

> Technical specifications 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 TSs until the condition can be met.

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

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

Pursuant to 10 CFR 50.90, whenever a holder of an operating license desires to amend the license, an 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, 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 (Reference 9 and Reference 10), contains the STS for BWR/4 plants. It is part of the regulatory standardization effort that the NRC staff has prepared STS for each of the light-water reactor nuclear designs.

The NRC staff's guidance for review of TSs is in Chapter 16, "Technical Specifications," of NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP), dated March 2010 (Reference 6).

2.3.1 Hope Creek Applicable Regulatory Design Requirements

Hope Creek Updated Final Safety Analysis Report (UFSAR) Section 3.1. "Conformance with NRC General Design Criteria," describes the extent to which the design criteria for the plant structures, systems, and components important to safety meet the General Design Criteria for Nuclear Power Plants specified in 10 CFR Part 50, Appendix A. The following criteria from the Hope Creek UFSAR are related to this LAR.

> Criterion 13 – Instrumentation and Control. Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operations, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the RCPB [reactor coolant pressure boundary], and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.
>
> Criterion 14 – Reactor Coolant Pressure Boundary. The RCPB shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.
>
> Criterion 30 – Quality of Reactor Coolant Pressure Boundary. Components which are part of the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practical. Means shall be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage.
>
> Criterion 33 – Reactor Coolant Makeup. A system to supply reactor coolant makeup for protection against small breaks in the RCPB shall be provided. The system safety function shall be to assure that specified acceptable fuel design limits are not exceeded as a result of reactor coolant loss due to leakage from the RCPB and rupture of small piping or other small components which are part of the boundary. The system shall be designed to assure that for onsite electric power system operation, assuming offsite power is not available, and for offsite electric power system operation, assuming onsite power is not available, the system safety function can be accomplished using the piping, pumps, and valves used to maintain coolant inventory during normal reactor operation.

Criterion 35 – Emergency Core Cooling. A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that:

1) Fuel and clad damage that could interfere with continued effective core cooling is prevented

2) Clad metal-water reaction is limited to negligible amounts.

Suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and containment capabilities shall be provided to assure that, assuming a single failure for onsite electrical power system operation, assuming offsite power is not available, and for offsite electrical power system operation, assuming onsite power is not available, the system safety function can be accomplished.

3.0 TECHNICAL EVALUATION

Section 2.2 of this SE lists the proposed TS changes, as included in References 1, 2, and 3 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 Staff Evaluation of Proposed "Drain Time" Definition

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

The NRC staff reviewed the proposed drain time definition from TSTF-542. For the purpose of NRC staff considerations, the term "break" describes a pathway for water to drain from the RPV that has not been prescribed in the "Drain Time" definition proposed in TSTF-542. Based on information furnished by the licensee, the NRC staff has determined 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 staff reviewed requests for additional information used during the development of TSTF-542, Revision 2, which provided examples of bounding drain time calculations for three examples: (1) water level at or below the RPV flange, (2) water level above RPV flange with fuel pool gates installed, and; (3) water level above RPV flange with fuel pool gates removed. The drain time is calculated by taking the water inventory above the break and dividing by the limiting drain rate until the TAF is reached. The limiting drain rate is a variable parameter depending on the break size and the reduction of elevation head above break location during the draindown event. The discharge point will depend on the lowest potential drain point for each RPV penetration flow path on a plant-specific basis. This calculation provides a conservative approach to determining the drain time of the RPV.

The NRC staff concluded that the licensee will use methods resulting in conservative calculations to determine RPV drain time, thereby protecting Safety Limit 2.1.4, 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 Hope Creek TSs is acceptable.

3.2 Staff Evaluation of Proposed TS 3/4.3.12, "RPV Water Inventory Control Instrumentation"

The purpose of the proposed 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 control functions that are required for manual pump starts or required as a permissive or as operational controls on the equipment of the systems that provide water injection capability, certain start commands, pump protection, and isolation functions. These instruments are required to be operable if the systems that provide water injection and isolation functions are to be considered operable, as described in Section 3.3 of this SE for revised TS 3.5.2. For Hope Creek, reactor operators have manual initiation push buttons for vessel injection, and, as an alternate, often more complex means of starting and injecting water than the preferred simple push button start but which can still be accomplished within the timeframes assumed in the development of TSTF-542.

Specifically, the proposed new TS 3/4.3.12 supports operation of the CS system and LPCI mode of the RHR system, including manual starts when needed, as well as the system isolation of the shutdown cooling system and the RWCU system. The equipment involved with each of these systems is described in the evaluation of TS 3/4.5.2 and the Bases for TS 3/4.5.2.

3.2.1 Staff Evaluation of Proposed TS 3/4.3.12, LCO and Applicability

A new TS 3/4.3.12, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC) Instrumentation," is proposed to provide alternative instrumentation requirements to support manual initiation of the ECCS injection/spray subsystem. This subsystem is required in the revised TS 3.5.2 and for automatic isolation of penetration flow paths that may be credited in the determination of drain time. The current TSs that contain instrumentation requirements related to OPDRVs are in TSs 3/4.3.2, 3/4.3.3, and 3/4.3.7.1. The requirements from TS Tables 3.3.3-1 (ECCS actuation instrumentation) and 4.3.3.1-1 (ECCS actuation instrumentation SRs) are being consolidated into new TS Tables 3.3.12-1 (RPV WIC instrumentation), 3.3.12-2 (RPV WIC instrumentation setpoints), and 4.3.12.1-1 (RPV WIC instrumentation SRs).

The references to OPDRV requirements throughout the current TSs would be deleted, as discussed in Section 3.8 of this SE.

The proposed LCO 3.3.12 states, "The RPV Water Inventory Control (WIC) actuation instrumentation channels shown in Table 3.3.12-1 shall be OPERABLE." The proposed applicability states, "As shown in Table 3.3.12-1."

Table 3.3.12-1 contains the trip 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 trip functions in Table 3.3.12-1 are removed from existing TS Tables 3.3.3-1 and 3.3.2-1.

New TS 3/4.3.12 places these trip functions in a single location with requirements appropriate to support the safety function for TS 3/4.5.2. If plant-specific design and TSs require different functions to support manual initiation of an ECCS subsystem, those functions are included in TS 3/4.3.12.

The NRC staff concluded that the licensee's proposed alternative is acceptable for Hope Creek since either CS or LPCI subsystems would be available to perform the intended function to inject water into the RPV; this meets the intent of the NRC-approved TSTF-542.

3.2.2 Staff Evaluation of the Proposed TS 3/4.3.12 Action

The proposed TS 3/4.3.3.12 actions are described in Section 2.2.2.5 of this SE.

Action 'a' would be applicable when one or more channels are inoperable in a trip system from Table 3.3.12-1 and directs the licensee to immediately enter the action referenced in Table 3.3.12-1 for any inoperable channels.

Action 3.3.12.a directs the licensee to take appropriate steps as required by TS Table 3.3.12-1. The NRC staff has determined this action satisfies the requirements of 10 CFR 50.36(c)(2)(i) by providing a remedial action permitted by the TS until the LCO can be met. The remedial actions provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

3.2.3 Staff Evaluation of Proposed TS 4.3.12 SRs and TS Table 4.3.12.1-1, "RPV Water Inventory Control Instrumentation Surveillance Requirements"

The proposed new TS 4.3.12 SRs include channel checks, Channel Functional Tests, and Logic System Functional Tests, as described in Sections 2.2.2.5 and 2.2.2.7 of this SE.

A channel check would apply to the following trip functions in Operational Conditions 4 and 5:

- Core Spray System: Reactor Vessel Pressure – Low (Permissive) and Core Spray Pump Discharge Flow-Low (Bypass)
- Low Pressure Coolant Injection Mode of RHR System: Reactor Vessel Pressure – Low (Permissive) and LPCI Pump Discharge Flow-Low (Bypass)

A channel check would apply to the following trip functions when automatic isolation of the associated penetration flow path(s) is credited in calculation drain time:

- RHR System Shutdown Cooling Mode Isolation: Reactor Vessel Water Level – Low, Level 3
- Reactor Water Cleanup System Isolation: Reactor Vessel Water Level - Low Low, Level 2

Performance of the channel check ensures 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 in 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 existing requirements and supports operating shift situational awareness.

The Channel Functional Test would apply to the following trip functions in Operational Conditions 4 and 5:

- CS Reactor Vessel Pressure – Low (Permissive)
- CS Core Spray Pump Discharge Flow-Low (Bypass)
- LPCI Reactor Vessel Pressure – Low (Permissive)
- LPCI Pump Discharge Flow-Low (Bypass)

The Channel Functional Test would apply to the following trip functions when automatic isolation of the associated penetration flow path(s) is credited in calculation drain time.

- RHR System Shutdown Cooling Mode Isolation: Reactor Vessel Water Level – Low, Level 3
- RWCU System Isolation: Reactor Vessel Water Level - Low Low, Level 2

The 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 is performed on each required channel to ensure that the entire channel will perform the intended function. The frequency is in accordance with the SFCP. This is acceptable to the NRC staff because it is consistent with the existing requirements for these functions and is based upon operating experience that demonstrates channel failure is rare. Since periods in Operational Conditions 4 and 5 as refueling outages are often on the order of 30 days or less, licensees could include this SR, if desired, as part of a refueling activity.

The Logic System Functional Test is applied to the following trip functions in Operational Conditions 4 and 5:

- CS System: Manual Initiation
- LPCI System: Manual Initiation

The Logic System Functional Test is 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, and demonstrates the operability of the required manual initiation logic for a specific channel. The frequency is in accordance with the SFCP. This is acceptable to the NRC staff because it is consistent with the existing requirements for these functions. Since periods in Operational Conditions 4 and 5 as refueling outages are often on the order of 30 days or less, licensees could include this SR, if desired, as part of a refueling activity.

3.3 TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation," and TS Table 3.3.12-2, "RPV Water Inventory Control Instrumentation Setpoints"

In order to support the requirements of TS 3/4.5.2, "RPV Water Inventory Control," and the definition of "Drain Time," the instrumentation requirements are designated in TS Table 3.3.12-1. These instruments are required to be operable if the systems that provide water injection and isolation functions are to be considered operable, as described in the NRC staff's evaluation of TS 3/4.5.2 (Section 3.4 of this SE).

Proposed TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation," specifies the instrumentation that shall be operable for each trip function in the table for Operational Conditions 4 and 5 (or other specified conditions), actions, required number of channels per function, and footnotes concerning items in the table. Proposed TS Table 3.3.12-2 specifies the allowable values for each trip function.

In Operational Conditions 4 and 5, each of the CS and LPCI pumps can be manually started by using either their component control switches with a water flow path established by the required valve switches, or by their division-level manual initiation push buttons. The licensee defined a subsystem as that which has full functional capability, while a division is a part of a subsystem. Per the Hope Creek UFSAR Section 6.3.2.2.3, there are four 50 percent capacity CS pumps, one in each division; two CS divisions make up a subsystem. Similarly, as stated in UFSAR Section 6.3.2.2.4, the LPCI system has four pumps, each with 100 percent capacity; each LPCI division is a subsystem. Therefore, Hope Creek has two CS subsystems and four LPCI subsystems. Automatic initiation of a CS/LPCI subsystem may be undesirable because it could lead to overflowing of the RPV cavity due to injection rates of thousands of gallons per minute. Thus, manual actuation is preferable, and there is adequate time to take manual actions (e.g., hours vs. minutes). Considering the action statements as the drain time decreases (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 initiate a CS/LPCI subsystem or the additional method of water injection, as needed. Consequently, there is no need for automatic initiation of a CS/LPCI subsystem to respond to an unexpected draining event. The NRC staff finds this acceptable because a draining event is a slow evolution when compared to a design-basis LOCA assumed to occur at a significant power level.

The NRC staff finds this change acceptable because the TS tables sufficiently discuss the purpose of the trip functions, applicability, number of required channels, and action when a trip function is inoperable. The selection of the allowable values shown in Table 3.3.12-2 is consistent with the current licensing basis requirements. This RPV WIC instrumentation set is acceptable because it is adequate so that the instrument channels respond with the required accuracy permitting pump systems to inject water when needed, and activating isolation equipment when commanded to support prevention or mitigation of a potential RPV draining event.

3.3.1 Staff Evaluation of Proposed TS Tables 3.3.12-1 and 3.3.12-2 Trip Functions and Setpoints

For TS Table 3.3.12-1, CS System Trip Function 1.a and LPCI Trip Function 2.a (both Reactor Vessel Pressure - Low (Permissive)), these signals are used as permissives for the low pressure ECCS subsystems. This ensures that, prior to opening the injection valves of the low pressure ECCS subsystems, the reactor pressure has fallen to a value below the subsystems' maximum design pressure. While it is assured during Operational Conditions 4 and 5 that the reactor steam dome pressure will be below the ECCS maximum design pressure, the Reactor Steam Dome Pressure - Low signals are assumed to be operable and capable of permitting initiation of the ECCS. The Core Spray Reactor Steam Dome Pressure - Low signals are initiated from four pressure transmitters in Divisions 1 and 2 that sense the reactor dome pressure. The LPCI Reactor Vessel Pressure – Low (Permissive) is initiated from a pressure switch downstream of each LPCI injection valve.

For the CS system, the reactor vessel pressure –low allowable value is ≤ 481 pounds per square inch gauge (psig) and the required channels per function is 4/division. This requirement is similar to Hope Creek TS Tables 3.3.3-1 and 3.3.3-2, trip function 1.c. Footnote (a) is related to this trip function which states the association with LCO 3.5.2. Also, Footnote (c) is associated to the trip function which states, Division 1 and 2 only.

For the LPCI system, the allowable value is ≤ 460 psig and the required channels per function is 1/valve, which is currently identified in Hope Creek TS Tables 3.3.3-1 and 3.3.3-2 (trip function 2.c). Footnote (a) is related to this trip function, which establishes the association with LCO 3.5.2.

For TS Table 3.3.12-1, CS System Trip Function 1.b and LPCI Trip Function 2.b (both Pump Discharge Flow-Low (Bypass)), these signals are provided to protect the associated low pressure ECCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump.

One flow transmitter per ECCS pump is used to detect the associated subsystem's flow rates. The logic is arranged such that each transmitter causes its associated minimum flow valve to open. The logic will close the minimum flow valve once the closure setpoint is exceeded. One channel of the Pump Discharge Flow - Low Function is required to be operable in Operational Conditions 4 and 5 when the associated CS or LPCI pump is required to be operable by LCO 3.5.2 to ensure the pumps are capable of injecting into the RPV when manually initiated.

For the CS system, the allowable value is ≥ 650 gallons per minute (gpm) and the required channels per function is 1/subsystem; this is currently located in Hope Creek TS Tables 3.3.3-1 and 3.3.3-2 (trip function 1.d). Footnote (a) is related to this trip function which establishes the association with LCO 3.5.2.

For the LPCI system, the allowable value is ≥ 1100 gpm and the required channels per function is 1/pump and is currently located in Hope Creek TS Tables 3.3.3-1 and 3.3.3-2 (trip function2.d). Footnote (a) is related to this trip function which establishes the association with LCO3.5.2. Footnote (d) is related to this trip function which identifies the function not required to be operable while its associated pump is operating in decay heat removal and when minimum flow valve is closed and deactivated.

For TS Table 3.3.12-1, CS System Trip Function 1.c and LPCI Trip Function 2.c (both Manual Initiation), these functions are to be operable in Operational Conditions 4 and 5. These functions were relocated from TS Tables 3.3.3-1 and 3.3.3-2 (trip functions 1.g and 2.f for CS and LPCI, respectively). The manual initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. There is one push button for each Division of low pressure ECCS. In Core Spray Divisions 1 and 2, manual initiation is associated with each CS pump and valve combination, while in Division 3 and 4 manual initiation is associated with each CS pump only. With respect to LPCI, there is one manual initiation push button for each of the four Divisions (i.e., one per subsystem). There are no Allowable Values for these functions since the channels are mechanically actuated based solely on the position of the push buttons. Footnote (a) is related to these trip functions which establishes the association with LCO 3.5.2.

For TS Table 3.3.12-1, Trip Function 3.a, RHR System Shutdown Cooling Mode Isolation, Reactor Vessel Water Level - Low, Level 3, is only required to be operable when automatic isolation of the associated penetration flow path is credited in the drain time calculation. The number of required instrument channels is 2 per valve, similar to the requirement specified in the current TS Table 3.3.2-1 (trip function 7.b). This is a new requirement in Operational Conditions 4 and 5 for the RHR/SDC system. The allowable value was chosen to be the same

as the allowable value for TS Table 3.3.2-2, "Isolation Actuation Instrumentation Setpoints," RHR/SDC mode isolation, Reactor Vessel Water Level – Low Level 3, which is ≥ 11 inches.

For TS Table 3.3.12-1, Trip Function 4.a, RWCU 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 number of required instrument channels is 2 per valve, similar to the requirement specified in current TS Table 3.3.2-1 (trip function 4.f). This is a new requirement in Operational Conditions 4 and 5 for the RWCU system. The allowable value was chosen to be the same as TS Table 3.3.2-2, "Isolation Actuation Instrumentation Setpoints," RWCU mode isolation, Reactor Vessel Water Level – Low Level 3, allowable value from, which is ≥ - 45 inches.

The NRC staff finds that proposed LCO Tables 3.3.12-1 and 3.3.12-2 correctly specify the lowest functional capability or performance levels of equipment required for safe operation of the facility. There is reasonable assurance that the actions required to be taken when the LCO is not met can be conducted without endangering the health and safety of the public.

3.3.2 Staff Evaluation of Proposed Table 3.3.12-1 Action

The proposed TS Table 3.3.12-1 actions are included in Section 2.2.2.7 of this SE.

Action 83:

Reactor vessel pressure-low permissive signals allow operation of the low pressure ECCS injection/spray subsystem manual injection functions when the pressure is below the specified allowable value. If the permissive is inoperable, manual initiation of ECCS is prohibited. Therefore, the permissive must be placed in the trip condition within 1 hour. With the permissive in the trip condition, manual initiation may be performed. Prior to placing the permissive in the tripped condition, the operator can take manual control of the pump and the injection valve to inject water into the RPV. The allowed outage time of 1 hour is intended to allow the operator time to evaluate any discovered inoperabilities and to place the channel in trip. With the action and associated allowed outage time of Action 83 not met, the associated low pressure ECCS injection/spray subsystem may be incapable of performing the intended function and must be declared inoperable immediately.

Action 84:

Concerning the CS system and LPCI mode of RHR, pumps discharge flow low – bypass; if this is inoperable, there is a risk that the associated low pressure 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 valve to ensure the pump does not overheat. The 24-hour allowed outage time was chosen to allow time for the operator to evaluate and repair any discovered inoperabilities. The allowed outage time is appropriate, given the ability to manually start the ECCS pumps and open the injection valves and to manually ensure the pump does not overheat. With the action and associated allowed outage time of Action 84 not met, the associated low pressure ECCS injection/spray subsystem may be incapable of performing the intended function and must be declared inoperable immediately.

Concerning manual initiation of CS system and LPCI mode of RHR, manual initiation with the main control room push buttons is preferred for vessel injection vs. operating pump(s) and valve(s) individual hand switches. If a manual initiation function is inoperable, the ECCS

subsystem pumps can be started manually and the valves can be opened manually, but this is not the preferred condition. The 24-hour allowed outage time was chosen to allow time for the operator to evaluate and repair any discovered inoperabilities. The allowed outage time is appropriate, given the ability to manually start the ECCS pumps and open the injection valves and to manually ensure the pump does not overheat. With the action and associated allowed outage time of Action 84 not met, the associated low pressure ECCS injection/spray subsystem may be incapable of performing the intended function and must be declared inoperable immediately.

Action 85:

Concerning RHR shutdown cooling mode and RWCU isolation, these functions are applicable when automatic isolation of the associated penetration flow path is credited in calculating drain time. If the instrumentation is inoperable, Action 85 directs an immediate declaration that the associated penetration flow path(s) are incapable of automatic isolation and requires calculation of drain time. The calculation cannot credit automatic isolation of the affected penetration flow paths.

Based on the NRC staff's review, proposed Actions 83, 84, and 85 in TS Table 3.3.12-1 are acceptable based on the actions taken related to the CS system, LPCI, RHR/SDC, and RWCU instrumentation that support new TS LCO 3.5.2. These actions satisfy the requirements of 10 CFR 50.36(c)(2)(i) by providing a remedial action permitted by the TSs until the LCO can be met. The remedial actions provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF. Therefore, there is reasonable assurance that the required actions to be taken when the LCO trip function is not met can be conducted without endangering the health and safety of the public.

The NRC staff finds these actions provide effective remedial measures because when one or more instrument channels are inoperable, the equipment and function controlled by these instruments cannot complete the required function in the normal manner, and direct the licensee to take appropriate actions as necessary. In addition, the NRC staff finds that proposed TS Tables 3.3.12-1 and 3.3.12-2 correctly specify 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.

3.4 Staff Evaluation of Proposed TS 3/4.5.2, "RPV Water Inventory Control"

The proposed LCO 3.5.2 states:

> DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours
>
> AND
>
> At least one of the following low pressure ECCS subsystems shall be OPERABLE:
>
> a. Core spray system subsystem with a subsystem comprised of:
>
> 1. Two OPERABLE core spray pumps, and

2. An OPERABLE flow path capable of taking suction from at least

   one of the following water sources and transferring the water through the spray sparger to the reactor vessel:

   a) From the suppression chamber, or

   b) When the suppression chamber water level is less than the limit or is drained, from the condensate storage tank containing at least 135,000 available gallons of water.

b. Low pressure coolant injection (LPCI) system subsystems with a subsystem comprised of:

   1. One OPERABLE LPCI pump, and

   2. An OPERABLE flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel. **

** A 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 reviewed the water sources that would be applicable to the proposed TS 3.5.2. One of the following shall be operable of either a CS system subsystem or one LPCI subsystem.

> A CS system subsystem consists of two motor driven pumps, flow path, and valves to transfer water from the suppression chamber or condensate storage tank to the RPV. An LPCI subsystem consists of one motor driven pump, flow path, and valves to transfer water from the suppression chamber to the RPV.

The CS system and LPCI 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 a CS system or LPCI pump would provide the necessary water source to counter these expected drain rates. Decay heat removal in Operational Conditions 4 and 5 is not affected by the proposed Hope Creek TS change, as these requirements on the number of shutdown cooling subsystems that must be operable and in operation to ensure adequate decay heat removal from the core are unchanged. These requirements can be found in Hope Creek TSs 3/4.4.9, Reactor Coolant System, "Residual Heat Removal – Cold Shutdown (TS LCO 3.4.9.2)"; 3/4.9.8, Refueling Operations, "Water Level – Reactor Vessel" (TS LCO 3.9.8); 3/4.9.11, Refueling Operations, "Residual Heat Removal and Coolant Circulation – High Water Level" (TS LCO 3.9.11.1); and Refueling Operations, "Low Water Level" (TS LCO 3.9.11.2). Based on these considerations, the NRC staff finds the water sources provide reasonable assurance that the lowest functional capability required for safe operation is maintained and protects the safety limit.

The proposed TS 3/4.5.2, "RPV Water Inventory Control" TS LCO 3.5.2 contains two parts. The first part states that drain time of RPV water inventory to the TAF shall be ≥ 36 hours, and the

second part states one low pressure ECCS subsystem shall be operable. The proposed applicability for TS LCO 3.5.2 is Operational Conditions 4 and 5.

The NRC staff reviewed the licensee's proposed TS LCO 3.5.2, focusing on ensuring the fuel remains covered with water and on the changes made compared to the current TS. The proposed TS LCO 3.5.2 contains Actions 'a through e' based on either required ECCS subsystem operability or drain time.

The current TS LCO states that two (both CS system and LPCI) subsystems shall be operable, whereas the proposed LCO 3.5.2 states that only one (CS or LPCI) low pressure ECCS subsystem shall be operable. The change from two subsystems to one low pressure ECCS subsystem is because this redundancy is not required. With one ECCS subsystem and nonsafety-related injection sources, defense-in-depth will be maintained. The defense-in-depth measure is consistent with other events considered during shutdown with no additional single failure assumed. The drain time controls, in addition to the required ECCS injection/spray subsystem, provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

The proposed Operational Conditions 4 and 5 applicability of TS LCO 3.5.2 is appropriate, given the unaffected TS requirements on ECCS in Operational Conditions 1, 2, and 3 (existing TS 3/4.5.1, "ECCS-Operating").

The proposed Action a states that if the required ECCS subsystem is inoperable, it is to be restored to operable status within 4 hours; otherwise, initiate action to establish a method of water injection capable of operating without offsite electrical power. The proposed action provides reasonable assurance of an available water source, if the required injection/spray subsystem is not met within the 4-hour completion time.

Existing TS LCO 3.5.2 Action b is deleted, which is described as Variation 12 in Sections 2.2.6.12 and 3.6.12 of this SE.

The proposed Action c states that for a drain time < 36 hours and ≥ 8 hours, the operators should, within 4 hours, (1) verify the secondary containment boundary is capable of being established in less than the drain time, and (2) verify each secondary containment penetration flow path is capable of being isolated in less than the drain time, and (3) verify that one required FRVS ventilation unit is capable of being placed in operation in less than the drain time. The proposed Action 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 FRVS ventilation unit capable of being placed in operation. In addition, if all of these actions are not completed within the time allotment, the operators are to immediately initiate action to restore drain time to ≥ 36 hours.

The proposed Action d states that when drain time < 8 hours, immediately (1) initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours, and (2) initiate action to establish a secondary containment boundary, (3) initiate action to isolate each secondary containment penetration flow path or verify it can be manually isolated from the control room, and (4) initiate action to verify one FRVS ventilation unit is capable of being placed in operation. Additionally, there is a Footnote '***', tied to Action d(1) stating that a required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. The proposed Action d provides adequate protection, should the drain time be

< 8 hours, because of the ability to establish an additional method of water injection (without offsite electrical power), establish secondary containment, isolate additional flow paths, and have an FRVS ventilation unit capable of being placed in operation. If all of these actions are not completed within the time allotment, the operators are to immediately initiate action to restore drain time to ≥ 36 hours

The proposed Action e states that with drain time < 1 hour, immediately initiate action to restore drain time to ≥ 36 hours. The proposed Action e is new, as it is not present in the current Hope Creek TSs. The proposed Action e is acceptable, as it provides the necessary step to restore the drain time to ≥ 36 hours.

Based on the NRC staff's review, the staff finds the proposed changes to TS LCO 3.5.2 are acceptable in establishing the actions to be taken to prevent the water level from reaching the TAF with the water sources available and to maintain drain time ≥ 36 hours. The LCO correctly specifies the lowest functional capability or performance levels of equipment required for safe operation of the facility. Further, 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.

3.4.1 Staff Evaluation of Proposed TS 4.5.2 Surveillances

The proposed TS 4.5.2 SRs include verification of drain time, verification of water levels/volumes that support CS and LPCI subsystems, verification of water-filled pipes to preclude water hammer events, verification of correct valve positions for the required ECCS injection/spray subsystem, operation of ECCS injection/spray systems in the recirculation line, verification of valves credited for automatic isolation actuated to the isolation position, and verification that the required ECCS injection/spray subsystem actuates on a manual initiation signal. Each of the eight SRs are described below.

SR 4.5.2.1: The drain time is determined or calculated and is required to be verified to be ≥ 36 hours in accordance with the SFCP. This surveillance verifies 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 4.5.2.2: The suppression chamber indicated water level (≥ 5.0 inches) for a required LPCI injection subsystem is required to be verified to ensure that pump net positive suction head and vortex prevention is available for the ECCS injection subsystem required to be operable by the LCO. This surveillance is required to be performed in accordance with the SFCP. Indications are available either locally or in the Control Room regarding suppression pool water level.

SR 4.5.2.3: The suppression chamber indicated water level (≥ 5.0 inches) or condensate storage tank level (at least 135,000 available gallons of water) for a required CS subsystem is required to be verified to ensure that pump net positive suction head and vortex prevention is available for the ECCS spray subsystem required to be operable by the LCO. This surveillance is required to be performed in accordance with the SFCP. Indications are available either locally or in the Control Room regarding suppression chamber water level and condensate storage tank level.

SR 4.5.2.4: The SR is to verify the ECCS injection/spray subsystem piping is sufficiently filled of water. This is a new SR requirement, and this surveillance is required to be performed in accordance with the SFCP. The ECCS flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the required ECCS injection/spray subsystems full of water ensures that the ECCS subsystem will perform properly. This may also prevent a water hammer following an ECCS initiation signal. One acceptable method of ensuring that the lines are full is to vent at the high points.

SR 4.5.2.5: Verification of the correct alignment for each manual, power operated, and automatic valve in the required ECCS subsystem flow path provides assurance that the proper flow path will be available for ECCS operation to support TS LCO 3.5.2. This is a new SR requirement, and this surveillance is required to be performed in accordance with the SFCP. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a nonaccident 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. Also, Footnote "#" states, "[E]xcept that an automatic valve capable of automatic return to its ECCS position when an ECCS signal is present may be in position for another mode of operation."

SR 4.5.2.6: The required ECCS injection/spray subsystem is required to be operated through its recirculation line for ≥ 10 minutes. This is a new SR requirement, and this surveillance is required to be performed in accordance with the SFCP. This demonstrates that the subsystem is capable of operation to support TS 3.5.2, RPV WIC. 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 4.5.2.7: Verification that each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated RPV water level isolation signal is required to prevent RPV water inventory from dropping below the TAF, should an unexpected draining event occur. This is a new SR requirement, and this surveillance is required to be performed in accordance with the SFCP.

SR 4.5.2.8: The required ECCS subsystem is required to actuate on a manual initiation signal. This surveillance verifies that a manual initiation signal will cause the required ECCS injection/spray subsystem to start and operate as designed, including pump startup and actuation of all automatic valves to their required positions. This SR is modified by Footnote "##," which excludes vessel injection/spray during the surveillance. Since all active components are testable and full flow can be demonstrated by recirculation through the test line, coolant injection into the RPV is not required during the surveillance. This is a new SR requirement, and this surveillance is required to be performed in accordance with the SFCP.

The NRC staff reviewed the proposed SRs associated with the new LCO 3.5.2 and determined that they are appropriate for ensuring the operability of the equipment and instrumentation specified in TS LCO 3.5.2.

3.5 Proposed Deletion of Instrumentation in TS Tables 3.3.3-1 and 4.3.3.1-1

LCO 3.3.3 currently states, "The emergency core cooling system (ECCS) actuation instrumentation channels shown in Table 3.3.3-1 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Allowable Value column of Table 3.3.3-2." Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," currently contains requirements for function operability during Operational Conditions 4 and 5 when associated ECCS subsystem(s) are required to be operable per LCO 3.5.2, "ECCS – Shutdown." Conforming changes are made to TS Tables 3.3.3-1 and 4.3.3.1-1.

In the revised TS, Operational Conditions 4 and 5 requirements will be deleted for the following functions.

1. Core Spray System

   (a) Reactor Vessel Water Level - Low Low Low, Level 1
   (c) Reactor Vessel Pressure - Low (Permissive)
   (d) Core Spray Pump Discharge Flow - Low (Bypass)
   (e) Core Spray Pump Start Time Delay - Normal Power
   (f) Core Spray Pump Start Time Delay - Emergency Power
   (g) Manual Initiation

2. Low Pressure Coolant Injection Mode of RHR System

   (a) Reactor Vessel Water Level - Low Low Low, Level 1
   (c) Reactor Vessel Pressure - Low (Permissive)
   (d) LPCI Pump Discharge Flow - Low (Bypass)
   (e) LPCI Pump Start Time Delay - Normal Power
   (f) Manual Injection

The NRC staff finds that for these 11 instrument functions in existing TS Tables 3.3.3-1 and 4.3.3.3-1, the applicability in Operational Conditions 4 and 5 is being deleted because the instrumentation requirements during shutdown are being deleted and/or consolidated into the new TS Tables 3.3.12-1, "RPV Water Inventory Control Instrumentation," and 3.3.12-2, "RPV Water Inventory Control Instrumentation Setpoints." The NRC staff finds acceptable the deletion of Operational Conditions 4 and 5 applicability for Functions 1.c, 1.d, 1.g, 2.c, 2.d, and 2.f, which will be relocated to the new TS instrumentation tables. For Functions 1.a and 2.a, the NRC staff finds their deletion acceptable because manual ECCS initiation is preferred over automatic initiation during Modes 4 and 5, and the operator would be able to use other more appropriately sized pumps if needed to mitigate a draining event. Also, the NRC staff finds the deletion of Functions 1.e, 1.f, and 2.e acceptable for the CS and LPCI pump start time delays. Only the LPCI time delay has an equivalent described in the STS; the CS time delays, which are further evaluated in Section 3.7.9 of this SE, do not. 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.

3.6 Staff Evaluation of Proposed Changes to TS 3/4.5.3 – Suppression Chamber

See Section 3.7.8 of this SE for the evaluation of changes to TS 3/4.5.3.

3.7 Staff Evaluation of Proposed Technical Variations

The licensee proposed the following 14 technical variations from the TS changes described in TSTF-542, or the applicable parts of the NRC staff's SE for TSTF-542. The licensee stated in the LAR that these variations do not affect the applicability of TSTF-542 or the NRC staff's SE to the proposed license amendment. The NRC staff evaluated each variation below.

3.7.1 Variation 1, TS Operational Conditions

STS Table 1.1-1 defines Modes of Operation (1 through 5) for STS plants, while Hope Creek proposed TS Table 1.2 defines Operational Conditions (1 through 5). The differences in the definitions of Operational Conditions 4 and 5 versus Modes 4 and 5 are as follows:

- The Hope Creek TS has an average reactor coolant temperature limit of ≤ 140 °F for Operational Condition 5, Refueling, and the STS does not.
- The Hope Creek TS has notes that describe allowances for repositioning the reactor mode switch and refers to Special Test Exceptions TS 3.10.1, 3.10.3, and 3.10.8, while the STS does not.

The NRC staff finds that these are current licensing basis requirements in the Hope Creek TSs. These differences have no impact on the proposed TSTF-542 changes: definition of "Drain Time," Modes 4/5 ECCS requirements, Modes 4/5 instrumentation requirements, or the applicability of the model SE. STS Modes 4 and 5 and Hope Creek Operational Conditions 4 and 5 are considered equivalent; therefore, the NRC staff finds Variation 1 acceptable.

3.7.2 Variation 2, TS Table 3.3.12-1, Actions 83, 84, and 85

Proposed TS Table 3.3.12-1 for RPV WIC instrumentation presents the TS actions in a manner consistent with the format of the current Hope Creek TSs. TS Action 83 combines TSTF-542 TS 3.3.5.2 Required Actions C.1 and E.1 in a single statement. Similarly, TS Action 84 combines TSTF-542 TS 3.3.5.2 Required Actions D.1 and E.1, and TS Action 85 combines TSTF-542 TS 3.3.5.2 Required Actions B.1 and B.2.

Given the existing format of the Hope Creek TSs, this is acceptable since the intent of TSTF-542 action is met for Table 3.3.12-1. Therefore, the NRC staff finds Variation 2 acceptable.

3.7.3 Variation 3, TS Table 3.3.3-1, Action 32

In Hope Creek TS Table 3.3.3-1 for ECCS Actuation Instrumentation, TS Action 32 applies only in Operational Conditions 4 and 5. Therefore, consistent with the removal of Operational Conditions 4 and 5 requirements from the ECCS Actuation Instrumentation TSs, TS Action 32 is being deleted.

TS Table 3.3.3-1, Action 32 currently states:

> With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, place the inoperable channel in the tripped condition within 24 hours.

The NRC staff reviewed Variation 3 and finds that Action 32 would no longer apply to any functions due to deletion of all of the requirements, related to the changes described in TSTF-542, Revision 2; therefore, Variation 3 is acceptable.

3.7.4 Variation 4, TS Table 3.3.12-1, New Note (c)

Note (c) is being added to TS Table 3.3.12-1 for the Core Spray Reactor Vessel Pressure Low (Permissive) trip function. Note (c) clarifies that the trip function is only required for Divisions 1 and 2. The note is included in the current TS Table 3.3.3-1 for ECCS Actuation Instrumentation.

The licensee has chosen to retain the footnote in the proposed table, which is an exception to the equivalent requirements of TSTF-542 STS Table 3.3.5.2. The NRC staff finds Variation 4 acceptable because it reflects the appropriate requirements based on the Hope Creek ECCS design and current licensing basis.

3.7.5 Variation 5, TS SR 4.5.2.5, Modified Note

Proposed SR 4.5.2.5 would be modified by a Note #. The proposed note is identical to Note * in the current SR 4.5.1.a.1.b and is consistent with the STS Bases for SR 3.5.2.5. This note is tied to the verification that valves in the flow path are in the correct position. Proposed Note # states:

> Except that an automatic valve capable of automatic return to its ECCS position when an ECCS signal is present may be in position for another mode of operation.

The licensee has chosen to retain the current licensing basis for this SR note related to the CS system and LPCI valve positions and, therefore, the NRC staff finds Variation 5 acceptable.

3.7.6 Variation 6, TS Table 3.3.12-1, LPCI and Decay Heat Removal Alignment

PSEG is proposing to add a Note (d) to TS Table 3.3.12-1 (RPV WIC Instrumentation).

Proposed Note (d) states:

> Function not required to be OPERABLE while associated pump is operating in decay heat removal when minimum flow valve is closed and deactivated.

This is appropriate since the associated RHR pump minimum flow valve (while operating in the decay heat removal mode) is closed and deactivated to prevent inadvertent vessel draindown events. Because the minimum flow valve is closed and deactivated, the associated TS Table 3.3.12-1 Function 2.b would not be required to be operable. Without the note, TS 3.3.12 Action 84 would require that the associated RHR pump be declared inoperable, which would be contrary to the intent of the existing note to LCO 3.5.2.b.2, which allows an LPCI subsystem to be considered operable during alignment and operational for decay heat removal if capable of being manually realigned and not otherwise inoperable.

The NRC staff finds that proposed Note (d) aligns with proposed Note "*" in LCO 3.5.2, which states, "A LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable." A similar requirement is in the TSTF-542 note to LCO 3.5.2. Since the RHR system has multiple

modes of operation, this is necessary because the RHR system may be required to operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Because of low pressure and low temperature conditions in Operational Conditions 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncover. Therefore, the NRC staff finds Variation 6 acceptable.

3.7.7 Variation 7, TS Index Correction

During the development of this LAR to adopt TSTF-542, Revision2, an administrative error was identified within the TS Index. As part of Hope Creek License Amendment No. 146, TS Definition 1.13, EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME, was relocated to TS page 1-3. The NRC staff has reviewed Variation 7 and finds it acceptable because it is an editorial correction.

3.7.8 Variation 8, TS 3.5.3, Suppression Chamber and Core Alterations

To align with NUREG-1433, Revision 4, and consistent with TSTF-542, Revision 2, PSEG proposes to revise TS 3.5.3, "Suppression Chamber," to remove TS requirements associated with Operational Conditions 4 and 5 since they are redundant to the requirements and intent of the newly proposed TS 3.5.2, "RPV Water Inventory Control."

Specifically, TS 3.5.2 is addressed in newly proposed TS LCO 3.5.2 and its associated SRs 4.5.2.2 and 4.5.2.3. In Operational Conditions 4 and 5, TS LCO 3.5.3.b requires a minimum indicated suppression chamber water level of 5.0" except that the suppression chamber level may be less than the limit, provided that:

1. No operations are performed that have a potential for draining the reactor vessel,
2. The reactor mode switch is locked in the shutdown or refuel position,
3. The condensate storage tank contains at least 135,000 available gallons of water, and
4. The CS system is operable per Specification 3.5.2 with an operable flow path capable of taking suction from the condensate storage tank and transferring the water through the spray sparger to the reactor vessel.

With LCO 3.5.3.b not met, TS LCO Action 3.5.3.b requires core alterations and operations that have a potential for draining the reactor vessel to be suspended, the reactor mode switch to be locked in the shutdown position, and secondary containment integrity to be established within 8 hours.

The minimum required suppression chamber water level in TS LCO 3.5.3.b and SR 4.5.3.2 is made redundant by proposed SRs 4.5.2.2 for LPCI subsystems and 4.5.2.3 for CS subsystems, which are consistent with TSTF-542. Removal of the TS Action 3.5.3.b requirement to suspend operations that have a potential for draining the reactor vessel is consistent with the proposed addition of drain time requirements to TS LCO 3.5.2. The TS Action 3.5.3.b requirement to establish secondary containment integrity within 8 hours is made redundant by proposed TS Actions 3.5.2.c and 3.5.2.d for drain times not meeting LCO 3.5.2, which are consistent with TSTF-542.

TS Action 3.5.3.b is currently modified by a note stating the suppression chamber is not required to be operable in Operational Condition 5, provided that the reactor vessel head is removed, the cavity is flooded or being flooded from the suppression pool, the spent fuel pool

gates are removed when the cavity is flooded, and the water level is maintained within the limits of Specifications 3.9.8 and 3.9.9. Removal of this note is consistent with the proposed addition of drain time requirements to TS LCO 3.5.2, and the removal of the similar allowance from STS 3.5.2 applicability for Mode 5.

Removal of the TS 3.5.3 requirements related to core alterations and reactor mode switch position are addressed in Variation 13 below.

The NRC staff finds that the above noted deletions to TS LCO 3.5.3, SR 4.5.3.1 ((b) only), and SR 4.5.3.2 are acceptable since the suppression chamber Operational Conditions 4 and 5 condition for water level and actions if the water level is less than 'the limit' are moved to the new TS LCO 3.5.2. The suppression chamber water levels are required for operable ECCS injection/spray subsystems that support newly defined drain time, and SRs provide verifications to acceptable water levels for proper system operations. Therefore, the NRC staff finds Variation 8 acceptable.

3.7.9 Variation 9, TS Table 3.3.3-1, CS System Pump Start Delay Time

Current Hope Creek TS Table 3.3.3-1 includes Trip Functions 1.e and 1.f, Core Spray Pump Start Delay Time – Normal Power and Core Spray Pump Start Delay Time – Emergency Power, respectively, which are required to be operable in Operational Conditions 1, 2, 3, 4, and 5. This staggering is unnecessary for manual operation. Therefore, these functions applicable in Operational Conditions 4 and 5 are being removed from Table 3.3.3-1 and are not being included in the proposed TS Table 3.3.12-1 for RPV WIC instrumentation. This is consistent with the intent of TSTF- 542 and a similar change made to STS Function 2.f, "Low Pressure Coolant Injection Pump Start – Time Delay Relay."

Although the STS has a pump start time delay function for LPCI similar to that in Hope Creek's TSs, the STS does not have an equivalent for CS. The NRC staff finds Variation 9 acceptable because Hope Creek's staggered starting of CS system pumps is related to automatic system actuation, and not required for manual operation.

3.7.10 Variation 10, TS Table 3.3.12-1, Note (a)

The Hope Creek Core Spray Reactor Vessel Pressure - Low (Permissive) is initiated from four pressure transmitters each in two divisions. The low pressure permissive for each division is provided in one-out-of-two-taken-twice logic. Manual initiation of each CS subsystem requires the low pressure permissive from its associated division.

The Hope Creek LPCI Reactor Vessel Pressure - Low (Permissive) is initiated from a pressure switch downstream of each LPCI injection valve. Manual initiation of each LPCI subsystem requires the low pressure permissive from the associated pressure switch.

Note (a) is, therefore, being added to proposed TS Table 3.3.12-1 for the CS and LPCI Reactor Vessel Pressure Low (Permissive) trip functions. Note (a) states that the Minimum Operable Channels per Trip Function requirement applies to those functions associated with an ECCS subsystem required to be operable by LCO 3.5.2, "RPV Water Inventory Control."

The NRC staff finds that the addition of Note (a) is acceptable since it clarifies the trip function requirements for both CS system and LPCI for the instrumentation relationship with TS LCO 3.5.2. Therefore, the NRC staff finds Variation 10 acceptable.

3.7.11 Variation 11, Filtration, Recirculation, and Ventilation System (FRVS)

The FRVS consists of two subsystems that are required to perform post-accident, safety-related functions. The FRVS recirculation system recirculates the Reactor Building air through filters for cleanup. This subsystem is the initial cleanup system before discharge is made via the FRVS ventilation subsystem. The FRVS ventilation system maintains the Reactor Building at a negative pressure with respect to the outdoors. A single FRVS ventilation subsystem is capable of maintaining the Reactor Building at a negative pressure with respect to the environment and filter gaseous releases in Operational Conditions 4 and 5. FRVS requirements are contained in proposed TS Actions 3.5.2.c and 3.5.2.d and are consistent with the requirements for the standby gas treatment system in TSTF-542.

The NRC staff finds the STS and the Hope Creek Licensing Bases are slightly different in terminology as they relate to the ventilation systems that maintain a negative pressure, limit fission product release during design-basis accidents, and provide air cleanup on the Reactor Building. The FRVS is similar in function to the STS standby gas treatment system; therefore, the NRC staff finds Variation 11 acceptable.

3.7.12 Variation 12, TS LCO 3.5.2, Action b Deletion

In Reference 1, the licensee stated that in alignment with TSTF-542, Revision 2, Proposed Safety Basis (Section 3.1.2), the existing Hope Creek TS 3.5.2 requirement to suspend core alterations as an action for ECCS inoperability is no longer warranted since there are no postulated events associated with core alterations that are prevented or mitigated by the proposed RPV WIC requirements. In addition, loss of RPV inventory events are not initiated by core alteration operations. Refueling LCOs 3.9.1, Reactor Mode Switch; 3.9.2, Instrumentation; 3.9.3, Control Rod Position; and 3.9.8, Water Level - Reactor Vessel, provide requirements to ensure safe operation during core alterations, including the required water level above the RPV flange. Therefore, PSEG proposes to delete TS 3.5.2 Action b in its entirety, including the action relating to core alterations.

In Reference 2, the licensee stated that the TS requirement for suspending core alterations has been reinstated by adding it into the newly proposed LCO 3.5.2, Action a, which now states:

> With none of the above low pressure ECCS subsystems OPERABLE, immediately suspend CORE ALTERATIONS and restore a subsystem to OPERABLE status within 4 hours. Otherwise, immediately initiate action to establish a method of water injection capable of operating without offsite electrical power.

As noted in Section 2.2 of the original submittal (Reference 1), the requirements of LCO 3.5.3.b are addressed in newly proposed TS LCO 3.5.2 and its associated SRs. Existing LCO 3.5.3, Action b, is captured by adding the immediate suspension of core alterations into the newly proposed LCO 3.5.2, Action a. In addition, the requirement to establish secondary containment in both LCO 3.5.2, Action b, and LCO 3.5.3, Action b, is captured by the newly proposed LCO 3.5.2, Actions c. and d.

The NRC staff questioned the deletion of existing TS LCO 3.5.2, Action b, related to core alteration in an e-mail dated May 30, 2018 (Reference 7). In the licensee's supplement dated June 27, 2018 (Reference 2), Hope Creek reinstated part of deleted Action b and revised TS LCO 3.5.2, Action a, as follows, to include core alteration.

a. With none of the above low pressure ECCS subsystem OPERABLE, immediately suspend CORE ALTERATIONS and restore a subsystem to OPERABLE status within 4 hours. Otherwise, initiate action to establish a method of water injection capable of operating without offsite electrical power.

The NRC staff finds Variation 12 acceptable since the TS requirement for suspending core alteration is reinstated by adding it into the newly proposed TS LCO 3.5.2, Action a.

3.7.13 Variation 13, TS LCO 3.5.3, Mode Switch to Locked

Variations 8 and 13 are related.

To align with NUREG-1433, Revision 4, and fully implement TSTF-542, Revision 2, PSEG proposes to revise TS 3.5.3, "Suppression Chamber," to remove TS requirements associated with Operational Conditions 4 and 5. As discussed above in Variation 7 (Section 3.7.7 of this SE), the requirements in TS 3.5.3 related to OPDRVs and actions to suspend OPDRVs are redundant to the requirements and intent of the newly proposed TS 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)."

LCO 3.5.3.b also requires the reactor mode switch to be locked in the shutdown or refuel position when suppression chamber water level is less than the TS limits in Operational Conditions 4 and 5. By definition, the reactor mode switch is in shutdown or refuel in Operational Conditions 4 and 5. The requirement to lock the mode switch in either position is an administrative control rather than an element in the lowest functional capability or performance levels of equipment required for safe operation of the facility required to be included in the TSs.

The TS Action 3.5.3.b requirement to lock the reactor mode switch in the shutdown position is not required because it does not provide compensatory measures for suppression chamber water level less than the TS limits. The TS Action 3.5.3.b requirement to suspend core alterations is not required because Refueling Operations LCOs 3.9.1, Reactor Mode Switch; 3.9.2, Instrumentation; 3.9.3, Control Rod Position; and 3.9.8, Water Level - Reactor Vessel, provide requirements to ensure safe operation during core alterations.

As stated above for Variation 7, the NRC staff finds that the above noted deletions from TS LCO 3.5.3, SR 4.5.3.1 ((b) only), and SR 4.5.3.2 are acceptable since the suppression chamber Operational Conditions 4 and 5 condition for water level and actions if the water level is less than 'the limit' are moved to the new TS LCO 3.5.2. The suppression chamber water levels are required for operable ECCS injection/spray subsystems that support the newly defined drain time, and SRs provide verifications to acceptable water levels for proper system operation.

In addition, since the suppression chamber water level requirements are moved to TS LCO 3.5.2 for Operational Conditions 4 and 5, the actions to lock the reactor mode switch are no longer required in TS LCO 3.5.3, and other TS LCOs provide safe operations\ during core alterations. Therefore, the NRC staff finds Variation 13 acceptable.

3.7.14 Variation 14, Core Spray Manual Initiation

In Reference 8, the licensee revised TS Table 3.3.12-1, "RPV Water Inventory Control Instrumentation," Trip Function 1.c – Core Spray System Manual Initiation, as it was originally proposed in References 1 and 2. The statement of minimum operable channels per trip function is changed from "1/subsystem" to "1/division." Each of the two CS subsystems is comprised of two divisions. Therefore, it is appropriate that CS manual initiation is "1/division" for divisions associated with a subsystem required to be operable by LCO 3.5.2, consistent with the presentation of the requirements for manual initiation in existing TS Table 3.3.3-1. Each of the four LPCI subsystems is comprised of a single division. Therefore, LPCI manual initiation is "1/subsystem," which is also consistent with the presentation of the requirements for manual initiation in existing TS Table 3.3.3-1.

The NRC staff reviewed this variation and found that the proposed minimum number of operable channels for CS manual initiation, 1/division, is consistent with the current requirements found in Hope Creek LCO 3.3.3. The NRC staff finds Variation 14 acceptable because the proposed requirement is appropriate for the Hope Creek CS system design and consistent with the current licensing basis.

3.8 Staff Evaluation of Proposed Deletion of References to OPDRVs

Section 2.2.5 of this SE lists the numerous OPDRV references proposed for deletion. The proposed changes would replace the existing specifications related to OPDRVs with revised specifications for RPV WIC. For example, the proposed change removes "during operations with a potential for draining the reactor vessel" and "initiate action to suspend operations with a potential for draining the reactor vessel." 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 new RPV WIC TSs with attendant equipment operability requirements, required actions and SRs, and deleting references to OPDRVs throughout the TSs.

The current Hope Creek TSs contain instrumentation requirements related to OPDRVs in four separate TSs. The proposed TS LCO 3.3.12 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 OPDRV requirements are for secondary containment, secondary containment isolation dampers, FRVS, control room temperature control, and electrical sources. Each of these systems' requirements during OPDRVs were proposed for consolidation into revised TS 3.5.2 for RPV WIC based on the appropriate plant conditions and calculated drain time.

The NRC staff has determined that the deletion of OPDRV references, along with the corresponding editorial changes, is appropriate because the proposed TSs governing RPV WIC and the associated instrumentation, TSs 3.5.2 and 3.3.12, respectively, are a greatly clarified and simplified alternative set of controls for ensuring that water level is maintained above the TAF and, therefore, these changes are acceptable.

3.9 Technical Conclusion

Hope Creek Safety Limit 2.1.4 3 requires that reactor vessel water level shall be greater than the top of active irradiated fuel. Maintaining water level above the TAF ensures that the fuel cladding fission product barrier is protected during shutdown conditions. The proposed changes

to the TSs establish new LCO requirements that address the preventive and mitigative equipment and associated instrumentation that provide an alternative means to support Safety Limit 2.1.4.3 during Operational Conditions 4 and 5.

The reactor coolant system is at a low operating temperature (< 200 °F) and is depressurized during Operational Conditions 4 and 5. An event involving a loss of inventory while in the shutdown condition does not exceed the capacity of one ECCS subsystem. The accidents that are postulated to occur during shutdown conditions, Control Rod Removed Error During Refueling (UFSAR 15.4.1.1), Fuel Handling Accident (UFSAR 15.7.4) and Postulated Radioactive Releases Due to Liquid Radwaste Tank Failure (UFSAR 15.7.3), do not involve a loss of inventory. The equipment and instrumentation associated with the RPV WIC TSs do not provide detection or mitigation related to these design-basis accidents.

The proposed TS LCO 3.5.2 contains requirements for operability of one ECCS subsystem, along with requirements to maintain a sufficiently long drain time so that plant operators would have time to diagnose and mitigate an unplanned draining event. The NRC staff has determined that LCOs 3.5.2 and 3.3.12 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 3.3.12 provide remedial actions to be taken in the event the LCO is not satisfied and, therefore, meet the requirements of 10 CFR 50.36(c)(2)(i).

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

The NRC staff evaluated the proposed drain time definition, TS 3/4.5.2, which contains the requirements for RPV WIC and TS 3/4.3.12, which contains the requirements for instrumentation necessary to support TS 3/4.5.2. 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 that meet 10 CFR 50.36(c)(2)(ii), Criterion 4, to establish LCOs for structures, systems, or components that are significant to public health and safety, as shown by operating experience.

The licensee proposed to delete OPDRV references from the TS applicability descriptions, 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, TSs 3/4.5.2 and 3/4.3.12, respectively, are a clarified and simplified alternative set of controls for ensuring that water level is maintained above the TAF.

The NRC staff reviewed the SRs associated with new LCOs 3.5.2 (SRs 4.5.2) and 3.3.12 (SRs 4.3.12). The NRC staff finds that the proposed TS SRs for TS 4.5.2 are acceptable since they support TS 3.5.2 drain time requirements, assure that water inventory is available for ECCS injection/spray subsystem RPV injection and pump performance, ECCS injection/spray subsystems are adequately filled, the subsystems have verified valve positions to support RPV injection, verified pumps provide adequate flow to support drain time and RPV injection, verification of automatic isolation, and ECCS injection/spray subsystems can be manually operated to inject with a manual initiation signal. The NRC staff finds that the three SRs proposed for TS 4.3.12 are sufficient and adequate because they will ensure that the systems

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 Operational Conditions 4 and 5. Therefore, the NRC staff concludes that the proposed SRs satisfy 10 CFR 50.36(c)(3) because the LCOs will be met.

The NRC staff evaluated the proposed Hope Creek changes against each of the applicable design requirements listed in Section 2.3.1 of this SE. The NRC staff finds that the proposed changes for Operational Conditions 4 and 5 operations, as they relate to the proposed TS changes for the new drain time definition and the removal of OPDRV references, are consistent with the General Design Criteria in that the Hope Creek 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 the technical specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the TSs. In accordance with this requirement, the licensee provided TS Bases changes in the proposed LAR (Reference 1). The NRC staff has concluded that the TS Bases changes provided describe the basis for the affected TSs and follow the Final Policy Statement on Technical Specification Improvements for Nuclear Power Reactors (58 *Federal Register* 39132).

Additionally, the proposed TS changes were reviewed for technical clarity and consistency with the existing Hope Creek requirements for customary terminology and formatting. The NRC staff found that the proposed changes were consistent with TSTF-542, Revision 2 (Reference 4), and Chapter 16 of the SRP (Reference 6).

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (83 FR 4294). 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 Letter from PSEG Nuclear LLC to U.S. NRC, "Hope Creek Generating Station, Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control'," dated September 21, 2017 (Agencywide Documents Access and Management System (Agencywide Documents Access and Management (ADAMS) Accession No. ML17265A847).

2 Letter from PSEG Nuclear LLC to U.S. NRC, "Hope Creek Generating Station, Response to Request for Additional Information Re: Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control'," dated June 27, 2018 (ADAMS Accession No. ML18178A234).

3 Letter from PSEG Nuclear LLC to U.S. NRC, "Hope Creek Generating Station, Supplement to License Amendment Request for Additional Information Re: Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control'," dated July 19, 2018 (ADAMS Accession No. ML18200A149.

4 Attachment to Technical Specifications Task Force Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control," dated March 14, 2016 (ADAMS Accession No. ML16074A448).

5 U.S. NRC, "Final Safety Evaluation for Technical Specifications Task Force Traveler TSTF-542, Revision 2, 'Reactor Pressure Vessel Water Inventory Control'," dated December 20, 2016 (ADAMS Accession No. ML16343B008).

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

7 E-mail from J. Kim, U.S. NRC, to B. Thomas and P. Duke, "Hope Creek - Final RAI RE: Revise TS to Adopt TSTF-542," dated May 30, 2018 (ADAMS Accession No. ML18150A691).

8 Letter from PSEG Nuclear LLC to U.S. NRC, "Hope Creek Generating Station, Supplement to License Amendment Request Re: Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control'," dated September 6, 2018 (ADAMS Accession No. ML18250A066).

9 US NRC, "Standard Technical Specifications, General Electric BWR/4 Plants," NUREG-1433, Vol. 1, "Specifications," Rev. 4.0, dated April 2012, ADAMS Accession No. ML12104A192.

10 US NRC, "Standard Technical Specifications, General Electric BWR/4 Plants," NUREG-1433, Vol. 2, "Bases," Rev. 4.0, dated April 2012, ADAMS Accession No. ML12104A193.

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Date: October 30, 2018

SUBJECT: HOPE CREEK GENERATING STATION - ISSUANCE OF AMENDMENT NO. 213 RE: REVISE TECHNICAL SPECIFICATIONS TO ADOPT TSTF-542, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (EPID L-2017-LLA-0352) DATED OCTOBER 30, 2018

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ADAMS Accession No.: ML18260A203 *by memorandum **by e-mail

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