



July 10, 2014

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Limerick Generating Station, Units 1 and 2  
Facility Operating License Nos. NPF-39 and NPF-85  
NRC Docket Nos. 50-352 and 50-353

Subject: Application to Revise Technical Specifications to Adopt TSTF-523, "Generic Letter 2008-01, Managing Gas Accumulation," using the Consolidated Line Item Improvement Process

- References:
1. TSTF-523, "Generic Letter 2008-01, Managing Gas Accumulation," Revision 2, dated February 20, 2013
  2. Notice of Availability of the "TSTF-523, 'Generic Letter 2008-01, Managing Gas Accumulation,' Using the Consolidated Line Item Improvement Process," dated January 15, 2014
  3. Letter from K. R. Jury (Exelon Generation Company, LLC/AmerGen Energy Company, LLC) to U.S. NRC, "Nine-Month Response to Generic Letter 2008-01," dated October 14, 2008

Pursuant to 10 CFR 50.90, Exelon Generation Company, LLC (EGC) is submitting a request for an amendment to the Technical Specifications for Limerick Generating Station, Units 1 and 2 (LGS).

The proposed amendments would modify Technical Specification requirements to address Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," as described in TSTF-523, Revision 2, "Generic Letter 2008-01, Managing Gas Accumulation." LGS committed to evaluate the resolution of the Technical Specification issues with respect to the elements contained in the TSTF, and submit a license amendment request, if deemed necessary based on the evaluation, within 180 days following NRC approval of the TSTF (Reference 3). This submittal satisfies the commitment.

Attachment 1 provides a description and assessment of the proposed change. Attachment 2 provides the existing Technical Specification pages marked up to show the proposed changes. Attachment 3 provides Table 1, which identifies the affected Standard Technical Specifications and provides the equivalent LGS Technical Specifications. Attachment 4 provides the existing Technical Specification Bases pages marked up to show the proposed changes. Changes to the existing Technical Specification Bases, consistent with the technical and regulatory analyses, will be implemented under the Technical Specification Bases Control Program. They are provided in Attachment 4 for information only.

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These proposed changes have been reviewed and approved by LGS's Plant Operations Review Committee and approved by the Nuclear Safety Review Board in accordance with the requirements of the EGC Quality Assurance Program.

EGC requests approval of the proposed amendment by July 10, 2015. Once approved, the amendment shall be implemented within 120 days.

There are no regulatory commitments contained in this letter.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the Commonwealth of Pennsylvania of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

Should you have any questions concerning this letter, please contact Wendy E. Croft at (610) 765-5726.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 10<sup>th</sup> day of July 2014.

Respectfully,



David P. Helker  
Manager - Licensing and Regulatory Affairs  
Exelon Generation Company, LLC

Attachments:      1. Description and Assessment  
                          2. Proposed Technical Specification Changes (Mark-Up)  
                          3. Equivalent LGS Technical Specification Nomenclature  
                          4. Proposed Technical Specification Bases Changes (Mark-Up)  
                              (For Information Only)

cc:      USNRC Region I, Regional Administrator  
          USNRC Project Manager, LGS  
          USNRC Senior Resident Inspector, LGS  
          Director, Bureau of Radiation Protection, PA Department of Environmental Resources  
          R. R. Janati, Commonwealth of Pennsylvania

## Attachment 1

### Description and Assessment

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#### 1.0 DESCRIPTION

The proposed change revises or adds Surveillance Requirements to verify that the system locations susceptible to gas accumulation are sufficiently filled with water and to provide allowances which permit performance of the verification. The changes are being made to address the concerns discussed in Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems."

The proposed amendment is consistent with TSTF-523, Revision 2, "Generic Letter 2008-01, Managing Gas Accumulation."

#### 2.0 ASSESSMENT

##### 2.1 Applicability of Published Safety Evaluation

Exelon Generation Company, LLC (EGC) has reviewed the model safety evaluation dated December 23, 2013 as part of the Federal Register Notice of Availability. This review included a review of the NRC Staff's evaluation, as well as the information provided in TSTF-523, Revision 2. As described in the subsequent paragraphs, EGC has concluded that the justifications presented in the TSTF-523, Revision 2 proposal and the model safety evaluation prepared by the NRC Staff are applicable to Limerick Generating Station, Units 1 and 2 (LGS) and justify this amendment for incorporation of the changes to the plant Technical Specifications (TSs).

##### 2.2 Optional Changes and Variations

EGC is not proposing any significant variations or deviations from the TS changes described in TSTF-523, Revision 2, or the applicable parts of the NRC Staff's model safety evaluation dated December 23, 2013. EGC is noting the following minor variations from the TS changes described in the TSTF-523, Revision 2:

- The LGS TS utilize different formatting, numbering, and titles than the Standard Technical Specifications (STS) on which TSTF-523, Revision 2 was based. Table 1 in Attachment 3 identifies the affected STS number, title, and section (i.e., Surveillance Requirements, LCO Bases, etc.) and provides the equivalent LGS TS number, title, and section.

EGC has reviewed these changes and determined that they are administrative and do not affect the applicability of TSTF-523, Revision 2 to the LGS TS.

#### 3.0 REGULATORY ANALYSIS

##### 3.1 No Significant Hazards Consideration Determination

Exelon Generation Company, LLC (EGC) requests adoption of TSTF-523, Revision 2, "Generic Letter 2008-01, Managing Gas Accumulation," which is an approved change to the Standard Technical Specifications (STS), into the Limerick Generating Station, Units 1 and 2 Technical Specifications (TS). The proposed change revises or adds Surveillance Requirements to verify that the system locations susceptible to gas accumulation are sufficiently filled with water and to provide allowances which permit performance of the verification.

## Attachment 1

### Description and Assessment

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EGC has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change revises or adds Surveillance Requirements (SRs) that require verification that the Emergency Core Cooling System (ECCS), the Residual Heat Removal (RHR) System, the Shutdown Cooling (SDC) System, the Containment Spray (CS) System, and the Reactor Core Isolation Cooling (RCIC) System are not rendered inoperable due to accumulated gas and to provide allowances which permit performance of the revised verification. Gas accumulation in the subject systems is not an initiator of any accident previously evaluated. As a result, the probability of any accident previously evaluated is not significantly increased. The proposed SRs ensure that the subject systems continue to be capable of performing their assumed safety function and are not rendered inoperable due to gas accumulation. Thus, the consequences of any accident previously evaluated are not significantly increased.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change revises or adds SRs that require verification that the ECCS, the RHR, the SDC, the CS, and the RCIC Systems are not rendered inoperable due to accumulated gas and to provide allowances which permit performance of the revised verification. The proposed change does not involve a physical alteration of the plant (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. In addition, the proposed change does not impose any new or different requirements that could initiate an accident. The proposed change does not alter assumptions made in the safety analysis and is consistent with the safety analysis assumptions.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

The proposed change revises or adds SRs that require verification that the ECCS, the RHR, the SDC, the CS, and the RCIC Systems are not rendered inoperable due to accumulated gas and to provide allowances which permit performance of the revised verification. The proposed change revises or adds new requirements to manage gas accumulation in order to ensure the subject systems are capable of performing their assumed safety functions. The proposed SRs are more comprehensive than the current SRs and will ensure that the assumptions of the safety analysis

## Attachment 1

Description and Assessment

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are protected. The proposed change does not adversely affect any current plant safety margins or the reliability of the equipment assumed in the safety analysis. Therefore, there are no changes being made to any safety analysis assumptions, safety limits or limiting safety system settings that would adversely affect plant safety as a result of the proposed change.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, EGC concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

### 3.2 Conclusions

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

### 4.0 ENVIRONMENTAL EVALUATION

The proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

**ATTACHMENT 2**

Proposed Technical Specification Changes (Mark-Up)

**Limerick Generating Station, Units 1 and 2**  
**Facility Operating License Nos. NPF-39 and NPF-85**

REVISED TECHNICAL SPECIFICATIONS PAGES

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REACTOR COOLANT SYSTEM

3/4.4.9 RESIDUAL HEAT REMOVAL

HOT SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.4.9.1 Two (2) independent RHR shutdown cooling subsystems shall be OPERABLE, and, with no recirculation pump in operation, at least one (1) RHR shutdown cooling subsystem shall be in operation. \* \*\* \*\*\*

Each independent RHR shutdown cooling subsystem shall consist of at least:

- a. One OPERABLE RHR pump, and
- b. One OPERABLE RHR heat exchanger, not common to the two (2) independent subsystems.

APPLICABILITY: OPERATIONAL CONDITION 3, with reactor vessel pressure less than the RHR cut-in permissive setpoint.

ACTION:

- a. With less than the above required independent RHR shutdown cooling subsystems OPERABLE, immediately initiate corrective action to return the required independent subsystems to OPERABLE status as soon as possible. Within 1 hour and at least once per 24 hours thereafter, verify the availability of at least one alternate method capable of decay heat removal for each inoperable independent RHR shutdown cooling subsystem. Be in at least COLD SHUTDOWN within 24 hours.\*\*\*\*
- b. With no independent RHR shutdown cooling subsystem in operation, immediately initiate corrective action to return at least one (1) independent subsystem to operation as soon as possible. Within 1 hour establish reactor coolant circulation by an alternate method and monitor reactor coolant temperature and pressure at least once per hour.

4.4.9.1.1

SURVEILLANCE REQUIREMENTS

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4.4.9.1 At least one independent RHR shutdown cooling subsystem or alternate method shall be determined to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

\*One independent RHR shutdown cooling subsystem may be inoperable for up to 2 hours for surveillance testing provided the other independent subsystem is OPERABLE and in operation.

\*\*The shutdown cooling pump may be removed from operation for up to 2 hours per 8-hour period provided the other independent subsystem is OPERABLE.

\*\*\*The independent RHR shutdown cooling subsystem may be removed from operation during hydrostatic testing.

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

Insert 1

Insert 2

3/4.4.9 RESIDUAL HEAT REMOVAL

HOT SHUTDOWN

LIMITING CONDITION FOR OPERATION

---

3.4.9.1 Two (2) independent RHR shutdown cooling subsystems shall be OPERABLE, and, with no recirculation pump in operation, at least one (1) RHR shutdown cooling subsystem shall be in operation. \* \*\* \*\*\*

Each independent RHR shutdown cooling subsystem shall consist of at least:

- a. One OPERABLE RHR pump, and
- b. One OPERABLE RHR heat exchanger, not common to the two (2) independent subsystems.

APPLICABILITY: OPERATIONAL CONDITION 3, with reactor vessel pressure less than the RHR cut-in permissive setpoint.

ACTION:

- a. With less than the above required independent RHR shutdown cooling subsystems OPERABLE, immediately initiate corrective action to return the required independent subsystems to OPERABLE status as soon as possible. Within 1 hour and at least once per 24 hours thereafter, verify the availability of at least one alternate method capable of decay heat removal for each inoperable independent RHR shutdown cooling subsystem. Be in at least COLD SHUTDOWN within 24 hours.\*\*\*\*
- b. With no independent RHR shutdown cooling subsystem in operation, immediately initiate corrective action to return at least one (1) independent subsystem to operation as soon as possible. Within 1 hour establish reactor coolant circulation by an alternate method and monitor reactor coolant temperature and pressure at least once per hour.

4.4.9.1.1

SURVEILLANCE REQUIREMENTS

---

4.4.9.1 At least one independent RHR shutdown cooling subsystem or alternate method shall be determined to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

\*One independent RHR shutdown cooling subsystem may be inoperable for up to 2 hours for surveillance testing provided the other independent subsystem is OPERABLE and in operation.

\*\*The shutdown cooling pump may be removed from operation for up to 2 hours per 8-hour period provided the other independent subsystem is OPERABLE.

\*\*\*The independent RHR shutdown cooling subsystem may be removed from operation during hydrostatic testing.

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

Insert 1

Insert 2

**Insert 1**

4.4.9.1.2 Verify RHR shutdown cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program. \*\*\*\*\*

**Insert 2**

\*\*\*\*\* Not required to be performed until 12 hours after reactor steam dome pressure is less than the RHR cut-in permissive setpoint.

REACTOR COOLANT SYSTEMCOLD SHUTDOWNLIMITING CONDITION FOR OPERATION

3.4.9.2 Two (2) RHR shutdown cooling subsystems shall be OPERABLE, and with no recirculation pump in operation, at least one (1) RHR shutdown cooling subsystem shall be in operation. \* \*\* \*\*\*

APPLICABILITY: OPERATIONAL CONDITION 4.

ACTION: #

- a. With one (1) or two (2) RHR shutdown cooling subsystems inoperable:
  1. Within one (1) hour, and once per 24 hours thereafter, verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem.
- b. With no RHR shutdown cooling subsystems in operation and no recirculation pump in operation:
  1. Within one (1) hour from discovery of no reactor coolant circulation, and once per 12 hours thereafter, verify reactor coolant circulating by an alternate method; and
  2. Once per hour monitor reactor coolant temperature and pressure.

4.4.9.2.1

SURVEILLANCE REQUIREMENTS

~~4.4.9.2~~ At least one (1) RHR shutdown cooling subsystem or recirculation pump is operating or an alternate method shall be determined to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

- \* Both RHR shutdown cooling subsystems and recirculation pumps may be removed from operation for up to two (2) hours per eight (8) hour period.
- \*\* One (1) RHR shutdown cooling subsystem may be inoperable for up to two (2) hours for the performance of Surveillances.
- \*\*\* The shutdown cooling subsystem may be removed from operation during hydrostatic testing.
- # Separate Action entry is allowed for each shutdown cooling subsystem.

4.4.9.2.2 Verify RHR Shutdown Cooling Subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

REACTOR COOLANT SYSTEM

COLD SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.4.9.2 Two (2) RHR shutdown cooling subsystems shall be OPERABLE, and with no recirculation pump in operation, at least one (1) RHR shutdown cooling subsystem shall be in operation. \* \*\* \*\*\*

APPLICABILITY: OPERATIONAL CONDITION 4.

ACTION: #

- a. With one (1) or two (2) RHR shutdown cooling subsystems inoperable:
  1. Within one (1) hour, and once per 24 hours thereafter, verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem.
- b. With no RHR shutdown cooling subsystems in operation and no recirculation pump in operation:
  1. Within one (1) hour from discovery of no reactor coolant circulation, and once per 12 hours thereafter, verify reactor coolant circulating by an alternate method; and
  2. Once per hour monitor reactor coolant temperature and pressure.

4.4.9.2.1

SURVEILLANCE REQUIREMENTS

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~~4.4.9.2~~ At least one (1) RHR shutdown cooling subsystem or recirculation pump is operating or an alternate method shall be determined to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

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- \* Both RHR shutdown cooling subsystems and recirculation pumps may be removed from operation for up two (2) hours per eight hour (8) period.
  - \*\* One (1) RHR shutdown cooling subsystem may be inoperable for up to two (2) hours for the performance of Surveillances.
  - \*\*\* The shutdown cooling subsystem may be removed from operation during hydrostatic testing.
  - # Separate Action entry is allowed for each shutdown cooling subsystem.

4.4.9.2.2 Verify RHR Shutdown Cooling Subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS

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

a. In accordance with the Surveillance Frequency Control Program:

Verifying locations susceptible to gas accumulation are sufficiently filled with water.

1. For the CSS, the LPCI system, and the HPCI system:
  - a) ~~Verifying by venting at the high point vents that the system piping from the pump discharge valve to the system isolation valve is filled with water.~~
  - b) Verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct\* position.
2. For the LPCI system, verifying that both LPCI system subsystem cross-tie valves (HV-51-182 A, B) are closed with power removed from the valve operators.
3. For the HPCI system, verifying that the HPCI pump flow controller is in the correct position.
4. For the CSS and LPCI system, performance of a CHANNEL FUNCTIONAL TEST of the injection header  $\Delta P$  instrumentation.

\*\*\*

b. Verifying that, when tested pursuant to Specification 4.0.5:

1. Each CSS pump in each subsystem develops a flow of at least 3175 gpm against a test line pressure corresponding to a reactor vessel to primary containment differential pressure of  $\geq 105$  psid plus head and line losses.
2. Each LPCI pump in each subsystem develops a flow of at least 10,000 gpm against a test line pressure corresponding to a reactor vessel to primary containment differential pressure of  $\geq 20$  psid plus head and line losses.
3. The HPCI pump develops a flow of at least 5600 gpm against a test line pressure which corresponds to a reactor vessel pressure of 1040 psig plus head and line losses when steam is being supplied to the turbine at 1040, +13, -120 psig.\*\*

c. In accordance with the Surveillance Frequency Control Program:

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

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

\*\* The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test. If OPERABILITY is not successfully demonstrated within the 12-hour period, reduce reactor steam dome pressure to less than 200 psig within the following 72 hours.

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

SURVEILLANCE REQUIREMENTS

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

a. In accordance with the Surveillance Frequency Control Program:

1. For the CSS, the LPCI system, and the HPCI system:

Verifying locations susceptible to gas accumulation are sufficiently filled with water.

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

\*\*\*

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

2. For the LPCI system, verifying that both LPCI system subsystem cross-tie valves (HV-51-282 A, B) are closed with power removed from the valve operators.

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

4. For the CSS and LPCI system, performance of a CHANNEL FUNCTIONAL TEST of the injection header ΔP instrumentation.

b. Verifying that, when tested pursuant to Specification 4.0.5:

1. Each CSS pump in each subsystem develops a flow of at least 3175 gpm against a test line pressure corresponding to a reactor vessel to primary containment differential pressure of = 105 psid plus head and line losses.

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

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

3. The HPCI pump develops a flow of at least 5600 gpm against a test line pressure which corresponds to a reactor vessel pressure of 1040 psig plus head and line losses when steam is being supplied to the turbine at 1040, +13, -120 psig.\*\*

c. In accordance with the Surveillance Frequency Control Program:

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

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

\*\* The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test. If OPERABILITY is not successfully demonstrated within the 12-hour period, reduce reactor steam dome pressure to less than 200 psig within the following 72-hours.

CONTAINMENT SYSTEMS

SUPPRESSION POOL SPRAY

LIMITING CONDITION FOR OPERATION

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3.6.2.2 The suppression pool spray mode of the residual heat removal (RHR) system shall be OPERABLE with two independent loops, each loop consisting of:

- a. One OPERABLE RHR pump, and
- b. An OPERABLE flow path capable of recirculating water from the suppression chamber through an RHR heat exchanger and the suppression pool spray sparger(s).

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With one suppression pool spray loop inoperable, restore the inoperable loop 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. With both suppression pool spray loops inoperable, restore at least one loop to OPERABLE status within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN\* within the following 24 hours.

SURVEILLANCE REQUIREMENTS

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4.6.2.2 The suppression pool spray mode of the RHR system shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.
- b. By verifying that each of the required RHR pumps develops a flow of at least 500 gpm on recirculation flow through the RHR heat exchanger and the suppression pool spray sparger when tested pursuant to Specification 4.0.5.

← c. By verifying RHR suppression pool spray subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

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

CONTAINMENT SYSTEMSSUPPRESSION POOL SPRAYLIMITING CONDITION FOR OPERATION

3.6.2.2 The suppression pool spray mode of the residual heat removal (RHR) system shall be OPERABLE with two independent loops, each loop consisting of:

- a. One OPERABLE RHR pump, and
- b. An OPERABLE flow path capable of recirculating water from the suppression chamber through an RHR heat exchanger and the suppression pool spray sparger(s).

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With one suppression pool spray loop inoperable, restore the inoperable loop 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. With both suppression pool spray loops inoperable, restore at least one loop to OPERABLE status within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN\* within the following 24 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.2 The suppression pool spray mode of the RHR system shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.
- b. By verifying that each of the required RHR pumps develops a flow of at least 500 gpm on recirculation flow through the RHR heat exchanger and the suppression pool spray sparger when tested pursuant to Specification 4.0.5.

c. By verifying RHR suppression pool spray subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.



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

CONTAINMENT SYSTEMS

SUPPRESSION POOL COOLING

LIMITING CONDITION FOR OPERATION

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3.6.2.3 The suppression pool cooling mode of the residual heat removal (RHR) system shall be OPERABLE with two independent loops, each loop consisting of:

- a. One OPERABLE RHR pump, and
- b. An OPERABLE flow path capable of recirculating water from the suppression chamber through an RHR heat exchanger.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With one suppression pool cooling loop inoperable, restore the inoperable loop 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.
- b. With both suppression pool cooling loops inoperable, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN\* within the next 24 hours.

SURVEILLANCE REQUIREMENTS

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4.6.2.3 The suppression pool cooling mode of the RHR system shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.
- b. By verifying that each of the required RHR pumps develops a flow of at least 10,000 gpm on recirculation flow through the flow path including the RHR heat exchanger and its associated closed bypass valve, the suppression pool and the full flow test line when tested pursuant to Specification 4.0.5.

**c. By verifying RHR suppression pool cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.**



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

\*\* During the extended 7-day Allowed Outage Time (AOT) specified by TS LCO 3.7.1.1, Action a.3.a) or a.3.b) to allow for RHRSW subsystem piping repairs, the 72-hour AOT for one inoperable suppression pool cooling loop may also be extended to 7 days for the same 7-day period.

CONTAINMENT SYSTEMS

SUPPRESSION POOL COOLING

LIMITING CONDITION FOR OPERATION

3.6.2.3 The suppression pool cooling mode of the residual heat removal (RHR) system shall be OPERABLE with two independent loops, each loop consisting of:

- a. One OPERABLE RHR pump, and
- b. An OPERABLE flow path capable of recirculating water from the suppression chamber through an RHR heat exchanger.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With one suppression pool cooling loop inoperable, restore the inoperable loop 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.
- b. With both suppression pool cooling loops inoperable, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN\* within the next 24 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.3 The suppression pool cooling mode of the RHR system shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.
- b. By verifying that each of the required RHR pumps develops a flow of at least 10,000 gpm on recirculation flow through the flow path including the RHR heat exchanger and its associated closed bypass valve, the suppression pool and the full flow test line when tested pursuant to Specification 4.0.5.

← c. By verifying RHR suppression pool cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

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

\*\*During the extended 7-day Allowed Outage Time (AOT) specified by TS LCO 3.7.1.1, Action a.3.a) or a.3.b) to allow for RHRSW subsystem piping repairs, the 72-hour AOT for one inoperable suppression pool cooling loop may also be extended to 7 days for the same 7-day period.

PLANT SYSTEMS

3/4.7.3 REACTOR CORE ISOLATION COOLING SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.3 The reactor core isolation cooling (RCIC) system shall be OPERABLE with an OPERABLE flow path capable of automatically taking suction from the suppression pool and transferring the water to the reactor pressure vessel.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3 with reactor steam dome pressure greater than 150 psig.

ACTION:

- a. With the RCIC system inoperable, operation may continue provided the HPCI system is OPERABLE; restore the RCIC system to OPERABLE status within 14 days. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to less than or equal to 150 psig within the following 24 hours.
- b. In the event the RCIC system is actuated and injects water into the reactor coolant system, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date.
- c. Specification 3.0.4.b is not applicable to RCIC.

SURVEILLANCE REQUIREMENTS

4.7.3 The RCIC system shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by:
  - 1. ~~Verifying by venting at the high point vents that the system piping from the pump discharge valve to the system isolation valve is filled with water.~~
  - 2. Verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position. \*\*
  - 3. Verifying that the pump flow controller is in the correct position.
- b. In accordance with the Surveillance Frequency Control Program by verifying that the RCIC pump develops a flow of greater than or equal to 600 gpm in the test flow path with a system head corresponding to reactor vessel operating pressure when steam is being supplied to the turbine at 1040 + 13, - 120 psig.\*

Verifying locations susceptible to gas accumulation are sufficiently filled with water.

\* The provisions of Specification 4.0.4 are not applicable, provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test. If OPERABILITY is not successfully demonstrated within the 12-hour period, reduce reactor steam pressure to less than 150 psig within the following 72 hours.

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

PLANT SYSTEMS

3/4.7.3 REACTOR CORE ISOLATION COOLING SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.3 The reactor core isolation cooling (RCIC) system shall be OPERABLE with an OPERABLE flow path capable of automatically taking suction from the suppression pool and transferring the water to the reactor pressure vessel.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3 with reactor steam dome pressure greater than 150 psig.

ACTION:

- a. With the RCIC system inoperable, operation may continue provided the HPCI system is OPERABLE; restore the RCIC system to OPERABLE status within 14 days. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to less than or equal to 150 psig within the following 24 hours.
- b. In the event the RCIC system is actuated and injects water into the reactor coolant system, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date.
- c. Specification 3.0.4.b is not applicable to RCIC.

SURVEILLANCE REQUIREMENTS

4.7.3 The RCIC system shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by:

Verifying locations susceptible to gas accumulation are sufficiently filled with water.

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

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

3. Verifying that the pump flow controller is in the correct position.

b. In accordance with the Surveillance Frequency Control Program by verifying that the RCIC pump develops a flow of greater than or equal to 600 gpm in the test flow path with a system head corresponding to reactor vessel operating pressure when steam is being supplied to the turbine at 1040 + 13, - 120 psig.\*

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

\* The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test. If OPERABILITY is not successfully demonstrated within the 12-hour period, reduce reactor steam dome pressure to less than 150 psig within the following 72 hours.

REFUELING OPERATIONS

3/4.9.11 RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION

HIGH WATER LEVEL

LIMITING CONDITION FOR OPERATION

---

3.9.11.1 One (1) RHR shutdown cooling subsystem shall be OPERABLE and in operation. \*

APPLICABILITY: OPERATIONAL CONDITION 5, when irradiated fuel is in the reactor vessel and the water level is greater than or equal to 22 feet above the top of the reactor pressure vessel flange.

ACTION:

- a. With the required RHR shutdown cooling subsystem inoperable:
  - 1. Within one (1) hour, and once per 24 hours thereafter, verify an alternate method of decay heat removal is available.
- b. With the required action and associated completion time of Action "a" above not met.
  - 1. Immediately suspend loading of irradiated fuel assemblies into the reactor pressure vessel; and
  - 2. Immediately initiate action to restore REFUELING FLOOR SECONDARY CONTAINMENT INTEGRITY to OPERABLE status; and
  - 3. Immediately initiate action to restore one (1) Standby Gas Treatment subsystem to OPERABLE status; and
  - 4. Immediately initiate action to restore isolation capability in each required Refueling Floor secondary containment penetration flow path not isolated.
- c. With no RHR shutdown cooling subsystem in operation:
  - 1. Within one (1) hour from discovery of no reactor coolant circulation, and once per 12 hours thereafter, verify reactor coolant circulation by an alternate method; and
  - 2. Once per hour monitor reactor coolant temperature.

4.9.11.1.1

SURVEILLANCE REQUIREMENTS

---

~~4.9.11.1~~ At least one (1) RHR shutdown cooling subsystem, or an alternate method, shall be verified to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

4.9.11.1.2 Verify required RHR shutdown cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

\* The required RHR shutdown cooling subsystem may be removed from operation for up to two (2) hours per eight (8) hour period.

REFUELING OPERATIONS

3/4.9.11 RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION

HIGH WATER LEVEL

LIMITING CONDITION FOR OPERATION

---

3.9.11.1 One (1) RHR shutdown cooling subsystem shall be OPERABLE and in operation. \*

APPLICABILITY: OPERATIONAL CONDITION 5, when irradiated fuel is in the reactor vessel and the water level is greater than or equal to 22 feet above the top of the reactor pressure vessel flange.

ACTION:

- a. With the required RHR shutdown cooling subsystem inoperable:
  - 1. Within one (1) hour, and once per 24 hours thereafter, verify an alternate method of decay heat removal is available.
- b. With the required action and associated completion time of Action "a" above not met.
  - 1. Immediately suspend loading of irradiated fuel assemblies into the reactor pressure vessel; and
  - 2. Immediately initiate action to restore REFUELING FLOOR SECONDARY CONTAINMENT INTEGRITY to OPERABLE status; and
  - 3. Immediately initiate action to restore one (1) Standby Gas Treatment subsystem to OPERABLE status; and
  - 4. Immediately initiate action to restore isolation capability in each required Refueling Floor secondary containment penetration flow path not isolated.
- c. With no RHR shutdown cooling subsystem in operation:
  - 1. Within one (1) hour from discovery of no reactor coolant circulation, and once per 12 hours thereafter, verify reactor coolant circulation by an alternate method; and
  - 2. Once per hour monitor reactor coolant temperature.

4.9.11.1.1

SURVEILLANCE REQUIREMENTS

---

4.9.11.1 At least one (1) RHR shutdown cooling subsystem, or an alternate method, shall be verified to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

4.9.11.1.2 Verify required RHR shutdown cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

\* The required RHR shutdown cooling subsystem may be removed from operation for up to two (2) hours per eight (8) hour period.

REFUELING OPERATIONS

LOW WATER LEVEL

LIMITING CONDITION FOR OPERATION

---

3.9.11.2 Two (2) RHR shutdown cooling subsystems shall be OPERABLE, and one (1) RHR shutdown cooling subsystem shall be in operation. \*

APPLICABILITY: OPERATIONAL CONDITION 5, when irradiated fuel is in the reactor vessel and the water level is less than 22 feet above the top of the reactor pressure vessel flange.

ACTION:

- a. With one (1) or two (2) required RHR shutdown cooling subsystems inoperable:
  1. Within one (1) hour, and once per 24 hours thereafter, verify an alternate method of decay heat removal is available for each inoperable required RHR shutdown cooling subsystem.
- b. With the required action and associated completion time of Action "a" above not met:
  1. Immediately initiate action to restore REFUELING FLOOR SECONDARY CONTAINMENT INTEGRITY to OPERABLE status; and
  2. Immediately initiate action to restore one (1) Standby Gas Treatment subsystem to OPERABLE status; and
  3. Immediately initiate action to restore isolation capability in each required Refueling Floor secondary containment penetration flow path not isolated.
- c. With no RHR shutdown cooling subsystem in operation:
  1. Within one (1) hour from discovery of no reactor coolant circulation, and once per 12 hours thereafter, verify reactor coolant circulation by an alternate method; and
  2. Once per hour monitor reactor coolant temperature.

4.9.11.2.1

SURVEILLANCE REQUIREMENTS

---

4.9.11.2 At least one (1) RHR shutdown cooling subsystem, or an alternate method, shall be verified to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

4.9.11.2.2 Verify RHR shutdown cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

\* The required operating shutdown cooling subsystem may be removed from operation for up to two (2) hours per eight (8) hour period.

REFUELING OPERATIONS

LOW WATER LEVEL

LIMITING CONDITION FOR OPERATION

---

3.9.11.2 Two (2) RHR shutdown cooling subsystems shall be OPERABLE, and one (1) RHR shutdown cooling subsystem shall be in operation. \*

APPLICABILITY: OPERATIONAL CONDITION 5, when irradiated fuel is in the reactor vessel and the water level is less than 22 feet above the top of the reactor pressure vessel flange.

ACTION:

- a. With one (1) or two (2) required RHR shutdown cooling subsystems inoperable:
  - 1. Within one (1) hour, and once per 24 hours thereafter, verify an alternate method of decay heat removal is available for each inoperable required RHR shutdown cooling subsystem.
- b. With the required action and associated completion time of Action "a" above not met:
  - 1. Immediately initiate action to restore REFUELING FLOOR SECONDARY CONTAINMENT INTEGRITY to OPERABLE status; and
  - 2. Immediately initiate action to restore one (1) Standby Gas Treatment subsystem to OPERABLE status; and
  - 3. Immediately initiate action to restore isolation capability in each required Refueling Floor secondary containment penetration flow path not isolated.
- c. With no RHR shutdown cooling subsystem in operation:
  - 1. Within one (1) hour from discovery of no reactor coolant circulation, and once per 12 hours thereafter, verify reactor coolant circulation by an alternate method; and
  - 2. Once per hour monitor reactor coolant temperature.

4.9.11.2.1

SURVEILLANCE REQUIREMENTS

---

~~4.9.11.2~~ At least one (1) RHR shutdown cooling subsystem, or an alternate method, shall be verified to be in operation and circulating reactor coolant in accordance with the Surveillance Frequency Control Program.

4.9.11.2.2 Verify RHR shutdown cooling subsystem locations susceptible to gas accumulation are sufficiently filled with water in accordance with the Surveillance Frequency Control Program.

\* The required operating shutdown cooling subsystem may be removed from operation for up to two (2) hours per eight (8) hour period.

**ATTACHMENT 3**

Equivalent LGS Technical Specification Nomenclature

**Limerick Generating Station, Units 1 and 2**

**Facility Operating License Nos. NPF-39 and NPF-85**

Table 1. Equivalent LGS Technical Specification Nomenclature

STS			LGS, Unit 1/2 TS		
Number	Title	Part	Number	Title	Part
3.4.8	RHR Shutdown Cooling System- Hot Shutdown	SR	4.4.9.1	Residual Heat Removal Hot Shutdown	SR
3.4.8	RHR Shutdown Cooling System- Hot Shutdown	LCO Bases	3/4.4.9	Residual Heat Removal	Bases
3.4.8	RHR Shutdown Cooling System- Hot Shutdown	SR Bases	3/4.4.9	Residual Heat Removal	Bases
3.4.9	RHR Shutdown Cooling System- Cold Shutdown	SR	4.4.9.2	Residual Heat Removal Cold Shutdown	SR
3.4.9	RHR Shutdown Cooling System- Cold Shutdown	LCO Bases	3/4.4.9	Residual Heat Removal	Bases
3.4.9	RHR Shutdown Cooling System- Cold Shutdown	SR Bases	3/4.4.9	Residual Heat Removal	Bases
3.5.1	ECCS – Operating	SR	4.5.1	ECCS – Operating	SR
3.5.1	ECCS – Operating	LCO Bases	3/4.5.1	ECCS – Operating and Shutdown	Bases
3.5.1	ECCS – Operating	SR Bases	3/4.5.1	ECCS – Operating and Shutdown	Bases
3.5.2	ECCS – Shutdown	SR	4.5.2	TS SR 4.5.2.1 redirects to the SRs in 4.5.1. No changes were made in TS 4.5.2	SR
3.5.2	ECCS – Shutdown	LCO Bases			
3.5.2	ECCS – Shutdown	SR Bases			
3.5.3	RCIC System	SR	4.7.3	Reactor Core Isolation Cooling System	SR
3.5.3	RCIC System	LCO Bases	3/4.7.3	Reactor Core Isolation Cooling System	Bases
3.5.3	RCIC System	SR Bases	3/4.7.3	Reactor Core Isolation Cooling System	Bases
3.6.2.3	RHR Suppression Pool Cooling	SR	4.6.2.3	Containment Systems Suppression Pool Cooling	SR
3.6.2.3	RHR Suppression Pool Cooling	LCO Bases	3/4.6.2	Depressurization Systems	Bases
3.6.2.3	RHR Suppression Pool Cooling	SR Bases	3/4.6.2	Depressurization Systems	Bases
3.6.2.4	RHR Suppression Pool Spray	SR	4.6.2.2	Containment Systems Suppression Pool Spray	SR
3.6.2.4	RHR Suppression Pool Spray	LCO Bases	3/4.6.2	Depressurization Systems	Bases
3.6.2.4	RHR Suppression Pool Spray	SR Bases	3/4.6.2	Depressurization Systems	Bases
3.9.8	RHR High Water Level	SR	4.9.11.1	Residual Heat Removal and Coolant Circulation High Water Level	SR
3.9.8	RHR High Water Level	LCO Bases	3/4.9.11	Residual Heat Removal and Coolant Circulation	Bases
3.9.8	RHR High Water Level	SR Bases	3/4.9.11	Residual Heat Removal and Coolant Circulation	Bases
3.9.9	RHR Low Water Level	SR	4.9.11.2	Low Water Level	SR
3.9.9	RHR Low Water Level	LCO Bases	3/4.9.11	Residual Heat Removal and Coolant Circulation	Bases
3.9.9	RHR Low Water Level	SR Bases	3/4.9.11	Residual Heat Removal and Coolant Circulation	Bases

**ATTACHMENT 4**

Proposed Technical Specification Bases Changes (Mark-Up)  
(For Information Only)

**Limerick Generating Station, Units 1 and 2**  
**Facility Operating License Nos. NPF-39 and NPF-85**

**REVISED TECHNICAL SPECIFICATION BASES PAGES**

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### 3/4.4.9 RESIDUAL HEAT REMOVAL (Cont'd)

required to be OPERABLE for that independent subsystem to be OPERABLE. During COLD SHUTDOWN and REFUELING conditions, however, the subsystems not only have a common suction source, but are allowed to have a common heat exchanger and common discharge piping. To meet the LCO of two (2) OPERABLE subsystems, both pumps in one (1) loop or one (1) pump in each of the two (2) loops must be OPERABLE. Since the piping and heat exchangers are passive components, that are assumed not to fail, they are allowed to be common to both subsystems. Additionally, each RHR shutdown cooling subsystem is considered OPERABLE if it can be manually aligned (remote or local) in the shutdown cooling mode for removal of decay heat. Operation (either continuous or intermittent) of one (1) subsystem can maintain and reduce the reactor coolant temperature as required. However, to ensure adequate core flow to allow for accurate average reactor coolant temperature monitoring, nearly continuous operation is required.

Alternate decay heat removal methods are available to operators. These alternate methods of decay heat removal can be verified available either by calculation (which includes a review of component and system availability to verify that an alternate decay heat removal method is available) or by demonstration, and that a method of coolant mixing be operational. Decay heat removal capability by ambient losses can be considered in evaluating alternate decay heat removal capability.

Insert 3

Management of gas voids is important to RHR Shutdown Cooling System OPERABILITY.

3/4.4.9 RESIDUAL HEAT REMOVAL (Cont'd)

required to be OPERABLE for that independent subsystem to be OPERABLE. During COLD SHUTDOWN and REFUELING conditions, however, the subsystems not only have a common suction source, but are allowed to have a common heat exchanger and common discharge piping. To meet the LCO of two (2) OPERABLE subsystems, both pumps in one (1) loop or one (1) pump in each of the two (2) loops must be OPERABLE. Since the piping and heat exchangers are passive components, that are assumed not to fail, they are allowed to be common to both subsystems. Additionally, each RHR shutdown cooling subsystem is considered OPERABLE if it can be manually aligned (remote or local) in the shutdown cooling mode for removal of decay heat. Operation (either continuous or intermittent) of one (1) subsystem can maintain and reduce the reactor coolant temperature as required. However, to ensure adequate core flow to allow for accurate average reactor coolant temperature monitoring, nearly continuous operation is required. ←

Alternate decay heat removal methods are available to operators. These alternate methods of decay heat removal can be verified available either by calculation (which includes a review of component and system availability to verify that an alternate decay heat removal method is available) or by demonstration, and that a method of coolant mixing be operational. Decay heat removal capability by ambient losses can be considered in evaluating alternate decay heat removal capability.

Management of gas voids is important to RHR Shutdown Cooling System OPERABILITY.

↑  
Insert 3

### **Insert 3**

RHR Shutdown Cooling System piping and components have the potential to develop voids and pockets of entrained gases. Preventing and managing gas intrusion and accumulation is necessary for proper operation of the RHR shutdown cooling subsystems and may also prevent water hammer, pump cavitation, and pumping of non-condensable gas into the reactor vessel. This surveillance verifies that the RHR Shutdown Cooling System piping is sufficiently filled with water prior to initially placing the system in operation during reactor shutdown. The RHR Shutdown Cooling System is OPERABLE when it is sufficiently filled with water to ensure that it can reliably perform its intended function.

The RHR Shutdown Cooling System is a manually initiated mode of the RHR System whose use is typically preceded by system piping flushes that disturb both the RHR pump suction and discharge piping. RHR Shutdown Cooling System is flushed and manually aligned for service using system operating procedures that ensure the RHR shutdown cooling suction and discharge flow paths are sufficiently filled with water. In the event that RHR Shutdown Cooling is required for emergency service, the system operating procedures that align and start the RHR System in shutdown cooling mode include the flexibility to eliminate piping flushes while maintaining minimum requirements to ensure that the suction and discharge flow paths are sufficiently filled with water. The RHR Shutdown Cooling System surveillance is met through the performance of the operating procedures that initially place the RHR shutdown cooling sub-system in service.

This surveillance requirement is modified by a Note allowing sufficient time (12 hours) to align the RHR System for Shutdown Cooling operation after reactor dome pressure is less than the RHR cut-in permissive set point.

### 3/4.5 EMERGENCY CORE COOLING SYSTEM

#### BASES

##### 3/4.5.1 and 3/4.5.2 ECCS - OPERATING and SHUTDOWN

The core spray system (CSS), together with the LPCI mode of the RHR system, is provided to assure that the core is adequately cooled following a loss-of-coolant accident and provides adequate core cooling capacity for all break sizes up to and including the double-ended reactor recirculation line break, and for smaller breaks following depressurization by the ADS. ←

Management of gas voids is important to ECCS injection/spray subsystem OPERABILITY.

The CSS is a primary source of emergency core cooling after the reactor vessel is depressurized and a source for flooding of the core in case of accidental draining.

The surveillance requirements provide adequate assurance that the CSS will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.~~

The low pressure coolant injection (LPCI) mode of the RHR system is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Four subsystems, each with one pump, provide adequate core flooding for all break sizes up to and including the double-ended reactor recirculation line break, and for small breaks following depressurization by the ADS.

The surveillance requirements provide adequate assurance that the LPCI system will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.~~

The high pressure coolant injection (HPCI) system is provided to assure that the reactor core is adequately cooled to limit fuel clad temperature in the event of a small break in the reactor coolant system and loss of coolant which does not result in rapid depressurization of the reactor vessel. The HPCI system permits the reactor to be shut down while maintaining sufficient reactor vessel water level inventory until the vessel is depressurized. The HPCI system continues to operate until reactor vessel pressure is below the pressure at which CSS operation or LPCI mode of the RHR system operation maintains core cooling.

The capacity of the system is selected to provide the required core cooling. The HPCI pump is designed to deliver greater than or equal to 5600 gpm at reactor pressures between 1182 and 200 psig and is capable of delivering at least 5000 gpm between 1182 and 1205 psig. In the system's normal alignment, water from the condensate storage tank is used instead of injecting water from the suppression pool into the reactor, but no credit is taken in the safety analyses for the condensate storage tank water.

### 3/4.5 EMERGENCY CORE COOLING SYSTEM

#### BASES

##### 3/4.5.1 and 3/4.5.2 ECCS - OPERATING and SHUTDOWN

The core spray system (CSS), together with the LPCI mode of the RHR system, is provided to assure that the core is adequately cooled following a loss-of-coolant accident and provides adequate core cooling capacity for all break sizes up to and including the double-ended reactor recirculation line break, and for smaller breaks following depressurization by the ADS.

Management of gas voids is important to ECCS injection/spray subsystem OPERABILITY.

The CSS is a primary source of emergency core cooling after the reactor vessel is depressurized and a source for flooding of the core in case of accidental draining.

The surveillance requirements provide adequate assurance that the CSS will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.~~

The low pressure coolant injection (LPCI) mode of the RHR system is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Four subsystems, each with one pump, provide adequate core flooding for all break sizes up to and including the double-ended reactor recirculation line break, and for small breaks following depressurization by the ADS.

The surveillance requirements provide adequate assurance that the LPCI system will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.~~

The high pressure coolant injection (HPCI) system is provided to assure that the reactor core is adequately cooled to limit fuel clad temperature in the event of a small break in the reactor coolant system and loss of coolant which does not result in rapid depressurization of the reactor vessel. The HPCI system permits the reactor to be shut down while maintaining sufficient reactor vessel water level inventory until the vessel is depressurized. The HPCI system continues to operate until reactor vessel pressure is below the pressure at which CSS operation or LPCI mode of the RHR system operation maintains core cooling.

The capacity of the system is selected to provide the required core cooling. The HPCI pump is designed to deliver greater than or equal to 5600 gpm at reactor pressures between 1182 and 200 psig and is capable of delivering at least 5000 gpm between 1182 and 1205 psig. In the system's normal alignment, water from the condensate storage tank is used instead of injecting water from the suppression pool into the reactor, but no credit is taken in the safety analyses for the condensate storage tank water.

EMERGENCY CORE COOLING SYSTEM

BASES

ECCS - OPERATING and SHUTDOWN (Continued)

With the HPCI system inoperable, adequate core cooling is assured by the OPERABILITY of the redundant and diversified automatic depressurization system and both the CS and LPCI systems. In addition, the reactor core isolation cooling (RCIC) system, a system for which no credit is taken in the safety analysis, will automatically provide makeup at reactor operating pressures on a reactor low water level condition. The HPCI out-of-service period of 14 days is based on the demonstrated OPERABILITY of redundant and diversified low pressure core cooling systems and the RCIC system. The HPCI system, and one LPCI subsystem, and/or one CSS subsystem out-of-service period of 8 hours ensures that sufficient ECCS, comprised of a minimum of one CSS subsystem, three LPCI subsystems, and all of the ADS will be available to 1) provide for safe shutdown of the facility, and 2) mitigate and control accident conditions within the facility. A Note prohibits the application of Specification 3.0.4.b to an inoperable HPCI subsystem. There is an increased risk associated with entering an OPERATIONAL CONDITION or other specified condition in the Applicability with an inoperable HPCI subsystem and the provisions of Specification 3.0.4.b, which allow entry into an OPERATIONAL CONDITION or other specified condition in the Applicability with the Limiting Condition for Operation not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

The surveillance requirements provide adequate assurance that the HPCI system will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test with reactor vessel injection requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage and to provide cooling at the earliest moment.~~

← Insert 4

Upon failure of the HPCI system to function properly after a small break loss-of-coolant accident, the automatic depressurization system (ADS) automatically causes selected safety/relief valves to open, depressurizing the reactor so that flow from the low pressure core cooling systems can enter the core in time to limit fuel cladding temperature to less than 2200°F. ADS is conservatively required to be OPERABLE whenever reactor vessel pressure exceeds 100 psig. This pressure is substantially below that for which the low pressure core cooling systems can provide adequate core cooling for events requiring ADS.

ADS automatically controls five selected safety-relief valves. The safety analysis assumes all five are operable. The allowed out-of-service time for one valve for up to fourteen days is determined in a similar manner to other ECCS sub-system out-of-service time allowances.

Verification that ADS accumulator gas supply header pressure is  $\geq 90$  psig ensures adequate gas pressure for reliable ADS operation. The accumulator on each ADS valve provides pneumatic pressure for valve actuation. The design pneumatic supply pressure requirements for the accumulator are such that, following a failure of the pneumatic supply to the accumulator at least two valve actuations can occur with the drywell at 70% of design pressure. The ECCS safety analysis assumes only one actuation to achieve the depressurization required for operation of the low pressure ECCS. This minimum required pressure of  $\geq 90$  psig is provided by the PCIG supply.

EMERGENCY CORE COOLING SYSTEM

BASES

ECCS - OPERATING and SHUTDOWN (Continued)

With the HPCI system inoperable, adequate core cooling is assured by the OPERABILITY of the redundant and diversified automatic depressurization system and both the CS and LPCI systems. In addition, the reactor core isolation cooling (RCIC) system, a system for which no credit is taken in the safety analysis, will automatically provide makeup at reactor operating pressures on a reactor low water level condition. The HPCI out-of-service period of 14 days is based on the demonstrated OPERABILITY of redundant and diversified low pressure core cooling systems and the RCIC system. The HPCI system, and one LPCI subsystem, and/or one CSS subsystem out-of-service period of 8 hours ensures that sufficient ECCS, comprised of a minimum of one CSS subsystem, three LPCI subsystems, and all of the ADS will be available to 1) provide for safe shutdown of the facility, and 2) mitigate and control accident conditions within the facility. A Note prohibits the application of Specification 3.0.4.b to an inoperable HPCI subsystem. There is an increased risk associated with entering an OPERATIONAL CONDITION or other specified condition in the Applicability with an inoperable HPCI subsystem and the provisions of Specification 3.0.4.b, which allow entry into an OPERATIONAL CONDITION or other specified condition in the Applicability with the Limiting Condition for Operation not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

The surveillance requirements provide adequate assurance that the HPCI system will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test with reactor vessel injection requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage and to provide cooling at the earliest moment.~~

← Insert 4

Upon failure of the HPCI system to function properly after a small break loss-of-coolant accident, the automatic depressurization system (ADS) automatically causes selected safety/relief valves to open, depressurizing the reactor so that flow from the low pressure core cooling systems can enter the core in time to limit fuel cladding temperature to less than 2200°F. ADS is conservatively required to be OPERABLE whenever reactor vessel pressure exceeds 100 psig. This pressure is substantially below that for which the low pressure core cooling systems can provide adequate core cooling for events requiring ADS.

ADS automatically controls five selected safety-relief valves. The safety analysis assumes all five are operable. The allowed out-of-service time for one valve for up to fourteen days is determined in a similar manner to other ECCS sub-system out-of-service time allowances.

Verification that ADS accumulator gas supply header pressure is  $\geq 90$  psig ensures adequate gas pressure for reliable ADS operation. The accumulator on each ADS valve provides pneumatic pressure for valve actuation. The design pneumatic supply pressure requirements for the accumulator are such that, following a failure of the pneumatic supply to the accumulator at least two valve actuations can occur with the drywell at 70% of design pressure. The ECCS safety analysis assumes only one actuation to achieve the depressurization required for operation of the low pressure ECCS. This minimum required pressure of  $\geq 90$  psig is provided by the PCIG supply.

#### **Insert 4**

The ECCS injection/spray subsystem flow path piping and components have the potential to develop voids and pockets of entrained gases. Preventing and managing gas intrusion and accumulation is necessary for proper operation of the ECCS injection/spray subsystems and may also prevent a water hammer, pump cavitation, and pumping of noncondensable gas into the reactor vessel.

Selection of ECCS injection/spray subsystem locations susceptible to gas accumulation is based on a review of system design information, including piping and instrumentation drawings, isometric drawings, plan and elevation drawings, and calculations. The design review is supplemented by system walk downs to validate the system high points and to confirm the location and orientation of important components that can become sources of gas or could otherwise cause gas to be trapped or difficult to remove during system maintenance or restoration. Susceptible locations depend on plant and system configuration, such as stand-by versus operating conditions.

The ECCS injection/spray subsystem is OPERABLE when it is sufficiently filled with water. Acceptance criteria are established for the volume of accumulated gas at susceptible locations. If accumulated gas is discovered that exceeds the acceptance criteria for the susceptible location (or the volume of accumulated gas at one or more susceptible locations exceeds an acceptance criteria for gas volume at the suction or discharge of a pump), the Surveillance is not met. Accumulated gas should be eliminated or brought within the acceptance criteria limits.

ECCS injection/spray subsystem locations susceptible to gas accumulation are monitored and, if gas is found, the gas volume is compared to the acceptance criteria for the location. Susceptible locations in the same system flow path which are subject to the same gas intrusion mechanisms may be verified by monitoring a representative subset of susceptible locations. Monitoring may not be practical for locations that are inaccessible due to radiological or environmental conditions, the plant configuration, or personnel safety. For these locations alternative methods (e.g., operating parameters, remote monitoring) may be used to monitor the susceptible location. Monitoring is not required for susceptible locations where the maximum potential accumulated gas void volume has been evaluated and determined to not challenge system OPERABILITY. The accuracy of the method used for monitoring the susceptible locations and trending of the results should be sufficient to assure system OPERABILITY during the Surveillance interval.

Surveillance 4.5.1.a.1.b is modified by a Note which exempts system vent flow paths opened under administrative control. The administrative control should be proceduralized and include stationing a dedicated individual at the system vent flow path who is in continuous communication with the operators in the control room. This individual will have a method to rapidly close the system vent flow path if directed.

## BASES

## 3/4.6.2 DEPRESSURIZATION SYSTEMS

Management of gas voids is important to Suppression Pool Cooling/Spray Subsystem OPERABILITY.

The specifications of this section ensure that the primary containment pressure will not exceed the design pressure of 55 psig during primary system blowdown from full operating pressure.

The suppression chamber water provides the heat sink for the reactor coolant system energy release following a postulated rupture of the system. The suppression chamber water volume must absorb the associated decay and structural sensible heat released during reactor coolant system blowdown from rated conditions. Since all of the gases in the drywell are purged into the suppression chamber air space during a loss-of-coolant accident, the pressure of the suppression chamber air space must not exceed 55 psig. The design volume of the suppression chamber, water and air, was obtained by considering that the total volume of reactor coolant is discharged to the suppression chamber and that the drywell volume is purged to the suppression chamber.

Using the minimum or maximum water volumes given in this specification, suppression pool pressure during the design basis accident is below the design pressure. Maximum water volume of 134,600 ft<sup>3</sup> results in a downcomer submergence of 12'3" and the minimum volume of 122,120 ft<sup>3</sup> results in a submergence approximately 2'3" less. The majority of the Bodega tests were run with a submerged length of 4 feet and with complete condensation. Thus, with respect to the downcomer submergence, this specification is adequate. The maximum temperature at the end of the blowdown tested during the Humboldt Bay and Bodega Bay tests was 170°F and this is conservatively taken to be the limit for complete condensation of the reactor coolant, although condensation would occur for temperature above 170°F.

Should it be necessary to make the suppression chamber inoperable, this shall only be done as specified in Specification 3.5.3.

Under full power operating conditions, blowdown through safety/relief valves assuming an initial suppression chamber water temperature of 95°F results in a bulk water temperature of approximately 140°F immediately following blowdown which is below the 190°F bulk temperature limit used for complete condensation via T-quencher devices. At this temperature and atmospheric pressure, the available NPSH exceeds that required by both the RHR and core spray pumps, thus there is no dependency on containment overpressure during the accident injection phase. If both RHR loops are used for containment cooling, there is no dependency on containment overpressure for post-LOCA operations.

CONTAINMENT SYSTEMS

BASES

Management of gas voids is important to Suppression Pool Cooling/Spray Subsystem OPERABILITY.

3/4.6.2 DEPRESSURIZATION SYSTEMS

The specifications of this section ensure that the primary containment pressure will not exceed the design pressure of 55 psig during primary system blowdown from full operating pressure.

The suppression chamber water provides the heat sink for the reactor coolant system energy release following a postulated rupture of the system. The suppression chamber water volume must absorb the associated decay and structural sensible heat released during reactor coolant system blowdown from rated conditions. Since all of the gases in the drywell are purged into the suppression chamber air space during a loss-of-coolant accident, the pressure of the suppression chamber air space must not exceed 55 psig. The design volume of the suppression chamber, water and air, was obtained by considering that the total volume of reactor coolant is discharged to the suppression chamber and that the drywell volume is purged to the suppression chamber.

Using the minimum or maximum water volumes given in this specification, suppression pool pressure during the design basis accident is below the design pressure. Maximum water volume of 134,600 ft<sup>3</sup> results in a downcomer submergence of 12'3" and the minimum volume of 122,120 ft<sup>3</sup> results in a submergence approximately 2'3" less. The majority of the Bodega tests were run with a submerged length of 4 feet and with complete condensation. Thus, with respect to the downcomer submergence, this specification is adequate. The maximum temperature at the end of the blowdown tested during the Humboldt Bay and Bodega Bay tests was 170°F and this is conservatively taken to be the limit for complete condensation of the reactor coolant, although condensation would occur for temperature above 170°F.

Should it be necessary to make the suppression chamber inoperable, this shall only be done as specified in Specification 3.5.3.

Under full power operating conditions, blowdown through safety/relief valves assuming an initial suppression chamber water temperature of 95°F results in a bulk water temperature of approximately 140°F immediately following blowdown which is below the 190°F bulk temperature limit used for complete condensation via T-quencher devices. At this temperature and atmospheric pressure, the available NPSH exceeds that required by both the RHR and core spray pumps, thus there is no dependency on containment overpressure during the accident injection phase. If both RHR loops are used for containment cooling, there is no dependency on containment overpressure for post-LOCA operations.

### 3/4.6.2 DEPRESSURIZATION SYSTEMS (Cont.)

← Insert 5

One of the surveillance requirements for the suppression pool cooling (SPC) mode of the RHR system is to demonstrate that each RHR pump develops a flow rate <sup>3</sup>10,000 gpm while operating in the SPC mode with flow through the heat exchanger and its associated closed bypass valve, ensuring that pump performance has not degraded during the cycle and that the flow path is operable. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice inspections confirm component operability, trend performance and detect incipient failures by indicating abnormal performance. The RHR heat exchanger bypass valve is used for adjusting flow through the heat exchanger, and is not designed to be a tight shut-off valve. With the bypass valve closed, a portion of the total flow still travels through the bypass, which can affect overall heat transfer. However, no heat transfer performance requirement of the heat exchanger is intended by the current Technical Specification surveillance requirement. This is confirmed by the lack of any flow requirement for the RHRSW system in Technical Specifications Section 3/4.7.1. Verifying an RHR flowrate through the heat exchanger does not demonstrate heat removal capability in the absence of a requirement for RHRSW flow. LGS does perform heat transfer testing of the RHR heat exchangers as part of its response to Generic Letter 89-13, which verified the commitment to meet the requirements of GDC 46.

Experimental data indicate that excessive steam condensing loads can be avoided if the peak local temperature of the suppression pool is maintained below 200°F during any period of relief valve operation for T-quencher devices. Specifications have been placed on the envelope of reactor operating conditions so that the reactor can be depressurized in a timely manner to avoid the regime of potentially high suppression chamber loadings.

Because of the large volume and thermal capacity of the suppression pool, the volume and temperature normally changes very slowly and monitoring these parameters daily is sufficient to establish any temperature trends. By requiring the suppression pool temperature to be frequently recorded during periods of significant heat addition, the temperature trends will be closely followed so that appropriate action can be taken.

In addition to the limits on temperature of the suppression chamber pool water, operating procedures define the action to be taken in the event a safety-relief valve inadvertently opens or sticks open. As a minimum this action shall include: (1) use of all available means to close the valve, (2) initiate suppression pool water cooling, (3) initiate reactor shutdown, and (4) if other safety-relief valves are used to depressurize the reactor, their discharge shall be separated from that of the stuck-open safety/relief valve to assure mixing and uniformity of energy insertion to the pool.

During a LOCA, potential leak paths between the drywell and suppression chamber airspace could result in excessive containment pressures, since the steam flow into the airspace would bypass the heat sink capabilities of the chamber. Potential sources of bypass leakage are the suppression chamber-to-drywell vacuum breakers (VBs), penetrations in the diaphragm floor, and cracks in the diaphragm floor and/or liner plate and downcomers located in the suppression chamber airspace. The containment pressure response to the postulated bypass leakage can be mitigated by manually actuating the suppression chamber sprays. An analysis was performed for a design bypass leakage area of  $A/\sqrt{k}$  equal to 0.0500 ft<sup>2</sup> to verify that the operator has sufficient time to initiate the sprays prior to exceeding the containment design pressure of 55 psig. The limit of 10% of the design value of 0.0500 ft<sup>2</sup> ensures that the design basis for the steam bypass analysis is met.

3/4.6.2 DEPRESSURIZATION SYSTEMS (Cont.)

← **Insert 5**

One of the surveillance requirements for the suppression pool cooling (SPC) mode of the RHR system is to demonstrate that each RHR pump develops a flow rate <sup>3</sup>10,000 gpm while operating in the SPC mode with flow through the heat exchanger and its associated closed bypass valve, ensuring that pump performance has not degraded during the cycle and that the flow path is operable. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice inspections confirm component operability, trend performance and detect incipient failures by indicating abnormal performance. The RHR heat exchanger bypass valve is used for adjusting flow through the heat exchanger, and is not designed to be a tight shut-off valve. With the bypass valve closed, a portion of the total flow still travels through the bypass, which can affect overall heat transfer. However, no heat transfer performance requirement of the heat exchanger is intended by the current Technical Specification surveillance requirement. This is confirmed by the lack of any flow requirement for the RHRSW system in Technical Specifications Section 3/4.7.1. Verifying an RHR flowrate through the heat exchanger does not demonstrate heat removal capability in the absence of a requirement for RHRSW flow. LGS does perform heat transfer testing of the RHR heat exchangers as part of its response to Generic Letter 89-13, which verified the commitment to meet the requirements of GDC 46.

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### **Insert 5**

RHR Suppression Pool Cooling/Spray subsystem piping and components have the potential to develop voids and pockets of entrained gases. Preventing and managing gas intrusion and accumulation is necessary for proper operation of the RHR suppression pool subsystems and may also prevent water hammer and pump cavitation.

Selection of RHR Suppression Pool Cooling/Spray subsystem locations susceptible to gas accumulation is based on a review of system design information, including piping and instrumentation drawings, isometric drawings, plan and elevation drawings, and calculations. The design review is supplemented by system walk downs to validate the system high points and to confirm the location and orientation of important components that can become sources of gas or could otherwise cause gas to be trapped or difficult to remove during system maintenance or restoration. Susceptible locations depend on plant and system configuration, such as stand-by versus operating conditions.

The RHR Suppression Pool Cooling/Spray subsystem is OPERABLE when it is sufficiently filled with water. Acceptance criteria are established for the volume of accumulated gas at susceptible locations. If accumulated gas is discovered that exceeds the acceptance criteria for the susceptible location (or the volume of accumulated gas at one or more susceptible locations exceeds an acceptance criteria for gas volume at the suction or discharge of a pump), the Surveillance is not met. Accumulated gas should be eliminated or brought within the acceptance criteria limits.

RHR Suppression Pool Cooling/Spray subsystem locations susceptible to gas accumulation are monitored and, if gas is found, the gas volume is compared to the acceptance criteria for the location. Susceptible locations in the same system flow path which are subject to the same gas intrusion mechanisms may be verified by monitoring a representative subset of susceptible locations. Monitoring may not be practical for locations that are inaccessible due to radiological or environmental conditions, the plant configuration, or personnel safety. For these locations alternative methods (e.g., operating parameters, remote monitoring) may be used to monitor the susceptible location. Monitoring is not required for susceptible locations where the maximum potential accumulated gas void volume has been evaluated and determined to not challenge system OPERABILITY. The accuracy of the method used for monitoring the susceptible locations and trending of the results should be sufficient to assure system OPERABILITY during the Surveillance interval.

PLANT SYSTEMS

BASES

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

REFERENCES

1. UFSAR Section 6.4
2. UFSAR Section 9.5
3. Regulatory Guide 1.196
4. NEI 99-03, "Control Room Habitability Assessment Guidance," June 2001.
5. Letter from Eric J. Leeds (NRC) to James W. Davis (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability." (ADAMS Accession No. ML040300694).

3/4.7.3 REACTOR CORE ISOLATION COOLING SYSTEM

Management of gas voids is important to RCIC System OPERABILITY.

The reactor core isolation cooling (RCIC) system is provided to assure adequate core cooling in the event of reactor isolation from its primary heat sink and the loss of feedwater flow to the reactor vessel without requiring actuation of any of the emergency core cooling system equipment. The RCIC system is conservatively required to be OPERABLE whenever reactor pressure exceeds 150 psig. This pressure is substantially below that for which low pressure core cooling systems can provide adequate core cooling.

The RCIC system specifications are applicable during OPERATIONAL CONDITIONS 1, 2, and 3 when reactor vessel pressure exceeds 150 psig because RCIC is the primary non-ECCS source of emergency core cooling when the reactor is pressurized.

With the RCIC system inoperable, adequate core cooling is assured by the OPERABILITY of the HPCI system and justifies the specified 14 day out-of-service period. A Note prohibits the application of Specification 3.0.4.b to an inoperable RCIC system. There is an increased risk associated with entering an OPERATIONAL CONDITION or other specified condition in the Applicability with an inoperable RCIC subsystem and the provisions of Specification 3.0.4.b, which allow entry into an OPERATIONAL CONDITION or other specified condition in the Applicability with the Limiting Condition for Operation not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

The surveillance requirements provide adequate assurance that RCIC will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation during reactor operation, a complete functional test requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage and to start cooling at the earliest possible moment.~~

↑ Insert 6

PLANT SYSTEMS

BASES

CONTROL ROOM EMERGENCY FRESH AIR SUPPLY SYSTEM - COMMON SYSTEM (Continued)

REFERENCES

1. UFSAR Section 6.4
2. UFSAR Section 9.5
3. Regulatory Guide 1.196
4. NEI 99-03, "Control Room Habitability Assessment Guidance," June 2001.
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The RCIC system specifications are applicable during OPERATIONAL CONDITIONS 1, 2, and 3 when reactor vessel pressure exceeds 150 psig because RCIC is the primary non-ECCS source of emergency core cooling when the reactor is pressurized.

With the RCIC system inoperable, adequate core cooling is assured by the OPERABILITY of the HPCI system and justifies the specified 14 day out-of-service period. A Note prohibits the application of Specification 3.0.4.b to an inoperable RCIC system. There is an increased risk associated with entering an OPERATIONAL CONDITION or other specified condition in the Applicability with an inoperable RCIC subsystem and the provisions of Specification 3.0.4.b, which allow entry into an OPERATIONAL CONDITION or other specified condition in the Applicability with the Limiting Condition for Operation not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

The surveillance requirements provide adequate assurance that RCIC will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation during reactor operation, a complete functional test requires reactor shutdown. ~~The pump discharge piping is maintained full to prevent water hammer damage and to start cooling at the earliest possible moment.~~

↑ Insert 6

## **Insert 6**

The RCIC System flow path piping and components have the potential to develop voids and pockets of entrained gases. Preventing and managing gas intrusion and accumulation is necessary for proper operation of the required RCIC System and may also prevent water hammer, pump cavitation, and pumping of noncondensable gas into the reactor vessel.

Selection of RCIC System locations susceptible to gas accumulation is based on a review of system design information, including piping and instrumentation drawings, isometric drawings, plan and elevation drawings, and calculations. The design review is supplemented by system walk downs to validate the system high points and to confirm the location and orientation of important components that can become sources of gas or could otherwise cause gas to be trapped or difficult to remove during system maintenance or restoration. Susceptible locations depend on plant and system configuration, such as stand-by versus operating conditions.

The RCIC System is OPERABLE when it is sufficiently filled with water. Acceptance criteria are established for the volume of accumulated gas at susceptible locations. If accumulated gas is discovered that exceeds the acceptance criteria for the susceptible location (or the volume of accumulated gas at one or more susceptible locations exceeds an acceptance criteria for gas volume at the suction or discharge of a pump), the Surveillance is not met. Accumulated gas should be eliminated or brought within the acceptance criteria limits.

RCIC System locations susceptible to gas accumulation are monitored and, if gas is found, the gas volume is compared to the acceptance criteria for the location. Susceptible locations in the same system flow path which are subject to the same gas intrusion mechanisms may be verified by monitoring a representative subset of susceptible locations. Monitoring may not be practical for locations that are inaccessible due to radiological or environmental conditions, the plant configuration, or personnel safety. For these locations alternative methods (e.g., operating parameters, remote monitoring) may be used to monitor the susceptible location. Monitoring is not required for susceptible locations where the maximum potential accumulated gas void volume has been evaluated and determined to not challenge system OPERABILITY. The accuracy of the method used for monitoring the susceptible locations and trending of the results should be sufficient to assure system OPERABILITY during the Surveillance interval.

Surveillance 4.7.3.a.2 is modified by a Note which exempts system vent flow paths opened under administrative control. The administrative control should be proceduralized and include stationing a dedicated individual at the system vent flow path who is in continuous communication with the operators in the control room. This individual will have a method to rapidly close the system vent flow path if directed.

3/4.9.11 RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION (Cont'd)

having one (1) RHR shutdown cooling subsystem OPERABLE ensures that 1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F, and 2) sufficient coolant circulation would be available through the reactor core to assure accurate temperature indication. ←

The requirement to have two (2) RHR shutdown cooling subsystems OPERABLE when there is less than 22 feet of water above the reactor vessel flange ensures that a single failure of the operating loop will not result in a complete loss of residual heat removal capability. With the reactor vessel head removed and 22 feet of water above the reactor vessel flange, a large heat sink is available for core cooling. Thus, in the event of a failure of the operating RHR subsystem, adequate time is provided to initiate alternate methods capable of decay heat removal or emergency procedures to cool the core.

To meet the LCO of the two (2) subsystems OPERABLE when there is less than 22 feet of water above the reactor vessel flange, both pumps in one (1) loop or one (1) pump in each of the two (2) loops must be OPERABLE. The two (2) subsystems have a common suction source and are allowed to have a common heat exchanger and common discharge piping. Additionally, each shutdown cooling subsystem can provide the required decay heat removal capability; however, ensuring operability of the other shutdown cooling subsystem provides redundancy.

The required cooling capacity of an alternate method of decay heat removal should be ensured by verifying its capability to maintain or reduce reactor coolant temperature either by calculation (which includes a review of component and system availability to verify that an alternate decay heat removal method is available) or by demonstration. Decay heat removal capability by ambient losses can be considered in evaluating alternate decay heat removal capability.

With the required decay heat removal subsystem(s) inoperable and the required alternate method(s) of decay heat removal not available in accordance with Action "a", additional actions are required to minimize any potential fission product release to the environment. This includes ensuring Refueling Floor Secondary Containment is OPERABLE; one (1) Standby Gas Treatment subsystem is OPERABLE; and Secondary Containment isolation capability (i.e., one (1) Secondary Containment isolation valve and associated instrumentation are OPERABLE or other acceptable administrative controls to assure isolation capability) in each associated penetration not isolated that is assumed to be isolated to mitigate radioactive releases. This may be performed as an administrative check, by examining logs or other information to determine whether the components are out of service for maintenance or other reasons. It is not necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the components. If, however, any required component is inoperable, then it must be restored to OPERABLE status. In this case, the surveillance may need to be performed to restore the component to OPERABLE status. Actions must continue until all required components are OPERABLE.

If no RHR subsystem is in operation, an alternate method of coolant circulation is required to be established within one (1) hour. The Completion Time is modified such that one (1) hour is applicable separately for each occurrence involving a loss of coolant circulation.

Insert 7



Management of gas voids is important to RHR Shutdown Cooling Subsystem OPERABILITY.

3/4.9.11 RESIDUAL HEAT REMOVAL AND COOLANT CIRCULATION (Cont'd)

having one (1) RHR shutdown cooling subsystem OPERABLE ensures that 1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F, and 2) sufficient coolant circulation would be available through the reactor core to assure accurate temperature indication. ←

The requirement to have two (2) RHR shutdown cooling subsystems OPERABLE when there is less than 22 feet of water above the reactor vessel flange ensures that a single failure of the operating loop will not result in a complete loss of residual heat removal capability. With the reactor vessel head removed and 22 feet of water above the reactor vessel flange, a large heat sink is available for core cooling. Thus, in the event of a failure of the operating RHR subsystem, adequate time is provided to initiate alternate methods capable of decay heat removal or emergency procedures to cool the core.

To meet the LCO of the two (2) subsystems OPERABLE when there is less than 22 feet of water above the reactor vessel flange, both pumps in one (1) loop or one (1) pump in each of the two (2) loops must be OPERABLE. The two (2) subsystems have a common suction source and are allowed to have a common heat exchanger and common discharge piping. Additionally, each shutdown cooling subsystem can provide the required decay heat removal capability; however, ensuring operability of the other shutdown cooling subsystem provides redundancy.

The required cooling capacity of an alternate method of decay heat removal should be ensured by verifying its capability to maintain or reduce reactor coolant temperature either by calculation (which includes a review of component and system availability to verify that an alternate decay heat removal method is available) or by demonstration. Decay heat removal capability by ambient losses can be considered in evaluating alternate decay heat removal capability.

With the required decay heat removal subsystem(s) inoperable and the required alternate method(s) of decay heat removal not available in accordance with Action "a", additional actions are required to minimize any potential fission product release to the environment. This includes ensuring Refueling Floor Secondary Containment is OPERABLE; one (1) Standby Gas Treatment subsystem is OPERABLE; and Secondary Containment isolation capability (i.e., one (1) Secondary Containment isolation valve and associated instrumentation are OPERABLE or other acceptable administrative controls to assure isolation capability) in each associated penetration not isolated that is assumed to be isolated to mitigate radioactive releases. This may be performed as an administrative check, by examining logs or other information to determine whether the components are out of service for maintenance or other reasons. It is not necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the components. If, however, any required component is inoperable, then it must be restored to OPERABLE status. In this case, the surveillance may need to be performed to restore the component to OPERABLE status. Actions must continue until all required components are OPERABLE.

If no RHR subsystem is in operation, an alternate method of coolant circulation is required to be established within one (1) hour. The Completion Time is modified such that one (1) hour is applicable separately for each occurrence involving a loss of coolant circulation.

Management of gas voids is important to RHR Shutdown Cooling Subsystem OPERABILITY.

Insert 7



### **Insert 7**

RHR Shutdown Cooling System piping and components have the potential to develop voids and pockets of entrained gases. Preventing and managing gas intrusion and accumulation is necessary for proper operation of the RHR shutdown cooling subsystems and may also prevent water hammer, pump cavitation, and pumping of non-condensable gas into the reactor vessel. This surveillance verifies that the RHR Shutdown Cooling System piping is sufficiently filled with water prior to placing the system in operation when in OPCON 5. The RHR Shutdown Cooling System is OPERABLE when it is sufficiently filled with water to ensure that it can reliably perform its intended function.

The RHR Shutdown Cooling System is a manually initiated mode of the RHR System that is aligned for service using system operating procedures that ensure the RHR shutdown cooling suction and discharge flow paths are sufficiently filled with water. An RHR Shutdown Cooling sub-system that is already in operation at the time of entry into the APPLICABILITY is OPERABLE. For an idle RHR Shutdown Cooling subsystem, the surveillance is met through the performance of the operating procedures that place the RHR Shutdown Cooling subsystem in service.