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

February 27, 2018

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 227 AND 190 REVISING TECHNICAL SPECIFICATIONS TO ADOPT TSTF-542, REVISION 2, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (CAC NOS. MF9967 AND MF9968; EPID L-2017-LLA-0260)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 227 and 190 to Renewed Facility Operating License Nos. NPF-39 and NPF-85 for the Limerick Generating Station, Units 1 and 2, respectively. These amendments consist of changes to the technical specifications in response to your application dated July 19, 2017, as supplemented by letters dated December 6, 2017; February 19, 2018; and February 27, 2018.

The amendments replace existing technical specification requirements related to "operations with a potential for draining the reactor vessel" with new requirements on reactor pressure vessel water inventory control to protect Safety Limit 2.1.4. Safety Limit 2.1.4 requires reactor pressure vessel water level to be greater than the top of active irradiated fuel. The changes are based on Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

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

Sincerely,

V. Sreenivas, Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosures:
1. Amendment No. 227 to Renewed NPF-39
2. Amendment No. 190 to Renewed NPF-85
3. Safety Evaluation

cc w/Enclosures: Distribution via Listserv

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

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-352

LIMERICK GENERATING STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 227
Renewed License No. NPF-39

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

   A. The application for amendment by Exelon Generation Company, LLC (Exelon Generation Company), dated July 19, 2017, as supplemented by letters dated December 6, 2017; February 19, 2018; and February 27, 2018, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-39 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 227, are hereby incorporated into this renewed license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented no later than May 31, 2019.

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 Facility Operating
License and Technical Specifications

Date of Issuance: February 27, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 227

LIMERICK GENERATING STATION, UNIT 1

RENEWED FACILITY OPERATING LICENSE NO. NPF-39

DOCKET NO. 50-352

Replace the following page of the Renewed Facility Operating License with the attached 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
vii	vii
xii	xii
xviii	xviii
xx	xx
1-2	1-2
---	1-2a
3/4 3-16	3/4 3-16
3/4 3-31	3/4 3-31
3/4 3-33	3/4 3-33
3/4 3-35	3/4 3-35
3/4 3-36	3/4 3-36
3/4 3-40	3/4 3-40
3/4 3-41	3/4 3-41
---	3/4 3-41a
---	3/4 3-41b
---	3/4 3-41c
---	3/4 3-41d
---	3/4 3-41e
3/4 3-65	3/4 3-65
3/4 3-67	3/4 3-67
3/4 5-6	3/4 5-6
---	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 6-50	3/4 6-50
3/4 6-52	3/4 6-52
3/4 7-6	3/4 7-6
3/4 7-7	3/4 7-7
3/4 8-9	3/4 8-9
3/4 8-14a	3/4 8-14a
3/4 8-20	3/4 8-20

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

(3) 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;

(4) Pursuant to the Act and 10 CFR Parts 30, 40, 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

(5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility, and to receive and possess, but not separate, such source, byproduct, and special nuclear materials as contained in the fuel assemblies and fuel channels from the Shoreham Nuclear Power Station.

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 (except as exempted from compliance in Section 2.D. below) 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

Exelon Generation Company is authorized to operate the facility at reactor core power levels not in excess of 3515 megawatts thermal (100% rated power) in accordance with the conditions specified herein and in Attachment 1 to this license. The items identified in Attachment 1 to this renewed license shall be completed as specified. Attachment 1 is hereby incorporated into this renewed license.

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 227, are hereby incorporated into this renewed license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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DEFINITIONS

SECTION

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

INDEX

BASES

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 moveable 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.

CORE OPERATING LIMITS REPORT

1.7a The CORE OPERATING LIMITS REPORT (COLR) is the unit-specific document that provides the 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 Specifications 6.9.1.9 thru 6.9.1.12. Plant operation within these limits is addressed in individual specifications.

CRITICAL POWER RATIO

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

DOSE EQUIVALENT I-131

1.9 DOSE EQUIVALENT I-131 shall be that concentration of I-131, microcuries per gram, which alone would produce the same inhalation committed effective dose equivalent (CEDE) as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The inhalation committed effective dose equivalent (CEDE) conversion factors used for this calculation shall be those listed in Table 2.1 of Federal Guidelines Report 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," ORNL, 1989, as described in Regulatory Guide 1.183. The factors in the column headed "effective" yield doses corresponding to the CEDE.

DOWNSCALE TRIP SETPOINT (DTSP)

1.9a The downscale trip setpoint associated with the Rod Block Monitor (RBM) rod block trip setting.

DRAIN TIME

1.9b 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

DRAIN TIME (Continued)

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.

1.10 (Deleted)

EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME

1.11 The EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ECCS actuation set-point at the channel sensor until the ECCS equipment is capable of performing its safety function, i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc. Times shall include diesel generator starting and sequence loading delays where applicable. The response time may be measured by any series of sequential, overlapping or total steps such that the entire response time is measured.

TABLE 3.3.2-1 (Continued)
ISOLATION ACTUATION INSTRUMENTATION
ACTION STATEMENTS

ACTION 20 - Be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24-hours.

ACTION 21 - Be in at least STARTUP with the associated isolation valves closed within 6 hours or be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

ACTION 22 - Be in at least STARTUP within 6 hours.

ACTION 23 - In OPERATIONAL CONDITION 1 or 2, verify the affected system isolation valves are closed within 1 hour and declare the affected system inoperable. In OPERATIONAL CONDITION 3, be in at least COLD SHUTDOWN within 12 hours.

ACTION 24 - Restore the manual initiation function to OPERABLE status within 8 hours or close the affected system isolation valves within the next hour and declare the affected system inoperable or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

ACTION 25 - Establish SECONDARY CONTAINMENT INTEGRITY with the standby gas treatment system operating within 1 hour.

ACTION 26 - Close the affected system isolation valves within 1 hour.

TABLE NOTATIONS

* Required when handling RECENTLY IRRADIATED FUEL in the secondary containment.

** May be bypassed under administrative control, with all turbine stop valves closed.

\# During operation of the associated Unit 1 or Unit 2 ventilation exhaust system.

(a) DELETED

(b) 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. Trip functions common to RPS Actuation Instrumentation are shown in Table 4.3.2.1-1. In addition, for the HPCI system and RCIC system isolation, provided that the redundant isolation valve, inboard or outboard, as applicable, in each line is OPERABLE and all required actuation instrumentation for that valve is OPERABLE, one channel may be placed in an inoperable status for up to 8 hours for required surveillance without placing the channel or trip system in the tripped condition.

TABLE 4.3.2.1-1 (Continued)

ISOLATION ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK (a)	CHANNEL FUNCTIONAL TEST (a)	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
7. SECONDARY CONTAINMENT ISOLATION				
a. Reactor Vessel Water Level Low, Low - Level 2				1, 2, 3
b. Drywell Pressure## - High				1, 2, 3
c.1. Refueling Area Unit 1 Ventilation Exhaust Duct Radiation - High				*#
2. Refueling Area Unit 2 Ventilation Exhaust Duct Radiation - High				*#
d. Reactor Enclosure Ventilation Exhaust Duct Radiation - High				1, 2, 3
e. Deleted				
f. Deleted				
g. Reactor Enclosure Manual Initiation	N.A.		N.A.	1, 2, 3
h. Refueling Area Manual Initiation	N.A.		N.A.	*

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

*Required when handling RECENTLY IRRADIATED FUEL in the secondary containment.

**When not administratively bypassed and/or when any turbine stop valve is open.

#During operation of the associated Unit 1 or Unit 2 ventilation exhaust system.

##These trip functions (2a, 6b, and 7b) are common to the RPS actuation trip function.

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/pump[b]	1, 2, 3	30
b. Drywell Pressure - High	2/pump[b]	1, 2, 3	30
c. Reactor Vessel Pressure - Low (Permissive)	6[b]	1, 2, 3	31
d. Manual Initiation	2[e]	1, 2, 3	33
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM***			
a. Reactor Vessel Water Level - Low Low Low, Level 1	2	1, 2, 3	30
b. Drywell Pressure - High	2	1, 2, 3	30
c. Reactor Vessel Pressure - Low (Permissive)	2	1, 2, 3	31
d. Injection Valve Differential Pressure-Low (Permissive)	1/valve	1, 2, 3	31
e. Manual Initiation	1	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	1, 2, 3	35
e. Reactor Vessel Water Level - High, Level 8	4[d]	1, 2, 3	31
f. Manual Initiation###	1/system	1, 2, 3	33

TABLE 3.3.3-1 (Continued)
EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION
TABLE NOTATIONS

(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 provides input to actuation logic for the associated emergency diesel generators.

(c) One trip system. Provides signal to HPCI pump suction valves only.

(d) On 1 out of 2 taken twice logic, provides a signal to trip the HPCI pump turbine only.

(e) The manual initiation push buttons start the respective core spray pump and diesel generator. The "A" and "B" logic manual push buttons also actuate an initiation permissive in the injection valve opening logic.

(f) A channel as used here is defined as the 127 bus relay for Item 1 and the 127, 127Y, and 127Z feeder relays with their associated time delay relays taken together for Item 2.

* DELETED

\# Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 100 psig.

** 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.

\### The injection functions of Drywell Pressure - High and Manual Initiation are not required to be OPERABLE with reactor steam dome pressure less than 550 psig.

TABLE 3.3.3-1 (Continued)
EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION
ACTION STATEMENTS

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 less than the Total Number of Channels, declare the associated emergency diesel generator and the associated offsite source breaker that is not supplying the bus inoperable and take the ACTION required by Specification 3.8.1.1 or 3.8.1.2, as appropriate.

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. Manual Initiation	N.A.		N.A.	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				1, 2, 3
d. Injection Valve Differential Pressure - Low (Permissive)				1, 2, 3
e. Manual Initiation	N.A.		N.A.	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. Manual Initiation	N.A.		N.A.	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	N.A.			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. Manual Initiation	N.A.		N.A.	1, 2, 3
h. ADS Drywell Pressure Bypass Timer	N.A.			1, 2, 3
5. LOSS OF POWER				
a. 4.16 kV Emergency Bus Under-voltage (Loss of Voltage)##	N.A.		N.A.	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.

Loss of Voltage Relay 127-11X is not field setable.

3/4.3.3.A REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC) INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.A The RPV Water Inventory Control (WIC) instrumentation channels shown in Table 3.3.3.A-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.3.A-1

ACTION:

a. With one or more channels inoperable in a trip system, take the ACTION referenced in Table 3.3.3.A-1 for the trip system.

SURVEILLANCE REQUIREMENTS

4.3.3.1.A Each RPV Water Inventory Control (WIC) instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and LOGIC SYSTEM FUNCTIONAL TEST as shown in Table 4.3.3.A-1 and at the frequencies specified in the Surveillance Frequency Control Program unless otherwise noted in Table 4.3.3.A-1.

TABLE 3.3.3.A-1
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTION
1. CORE SPRAY SYSTEM			
a. Reactor Vessel Pressure - Low (Permissive)	6[(a)]	4, 5	39
b. Manual Initiation	2[(a)(c)]	4, 5	40
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM			
a. Injection Valve Differential Pressure - Low (Permissive)	1/valve[(a)]	4, 5	39
b. Manual Initiation	1[(a)]	4, 5	40
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION			
a. Reactor Vessel Water Level - Low - Level 3	2 in one trip system	(b)	38
4. REACTOR WATER CLEANUP SYSTEM ISOLATION			
a. Reactor Vessel Water Level - Low, Low - Level 2	2 in one trip system	(b)	38

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC)."

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

(c) The manual initiation push buttons start the respective core spray pump and diesel generator. The "A" and "B" logic manual push buttons also actuate an initiation permissive in the injection valve opening logic.

TABLE 3.3.3.A-1 (Continued)
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION
ACTION STATEMENTS

ACTION 38 - Declare the associated trip system for the penetration flow path(s) incapable of automatic isolation and calculate DRAIN TIME.

ACTION 39 - Within 1 hour, place channel in trip. Otherwise, declare associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 40 - Within 24 hours, restore channel to OPERABLE status. Otherwise, declare associated low pressure ECCS injection/spray subsystem inoperable.

TABLE 3.3.3.A-2
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION SETPOINTS

TRIP FUNCTION	ALLOWABLE VALUE
1. CORE SPRAY SYSTEM	
a. Reactor Vessel Pressure - Low (Permissive)	≥ 435 psig (decreasing)
b. Manual Initiation	N.A.
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM	
a. Injection Valve Differential Pressure - Low (Permissive)	≤ 84 psid
b. Manual Initiation	N.A.
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION	
a. Reactor Vessel Water Level - Low - Level 3	≥ 11.0 inches
4. REACTOR WATER CLEANUP SYSTEM ISOLATION	
a. Reactor Vessel Water Level - Low, Low - Level 2	≥ -45 inches

TABLE 4.3.3.A-1
RPV WATER INVENTORY CONTROL (WIC) 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. Manual Initiation	N.A.	N.A.		4, 5
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM				
a. Injection Valve Differential Pressure - Low (Permissive)			N.A.	4, 5
b. 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.

TABLE 3.3.7.1-1 (Continued)

RADIATION MONITORING INSTRUMENTATION

TABLE NOTATIONS

*When RECENTLY IRRADIATED FUEL is being handled in the secondary containment with the vessel head removed and fuel in the vessel.

(a) With fuel in the spent fuel storage pool.

(b) Alarm only.

ACTION STATEMENTS

ACTION 70 - With one monitor inoperable, restore the inoperable monitor to the OPERABLE status within 7 days or, within the next 6 hours, initiate and maintain operation of the control room emergency filtration system in the radiation isolation mode of operation.

With two or more of the monitors inoperable, within one hour, initiate and maintain operation of the control room emergency filtration system in the radiation mode of operation.

ACTION 71 - With one of the required monitor inoperable, assure a portable continuous monitor with the same alarm setpoint is OPERABLE in the vicinity of the installed monitor during any fuel movement. If no fuel movement is being made, perform area surveys of the monitored area with portable monitoring instrumentation at least once per 24 hours.

ACTION 72 - With the required monitor inoperable, obtain and analyze at least one grab sample of the monitored parameter at least once per 24 hours.

ACTION 73 - With the required monitor inoperable, assure a portable alarming monitor is OPERABLE in the vicinity of the installed monitor or perform area surveys of the monitored area with portable monitoring instrumentation at least once per 24 hours.

TABLE 4.3.7.1-1 (Continued)

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATIONS

*When RECENTLY IRRADIATED FUEL is being handled in the secondary containment with the vessel head removed and fuel in the vessel.

(a) With fuel in the spent fuel storage pool.

(b) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

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

3/4.5.2 REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC)

LIMITING CONDITION FOR OPERATION

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

AND

At least one of the following shall be OPERABLE:

a. Core spray system (CSS) subsystem comprised of:

1. Two OPERABLE CSS 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, equivalent to a level of 29 feet.

b. Low pressure coolant injection (LPCI) system 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 CONDITIONS 4 and 5.

ACTION:

a. With none of the above required subsystems OPERABLE, immediately suspend CORE ALTERATIONS. Restore at least one subsystem to OPERABLE status within 4 hours. Otherwise, initiate action to establish a method of water injection capable of operating without offsite electrical power.

b. DELETED

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

LIMITING CONDITION FOR OPERATION (Continued)

ACTION:

c. With DRAIN TIME less than 36 hours and greater than or equal to 8 hours, within 4 hours:

1. Verify SECONDARY CONTAINMENT INTEGRITY is capable of being established in less than the DRAIN TIME,

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

3. Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.

d. With DRAIN TIME less than 8 hours, immediately:

1. Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level greater than TAF for greater than or equal to 36 hours,***

2. Initiate action to establish SECONDARY CONTAINMENT INTEGRITY,

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 standby gas treatment subsystem is capable of being placed in operation.

e. With required ACTION and associated allowed outage time for ACTIONs c. or d. not met, or DRAIN TIME less than 1 hour, immediately initiate action to restore DRAIN TIME to greater than or equal to 36 hours.

***The required injection/spray subsystem or an additional method of water injection shall be capable of operating without offsite electrical power.

SURVEILLANCE REQUIREMENTS

4.5.2.1 Verify DRAIN TIME is greater than or equal to 36 hours in accordance with the Surveillance Frequency Control Program.

4.5.2.2 Verify, for a required LPCI subsystem, the suppression chamber water level is greater than or equal to 16 feet 0 inches in accordance with the Surveillance Frequency Control Program.

4.5.2.3 Verify, for a required CSS subsystem, that the suppression chamber water level is greater than or equal to 16 feet 0 inches or the condensate storage tank water level is greater than or equal to 29 feet 0 inches in accordance with the Surveillance Frequency Control Program.

4.5.2.4 Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.

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 greater than or equal to 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.##

---

*DELETED.

#Not required to be met for system vent flow paths open under administrative control.

^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 CONDITIONS 1, 2, and 3 with a contained water volume of at least 122,120 ft^3, equivalent to a level of 22'0".

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, as applicable:

a. 22'0" in accordance with the Surveillance Frequency Control Program.

b. DELETED

4.5.3.2 DELETED

3/4.6.5 SECONDARY CONTAINMENT

REFUELING AREA SECONDARY CONTAINMENT INTEGRITY

LIMITING CONDITION FOR OPERATION

3.6.5.1.2 REFUELING AREA SECONDARY CONTAINMENT INTEGRITY shall be maintained.

APPLICABILITY: When RECENTLY IRRADIATED FUEL is being handled in the secondary containment.

ACTION:

Without REFUELING AREA SECONDARY CONTAINMENT INTEGRITY, suspend handling of RECENTLY IRRADIATED FUEL in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.1.2 REFUELING AREA SECONDARY CONTAINMENT INTEGRITY shall be demonstrated by:

a. Verifying in accordance with the Surveillance Frequency Control Program that the pressure within the refueling area secondary containment is greater than or equal to 0.25 inch of vacuum water gauge.

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

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

   2. At least one door in each access to the refueling area secondary containment is closed, except when the access opening is being used for entry and exit.

   3. All refueling area 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, slide gate dampers or deactivated automatic dampers/valves secured in position.

c. In accordance with the Surveillance Frequency Control Program:

   Operating one standby gas treatment subsystem for one hour and maintaining greater than or equal to 0.25 inch of vacuum water gauge in the refueling area secondary containment at a flow rate not exceeding 764 cfm.

REFUELING AREA SECONDARY CONTAINMENT AUTOMATIC ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.5.2.2 The refueling area secondary containment ventilation system automatic isolation valves shall be OPERABLE.

APPLICABILITY: When RECENTLY IRRADIATED FUEL is being handled in the secondary containment.

ACTION:

With one or more of the refueling area secondary containment ventilation system automatic isolation valves inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and within 8 hours either:

a. Restore the inoperable valves to OPERABLE status, or

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

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

Otherwise, suspend handling of RECENTLY IRRADIATED FUEL in the refueling area secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.2.2 Each refueling area secondary containment ventilation system automatic isolation valve shall be demonstrated OPERABLE:

a. Prior to returning the valve to service after maintenance, repair or replacement work is performed on the valve or its associated actuator, control or power circuit by cycling the valve 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 valve actuates to its isolation position.

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

STANDBY GAS TREATMENT SYSTEM - COMMON SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.5.3 Two independent standby gas treatment subsystems shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, and when (1) irradiated fuel is being handled in the refueling area secondary containment, or (2) during CORE ALTERATIONS.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1. With one standby gas treatment subsystem inoperable, 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.

b. When (1) irradiated fuel is being handled in the refueling area secondary containment, or (2) during CORE ALTERATIONS:

1. With one standby gas treatment subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 7 days, or suspend handling of irradiated fuel in the secondary containment and CORE ALTERATIONS. The provisions of Specification 3.0.3 are not applicable.

2. With both standby gas treatment subsystems inoperable, if in progress, suspend handling of irradiated fuel in the secondary containment and CORE ALTERATIONS. The provisions of Specification 3.0.3. are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.3 Each standby gas treatment subsystem shall be demonstrated OPERABLE:

a. 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 with the heaters OPERABLE.

3/4.7.2 CONTROL ROOM EMERGENCY FRESH AIR SUPPLY SYSTEM - COMMON SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.2 Two independent control room emergency fresh air supply system subsystems shall be OPERABLE.

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

APPLICABILITY: All OPERATIONAL CONDITIONS and when RECENTLY IRRADIATED FUEL is being handled in the secondary containment.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1. With one control room emergency fresh air supply 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 fresh air supply subsystems inoperable due to an inoperable CRE boundary,

a. Initiate action to implement mitigating actions immediately or be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours; and

b. Within 24 hours, verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits and actions to mitigate exposure to smoke hazards are taken or be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours; and

c. Restore CRE boundary to operable status within 90 days or be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION 4, 5, or when RECENTLY IRRADIATED FUEL is being handled in the secondary containment:

1. With one control room emergency fresh air supply subsystems 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 radiation isolation mode of operation.

2. With both control room emergency fresh air supply subsystems inoperable for reasons other than Condition b.3, immediately suspend handling of RECENTLY IRRADIATED FUEL in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

3. With one or more control room emergency fresh air subsystems inoperable due to an inoperable CRE boundary, immediately suspend handling of RECENTLY IRRADIATED FUEL in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.2.1 Each control room emergency fresh air supply subsystem shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying the control room air temperature to be less than or equal to 85°F effective temperature.

b. In accordance with the Surveillance Frequency Control Program on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the subsystem operates with the heaters OPERABLE.

c. In accordance with the Surveillance Frequency Control Program or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire, or chemical release in any ventilation zone communicating with the subsystem by:

1. Verifying that the subsystem satisfies the in-place penetration and bypass leakage testing acceptance criteria of less than 0.05% and uses the test procedure guidance in Regulatory Positions C.5.a, C.5.c, and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the system flow rate is 3000 cfm ± 10%.

2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows the methyl iodide penetration of less than 2.5% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and a relative humidity of 70%.

3. Verifying a subsystem flow rate of 3000 cfm ± 10% during subsystem operation when tested in accordance with ANSI N510-1980.

d. After every 720 hours of charcoal adsorber operation by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows the methyl iodide penetration of less than 2.5% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and a relative humidity of 70%.

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 each with:

1. A day fuel tank containing a minimum of 250 gallons of fuel.

2. A fuel storage system containing a minimum of 33,500 gallons of fuel.

3. A fuel transfer pump.

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 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 feet 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.

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 and 4.8.1.1.2.

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*When handling irradiated fuel in the secondary containment.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

2. Division 1 or 2 with float current > 2 amps, or with Division 3 or 4 with float current > 1 amp, perform 4.8.2.1.a.2 within 2 hours for affected battery(s) and restore battery float current to within limits within 18 hours.

3. One or two batteries on one division with one or more cells electrolyte level less than minimum established design limits, if electrolyte level was below the top of the plates restore electrolyte level to above top of plates within 8 hours and verify no evidence of leakage(*) within 12 hours. In all cases, restore electrolyte level to greater than or equal to minimum established design limits within 31 days.

4. One or two batteries on one division with pilot cell electrolyte temperature less than minimum established design limits, restore battery pilot cell temperature to greater than or equal to minimum established design limits within 12 hours.

5. Batteries in more than one division affected, restore battery parameters for all batteries in one division to within limits within 2 hours.

6. (i) Any battery having both (Action b.1) one or more battery cells float voltage < 2.07 volts and (Action b.2) float current not within limits, and/or

   (ii) Any battery not meeting any Action b.1 through b.5,

   Restore the battery parameters to within limits within 2 hours.

c. 1. With the requirements of Action a. and/or Action b. not met, or

2. With less than two divisions of the above required D.C. electrical power sources OPERABLE for reasons other than Actions a. and/or b.,

Suspend CORE ALTERATIONS and handling of irradiated fuel in the secondary containment.

d. 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.

(*) Contrary to the provisions of Specification 3.0.2, if electrolyte level was below the top of the plates, the verification that there is no evidence of leakage is required to be completed regardless of when electrolyte level is restored.

LIMITING CONDITION FOR OPERATION (Continued)

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5, and *.

ACTION:

a. With less than two divisions of the above required Unit 1 A.C. distribution systems energized, suspend CORE ALTERATIONS and handling of irradiated fuel in the secondary containment.

b. With less than two divisions of the above required Unit 1 D.C. distribution systems energized, suspend CORE ALTERATIONS and handling of irradiated fuel in the secondary containment.

c. With any of the above required Unit 2 and common AC and/or DC distribution system divisions not energized, declare the associated common equipment inoperable, and take the appropriate ACTION for that system.

d. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

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

*When handling irradiated fuel in the secondary containment.

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

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-353

LIMERICK GENERATING STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 190
Renewed License No. NPF-85

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

   A. The application for amendment by Exelon Generation Company, LLC (Exelon Generation Company), dated July 19, 2017, as supplemented by letters dated December 6, 2017; February 19, 2018; and February 27, 2018, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-85 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 190, are hereby incorporated into this renewed license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented no later than May 31, 2019.

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 Facility Operating
License and Technical Specifications

Date of Issuance: February 27, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 190

LIMERICK GENERATING STATION, UNIT 2

RENEWED FACILITY OPERATING LICENSE NO. NPF-85

DOCKET NO. 50-353

Replace the following page of the Renewed Facility Operating License with the attached 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
vii	vii
xii	xii
xviii	xviii
xx	xx
1-2	1-2
---	1-2a
3/4 3-16	3/4 3-16
3/4 3-31	3/4 3-31
3/4 3-33	3/4 3-33
3/4 3-35	3/4 3-35
3/4 3-36	3/4 3-36
3/4 3-40	3/4 3-40
3/4 3-41	3/4 3-41
---	3/4 3-41a
---	3/4 3-41b
---	3/4 3-41c
---	3/4 3-41d
---	3/4 3-41e
3/4 3-65	3/4 3-65
3/4 3-67	3/4 3-67
3/4 5-6	3/4 5-6
---	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 6-50	3/4 6-50
3/4 6-52	3/4 6-52
3/4 7-6	3/4 7-6
3/4 7-6a	3/4 7-6a
3/4 8-9	3/4 8-9
3/4 8-14a	3/4 8-14a
3/4 8-19	3/4 8-19
3/4 8-20	3/4 8-20

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

(3) 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;

(4) Pursuant to the Act and 10 CFR Parts 30, 40, 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

(5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility, and to receive and possess, but not separate, such source, byproduct, and special nuclear materials as contained in the fuel assemblies and fuel channels from the Shoreham Nuclear Power Station.

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 (except as exempted from compliance in Section 2.D. below) 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

Exelon Generation Company is authorized to operate the facility at reactor core power levels of 3515 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 190, are hereby incorporated into this renewed license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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DEFINITIONS

SECTION

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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BASES

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 moveable 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.

CORE OPERATING LIMITS REPORT

1.7a The CORE OPERATING LIMITS REPORT (COLR) is the unit-specific document that provides the 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 Specifications 6.9.1.9 thru 6.9.12. Plant operation within these limits is addressed in individual specifications.

CRITICAL POWER RATIO

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

DOSE EQUIVALENT I-131

1.9 DOSE EQUIVALENT I-131 shall be that concentration of I-131, microcuries per gram, which alone would produce the same inhalation committed effective dose equivalent (CEDE) as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The inhalation committed effective dose equivalent (CEDE) conversion factors used for this calculation shall be those listed in Table 2.1 of Federal Guidelines Report 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," ORNL, 1989, as described in Regulatory Guide 1.183. The factors in the column headed "effective" yield doses corresponding to the CEDE.

DOWNSCALE TRIP SETPOINT (DTSP)

1.9a The downscale trip setpoint associated with the Rod Block Monitor (RBM) rod block trip setting.

DRAIN TIME

1.9b 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

DRAIN TIME (Continued)

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.

1.10 (Deleted)

EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME

1.11 The EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ECCS actuation set-point at the channel sensor until the ECCS equipment is capable of performing its safety function, i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc. Times shall include diesel generator starting and sequence loading delays where applicable. The response time may be measured by any series of sequential, overlapping or total steps such that the entire response time is measured.

TABLE 3.3.2-1 (Continued)
ISOLATION ACTUATION INSTRUMENTATION
ACTION STATEMENTS

ACTION 20 - Be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

ACTION 21 - Be in at least STARTUP with the associated isolation valves closed within 6 hours or be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

ACTION 22 - Be in at least STARTUP within 6 hours.

ACTION 23 - In OPERATIONAL CONDITION 1 or 2, verify the affected system isolation valves are closed within 1 hour and declare the affected system inoperable. In OPERATIONAL CONDITION 3, be in at least COLD SHUTDOWN within 12 hours.

ACTION 24 - Restore the manual initiation function to OPERABLE status within 8 hours or close the affected system isolation valves within the next hour and declare the affected system inoperable or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

ACTION 25 - Establish SECONDARY CONTAINMENT INTEGRITY with the standby gas treatment system operating within 1 hour.

ACTION 26 - Close the affected system isolation valves within 1 hour.

TABLE NOTATIONS

* Required when handling RECENTLY IRRADIATED FUEL in the secondary containment.

** May be bypassed under administrative control, with all turbine stop valves closed.

\# During operation of the associated Unit 1 or Unit 2 ventilation exhaust system.

(a) DELETED

(b) 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. Trip functions common to RPS Actuation Instrumentation are shown in Table 4.3.2.1-1. In addition, for the HPCI system and RCIC system isolation, provided that the redundant isolation valve, inboard or outboard, as applicable, in each line is OPERABLE and all required actuation instrumentation for that valve is OPERABLE, one channel may be placed in an inoperable status for up to 8 hours for required surveillance without placing the channel or trip system in the tripped condition.

TABLE 4.3.2.1-1 (Continued)
ISOLATION ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION	CHANNEL CHECK(a)	CHANNEL FUNCTIONAL TEST(a)	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
7. SECONDARY CONTAINMENT ISOLATION				
a. Reactor Vessel Water Level Low, Low - Level 2				1, 2, 3
b. Drywell Pressure## - High				1, 2, 3
c.1. Refueling Area Unit 1 Ventilation Exhaust Duct Radiation - High				*#
2. Refueling Area Unit 2 Ventilation Exhaust Duct Radiation - High				*#
d. Reactor Enclosure Ventilation Exhaust Duct Radiation - High				1, 2, 3
e. Deleted				
f. Deleted				
g. Reactor Enclosure Manual Initiation	N.A.		N.A.	1, 2, 3
h. Refueling Area Manual Initiation	N.A.		N.A.	*

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

*Required when handling RECENTLY IRRADIATED FUEL in the secondary containment.

**When not administratively bypassed and/or when any turbine stop valve is open.

#During operation of the associated Unit 1 or Unit 2 ventilation exhaust system.

##These trip functions (2a, 6b, and 7b) are common to the RPS actuation trip function.

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/pump[b]	1, 2, 3	30
b. Drywell Pressure - High	2/pump[b]	1, 2, 3,	30
c. Reactor Vessel Pressure - Low (Permissive)	6[b]	1, 2, 3	31
d. Manual Initiation	2[e]	1, 2, 3	33
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM***			
a. Reactor Vessel Water Level - Low Low Low, Level 1	2	1, 2, 3	30
b. Drywell Pressure - High	2	1, 2, 3	30
c. Reactor Vessel Pressure - Low (Permissive)	2	1, 2, 3	31
d. Injection Valve Differential Pressure-Low (Permissive)	1/valve	1, 2, 3	31
e. Manual Initiation	1	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	1, 2, 3	35
e. Reactor Vessel Water Level - High, Level 8	4[d]	1, 2, 3	31
f. Manual Initiation###	1/system	1, 2, 3	33

TABLE 3.3.3-1 (Continued)
EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION
TABLE NOTATIONS

(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 provides input to actuation logic for the associated emergency diesel generators.

(c) One trip system. Provides signal to HPCI pump suction valves only.

(d) On 1 out of 2 taken twice logic, provides a signal to trip the HPCI pump turbine only.

(e) The manual initiation push buttons start the respective core spray pump and diesel generator. The "A" and "B" logic manual push buttons also actuate an initiation permissive in the injection valve opening logic.

(f) A channel as used here is defined as the 127 bus relay for Item 1 and the 127, 127Y, and 127Z feeder relays with their associated time delay relays taken together for Item 2.

* DELETED

\# Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 100 psig.

** 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.

\### The injection functions of Drywell Pressure - High and Manual Initiation are not required to be OPERABLE with reactor steam dome pressure less than 550 psig.

TABLE 3.3.3-1 (Continued)
EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION
ACTION STATEMENTS

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 less than the Total Number of Channels, declare the associated emergency diesel generator and the associated offsite source breaker that is not supplying the bus inoperable and take the ACTION required by Specification 3.8.1.1 or 3.8.1.2, as appropriate.

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. Manual Initiation	N.A.		N.A.	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				1, 2, 3
d. Injection Valve Differential Pressure - Low (Permissive)				1, 2, 3
e. Manual Initiation	N.A.		N.A.	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. Manual Initiation	N.A.		N.A.	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	N.A.			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. Manual Initiation	N.A.		N.A.	1, 2, 3
h. ADS Drywell Pressure Bypass Timer	N.A.			1, 2, 3
5. LOSS OF POWER				
a. 4.16 kV Emergency Bus Under voltage (Loss of Voltage)##	N.A.		N.A.	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.

Loss of Voltage Relay 127-11X is not field setable.

3/4.3.3.A REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC) INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.A The RPV Water Inventory Control (WIC) instrumentation channels shown in Table 3.3.3.A-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.3.A-1

ACTION:

a. With one or more channels inoperable in a trip system, take the ACTION referenced in Table 3.3.3.A-1 for the trip system.

SURVEILLANCE REQUIREMENTS

4.3.3.1.A Each RPV Water Inventory Control (WIC) instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and LOGIC SYSTEM FUNCTIONAL TEST as shown in Table 4.3.3.A-1 and at the frequencies specified in the Surveillance Frequency Control Program unless otherwise noted in Table 4.3.3.A-1.

TABLE 3.3.3.A-1
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTION
1. CORE SPRAY SYSTEM			
a. Reactor Vessel Pressure - Low (Permissive)	6[a]	4, 5	39
b. Manual Initiation	2[a][c]	4, 5	40
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM			
a. Injection Valve Differential Pressure - Low (Permissive)	1/valve[a]	4, 5	39
b. Manual Initiation	1[a]	4, 5	40
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION			
a. Reactor Vessel Water Level Low - Level 3	2 in one trip system	(b)	38
4. REACTOR WATER CLEANUP SYSTEM ISOLATION			
a. Reactor Vessel Water Level - Low, Low - Level 2	2 in one trip system	(b)	38

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC)."

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

(c) The manual initiation push buttons start the respective core spray pump and diesel generator. The "A" and "B" logic manual push buttons also actuate an initiation permissive in the injection valve opening logic.

TABLE 3.3.3.A-1 (Continued)
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION
ACTION STATEMENTS

ACTION 38 - Declare the associated trip system for the penetration flow path(s) incapable of automatic isolation and calculate DRAIN TIME.

ACTION 39 - Within 1 hour, place channel in trip. Otherwise, declare associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 40 - Within 24 hours, restore channel to OPERABLE status. Otherwise, declare associated low pressure ECCS injection/spray subsystem inoperable.

TABLE 3.3.3.A-2
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION SETPOINTS

TRIP FUNCTION	ALLOWABLE VALUE
1. CORE SPRAY SYSTEM	
a. Reactor Vessel Pressure - Low (Permissive)	≥ 435 psig (decreasing)
b. Manual Initiation	N.A.
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM	
a. Injection Valve Differential Pressure - Low (Permissive)	≤ 84 psid
b. Manual Initiation	N.A.
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION	
a. Reactor Vessel Water Level - Low - Level 3	≥ 11.0 inches
4. REACTOR WATER CLEANUP SYSTEM ISOLATION	
a. Reactor Vessel Water Level - Low, Low - Level 2	≥ -45 inches

TABLE 4.3.3.A-1
RPV WATER INVENTORY CONTROL (WIC) 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. Manual Initiation	N.A.	N.A.		4, 5
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM				
a. Injection Valve Differential Pressure Low (Permissive)			N.A.	4, 5
b. 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.

TABLE 3.3.7.1-1 (Continued)

RADIATION MONITORING INSTRUMENTATION

TABLE NOTATIONS

*When RECENTLY IRRADIATED FUEL is being handled in the secondary containment with the vessel head removed and fuel in the vessel.

(a) With fuel in the spent fuel storage pool.

(b) Alarm only.

ACTION STATEMENTS

ACTION 70 - With one monitor inoperable, restore the inoperable monitor to the OPERABLE status within 7 days or, within the next 6 hours, initiate and maintain operation of the control room emergency filtration system in the radiation isolation mode of operation.

With two or more of the monitors inoperable, within one hour, initiate and maintain operation of the control room emergency filtration system in the radiation mode of operation.

ACTION 71 - With one of the required monitor inoperable, assure a portable continuous monitor with the same alarm setpoint is OPERABLE in the vicinity of the installed monitor during any fuel movement. If no fuel movement is being made, perform area surveys of the monitored area with portable monitoring instrumentation at least once per 24 hours.

ACTION 72 - With the required monitor inoperable, obtain and analyze at least one grab sample of the monitored parameter at least once per 24 hours.

ACTION 73 - With the required monitor inoperable, assure a portable alarming monitor is OPERABLE in the vicinity of the installed monitor or perform area surveys of the monitored area with portable monitoring instrumentation at least once per 24 hours.

TABLE 4.3.7.1-1 (Continued)

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TABLE NOTATIONS

*When RECENTLY IRRADIATED FUEL is being handled in the secondary containment with the vessel head removed and fuel in the vessel.

(a) With fuel in the spent fuel storage pool.

(b) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.

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

3/4.5.2 REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC)

LIMITING CONDITION FOR OPERATION

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

AND

At least one of the following shall be OPERABLE:

a. Core spray system (CSS) subsystem comprised of:

1. Two OPERABLE CSS 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, equivalent to a level of 29 feet.

b. Low pressure coolant injection (LPCI) system 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 CONDITIONS 4 and 5.

ACTION:

a. With none of the above required subsystems OPERABLE, immediately suspend CORE ALTERATIONS. Restore at least one subsystem to OPERABLE status within 4 hours. Otherwise, initiate action to establish a method of water injection capable of operating without offsite electrical power.

b. DELETED.

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

LIMITING CONDITION FOR OPERATION (Continued)

ACTION:

c. With DRAIN TIME less than 36 hours and greater than or equal to 8 hours, within 4 hours:

1. Verify SECONDARY CONTAINMENT INTEGRITY is capable of being established in less than the DRAIN TIME,

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

3. Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.

d. With DRAIN TIME less than 8 hours, immediately:

1. Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level greater than TAF for greater than or equal to 36 hours,***

2. Initiate action to establish SECONDARY CONTAINMENT INTEGRITY,

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 standby gas treatment subsystem is capable of being placed in operation.

e. With required ACTION and associated allowed outage time for ACTIONs c. or d. not met, or DRAIN TIME less than 1 hour, immediately initiate action to restore DRAIN TIME to greater than or equal to 36 hours.

***The required injection/spray subsystem or an additional method of water injection shall be capable of operating without offsite electrical power.

SURVEILLANCE REQUIREMENTS

4.5.2.1 Verify DRAIN TIME is greater than or equal to 36 hours in accordance with the Surveillance Frequency Control Program.

4.5.2.2 Verify, for a required LPCI subsystem, the suppression chamber water level is greater than or equal to 16 feet 0 inches in accordance with the Surveillance Frequency Control Program.

4.5.2.3 Verify, for a required CSS subsystem, that the suppression chamber water level is greater than or equal to 16 feet 0 inches or the condensate storage tank water level is greater than or equal to 29 feet 0 inches in accordance with the Surveillance Frequency Control Program.

4.5.2.4 Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.

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 greater than or equal to 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.##

*DELETED.

#Not required to be met for system vent flow paths open under administrative control.

^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 CONDITIONS 1, 2, and 3 with a contained water volume of at least 122,120 ft^3, equivalent to a level of 22'0".

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, as applicable:

a. 22'0" in accordance with the Surveillance Frequency Control Program.

b. DELETED

4.5.3.2 DELETED

3/4.6.5 SECONDARY CONTAINMENT

REFUELING AREA SECONDARY CONTAINMENT INTEGRITY

LIMITING CONDITION FOR OPERATION

3.6.5.1.2 REFUELING AREA SECONDARY CONTAINMENT INTEGRITY shall be maintained.

APPLICABILITY: When RECENTLY IRRADIATED FUEL is being handled in the secondary containment.

ACTION:

Without REFUELING AREA SECONDARY CONTAINMENT INTEGRITY, suspend handling of RECENTLY IRRADIATED FUEL in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.1.2 REFUELING AREA SECONDARY CONTAINMENT INTEGRITY shall be demonstrated by:

a. Verifying in accordance with the Surveillance Frequency Control Program that the pressure within the refueling area secondary containment is greater than or equal to 0.25 inch of vacuum water gauge.

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

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

2. At least one door in each access to the refueling area secondary containment is closed, except when the access opening is being used for entry and exit.

3. All refueling area 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, slide gate dampers or deactivated automatic dampers/valves secured in position.

c. In accordance with the Surveillance Frequency Control Program:

Operating one standby gas treatment subsystem for one hour and maintaining greater than or equal to 0.25 inch of vacuum water gauge in the refueling area secondary containment at a flow rate not exceeding 764 cfm.

REFUELING AREA SECONDARY CONTAINMENT AUTOMATIC ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.5.2.2 The refueling area secondary containment ventilation system automatic isolation valves shall be OPERABLE.

APPLICABILITY: When RECENTLY IRRADIATED FUEL is being handled in the secondary containment.

ACTION:

With one or more of the refueling area secondary containment ventilation system automatic isolation valves inoperable, maintain at least one isolation valve OPERABLE in each affected penetration that is open and within 8 hours either:

a. Restore the inoperable valves to OPERABLE status, or

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

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

Otherwise, suspend handling of RECENTLY IRRADIATED FUEL in the refueling area secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.6.5.2.2 Each refueling area secondary containment ventilation system automatic isolation valve shall be demonstrated OPERABLE:

a. Prior to returning the valve to service after maintenance, repair or replacement work is performed on the valve or its associated actuator, control or power circuit by cycling the valve 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 valve actuates to its isolation position.

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

STANDBY GAS TREATMENT SYSTEM - COMMON SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.5.3 Two independent standby gas treatment subsystems shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, and when (1) irradiated fuel is being handled in the refueling area secondary containment, or (2) during CORE ALTERATIONS.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1. With the Unit 1 diesel generator for one standby gas treatment subsystem inoperable for more than 30 days, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With one standby gas treatment subsystem inoperable, 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.

3. With one standby gas treatment subsystem inoperable and the other standby gas treatment subsystem with an inoperable Unit 1 diesel generator, restore the inoperable subsystem to OPERABLE status or restore the inoperable Unit 1 diesel generator 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 the Unit 1 diesel generators for both standby gas treatment system subsystems inoperable for more than 72 hours, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. When (1) irradiated fuel is being handled in the refueling area secondary containment, or (2) during CORE ALTERATIONS:

1. With one standby gas treatment subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 7 days, or suspend handling of irradiated fuel in the secondary containment and CORE ALTERATIONS. The provisions of Specification 3.0.3 are not applicable.

2. With both standby gas treatment subsystems inoperable, if in progress, suspend handling of irradiated fuel in the secondary containment and CORE ALTERATIONS. The provisions of Specification 3.0.3 are not applicable.

3/4.7.2 CONTROL ROOM EMERGENCY FRESH AIR SUPPLY SYSTEM - COMMON SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.2 Two independent control room emergency fresh air supply system subsystems shall be OPERABLE.

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

APPLICABILITY: All OPERATIONAL CONDITIONS and when RECENTLY IRRADIATED FUEL is being handled in the secondary containment.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1. With the Unit 1 diesel generator for one control room emergency fresh air supply subsystem inoperable for more than 30 days, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With one control room emergency fresh air supply subsystem inoperable for reasons other than Condition a.5, 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.

3. With one control room emergency fresh air supply subsystem inoperable for reasons other than Condition a.5, and the other control room emergency fresh air supply subsystem with an inoperable Unit 1 diesel generator, restore the inoperable subsystem to OPERABLE status or restore the Unit 1 diesel generator 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 the Unit 1 diesel generators for both control room emergency fresh air supply subsystems inoperable for more than 72 hours, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

5. With one or more control room emergency fresh air supply subsystems inoperable due to an inoperable CRE boundary,

a. Initiate action to implement mitigating actions immediately or be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours; and

b. Within 24 hours, verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits and actions to mitigate exposure to smoke hazards are taken or be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours; and

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

c. Restore CRE boundary to operable status within 90 days or be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION 4, 5 or when RECENTLY IRRADIATED FUEL is being handled in the secondary containment:

1. With one control room emergency fresh air supply 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 radiation isolation mode of operation.

2. With both control room emergency fresh air supply subsystem inoperable for reasons other than Condition b.3, immediately suspend handling of RECENTLY IRRADIATED FUEL in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

3. With one or more control room emergency fresh air subsystems inoperable due to an inoperable CRE boundary, immediately suspend handling of RECENTLY IRRADIATED FUEL in the secondary containment. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.2.1 Each control room emergency fresh air supply subsystem shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying the control room air temperature to be less than or equal to 85°F effective temperature.

b. In accordance with the Surveillance Frequency Control Program on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the subsystem operates with the heaters OPERABLE.

c. In accordance with the Surveillance Frequency Control Program or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire, or chemical release in any ventilation zone communicating with the subsystem by:

1. Verifying that the subsystem satisfies the in-place penetration and bypass leakage testing acceptance criteria of less than 0.05% and uses the test procedure guidance in Regulatory Positions C.5.a, C.5.c, and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the system flow rate is 3000 cfm ± 10%.

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 each with:

1. A day fuel tank containing a minimum of 250 gallons of fuel.

2. A fuel storage system containing a minimum of 33,500 gallons of fuel.

3. A fuel transfer pump.

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 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 feet 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.

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 and 4.8.1.1.2.

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*When handling irradiated fuel in the secondary containment.

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

2. Division 1 or 2 with float current > 2 amps, or with Division 3 or 4 with float current > 1 amp, perform 4.8.2.1.a.2 within 2 hours for affected battery(s) and restore battery float current to within limits within 18 hours.

3. One or two batteries on one division with one or more cells electrolyte level less than minimum established design limits, if electrolyte level was below the top of the plates restore electrolyte level to above top of plates within 8 hours and verify no evidence of leakage(*) within 12 hours. In all cases, restore electrolyte level to greater than or equal to minimum established design limits within 31 days.

4. One or two batteries on one division with pilot cell electrolyte temperature less than minimum established design limits, restore battery pilot cell temperature to greater than or equal to minimum established design limits within 12 hours.

5. Batteries in more than one division affected, restore battery parameters for all batteries in one division to within limits within 2 hours.

6. (i) Any battery having both (Action b.1) one or more battery cells float voltage < 2.07 volts and (Action b.2) float current not within limits, and/or

   (ii) Any battery not meeting any Action b.1 through b.5,

   Restore the battery parameters to within limits within 2 hours.

c. 1. With the requirements of Action a. and/or Action b. not met, or

2. With less than two divisions of the above required D.C. electrical power sources OPERABLE for reasons other than Actions a. and/or b.,

Suspend CORE ALTERATIONS and handling of irradiated fuel in the secondary containment.

d. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

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

(*) Contrary to the provisions of Specification 3.0.2, if electrolyte level was below the top of the plates, the verification that there is no evidence of leakage is required to be completed regardless of when electrolyte level is restored.

LIMITING CONDITION FOR OPERATION (Continued)

c)	125-V DC Distribution Panels:	2PPA1	(2AD102)
		2PPA2	(2AD501)
		2PPA3	(2AD162)
2. Unit 2 Division 2, Consisting of:			
a)	250-V DC Fuse Box:	2FB	(2BD105)
b)	250-V DC Motor Control Centers:	2DB-1	(20D202)
		2DB-2	(20D203)
c)	125-V DC Distribution Panels:	2PPB1	(2BD102)
		2PPB2	(2BD501)
		2PPB3	(2BD162)
3. Unit 2 Division 3, Consisting of:			
a)	125-V DC Fuse Box:	2FC	(2CD105)
b)	125-V DC Distribution Panels:	2PPC1	(2CD102)
		2PPC2	(2CD501)
		2PPC3	(2CD162)
4. Unit 2 Division 4, Consisting of:			
a)	125-V DC Fuse Box:	2FD	(2DD105)
b)	125-V DC Distribution Panels:	2PPD1	(2DD102)
		2PPD2	(2DD501)
		2PPD3	(2DD162)
5. Unit 1 and Common Division 1, Consisting of:			
a)	250-V DC Fuse Box:	1FA	(1AD105)
b)	125-V DC Distribution Panels:	1PPA1	(1AD102)
		1PPA2	(1AD501)
6. Unit 1 and Common Division 2, Consisting of:			
a)	250-V DC Fuse Box:	1FB	(1BD105)
b)	125-V DC Distribution Panels:	1PPB1	(1BD102)
		1PPB2	(1BD501)
7. Unit 1 and Common Division 3, Consisting of:			
a)	125-V DC Fuse Box:	1FC	(1CD105)
b)	125-V DC Distribution Panels:	1PPC1	(1CD102)
		1PPC2	(1CD501)
8. Unit 1 and Common Division 4, Consisting of:			
a)	125-V DC Fuse Box:	1FD	(1DD105)
b)	125-V DC Distribution Panels:	1PPD1	(1DD102)
		1PPD2	(1DD501)

APPLICABILITY: OPERATIONAL CONDITIONS 4, 5, and *.

ACTION:

a. With less than two divisions of the above required Unit 2 A.C. distribution systems energized, suspend CORE ALTERATIONS and handling of irradiated fuel in the secondary containment.

*When handling irradiated fuel in the secondary containment.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

b. With less than two divisions of the above required Unit 2 D.C. distribution systems energized, suspend CORE ALTERATIONS and handling of irradiated fuel in the secondary containment.

c. With any of the above required Unit 1 and common AC and/or DC distribution system divisions not energized, declare the associated common equipment inoperable, and take the appropriate ACTION for that system.

d. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

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

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 227 TO

RENEWED FACILITY OPERATING LICENSE NO. NPR-39 AND

AMENDMENT NO. 190 TO RENEWED FACILITY OPERATING LICENSE NO. NPR-85

EXELON GENERATION COMPANY, LLC

LIMERICK GENERATING STATION, UNITS 1 AND 2

DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By application dated July 19, 2017 (Reference 1), as supplemented by letters dated December 20, 2017 (Reference 2), February 19, 2018 (Reference 3); and February 27, 2018 (Reference 4), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request (LAR) for Limerick Generating Station, Units 1 and 2 (Limerick).

The amendments would replace existing technical specification (TS) requirements related to "operations with a potential for draining the reactor vessel" (OPDRVs) with new requirements on reactor pressure vessel (RPV) water inventory control (WIC) to protect Safety Limit 2.1.4. Safety Limit 2.1.4 requires RPV water level to be greater than the top of active irradiated fuel. These alternative requirements would protect Safety Limit 2.1.4. Limerick TS Section 2.0, "Safety Limits and Limiting Safety System Settings," Safety Limit 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.

The proposed changes are based on Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control," dated March 14, 2016 (Reference 5). The U.S. Nuclear Regulatory Commission (NRC or the Commission) issued a final safety evaluation (SE) approving TSTF-542, Revision 2, on December 20, 2016 (Reference 6).

Additionally, a new definition "drain time" is added to Limerick TS Section 1.0, "Definitions." Drain time establishes 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 SE (Reference 6). These are explained in Section 2.2.6 of this SE and evaluated in Section 3.7.

The supplemental letters dated December 6, 2017; February 19, 2018; and February 27, 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 September 12, 2017 (82 FR 42848).

2.0 REGULATORY EVALUATION

2.1 System Description

The boiling water reactor (BWR) RPVs have penetrations located below the top of active fuel (TAF). For example, these penetrations provide entry for control rods, recirculation flow, and shutdown cooling. Because these penetrations are below the TAF, a potential to drain the reactor vessel water inventory and lose effective core cooling exists. The loss of water inventory and effective core cooling could lead to fuel cladding failure and potential radioactive release.

During operation in Operational Condition 1 (power operation – mode switch position in run), Condition 2 (startup - mode switch position in startup/hot standby), and Condition 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 that large quantities of water will be injected into the vessel, should level decrease below the preselected value. These requirements are designed to mitigate the effects of a loss-of-coolant accident (LOCA) and provide protection for other accidents or transients involving a water inventory loss.

During BWR operation in Condition 4 (cold shutdown – mode switch positon in shutdown and average reactor coolant temperature ≤ 200 °F) and Condition 5 (refueling – mode switch position in shutdown or refuel with fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed), the pressures and temperatures that could cause a LOCA are not present. During certain phases of refueling (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 (reference to existing Limerick TS 3/4.9.11 and TS 3.5.2) over the top of the RPV flange, and the spent fuel storage pool gates are removed). This large volume of water available in and above the RPV (during much of the time when in Condition 5) provides sufficient time for operator detection and manual operator action to stop and mitigate an RPV draining event. However, typically during cold shutdown (Condition 4) or refueling (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.

In comparison to Conditions 1, 2, and 3 with high temperatures and pressures (especially in Conditions 1 and 2), 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 BWR RPV water level decrease from potentially significant or even

unexpected drainage paths. These potential drainage paths in Conditions 4 and 5 generally would require less water replacement capability to maintain water above TAF.

To address the draindown potential during Conditions 4 and 5, the current Limerick 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 water inventory control TS with attendant equipment operability requirements, required actions and surveillance requirements (SRs), and deleting references to OPDRVs throughout the TSs.

2.2 Proposed TS Changes

Section 2.2.1 discusses the addition of a new definition "drain time" (evaluated below in Section 3.1).

Section 2.2.2 discusses TS 3/4.3, "Instrumentation," revisions, including:

Table 3.3.2-1, "Isolation Actuation Instrumentation"
Table 4.3.2.1-1, "Isolation Actuation Instrumentation Surveillance Requirements"
Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation"
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 discusses TS 3/4.3, "Instrumentation," TS additions, including:

TS 3/4.3.3.A, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC) Instrumentation"
TS Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation
TS Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation Action Statements"
TS Table 3.3.3.A-2, "RPV Water Inventory Control (WIC) Instrumentation Setpoints"
TS Table 4.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation Surveillance Requirements"

Section 2.2.2 is evaluated below in Sections 3.2 and 3.3. Section 2.2.3 discusses TS Section 3/4.5.2, "ECCS - Shutdown," revision changes to TS 3/4.5.2 limiting conditions for operation (LCOs) and TS 4.5.2 SRs (evaluated below in Section 3.4).

Section 2.2.4 discusses changes to TS 3/4.5.3, "Suppression Chamber" (evaluated below in Section 3.6). Section 2.2.5 discusses Limerick's deletion of OPDRVs references (evaluated in Section 3.8). Section 2.2.6 discusses Limerick's identified variation to TSTF-542, Revision 2 (evaluated below in Section 3.7).

2.2.1 Addition of Drain Time Definition

The licensee's July 19, 2017, application (Reference 1), includes the following definition of "drain time" that would be added to Limerick TS Section 1.0, "Definitions":

1.9b 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 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 TS Section 3/4.3, "Instrumentation"

The following subsections describe the existing and proposed changes to the Limerick TS, Section 3/4.3, "Instrumentation":

2.2.2.1 TS Table 3.3.2-1, "Isolation Actuation Instrumentation"

TS Table 3.3.2-1, "Isolation Actuation Instrumentation Action Statements," table notations for "*" is proposed to be revised to remove the reference to OPDRV. The existing table notation states:

> Required when (1) handling RECENTLY IRRADIATED FUEL in the secondary containment, or (2) during operations with a potential for draining the reactor vessel with the vessel head removed and fuel in the vessel.

The proposed table notation states:

> Required when handling RECENTLY IRRADIATED FUEL in the secondary containment.

The proposed change to the table notation will remove the applicable operational conditions for OPDRV for the following trip functions, secondary containment isolation:

7.c.1 Refueling Area Unit 1 Ventilation Exhaust Duct Radiation – High
7.c.2 Refueling area Unit 2 Ventilation Exhaust Duct Radiation – High
7.h Refueling Area Manual Initiation

2.2.2.2 Changes to TS Table 4.3.2.1-1, "Isolation Actuation Instrumentation Surveillance Requirements"

As stated in Section 2.2.2.1 of this SE, three instrumentation trip functions are affected by the removal of the OPDRV table notation '*.' Therefore, this also affects these three instrumentation SRs. TS Table 4.3.2.1-1, "Isolation Actuation Instrumentation Surveillance Requirements," Footnote '*' is revised to remove the reference to OPDRV. The existing Footnote '*' states:

> Required when (1) handling RECENTLY IRRADIATED FUEL in the secondary containment, or (2) during operations with a potential for draining the reactor vessel with the vessel head removed and fuel in the vessel.

The proposed change to Footnote '*' states:

> Required when handling RECENTLY IRRADIATED FUEL in the secondary.

The proposed change to Footnote '*' will remove the SRs for OPDRV for the same trip function, secondary containment isolation stated in Section 2.2.2.1 of this SE.

2.2.2.3 TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation"

TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," is proposed to be revised to remove the reference to OPDRV. TS table trip function instrumentation are proposed to be deleted for Conditions 4 and 5 for the following:

1. CORE SPRAY SYSTEM
   a. Reactor Vessel Water Level - Low Low Low, Level 1
   c. Reactor Vessel Pressure - Low (Permissive)
   d. Manual Initiation

2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM
   a. Reactor Vessel Water Level - Low Low Low, Level 1
   d. Injection Valve Differential Pressure – Low (Permissive)
   e. Manual Injection

Footnote '*' is proposed to be modified and to delete the reference to TS 3.5.2. The existing footnote states:

> When the system is required to be OPERABLE per Specification 3.5.2.

The Footnote '*' proposed change is:

> DELETED

TS Table 3.3.3.-1, Action 32, is proposed to be deleted to remove the reference to operable channels for item 1.c above. Since Core Spray System, Reactor Vessel Pressure - Low (Permissive) is proposed to be deleted, Action 32 is no longer needed. The existing Action 32 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 Action 32 proposed change is:

> DELETED

2.2.2.4 TS Table 4.3.3.1-1, "Emergency Core Cooling System Actuation Instrumentation Surveillance Requirements"

As stated in Section 2.2.2.3 of this SE, six instrumentation trip functions are affected by the removal of OPDRV Footnote '*.' Therefore, TS Table 4.3.3-1, "Emergency Core Cooling System Actuation Instrumentation Surveillance Requirements," trip function instrumentation SRs, SRs are proposed to be deleted for Conditions 4 and 5 for the following.

1. CORE SPRAY SYSTEM
   a. Reactor Vessel Water Level - Low Low Low, Level 1
   c. Reactor Vessel Pressure - Low
   d. Manual Initiation

2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM
   a. Reactor Vessel Water Level - Low Low Low, Level 1
   d. Injection Valve Differential Pressure – Low (Permissive)
   e. Manual Injection

Footnote '*' is proposed to be modified and to delete the reference to TS 3.5.2. The existing footnote states:

When the system is required to be OPERABLE per Specification 3.5.2.

The Footnote '*' proposed change is:

DELETED

2.2.2.5 TS 3/4.3.3.A, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC) Instrumentation"

The proposed new TS 3/4.3.3.A is as follows:

INSTRUMENTATION

3/4.3.3.A REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC) INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.A The RPV Water Inventory Control (WIC) instrumentation channels shown in Table 3.3.3.A.-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3.3.A-1

ACTION:

a. With one or more channels inoperable in a trip system, take the ACTION referenced in Table 3.3.3.A-1 for the trip system.

SURVEILLANCE REQUIREMENTS

4.3.3.1.A Each RPV Water Inventory Control (WIC) instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST and LOGIC SYSTEM FUNCTIONAL TEST as shown in Table 4.3.3.A-1 and at the frequencies specified in the Surveillance Frequency Control Program unless otherwise noted in Table 4.3.3.A-1.

2.2.2.6 TS Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation"

The proposed insertion of new TS Table 3.3.3.A-1 would contain functions that are comprised of requirements moved from TS Table 3.3.3-1, as well as new requirements. The new TS Table 3.3.3.A-1 is shown below, with applicable footnotes:

TABLE 3.3.3.A-1
RPV WATER INVENTORY CONTROL (WIC) INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION	APPLICABLE OPERATIONAL CONDITIONS	ACTIONS
1. CORE SPRAY SYSTEM			
a. Reactor Vessel Pressure – Low (Permissive)	6[a]	4,5	39
b. Manual Initiation	2[a][c]	4,5	40
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM			
a. Injection Valve Differential Pressure - Low (Permissive)	1/valve[a]	4,5	39
b. Manual Initiation	1[a]	4,5	40
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION			
a. Reactor Vessel Water Level Low - Level 3	2 in one trip system	(b)	38
4. REACTOR WATER CLEANUP SYSTEM ISOLATION			
a. Reactor Vessel Water Level - Low, Low - Level 2	2 in one trip system	(b)	38

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "REACTOR PRESSURE VESSEL (RPV) WATER INVENTORY CONTROL (WIC)."

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

(c) The manual initiation push buttons start the respective core spray pump and diesel generator. The "A" and "B" logic manual push buttons also actuate an initiation permissive in the injection valve opening logic.

2.2.2.7 TS Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation Action Statements"

The proposed new TS Table 3.3.3 A-1 Action Statements are as follows:

ACTION 38 – Declare the associated trip system for the penetration flow path(s) incapable of automatic isolation and calculate DRAIN TIME.

ACTION 39 – Within 1 hour, place channel in trip. Otherwise, declare associated low pressure ECCS injection/spray subsystem inoperable.

ACTION 40 – Within 24 hours, restore channel to OPERABLE status. Otherwise, declare associated low pressure ECCS injection/spray subsystem inoperable.

2.2.2.8 TS Table 3.3.3.A-2, "RPV Water Inventory Control (WIC) Instrumentation Setpoints"

The proposed new TS 'Table 3.3.3 A-2, "RPV Water Inventory Control (WIC) Instrumentation Setpoints," is shown below:

TRIP FUNCTION	ALLOWABLE VALUE
1. CORE SPRAY SYSTEM a. Reactor Vessel Pressure – Low (Permissive) b. Manual Initiation	 ≥ 435 psig (decreasing) N.A.
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM a. Injection Valve Differential Pressure - Low (Permissive) b. Manual Initiation	 ≤ 84 psid N.A.
3. RHR SYSTEM SHUTDOWN COOLING MODE ISOLATION a. Reactor Vessel Water Level – Low Level 3	 ≥ 11.0 inches
4. REACTOR WATER CLEANUP SYSTEM ISOLATION a. Reactor Vessel Water Level - Low, Low - Level 2	 ≥ -45 inches

2.2.2.9 TS Table 4.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation Surveillance Requirements"

The proposed new TS Table 4.3.3 A-1, "RPV Water Inventory Control (WIC) Instrumentation Surveillance Requirements," is shown below:

TABLE 4.3.3.A-1
RPV WATER INVENTORY CONTROL (WIC) 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) b. Manual Initiation	 N.A.	 N.A.	 N.A.	 4, 5 4, 5
2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM a. Injection Valve Differential Pressure - Low (Permissive) b. Manual Initiation	 N.A.	 N.A.	 N.A.	 4, 5 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.

2.2.2.10 TS Table 3.3.7.1-1, "Radiation Monitoring Instrumentation"

TS Table 3.3.7.1-1, "Radiation Monitoring Instrumentation," table notation for '*' is revised to remove the reference to OPDRV. The existing notation states:

> When RECENTLY IRRADIATED FUEL is being handled in the secondary containment or during operations with a potential for draining the reactor vessel with the vessel head removed and fuel in the vessel.

The proposed modified notation states:

> When RECENTLY IRRADIATED FUEL is being handled in the secondary containment with the vessel head removed and fuel in the vessel.

2.2.2.11 TS Table 4.3.7.1-1, "Radiation Monitoring Instrumentation Surveillance Requirements"

TS Table 4.3.7.1-1, "Radiation Monitoring Instrumentation Surveillance Requirements," table notation for '*' is revised to remove the reference to OPDRV. The existing notation states:

Table notation for '*' is revised to remove the reference to OPDRV. The existing notation states:

> When RECENTLY IRRADIATED FUEL is being handled in the secondary containment or during operations with a potential for draining the reactor vessel with the vessel head removed and fuel in the vessel.

The proposed modified notation states:

> When RECENTLY IRRADIATED FUEL is being handled in the secondary containment with the vessel head removed and fuel in the vessel.

2.2.3 TS Section 3/4.5.2, "ECCS - Shutdown"

The proposed change to the title of TS Section 3/4.5.2, "ECCS - Shutdown," is from "ECCS – Shutdown," to "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)."

2.2.3.1 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 shall be OPERABLE:

a. Core spray system (CSS) subsystem comprised of:

1. Two OPERABLE CSS 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, equivalent to a level of 29 feet.

b. Low pressure coolant injection (LPCI) system 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 CONDITIONS 4 and 5*.

ACTION:

a. With none of the above required subsystems OPERABLE, Immediately suspend CORE ALTERATIONS. Restore at least one subsystem to OPERABLE status within 4 hours. Otherwise, initiate action to establish a method of water injection capable of operating without offsite electrical power.

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

b. DELETED

c. With DRAIN TIME less than 36 hours and greater than or equal to 8 hours, within 4 hours:

1. Verify SECONDARY CONTAINMENT INTEGRITY is capable of being established in less than the DRAIN TIME,

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

3. Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.

d. With DRAIN TIME less than 8 hours, immediately:

1. Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level greater than TAF for greater than or equal to 36 hours,***

2. Initiate action to establish SECONDARY CONTAINMENT INTEGRITY,

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 standby gas treatment subsystem is capable of being placed in operation.

e. With required ACTION and associated allowed outage time for ACTIONs c. or d. not met, or DRAIN TIME less than 1 hour, immediately initiate action to restore DRAIN TIME to greater than or equal to 36 hours.

***The required injection/spray subsystem or an 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 remove Footnote '*' associated with applicability Operational Condition 5, which states:

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.

2.2.3.2 TS 4.5.2 SRs

The proposed changes to TS SR 4.5.2 for Limerick would modify existing SRs 4.5.2.1 and 4.5.2.2 as follows:

> 4.5.2.1 Verify DRAIN TIME is greater than or equal to 36 hours in accordance with the Surveillance Frequency Control Program.
>
> 4.5.2.2 Verify, for a required LPCI subsystem, the suppression chamber water level is greater than or equal to 16 feet 0 inches in accordance with the Surveillance Frequency Control Program.

The proposed changes to TS SR 4.5.2 for Limerick would add six new SRs as follows:

> 4.5.2.3 Verify, for a required CSS subsystem, that the suppression chamber water level is greater than or equal to 16 feet 0 inches or the condensate storage tank water level is greater than or equal to 29 feet 0 inches in accordance with the Surveillance Frequency Control Program.
>
> 4.5.2.4 Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.
>
> 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 greater than or equal to 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 Limerick would add three new SR footnotes as follows:

> # Not required to be met for system vent flow paths open under administrative control.
>
> ^ 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.

The proposed change to TS SR 4.5.2 for Limerick would delete one SR footnote, which states:

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

The Footnote '*' proposed change is:

DELETED

2.2.4 TS Section 3/4.5.3, "Suppression Chamber"

TS 3/4.5.3, "Suppression Chamber," and SRs are revised to remove the references to Operational Conditions 4 and 5. Specifically, 3.5.3 LCO b, Action b, LCO Footnote '*'; SR 4.5.2.1, Part b, SR 4.5.3.2, and SR Footnote '*' are deleted. TS 3.5.3 LCO and SR 4.5.3 are as follows:

LIMITING CONDITION FOR OPERATION

3.5.3 The suppression chamber shall be OPERABLE:

a. In OPERATIONAL CONDITIONS 1, 2, and 3 with a contained water volume of at least 122,120 ft^3, equivalent to a level of 22'0".

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, as applicable:

a. 22'0" in accordance with the Surveillance Frequency Control Program.

b. DELETED

4.5.3.2 DELETED

2.2.5 Deletion of References to OPDRVs Term

In the licensee's July 19, 2017, application, the licensee proposed to delete references to OPDRVs throughout the Limerick TSs. These TSs contain one or more OPDRVs references, such as, "or during operations with a potential for draining the reactor vessel, with the vessel head removed and fuel in the 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:

Limerick LCOs Location of OPDRVs References

TS 3/4.6.5, "Containment Systems, Secondary Containment, Refueling Area Secondary Containment Integrity," LCO 3.6.5.1.2, Applicability, Action

TS 3/4.6.5, "Containment Systems, Secondary Containment, Refueling Area Secondary Containment Automatic Isolation Valves," LCO 3.6.5.2.2, Applicability, Action

TS 3/4.6.5, "Containment Systems, Secondary Containment, Standby Gas Treatment System – Common System, LCO 3.6.5.3, Applicability, Action b

TS 3/4.7.2, "Plant Systems, Control Room Emergency Fresh Air Supply System – Common System," LCO 3.7.2, Applicability, Action b

TS 3/4.8.1, "Electrical Power Systems, A.C. Sources – Shutdown," LCO 3.8.1.2, Actions a and c

TS 3/4.8.2, "Electrical Power Systems, D.C. Sources – Shutdown," LCO 3.8.2.2, Action c

TS 3/4.8.3, "Electrical Power Systems, Distribution – Shutdown," LOC 3.8.3.2, Actions b and c

2.2.6 Limerick Plant-Specific TSTF-542 TS Variations

In Attachment 1, Section 2.2, of the licensee's July 19, 2017, application (Reference 1), the licensee identified several Limerick plant-specific TS variations from TSTF-542, Revision 2 (Reference 5), or the NRC-approved TSTF-542 SE (Reference 6). The licensee stated these variations do not affect the applicability of TSTF-542 or the NRC staff's SE. The staff has determined the licensee's proposed variations can be characterized as either administrative or technical. Section 3.7 of this SE includes the staff's technical evaluation of each of these technical variations.

2.2.6.1 Variation 1, Deletion of TS 3.5.2, Action b

In alignment with TSTF-542, Revision 2, Section 3.1.2, "Proposed Safety Basis," the existing Limerick 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 water inventory control requirements. In addition, loss of RPV inventory events are not initiated by core alteration operations. Refueling LCOs provide requirements to ensure safe operation during core alterations, including required water level above the RPV flange. Therefore, Limerick proposes to delete TS 3.5.2, Action 'b,' in its entirety, including the action relating to core alterations.

2.2.6.2 Variation 2, Suppression Chamber

In alignment with NUREG-1433, Revision 4, and consistent with TSTF-542, Revision 2, Limerick 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, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)." For example, the existing Limerick TS LCO 3.5.3.b contains conditions that allow the suppression chamber level to be less than the required 16 feet 0 inches in Operational Conditions 4 and 5 if the conditions are met, such as maintaining an operable flow path for the core spray system (CSS) to take suction from the condensate storage tank (CST) and ensuring there is sufficient level (29 feet) in the CST. These conditions are satisfied by the proposed LCO 3.5.2.a.2.b. In addition, existing SR 4.5.3.1.b requires verifying that the suppression chamber water level is 16 feet 0 inches. This is satisfied by proposed SRs 4.5.2.2 and 4.5.2.3.

2.2.6.3 Variation 3, Pump Discharge Flow-Low

TSs based on NUREG-0123, Revision 2, such as the current Limerick TSs, do not include requirements in Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," for the following functions that are listed in TSTF-542, "1b - Core Spray Pump Discharge Flow-Low (Bypass)," and "2b - Low Pressure Coolant Injection Pump Discharge Flow-Low (Bypass)." Therefore, to align with current Limerick instrumentation TSs, no requirements were added for these functions as part of the newly proposed TS Table 3.3.3.A-1.

2.2.6.4 Variation 4, RPV Pressure Low

TSTF-542, Table 3.3.5.2-1, "RPV Water Inventory Control Instrumentation," contains Function 2.a, "Reactor Steam Dome Pressure – Low (Injection Permissive)," as a permissive for the injection function of the low pressure coolant injection (LPCI) system in Operational Conditions 4 and 5. The current Limerick TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," contains a similar Function 2.c, "Reactor Vessel Pressure – Low"; however, for Limerick, this function is only required in Operational Conditions 1, 2, and 3, and is combined with the drywell pressure – high function to provide an automatic initiation signal for LPCI, which is separate from the injection logic. For Limerick, the permissive for the injection function of LPCI in Operational Conditions 4 and 5 from TS Table 3.3.3-1 is Function 2.d, "Injection Valve Differential Pressure – Low." This interlock, as determined by monitoring the differential pressure across the injection valve, is to prevent opening the injection valve if reactor pressure is greater than the residual heat removal (RHR) system piping design maximum pressure. Therefore, the new proposed TS Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation," for Limerick will include Function 2.a, "Injection Valve Differential Pressure – Low (Permissive)," for the injection function of the LPCI mode of the RHR system rather than the reactor vessel pressure – low [reactor steam dome pressure – low] function specified in TSTF-542. This variation is consistent with the current Limerick TSs and operation of the plant, and does not affect the applicability of TSTF-542 to the Limerick TSs.

2.2.6.5 Variation 5, Gas Accumulation

Limerick TSs include Amendment Nos. 216 for Unit 1, and 178 for Unit 2, for TSTF-523, "Generic Letter 2008-01, Managing Gas Accumulation." As discussed in the technical evaluation of TSTF-542, Revision 2, the changes in TSTF-523 are also applicable to the proposed SRs 4.5.2.4 and 4.5.2.5. Therefore, the following changes are being made to the proposed SRs 4.5.2.4 and 4.5.2.5 based on the changes made to the corresponding Limerick

SRs in the above-referenced amendments that adopted TSTF-523. The following changes have no effect on the adoption of TSTF-542 and are an acceptable variation in accordance with Section 3.2.4.4 of TSTF-542.

SR 4.5.2.4 has been modified from "Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve," to "Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water."

SR 4.5.2.5 has been modified to retain the note: "Not required to be met for system vent flow paths opened under administrative control."

2.3 Applicable Regulatory Requirements

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

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

> (1) Safety limits, limiting safety system settings, and limiting control settings. (i)(A) Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity. If any safety limit is exceeded, the reactor must be shut down. The licensee shall notify the Commission, review the matter, and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude recurrence. Operation must not be resumed until authorized by the Commission.

As required by 10 CFR 50.36(c)(2)(i), the TSs will include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Pursuant to 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 at 10 CFR 50.36(c)(2)(ii) requires licensees to establish TS LCOs for items meeting one or more of the listed criteria. Specifically, Criterion 4, "A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety," supports the establishment of LCOs for RPV WIC due to insights gained via operating experience.

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

Pursuant to 10 CFR 50.90, whenever a holder of an operating license desires to amend the license, application for an amendment must be filed with the Commission fully describing the changes desired, and following, as far as applicable, the form prescribed for original applications. The technical information to be included in an application for an operating license is governed in particular by 10 CFR 50.34(b).

As described in 10 CFR 50.92(a), in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations that govern the issuance of initial licenses 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, Volumes 1 and 2 (Reference 7 and Reference 8), contain the Standard Technical Specifications for Boiling Water Reactor (BWR)/4 plants and are part of the regulatory standardization effort. (The NRC staff had prepared Standard Technical Specifications for each of the light-water reactor nuclear designs. Changes will be incorporated into future revisions of NUREG-1433, Volumes 1 and 2.)

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," dated March 2010 (Reference 9).

2.3.1 Limerick Applicable Regulatory Design Requirements

The Limerick 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 Appendix A to 10 CFR Part 50. The following criteria 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 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 reactor coolant pressure boundary 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 reactor coolant pressure boundary 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 reactor coolant pressure boundary 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 reactor coolant pressure boundary and rupture of small piping or other small components which are part of the boundary. The system shall be designed to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available), the system safety function can be accomplished using the piping, pumps, and valves used to maintain coolant inventory during normal reactor operation.

Criterion 35 – Emergency Core Cooling. A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

Suitable redundancy in components and features and suitable interconnections, leak detection, isolation, and containment capabilities shall be provided 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, assuming a single failure.

3.0 TECHNICAL EVALUATION

3.1 Staff Evaluation of Proposed Drain Time Definition

The proposed drain time definition in TS Section 1.0, "Definitions," 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.

The NRC staff reviewed the proposed drain time definition. 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 proposed "drain time definition." All RPV penetrations below the TAF are included in the determination of drain time as potential pathways. The drain time would be 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. The NRC staff finds the proposed "drain time" definition acceptable because the calculation provides a conservative approach to determining the drain time of the RPV.

3.2 TS 3/4.3.3.A, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC) Instrumentation"

The purpose of the RPV WIC instrumentation is to support the requirements of new TS LCO 3.5.2 and the definition of drain time. Instrumentation and controls and their signal functions are required for manual pump starts or are required as a permissive or operational controls on the equipment of the systems that provide water injection capability, certain start

commands, pump protection, and isolation functions. 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 SE of new TS LCO 3.5.2. For Limerick, reactor operators have alternate, often more complex means, of starting and injecting water than the preferred simple push button start.

Specifically, the RPV WIC instrumentation supports operation of the CSS and LPCI, including manual starts, when needed, as well as the system isolation of the RHR/shutdown cooling (SDC) system and the reactor water cleanup (RWCU) system. The equipment involved with each of these systems is described in the evaluation of TS 3.5.2 and the bases for LCO 3.5.2.

3.2.1 Staff Evaluation of Proposed TS 3/4.3.3.A, LCO and Applicability

A new TS 3/4.3.3.A, "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 required in new TS 3.5.2 and automatic isolation of penetration flow paths that may be credited in the determination of drain time. The current TSs contain instrumentation requirements related to OPDRVs is in TS Table 3.3.3-1 and TS Table 4.3.3.1-1. These requirements from Table 3.3.3-1 (actuation instrumentation) and Table 4.3.3.1-1 (SRs) are being consolidated into new TS Table 3.3.3.A-1 (WIC instrumentation), TS Table 3.3.3.A-2 (WIC instrumentation setpoints), and TS Table 4.3.3.A-1 (WIC instrumentation SRs).

The proposed LCO 3.3.3.A states, "The RPV Water Inventory Control (WIC) instrumentation channels shown is Table 3.3.3.A-1 shall be OPERABLE."

The applicability states, "As shown in Table 3.3.3.A-1." Table 3.3.3.A-1 contains those instrumentation 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 3.3.3.A-1 are moved from existing TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation." For RHR SDC, reactor vessel water level low level 3 is derived from existing TS Table 3.3.2-1, Trip Function 2.a (only applicable Operational Conditions 1, 2, and 3), "Isolation Actuation Instrumentation."

For RWCU, reactor vessel water level low low level 2 is derived from existing TS Table 3.3.2-1, Trip Function 3.e (only applicable Operational Condition 1, 2, and 3), "Isolation Actuation Instrumentation."

Creation of TS 3/4.3.3.A with Table 3.3.3.A-1 places these trip functions in a single location with requirements appropriate to support the safety function for TS 3.5.2. If plant-specific design and TSs require different functions to support manual initiation of an ECCS subsystem, those functions should be included in TS 3/4.3.3.A.

The NRC staff concluded the licensee's proposed alternative is acceptable since the ECCS injection/spray subsystem would be available to perform the intended function to inject water into the RPV, which meets the requirements of TSTF-542.

3.2.2 Staff Evaluation of Proposed TS 3/4.3.3.A Actions

The proposed TS 3/4.3.3.3.A Action is included in Section 2.2.2.5 of this SE. The NRC staff finds this action is sufficient and necessary 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 these actions direct the licensee to take appropriate actions as necessary and enter immediately into the conditions referenced in Table 3.3.3.A-1. 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.

Action a is applicable when one or more channels are inoperable in a trip system from Table 3.3.3.A-1 and directs the licensee to immediately enter the condition referenced in Table 3.3.3.A-1 for that channel.

3.2.3 Staff Evaluation of Proposed TS 4.3.3.1.A SRs and Table 4.3.3.3.A-1, "RPV Water Inventory (WIC) Instrumentation Surveillance Requirements"

The TS 4.3.3.1.A SRs include channel checks, channel functional tests, and logic system functional tests as described in Sections 2.2.2.5 and 2.2.2.9 of this SE. The NRC staff finds these tests are sufficient and adequate because they are essential to ensure the trip functions of TS Table 3.3.3.A-1 are operable (i.e., capable of performing the specified safety function in support of TS 3.5.2, "Drain Time," and the protection from a potential draindown of the RPV in Operational Conditions 4 and 5). The NRC staff also finds the proposed TS 4.3.3.1.A surveillances of LCO 3.3.3.A as described in Section 3.3.3 satisfies 10 CFR 50.36(c)(3) by providing the specific SRs relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained.

Channel check is applied to the following trip functions in Operational Conditions 4 and 5:

> Core Spray System, Reactor Vessel Pressure – Low (Permissive)
>
> LPCI Mode of RHR System, Injection Valve Differential Pressure - Low (Permissive)
>
> Channel Check is applied to the following Trip Functions when automatic isolation of the associated penetration flow path(s) is credited in calculation Drain Time:
>
> RHR System SDC Mode Isolation, Reactor Vessel Water Level – Low Level 3
>
> RWCU 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 to verify the instrumentation continues to operate properly between each channel functional test. The frequency in accordance with the Surveillance Frequency Control Program is consistent with the existing requirements and supports operating shift situational awareness.

A channel functional test is applied to the following trip functions in Operational Conditions 4 and 5:

Core Spray System, Reactor Vessel Pressure – Low (Permissive)

LPCI Mode of RHR System, Injection Valve Differential Pressure - Low (Permissive)

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

RHR System SDC Mode Isolation, Reactor Vessel Water Level – Low Level 3

RWCU Isolation, Reactor Vessel Water Level - Low, Low - Level 2

A channel functional test is the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify operability of all devices in the channel required for channel operability. It is performed on each required channel to ensure that the entire channel will perform the intended function. The frequency is in accordance with the Surveillance Frequency Control Program. This is acceptable 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 in the order of 30 days or less, licensees could include this SR, if desired, as part of a refueling activity.

A logic system functional test is applied to the following trip functions in Operational Conditions 4 and 5:

Core Spray System, Manual Initiation

LPCI Mode of RHR 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 Surveillance Frequency Control Program. The NRC staff finds this acceptable because it is consistent with the existing requirements for these functions. Since periods in Operational Conditions 4 and 5 as refueling outages are often in the order of 30 days or less, licensees could include this SR, if desired, as part of a refueling activity.

3.3 Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation," and Table 3.3.3.A-2, "RPV Water Inventory Control (WIC) Instrumentation Setpoints"

In order to support the requirements of TS 3/4.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)"; LCO 3.5.2; and the definition of "drain time," the instrumentation requirements are designated in Table 3.3.3.A-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.

Proposed TS Table 3.3.3.1-A, "RPV Water Inventory Control (WIC) 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) action, the required number of channels per

function, and footnotes concerning items of the table. Table 3.3.3.2-A specifies for each trip function the instrumentation allowable values.

Proposed Table TS 3.3.3.A-1 presents details on the functions required to support the equipment and functions of TS 3.5.2. The NRC staff finds the presentation in this table acceptable because this section sufficiently discusses the purpose of the functions, the applicability, the number of required channels, and the action is the trip function is inoperable. The selection of the allowable value is shown in Table 3.3.3.A-2. The NRC staff finds the RPV WIC instrumentation set is acceptable because it is adequate to ensure the instruments of the channels respond with the required accuracy, permitting pump systems to operate to inject water when needed and isolation of equipment when commanded to support the prevention of or mitigate a potential RPV draining event.

All of the CCS and LPCI pumps in Operational Conditions 4 and 5 can be manually started with their control switch and with a water flow path established with the required valve switches or with their manual initiation push button. Automatic initiation of a CCS/LPCI subsystem may be undesirable because it could lead to overflowing the RPV cavity due to injection rates of thousands of gallons per minute. Thus, there is adequate time to take manual actions (e.g., hours versus 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 CCS/LPCI subsystem or the additional method of water injection, as needed. Consequently, there is no need for automatic initiation of a CCS/LPCI subsystem to respond to an unexpected draining event. The NRC staff finds this is acceptable because a draining event is a slow evolution when compared to a design-basis LOCA assumed to occur at a significant power level.

3.3.1 Staff Evaluation of Proposed Table 3.3.3.A-1, Trip Functions and Setpoints

For TS Table 3.3.3.A-1, CCS Trip Function 1.a, "Reactor Vessel Pressure – Low (Permissive)," this signal is used as permissives and protection for a low pressure ECCS injection/spray subsystem manual initiation functions. This function ensures that the reactor pressure has fallen to a value below these subsystems' maximum design pressure before permitting the operator to open the injection valves of the CCS systems. Even though during Operational Conditions 4 and 5 the reactor vessel pressure is expected to virtually always be below the CCS maximum design pumping pressure, the reactor pressure - low signals are required to be operable and capable of permitting initiation of the CCS. The reactor vessel pressure - low signals are initiated from four pressure transmitters that sense the reactor vessel pressure. The transmitters are connected to four trip units. The outputs of the trip units are connected to relays whose contacts are arranged in a one-out-of-two taken twice logic. The allowable value is ≥ 435 pounds per square inch gauge (psig) (decreasing), and the required channels per function are 6 and were previously found in Limerick TS Table 3.3.3-1 and TS Table 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.

For TS Table 3.3.3.A-1, Trip Function 2.a, "Injection Valve Differential Pressure – Low (Permissive)," signal is used as permissives and protection for these LPCI manual initiation functions. This function ensures that the reactor pressure has fallen to a value below these subsystems' maximum design pressure before permitting the operator to open the injection valves of the low pressure injection subsystems. Even though during Operational Conditions 4 and 5 the reactor steam dome pressure is expected to virtually always be below the ECCS

maximum design pumping pressure, the valve differential pressure – low signal is required to be operable and capable of permitting initiation of the LPCI. The injection valve differential pressure – low signals is initiated from four differential pressure transmitters (one per valve) that monitor the differential pressure across each LPCI injection valve. The allowable values are ≤ 84 pounds per square inch differential (psid), and the required channel per function is 1 per valve and was previously found in Limerick TS Table 3.3.3-1 and TS Table 3.3.3-2 (Trip Function 2.d). Footnote (a) is related to this trip function, which states the association with LCO 3.5.2.

For TS Table 3.3.3.A-1, Function 3.a, "Reactor Vessel Water Level – Low - Level 3," the function is only required to be operable when automatic isolation of the associated penetration flow path is credited in the drain time calculation (TS Table 3.3.3.A-1, Footnote b). The number of required instrument channels is 2 in one trip system, which retains the requirement specified in current TS Table 3.3.2-1 (Trip Function 2.a). This is a new requirement in Operational Conditions 4 and 5 for the RHR/SDC system. Reactor vessel water level low – level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the reactor vessel water level low – level 3 function are available, only two channels (all in the same trip system) are required to be operable. The allowable value was chosen to be the same as TS Table 3.3.2-2, "Isolation Actuation Instrumentation Setpoints," RHR/SDC mode isolation, reactor vessel water level – low level 3, allowable value from, which is ≥ 11.0 inches.

For Table 3.3.3.A-1, Function 4.a, "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 (TS Table 3.3.3.A-1, Footnote b). The number of required instrument channels is 2 in one trip system, which retains the requirement specified in current TS Table 3.3.2-1 (Trip Function 3.e). Reactor vessel water level – low, low – level 2 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the reactor vessel water level – low, low – level 2 function are available, only two channels (all in the same trip system) are required to be operable. 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 isolation, reactor vessel water level – low level 2, allowable value from, which is ≥ - 45 inches.

For Table 3.3.3.A-1 Function 1.b, "Manual Initiation," the function is to be operable in Operational Conditions 4 and 5. 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 of the CSS and LPCI subsystems (i.e., four for CSS). There is no allowable value for this trip function since the channels are mechanically actuated based solely on the position of the push buttons. Two channels of the manual initiation function are required to be operable. This function includes two footnotes. Footnote (a) is related to these trip functions, which states the association with LCO 3.5.2. Footnote (c) is related to the CSS manual initiation push buttons, which start the respective core spray pump and diesel generator. The "A" and "B" logic manual push buttons also actuate an initiation permissive in the injection valve opening logic.

For Table 3.3.3.A-1, Function 2.b, "Manual Isolation," the function is to be operable in Operational Conditions 4 and 5. 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 of the LPCI subsystems (i.e., four LPCI). There is no allowable value for this trip function since the channels are mechanically actuated based solely on the position of the push buttons. A channel of the manual initiation function (one channel per subsystem) is required to be operable. Footnote (a) is related to these trip functions, which states the association with LCO 3.5.2.

The NRC staff finds that proposed LCOs Table 3.3.3.A-1 and Table 3.3.3.A-2 correctly specifies the lowest functional capability or performance levels of equipment required for safe operation of the facility. There is reasonable assurance that the required actions to be taken when the LCO is not met can be conducted without endangering the health and safety of the public.

3.3.2 Staff Evaluation of Proposed Table 3.3.3.A-1, Action

The proposed TS Table 3.3.3.A-1, Actions, are included in Section 2.2.2.7 of this SE. The NRC staff finds these actions are sufficient and necessary 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 these actions direct the licensee to take appropriate actions as necessary. 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.

Action 38 concerning reactor vessel water level low for either RWCU isolation or RHR/SDC isolation directs an immediate declaration that the associated penetration flow path(s) are incapable of automatic isolation. This is applicable when automatic isolation of the associated penetration flow path is credited as a path for potential drainage in calculating drain time. If the trips systems are inoperable for the credited automatic isolation, then drain time shall be calculated.

Action 39 concerning CCS reactor vessel pressure – low permissive or LPCI injection valve differential pressure – low permissive, directs that this trip function must be placed in the trip condition within 1 hour; otherwise, declare the associated low pressure ECCS injection/spray subsystem inoperable. With the permissive function instrument in the trip condition, manual injection valve opening may now be performed using the preferred control board switches. This 1-hour completion time is acceptable because despite the preferred start method being prevented, the reactor operator can take manual control of the pump and the injection valve to inject water into the RPV and achieve the safety function. The time of 1 hour also provides reasonable time for evaluation and placing the channel in trip.

Action 40 concerning CCS and LCPI manual initiation directs that this trip function must be placed in the trip condition within 1 hour. With the permissive function instrument in the trip condition, manual injection valve opening may now be performed using the preferred control board switches. This 1-hour completion time is acceptable because despite the preferred start method being prevented, the reactor operator can take manual control of the pump and the injection valve to inject water into the RPV and achieve the safety function. The time of 1 hour also provides reasonable time for evaluation and placing the channel in trip.

Based on the NRC staff's review, the proposed Actions 38, 39, and 40 to TS Table 3.3.3.A-1 are acceptable based on the actions taken related to the CCS, 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. 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.

3.4 TS 3/4.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)"

The proposed LCO 3.5.2 states:

> 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 shall be OPERABLE:
>
> a. Core spray system (CSS) subsystem comprised of:
>
> 1. Two OPERABLE CSS 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, equivalent to a level of 29 feet.
>
> b. Low pressure coolant injection (LPCI) system 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.**
>
> **One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

The NRC staff reviewed the water sources that would be applicable to the proposed TS 3.5.2. One of the following shall be operable – either a CSS subsystem or one LPCI subsystem. A CCS 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 CSS and LPCI pumps are high-capacity pumps with flow rates of thousands of gallons per minute (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 CSS 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 Limerick TS changes, 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 Limerick TS 3/4.4.9, "Residual Heat Removal – Cold Shutdown" (TS LCO 3.4.9.2), and TS 3/4.9.11, "Residual Heat Removal and Coolant Circulation," "high water level" (TS LCO 3.9.11.1), and "low water level" (TS LCO 3.9.11.2). Based on these considerations, the NRC staff finds the water sources provide assurances that the lowest functional capability required for safe operation is maintained and protects the safety limit.

The proposed TS 3/4.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)," TS 3.5.2 LCO contains two parts. The first part states that drain time of RPV water inventory to the TAF shall be ≥ 36 hours. The second part states one low pressure ECCS injection/spray subsystem shall be operable. The proposed applicability for TS 3.5.2 is Operational Conditions 4 and 5.

The NRC staff reviewed the proposed TS LCO 3.5.2 focusing on ensuring the fuel remains covered with water and 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 injection/spray subsystem operability or drain time. Existing TS LCO 3.5.2, Action b, is deleted, which is described as Variation 1 in Sections 2.2.6.1 and 3.6.1 of this SE.

The current TS LCO states that two ECCS injection/spray subsystems shall be operable, whereas the proposed LCO 3.5.2 states that only one ECCS injection/spray subsystem shall be operable. This change is reflected in Condition A. The change from two ECCS injection/spray subsystems to one ECCS injection/spray subsystem is because this redundancy is not required. With one ECCS injection/spray subsystem and nonsafety-related injection source, 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 injection/spray 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 adequate assurance of an available water source, should the required injection/spray subsystem not be met within the 4-hour completion time.

Action a also states that if the required ECCS injection/spray subsystems is inoperable to immediately suspend core alteration. This is addressed in Variation 1 in Section 3.7.1 of this SE.

Action b is deleted.

The proposed Action c states that for a drain time < 36 hours and ≥ 8 hours, and within 4 hours, to: (1) verify secondary containment boundary is capable of being established in less than the drain time, (2) verify each secondary containment penetration flow path is capable of being isolated less than the drain time, and (3) verify required one standby gas treatment subsystem 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 standby gas treatment subsystem capable of being placed in operations.

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

The proposed Action e states that when the required action and associated completion time of Actions c or d is not met, or the drain time is < 1 hour, initiate action to restore drain time to ≥ 36 hours, immediately. The proposed Action e is new, as it is not present in the current Limerick TSs. The proposed Action e is acceptable, as it provides the necessary step to restore the drain time to ≥ 36 hours, should the other conditions not be met, or if the drain time is < 1 hour.

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

3.4.1 Staff Evaluation of Proposed TS 4.5.2 SRs

The proposed TS 4.5.2 SRs include verification of drain time, verification of water levels/volumes that support ECCS injection/spray subsystems, verification of water-filled pipes, verification of correct valve positions for the required ECCS injection/spray subsystem and operations 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 Surveillance Frequency Control Program. 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 water level (≥ 16 feet 0 inches) for a required LPCI injection subsystem is required to be verified to ensure 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 Surveillance Frequency Control Program. Indications are available either locally or in the control room regarding suppression chamber water level.

SR 4.5.2.3: The suppression chamber water level (≥ 16 feet 0 inches) or condensate storage tank level (≥ 29 feet 0 inches) for a required CSS spray subsystem is required to be verified to ensure 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 Surveillance Frequency Control Program. 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 with water. The ECCS flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump lines of the required ECCS injection/spray subsystems full of water ensures that the ECCS subsystem will perform properly. 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 valves 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 surveillance is required to be performed in accordance with the Surveillance Frequency Control Program. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a non-accident position, provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. Footnote "#" states that this SR is not required to be met for system vent flow paths open under administrative controls. Also, Footnote "^" states that 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.

SR 4.5.2.6: The required ECCS injection/spray subsystem is required to be operated through its recirculation line for ≥ 10 minutes in accordance with the Surveillance Frequency Control Program. This demonstrates that the subsystem is capable of operation to support TS 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control (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 surveillance is required to be performed in accordance with the Surveillance Frequency Control Program.

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 CSS subsystem or LPCI 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 surveillance is required to be performed in accordance with the Surveillance Frequency Control Program.

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 LCOs 3.5.2.

3.5 Proposed Deletion of Instrumentation in TS Table 3.3.3-1 and Table 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 Trip Setpoint column of Table 3.3.3-2 and with EMERGENCY CORE COOLING SYSTEM RESPONSE TIME as shown in Table 3.3.3-3.

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 Table 3.3.3-1 and Table 4.3.3.1-1. Specifically, the following instrumentation are deleted for Operational Conditions 4 and 5.

1. CORE SPRAY SYSTEM
   a. Reactor Vessel Water Level - Low Low Low, Level 1
   c. Reactor Vessel Pressure - Low (Permissive)
   d. Manual Initiation

2. LOW PRESSURE COOLANT INJECTION MODE OF RHR SYSTEM
   a. Reactor Vessel Water Level - Low Low Low, Level 1
   c. Injection Valve Differential Pressure–Low (Permissive)
   e. Manual Initiation

The NRC staff finds that for these six instruments in existing TS Table 3.3.3-1 and Table 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 Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation," and TS Table 3.3.3.A-2, "RPV Water Inventory Control (WIC) Instrumentation Setpoints." The NRC staff finds acceptable the deletion of Instrumentation 1.c, 1.d, 2.d, and 2.e, which are consolidated into the new TS tables and balance of the Instrumentation, 1.a and 2.a, 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.

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

The licensee proposed changes to TS 3/4.5.3, "Suppression Chamber," as described in Sections 2.2.4 and 2.2.6.2 of this SE. Since the licensee describes this as Variation 2, the NRC staff evaluation is shown in Section 3.6.2 of this SE.

3.7 Staff Evaluation of Proposed Technical Variations

The licensee proposed the following five technical variations from the TS changes described in TSTF-542 or the applicable parts of the NRC staff's SE. 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, Deletion of TS 3.5.2, Action b

Existing TS LCO 3.5.2, Action b, states:

> 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.

In alignment with TSTF-542, Revision 2, Section 3.1.2, "Proposed Safety Basis," the existing Limerick TS 3.5.2 requirement to suspend core alterations was an action for ECCS inoperability. Refueling LCOs provide requirements to ensure safe operation during core alterations, including required water level above the RPV flange. Therefore, Limerick proposes to delete TS 3.5.2, Action 'b,' in its entirety, including the action relating to core alterations.

The NRC staff questioned the deletion of existing TS LCO 3.5.2, Action b, related to core alteration in an e-mail dated November 7, 2017 (Reference 10). In the licensee's supplement dated December 6, 2017 (Reference 2), Limerick 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 required subsystems OPERABLE, immediately suspend CORE ALTERATIONS. Restore at least one 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 that since core alteration was to be suspend part of the Limerick licensing bases when no ECCS systems are operable (Action b) and core alteration is reinstated when no ECCS systems are operable (new Action a), the NRC staff finds this acceptable.

3.7.2 Variation 2, Suppression Chamber

Section 2.2.4 of this SE describes the proposed changes to the existing TS LCO 3/4.5.3, "Suppression Chamber." In alignment with NUREG-1433, Revision 4, and consistent with TSTF-542, Revision 2, Limerick 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, "Reactor Pressure Vessel (RPV) Water Inventory Control (WIC)."

Specifically, the following text is deleted:

TS LCO 3.5.3.b:

> In OPERATIONAL CONDITION 4 and 5* with a contained water volume of at least 88,815 ft^3, equivalent to a level of 16'0", except that the suppression chamber level may be less than the limit or may be drained 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, equivalent to a level of 29 feet, and
>
> 4. The core spray 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.

TS LCO 3.5.3: APPLICABILITY:

> OPERATIONAL CONDITIONS "4, and 5*"

TS LCO 3.5.3, Action b:

> In OPERATIONAL CONDITION 4 or 5* with the suppression chamber water level less than the above limit or drained and the above required conditions not satisfied, suspend CORE ALTERATIONS and all operations that have a potential for draining the reactor vessel and lock the reactor mode switch in the Shutdown position. Establish SECONDARY CONTAINMENT INTEGRITY within 8 hours.

TS LCO 3.5.3, Footnote *:

> *The suppression chamber is not required to be OPERABLE 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.

TS SR 4.5.3.1.b:

> 16'0" in accordance with the Surveillance Frequency Control Program."

TS SR 4.5.3.2:

> With the suppression chamber level less than the above limit or drained in OPERATIONAL CONDITION 4 or 5*, in accordance with the Surveillance Frequency Control Program:
>
> a. Verify the required conditions of Specification 3.5.3b. to be satisfied, or
>
> b. Verify footnote conditions * to be satisfied.

TS SR 4.5.3.2, Footnote "*":

> *The suppression chamber is not required to be OPERABLE 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.

The existing Limerick TS LCO 3.5.3.b contains conditions that allow the suppression chamber level to be less than the required 16 feet 0 inches in Operational Conditions 4 and 5 if the conditions are met, such as maintaining an operable flow path for the CSS to take suction from the CST and ensuring there is sufficient level (29 feet) in the CST. These conditions are satisfied by the proposed LCO 3.5.2.a.2.b. In addition, existing Limerick SR 4.5.3.1.b requires verifying that the suppression chamber water level is 16 feet 0 inches. This is satisfied by proposed SRs 4.5.2.2 and 4.5.2.3.

The NRC staff finds that the above-noted deletions to TS LCO 3.5.3, SR 4.5.3.1, and SR 4.5.3.2 are acceptable since the suppression chamber Operational Conditions 4 and 5 actions 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.

3.7.3 Variation 3, Pump Discharge Flow-Low

Because Limerick, Unit 1 and Unit 2, TSs are based on NUREG-0123, Revision 2, the current Limerick TSs in Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," do not include requirements for the following functions that are listed in TSTF-542: "1.b - Core Spray Pump Discharge Flow-Low (Bypass)" and "2.b - Low Pressure Coolant Injection Pump Discharge Flow-Low (Bypass)." Therefore, to align with current Limerick instrumentation TSs, no requirements were added for these functions as part of the newly proposed TS Table 3.3.3.A-1.

In Attachment 2, Limerick provided additional information to explain the operation of core spray and RHR systems. In particular, Limerick noted that the design of the core spray and RHR systems include a pump minimum flow bypass line, which provides pump minimum flow protection when the respective pump is operating and the associated discharge flow path is not open, or reactor pressure is greater than pump discharge pressure following system initiation. Further, the functionality of this instrumentation is tested under current TS SR 4.3.3.2, "Logic System Functional Tests." Calibration of the transmitter and associated trip unit, and verification of trip unit trip and reset setpoint accuracy, of the core spray and RHR pump discharge low flow bypass instrumentation is performed under preventive maintenance activities. Additionally,

operational readiness of the active valves located in the core spray and RHR pump minimum flow bypass lines are demonstrated periodically under the Limerick ASME Section XI Inservice Testing program. The testing and maintenance activities described above provide reasonable assurance that the core spray and RHR pumps will operate as expected when the associated discharge flow path is not open, or reactor pressure is greater than pump discharge pressure following system initiation.

The NRC staff finds that this variation is acceptable since Limerick performs testing of the core spray and RHR pump discharge low flow bypass instrumentation under its existing TS SRs, which will verify that this instrumentation is operable.

3.7.4 Variation 4, RPV Pressure Low

TSTF-542, Table 3.3.5.2-1, "RPV Water Inventory Control Instrumentation," contains Function 2.a, "Reactor Steam Dome Pressure – Low (Injection Permissive)," as a permissive for the injection function of the LPCI system in Operational Conditions 4 and 5. The current Limerick TS Table 3.3.3-1, "Emergency Core Cooling System Actuation Instrumentation," contains a similar Function 2.c, "Reactor Vessel Pressure – Low." However, for Limerick, this function is only required in Operational Conditions 1, 2, and 3, and is combined with the drywell pressure – high function to provide an automatic initiation signal for LPCI, which is separate from the injection logic. For Limerick, the permissive for the injection function of LPCI in Operational Conditions 4 and 5 from TS Table 3.3.3-1 is Function 2.d, "Injection Valve Differential Pressure – Low." This interlock, as determined by monitoring the differential pressure across the injection valve, is to prevent opening the injection valve if reactor pressure is greater than the RHR system piping design maximum pressure. Therefore, the new proposed TS Table 3.3.3.A-1, "RPV Water Inventory Control (WIC) Instrumentation," for Limerick will include Function 2.a, "Injection Valve Differential Pressure – Low (Permissive)," for the injection function of the LPCI mode of the RHR system rather than the Reactor Vessel Pressure – Low [Reactor Steam Dome Pressure – Low] function specified in TSTF-542. This variation is consistent with the current Limerick TSs and operation of the plant and does not affect the applicability of TSTF-542 to the Limerick TSs.

The NRC staff finds that Variation 4 is acceptable because Limerick included Function 2.a in the new proposed TS Table 3.3.3.A-1 to use the injection function of the LPCI when the pressure across the injection valve is lower than the reactor pressure so the RHR system piping can operate within is design.

3.7.5 Variation 5, Gas Accumulation

Limerick TSs include Amendment Nos. 216 for Unit 1, and 178 for Unit 2 (Reference 11), for TSTF-523, "Generic Letter 2008-01, Managing Gas Accumulation," dated May 11, 2015. As discussed in the technical evaluation of TSTF-542, Revision 2, the changes in TSTF-523 are also applicable to the proposed SRs 4.5.2.4 and 4.5.2.5. Therefore, the following changes are being made to the proposed SRs 4.5.2.4 and 4.5.2.5 based on the changes made to the corresponding Limerick SRs in the above-referenced amendments that adopted TSTF-523. The following changes have no effect on the adoption of TSTF-542 and are an acceptable variation in accordance with Section 3.2.4.4 of TSTF-542:

- SR 4.5.2.4 has been modified from "Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection

valve," to "Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water."

- SR 4.5.2.5 has been modified to retain the note: "Not required to be met for system vent flow paths opened under administrative control."

The licensee has retained its current licensing basis, which was evaluated with the adoption of TSTF-523, and therefore, the NRC staff finds Variation 5 acceptable.

3.8 Staff Evaluation of Proposed Deletion of References to OPDRVs Term

Section 2.2.5 of this SE lists the seven Limerick TSs where the licensee proposed deletion of phrases used for controls during OPDRVs from applicability and actions. The proposed changes remove the following from the current Limerick TS: the term "operations with a potential for draining the reactor vessel, with the vessel head removed and fuel in the vessel," and "operations with a potential for draining the reactor vessel." TS OPDRV requirements have existed for many years, but there is no clearly stated description of the event that is being prevented or mitigated. However, from the existing TS requirements, one can infer the postulated event that forms the basis of the existing TSs.

The current Limerick TSs contain instrumentation requirements related to OPDRVs in four TSs (listed below), which have the OPDRVs phrases described above.

Table 3.3.2-1, "Isolation Actuation Instrumentation"
Table 4.3.2.1-1, "Isolation Actuation Instrumentation Surveillance Requirements"
Table 3.3.7.1-1, "Radiation Monitoring Instrumentation"
Table 4.3.7.1-1, "Radiation Monitoring Instrumentation Surveillance Requirements"

The proposed TS 3.3.3.A consolidates the instrumentation requirements into a single location to simplify the presentation and provide requirements consistent with TS 3.5.2. The remaining TSs with OPDRVs requirements are for secondary containment, containment isolation valves, standby gas treatment system, control room air supply, and electrical sources. Each of these systems' requirements during OPDRVs were proposed for consolidation into new TS 3.5.2 for RPV WIC based on the appropriate plant conditions and calculated drain time.

The NRC staff has determined that deletion of OPDRVs references, along with the corresponding editorial changes, are appropriate because the proposed TSs governing RPV WIC and the associated instrumentation, TSs 3.5.2 and 3.3.3.A, respectively, are a greatly clarified and simplified alternative set of controls for ensuring water level is maintained above the TAF.

3.9 Technical Conclusion

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 TS changes evaluated within this SE establish new LCO requirements that address the preventive and mitigative equipment and associated instrumentation that provide an alternative means to support 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 is judged not to 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 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 3.3.3.A 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 3.3.3.A provide remedial actions to be taken in the event the LCO is not satisfied, and therefore, meet the requirements of 10 CFR 50.36(c)(2)(i). The NRC staff finds that the proposed action statements provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

The NRC staff evaluated the proposed drain time definition, TS 3.5.2 that contains the requirements for RPV WIC and TS 3.3.3.A, which contain the requirements for instrumentation necessary to support TS 3.5.2. Based on the considerations discussed above, the NRC staff concludes that the proposed revisions are acceptable because they consolidate and clarify the RPV WIC requirements, which meet 10 CFR 50.36(c)(2)(ii), Criterion 4, to establish LCOs for structures, systems, or components significant to public health and safety as evidenced by operating experience.

The licensee proposed to delete phrases used for controls during OPDRVs from TSs applicability, condition, required actions, and footnotes. The NRC staff has reviewed the proposed changes and determined that deletion of OPDRVs references, along with the corresponding editorial changes, are appropriate because the proposed TSs governing RPV WIC and the associated instrumentation, TSs 3.5.2 and 3.3.3.A, respectively, are greatly clarified and a simplified alternative set of controls for ensuring water level is maintained above the TAF.

The NRC staff reviewed the SRs associated with the new LCOs 3.5.2 (SRs 4.5.2) and 3.3.3.A (SRs 4.3.3.A). The NRC staff finds that the proposed TS SRs 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 subsystem 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 SRs proposed for TS 3.3.3.A are sufficient and adequate because they are essential to ensure that the functions are capable of performing their specified safety functions in support of TS 3.5.2 drain time and the protection from a potential draindown 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).

The NRC staff evaluated the proposed Limerick changes against each of the unit 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, as they relate to the proposed TS changes for the new drain time definition and the removal of OPDRVs references, remain consistent with the General Design Criteria in that the Limerick design requirements for instrumentation, reactor coolant leakage detection, reactor coolant pressure boundary, and reactor coolant makeup are unaffected.

The regulation at 10 CFR 50.36(a)(1) states that a summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the TSs. In accordance with the 10 CFR 50.36(a)(1) 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 TS and follow the Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors (58 FR 39132; July 22, 1993).

Additionally, the proposed TS changes were reviewed for technical clarity and consistency with the existing Limerick requirements for customary terminology and formatting. The NRC staff found that the proposed changes were consistent with TSTF-542, Revision 2 (Reference 5), and Chapter 16 of NUREG-0800, Revision 3 (Reference 9).

In a letter dated February 19, 2018 (Reference 3), the licensee requested an extension to the the implementation date of the LAR. Specifically, the licensee stated that removal of snubbers from unisolable segments of RCS penetration flow paths to support the station Snubber Program could impact the TSTF-542 drain time calculations required to determine TS LCOs. The licensee stated in its request that additional time was necessary prior to implementation of the proposed amendments to perform the applicable seismic analyses or determine an acceptable alternative for implementing the proposed amendments. The NRC staff has evaluated the licensee's request and determined the licensee is appropriately exhibiting the necessary sensitivity to adopt the TSTF-542 requirements in association with other station procedures. As no safety concerns are immediately identified, the NCR staff has concluded the licensee's request is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments on January 17, 2018. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to use of a facility component located within the restricted area, as defined in 10 CFR Part 20, and changes SRs. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (82 FR 42848; September 12, 2017). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no

environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

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

7.0 REFERENCES

1. Letter from Exelon Generation Company, LLC to U.S. NRC, "Limerick Generating Station, Units 1 and 2, Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control,' Revision 2," dated July 19, 2017 (ADAMS Accession No. ML17200D096).

2. Letter from Exelon Generation Company, LLC to U.S. NRC, "Limerick Generating Station, Units 1 and 2, Response to Request for Additional Information, Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control,' Revision 2," dated December 6, 2017 (ADAMS Accession No. ML17340A197).

3. Letter from Exelon Generation Company, LLC to U.S. NRC, "Limerick Generating Station, Units 1 and 2, Request for Implementation Date Extension, Application to Revise Technical Specifications to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control,' Revision 2," dated February 19, 2018 (ADAMS Accession No. ML18050A025).

4. Letter from Exelon Generation Company, LLC to U.S. NRC, "Limerick Generating Station, Units 1 and 2, Request for Implementation Date Extension Clarification Application to Revise Technical Specifiactions to Adopt TSTF-542, 'Reactor Pressure Vessel Water Inventory Control, Revision 2," dated February 27, 2018 (ADAMS Accession No. ML18058A721).

5. Letter from Technical Specifications Task Force to U.S. NRC enclosing Technical Specifications Task Force Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control," dated March 14, 2016 (ADAMS Accession No. ML16074A448).

6. Final Safety Evaluation of Technical Specifications Task Force Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control (TAC No. MF3487)," dated December 20, 2016 (ADAMS Accession No. ML16343B008).

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

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

9. NUREG-0800, Revision 3, "Standard Review Plan," Section 16.0, "Technical Specifications," dated March 2010 (ADAMS Accession No. ML100351425).

10. E-mail message from V. Sreenivas, U.S. NRC, to Glenn Stewart, Exelon Generation Company, LLC, "Limerick Generating Station TSTF-542 RAIs: Response Requested by 12-08-2017," dated November 7, 2017 (ADAMS Accession No. ML17311B104).

11. Limerick Generating Station, Units 1 and 2, "Issuance of Amendments Re: Adoption of Technical Specification Task Force (TSTF) Traveler TSTF-523, 'Generic Letter 2008-01, Managing Gas Accumulation,'" dated May 11, 2015.

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Date: February 27, 2018

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 227 AND 190 REVISING TECHNICAL SPECIFICATIONS TO ADOPT TSTF-542, REVISION 2, "REACTOR PRESSURE VESSEL WATER INVENTORY CONTROL" (CAC NOS. MF9967 AND MF9968; EPID L-2017-LLA-0260) DATED FEBRUARY 27, 2018

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