

RS-12-073

10 CFR 50.90

July 23, 2012

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

Braidwood Station, Units 1 and 2  
Facility Operating License Nos. NPF-72 and NPF-77  
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2  
Facility Operating License Nos. NPF-37 and NPF-66  
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: License Amendment Request to Revise Technical Specifications Section 3.5.3,  
"ECCS - Shutdown"

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC, (EGC), requests amendments to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2.

The proposed amendments would delete the Limiting Condition for Operation (LCO) Note associated with Technical Specifications (TS) Section 3.5.3, "ECCS – Shutdown," to reflect current plant configuration and ensure the Residual Heat Removal (RHR) system operability meets the TS 3.5.3 LCO requirement. The proposed changes will correct a non-conservative TS which may not adequately ensure the RHR system operability requirements during shutdown cooling operations in MODE 4. This conclusion is based on EGC's evaluation of information provided in Westinghouse Nuclear Safety Advisory Letter (NSAL) 09-8, "Presence of Vapor in Emergency Core Cooling System/Residual Heat Removal System in Modes 3/4 Loss-of-Coolant Accident Conditions," dated November 3, 2009.

This attached amendment request is subdivided as follows:

Attachment 1 provides a description and evaluation of the proposed changes.

Attachments 2 and 3 provide the marked-up TS pages for Braidwood Station and Byron Station, respectively, with the proposed changes indicated.

Attachments 4 and 5 provide the marked-up TS Bases pages for Braidwood Station and Byron Station, respectively, with the proposed changes indicated. The TS Bases pages are provided for information only and do not require NRC approval.

The proposed change has been reviewed by the Braidwood Station and Byron Station Plant Operations Review Committees and approved by their respective Nuclear Safety Review Boards in accordance with the requirements of the EGC Quality Assurance Program.

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

EGC requests approval of the proposed license amendment by July 23, 2013. Once approved, the amendment will be implemented within 45 days.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Dwi Murray at (630) 657-3695.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 23rd day of July 2012.

Respectfully,



David M. Gullott  
Manager – Licensing  
Exelon Generation Company, LLC

Attachments:

1. Evaluation of Proposed Changes
2. Proposed Technical Specifications Changes for Braidwood Station, Units 1 and 2
3. Proposed Technical Specifications Changes for Byron Station, Units 1 and 2
4. Proposed Technical Specifications Bases Changes for Braidwood Station, Units 1 and 2
5. Proposed Technical Specifications Bases Changes for Byron Station, Units 1 and 2

cc: NRC Regional Administrator – Region III  
NRC Senior Resident Inspector – Braidwood Station  
NRC Senior Resident Inspector – Byron Station  
NRC Project Manager, NRR – Braidwood and Byron Stations

**ATTACHMENT 1**  
**Evaluation of Proposed Changes**

Subject: License Amendment Request to Revise Technical Specifications Section 3.5.3,  
"ECCS - Shutdown"

- 1.0 SUMMARY DESCRIPTION
- 2.0 DETAILED DESCRIPTION
- 3.0 TECHNICAL EVALUATION
- 4.0 REGULATORY EVALUATION
  - 4.1 Applicable Regulatory Requirements/Criteria
  - 4.2 Precedents
  - 4.3 No Significant Hazards Consideration
  - 4.4 Conclusions
- 5.0 ENVIRONMENTAL CONSIDERATION
- 6.0 REFERENCES

**ATTACHMENT 1**  
**Evaluation of Proposed Changes**

**1.0 SUMMARY DESCRIPTION**

This evaluation supports a request to amend Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2.

Exelon Generation Company, LLC, (EGC) proposes to delete the Limiting Condition for Operation (LCO) Note associated with TS 3.5.3, "ECCS – Shutdown," to reflect current plant configuration and ensure the Residual Heat Removal (RHR) system operability meets the TS 3.5.3 LCO requirement.

The proposed changes will correct a non-conservative TS which may not adequately ensure the RHR system operability requirements during shutdown cooling operations in MODE 4. This non-conservative TS conclusion is based on EGC's evaluation of information provided in Westinghouse Nuclear Safety Advisory Letter (NSAL) 09-8, "Presence of Vapor in Emergency Core Cooling System/Residual Heat Removal System in Modes 3/4 Loss-of-Coolant Accident Conditions," dated November 3, 2009 (Reference 2). The evaluation determined that the Reactor Coolant System (RCS) temperature must be reduced to less than or equal to 200°F in order to eliminate the potential for flashing of hot water within the isolated RHR system hot leg suction piping during transfer to the containment sump. This condition affects the manner in which the RHR system will be required to be operated in MODE 4, and directly affects the restoration time required to establish operability of an RHR train for Emergency Core Cooling System (ECCS) injection following termination of shutdown cooling. Administrative controls are currently in place to address this TS non-conservatism in accordance with NRC Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety."

**2.0 DETAILED DESCRIPTION**

The proposed change will delete the following LCO Note in TS 3.5.3:

----- NOTE -----  
A Residual Heat Removal (RHR) train may be considered  
OPERABLE during alignment and operation for decay heat  
removal, if capable of being manually realigned to the ECCS  
mode of operation.  
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Attachments 2 and 3 provide the marked up TS pages for Braidwood and Byron Stations, respectively, for the proposed change.

Attachments 4 and 5 include the marked up TS Bases pages associated with the proposed changes and are provided for information only. The proposed changes reflect current plant configuration and ensure the RHR system operability meets TS 3.5.3 LCO requirement.

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**3.0 TECHNICAL EVALUATION**

The primary function of the ECCS as described in UFSAR Section 6.3.1 is to remove the stored and fission product decay heat from the reactor core during accident conditions. The ECCS components consist of the centrifugal charging, safety injection and RHR pumps, accumulators, RHR heat exchangers and the Refueling Water Storage Tank (RWST), along with the associated piping, valves, instrumentation and other related equipment. During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs.

As the low head portion of the ECCS, the RHR system performs two functions. In conjunction with the high head portion of the ECCS, the system provides borated water from the RWST, into the RCS cold legs, during the injection phase following a loss-of-coolant accident (LOCA). The system also functions to provide long-term recirculation capability for core cooling following the injection phase of the LOCA. This function is accomplished by aligning the system to take fluid from the containment sump, cool it by circulation through the residual heat exchangers, and supply it to the core directly as well as via the centrifugal charging pumps and safety injection pumps.

The RHR pumps are also used for core decay heat removal during the latter stages of normal reactor cooldown (MODE 4) and when the reactor is held at cold shutdown (MODE 5). However, during all other plant operating modes, it is aligned to perform the low head injection function of the ECCS. In the event of a LOCA, the RHR pumps are automatically started on receipt of an "S" signal (safety injection actuation) and deliver water to the RCS from the RWST during the injection phase and from the containment sump during the recirculation phase.

During MODE 4, "Hot Shutdown," (i.e., average reactor coolant temperature is greater than 200°F and less than 350°F) TS 3.5.3 LCO requires that one of the two independent (and redundant) ECCS trains be operable to ensure that sufficient ECCS flow is available to the core following a design basis accident (DBA). Currently, the Braidwood and Byron Stations TS 3.5.3 LCO Note states that RHR may be considered operable during alignment and operation for decay heat removal, if capable of being manually realigned to the ECCS mode of operation. This Note allows the operation of an RHR train, as a subsystem of ECCS, in the shutdown cooling mode during MODE 4. However, due to the potential for steam binding of the RHR pump suction piping to occur when the RCS hot leg temperature is greater than 260°F and the RHR train is realigned to the RWST, one RHR train must remain aligned for the ECCS mode of operation to satisfy LCO 3.5.3 when RCS hot leg temperature is greater than 260°F.

In 1993, Westinghouse issued Nuclear Safety Advisory Letter (NSAL) 93-004, "RHRs Operation as Part of the ECCS during Plant Startup," (Reference 1). NSAL-93-004 identified a potential concern associated with steam flashing of hot water in the RHR system suction piping when the RHR system is transferred from shutdown cooling mode to the ECCS mode with the lower pressure RWST aligned as the RHR system water source. EGC's evaluation determined that the RWST elevation head was sufficient to prevent flashing of water less than 260°F in the RHR system suction piping. The evaluation of NSAL-93-004 resulted in precautions and venting guidance being implemented into Braidwood and Byron stations procedures to prevent flashing

**ATTACHMENT 1**  
**Evaluation of Proposed Changes**

of hot water trapped in the RHR system piping during realignment to the RWST. Furthermore, a change to Braidwood and Byron stations' Bases for TS 3.5.3 LCO was implemented to ensure that one RHR train remains aligned for ECCS mode of operation whenever RCS hot leg temperature is greater than 260°F.

In 2009, Westinghouse issued NSAL-09-8 to clarify previous guidance provided in NSAL-93-004 to ensure that affected facilities take into consideration the significantly reduced elevation head present when the RHR system supply is transferred from the RWST to the ECCS recirculation sump. EGC's evaluation of NSAL-09-8 confirmed that the 260°F limit applied to the RHR system for alignment for ECCS injection was sufficient to prevent flashing/voiding in RHR system piping when aligned to the RWST but could result in flashing of liquids in the hot leg suction lines, when the RHR system is transferred to the ECCS recirculation sump. This potential exists due to the elevation differences between the RHR lines at the containment penetrations and the expected containment sump level combined with the postulated containment pressure at the established 260°F limit. EGC's evaluation concluded that the RCS temperature must be reduced to less than or equal to 200°F in order to eliminate the potential for flashing of hot water within the isolated RHR system hot leg suction piping during transfer to the ECCS recirculation sump. Therefore, this condition affects the manner in which the RHR system will be required to be operated in MODE 4 at RCS temperatures greater than 200°F.

Corrective actions were implemented at Braidwood and Byron Stations to address the issue based on EGC's evaluation, which included implementation of a standing order to provide guidance and establish controls for the RHR system alignment as an interim action until procedure revisions were completed. The standing order ensured that any RHR train operating in the shutdown cooling mode greater than 200°F was not to be considered immediately available for alignment to the ECCS mode of operation. Revisions of associated operating and emergency procedures to reflect the more restrictive 200°F temperature limit for alignment of an RHR train for ECCS injection following termination of shutdown cooling were completed and implemented as permanent corrective actions.

Subsequently, Braidwood Station reported in Licensee Event Report (LER) 2010-007-00 (Reference 3) of four occurrences where both RHR trains were placed into shutdown cooling operation prior to reaching MODE 5, "Cold Shutdown," (i.e., average reactor coolant temperature is less than or equal to 200°F). Similarly, Byron Station reported in LER 2011-001-00 (Reference 4) of three occurrences where both RHR trains were placed into shutdown cooling operation prior to reaching MODE 5. These conditions represent an event or condition that could have prevented fulfillment of a safety function. However, there were no actual safety consequences impacting plant or public safety as a result of the reported occurrences.

Since the condition described in NSAL 09-8 affects the RHR system method of operation during MODE 4, the proposed changes to delete the TS 3.5.3 LCO Note and revise the associated TS 3.5.3 Bases will reflect the new RCS temperature limit of less than or equal to 200°F for alignment of an RHR train for ECCS injection following termination of shutdown cooling. These proposed changes will correct a non-conservative TS to reflect current plant configuration and ensure the RHR system operability meets the TS 3.5.3 LCO requirement.

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**4.0 REGULATORY EVALUATION**

**4.1 Applicable Regulatory Requirements/Criteria**

10 CFR 50, Appendix A, General Design Criterion (GDC) 34 requires that a system to remove residual heat be provided with a safety function to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded.

10 CFR 50, Appendix A, GDC 35 requires that a system to provide abundant emergency core cooling be provided with a safety function to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

10 CFR 50.36(c)(2), "Limiting conditions for operation," paragraph (i) defines the limiting conditions for operation as the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. Furthermore, Criterion 3 of 10 CFR 50.36(c)(2)(ii) requires that a TS LCO must be established for a structure, system, or component that is part of the primary success path and functions to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

10 CFR 50.46(a)(1)(i) requires that each boiling or pressurized light-water nuclear power reactor be provided with an ECCS designed with a calculated cooling performance in accordance with an acceptable evaluation model following a postulated LOCA.

The proposed changes will ensure that one train of RHR remains aligned for the ECCS mode of operation during MODE 4 to assure TS 3.5.3 LCO requirement is met. Therefore, the proposed changes will assure safe operation by continuing to meet applicable regulations and requirements.

**4.2 Precedents**

EGC is not aware of any precedents for license amendment requests to revise the TS 3.5.3 LCO Note which allows an RHR train to be considered operable for ECCS mode of operation when aligned for decay heat removal operation.

**4.3 No Significant Hazards Consideration**

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC, (EGC), is requesting amendments to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2.

## **ATTACHMENT 1**

### **Evaluation of Proposed Changes**

The proposed changes will revise Technical Specifications (TS) Section 3.5.3 Limiting Condition for Operation (LCO) for Emergency Core Cooling System (ECCS) operability requirement in MODE 4 by deleting the LCO Note which allows a Residual Heat Removal (RHR) train to be considered operable for ECCS mode of operation when aligned for decay heat removal operation. The proposed changes will correct a non-conservative TS which may not adequately ensure the RHR system operability requirements during shutdown cooling operations in MODE 4. The proposed changes will ensure that one train of RHR remains aligned for ECCS mode of operation to satisfy the TS 3.5.3 LCO requirements. This conclusion is based on the information provided in Westinghouse Nuclear Safety Advisory Letter (NSAL) 09-8, "Presence of Vapor in Emergency Core Cooling System/Residual Heat Removal System in Modes 3/4 Loss-of-Coolant Accident Conditions," dated November 3, 2009.

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

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

Response: No.

The proposed changes to delete the TS 3.5.3 LCO Note will ensure that one train of RHR remains aligned for ECCS mode of operation as required to mitigate an accident described in the Updated Final Safety Analysis Report (UFSAR). The proposed changes do not affect the design, operational characteristics, and function of the ECCS and RHR systems to mitigate a design basis accident (DBA). Furthermore, the interfaces between the RHR system and other plant systems' operating functions, or the reliability of the RHR system are not impacted by the proposed changes. Since the ECCS and RHR systems are not accident initiators, the proposed changes do not impact the initiators or assumptions of analyzed accidents, nor do they impact the mitigation of accidents or transient events. Therefore, the ECCS and RHR systems will be capable of performing their accident mitigation functions, and the proposed deletion of the TS 3.5.3 LCO Note does not involve a significant increase in the probability of an accident.

The proposed changes will ensure that one train of RHR be available for ECCS mode of operation during MODE 4 to ensure that the RHR system, as a subsystem of ECCS, is operable for ensuring sufficient ECCS flow is available to the core for mitigating the consequences of a loss of coolant accident (LOCA). Thus, the proposed deletion of the TS 3.5.3 LCO Note does not involve a significant increase in the consequences of an accident.

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



**ATTACHMENT 1**  
**Evaluation of Proposed Changes**

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

Response: No.

The proposed deletion of the TS 3.5.3 LCO Note does not change the design function or operation of the RHR system components, or maintenance activities. The proposed changes do not change or introduce any new or different type of equipment, modes of system operation, failure mechanisms, malfunctions, or accident initiators. The proposed changes will ensure that one train of ECCS is operable to mitigate the consequences of a LOCA as previously assumed in the UFSAR.

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

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

Response: No.

This proposed changes to delete the TS 3.5.3 LCO Note will ensure that TS 3.5.3 LCO requirements is met to ensure that sufficient ECCS flow is available to the core following a DBA, such as a LOCA, as described in the UFSAR. The proposed changes will revise the existing non-conservative TS to reflect current plant configuration that the Reactor Coolant System (RCS) temperature must be reduced to less than or equal to 200°F in order to eliminate the potential for flashing of hot water within the isolated RHR system hot leg suction piping during transfer to the ECCS recirculation sump. The proposed changes will ensure the RHR system operability to meet TS 3.5.3 LCO requirement and do not affect the ability of the RHR system to provide long-term capability for core cooling following a LOCA.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, EGC concludes that the proposed amendments do not involve a 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.

#### **4.4 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.

#### **5.0 ENVIRONMENTAL CONSIDERATION**

EGC has evaluated the proposed amendments for environmental considerations. The review has resulted in the determination that the proposed amendment would change a requirement

## **ATTACHMENT 1**

### **Evaluation of Proposed Changes**

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 amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment 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 amendment.

#### **6.0 REFERENCES**

1. Westinghouse Nuclear Safety Advisory Letter (NSAL) 93-004, "RHRS Operation as Part of the ECCS during Plant Startup," dated April 20, 1993
2. Westinghouse Nuclear Safety Advisory Letter (NSAL) 09-8, "Presence of Vapor in Emergency Core Cooling System/Residual Heat Removal System in Modes 3/4 Loss-of-Coolant Accident Conditions," dated November 3, 2009
3. Braidwood Station Licensee Event Report 2010-007-00, "Potential Loss of Residual Heat Removal System Safety Function in Mode 4 When Aligned for Shutdown Cooling Due to Potential for Flashing or Voiding of Coolant During a Shutdown Loss of Coolant Accident," dated January 18, 2011 (ADAMS Accession No. ML110180428)
4. Byron Station Licensee Event Report 2011-001-00, "Potential Loss of Residual Heat Removal System Safety Function in Mode 4 When Aligned for Shutdown Cooling Due to Potential for Flashing or Voiding of Coolant During a Shutdown Loss of Coolant Accident," dated March 7, 2011 (ADAMS Accession No. ML110660223)

**ATTACHMENT 2**  
**Proposed Technical Specifications Changes for Braidwood Station, Units 1 and 2**

**Braidwood Station, Units 1 and 2**  
**Facility Operating License Nos. NPF-72 and NPF-77**

**Mark-up of Technical Specifications Page**

3.5.3 – 1

### 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

#### 3.5.3 ECCS-Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

NOTE

~~A Residual Heat Removal (RHR) train may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned to the ECCS mode of operation.~~

APPLICABILITY: MODE 4.

#### ACTIONS

-----NOTE-----

LCO 3.0.4.b is not applicable to ECCS high head subsystem.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS RHR subsystem inoperable.	A.1 Initiate action to restore required ECCS RHR subsystem to OPERABLE status.	Immediately
B. Required ECCS centrifugal charging subsystem inoperable.	B.1 Restore required ECCS centrifugal charging subsystem to OPERABLE status.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 5.	24 hours

**ATTACHMENT 3**  
**Proposed Technical Specifications Changes for Byron Station, Units 1 and 2**

**Byron Station, Units 1 and 2**  
**Facility Operating License Nos. NPF-37 and NPF-66**

**Mark-up of Technical Specifications Page**

3.5.3 – 1

### 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

#### 3.5.3 ECCS-Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

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NOTE

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A Residual Heat Removal (RHR) train may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned to the ECCS mode of operation.

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APPLICABILITY: MODE 4.

#### ACTIONS

-----NOTE-----  
LCO 3.0.4.b is not applicable to ECCS high head subsystem.  
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CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS RHR subsystem inoperable.	A.1 Initiate action to restore required ECCS RHR subsystem to OPERABLE status.	Immediately
B. Required ECCS centrifugal charging subsystem inoperable.	B.1 Restore required ECCS centrifugal charging subsystem to OPERABLE status.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 5.	24 hours

**ATTACHMENT 4**  
**Proposed Technical Specifications Bases Changes for Braidwood Station, Units 1 and 2**

**Braidwood Station, Units 1 and 2**  
**Facility Operating License Nos. NPF-72 and NPF-77**

**Mark-up of Technical Specifications Bases Pages**

B 3.5.3 – 2

B 3.5.3 – 4

## BASES

### LCO

In MODE 4, one of the two independent (and redundant) ECCS trains is required to be OPERABLE to ensure that sufficient ECCS flow is available to the core following a DBA.

In MODE 4, an ECCS train consists of a centrifugal charging subsystem and an RHR subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWST and transferring suction to the containment sump.

flashing/  
steam voiding

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs.

Due

hot leg

~~The LCO is modified by a Note that allows an RHR train to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4. However, due to the potential for steam binding of the RHR pump suction piping to occur when the RCS hot leg temperature is greater than 260°F and the RHR train is realigned to the RWST, one RHR train must remain aligned for the ECCS mode of operation to satisfy LCO 3.5.3 when RCS hot leg temperature is greater than 260°F.~~

containment sump  
(Refs. 1 and 2)

200

in MODE 4

### APPLICABILITY

In MODES 1, 2, and 3, the OPERABILITY requirements for ECCS are covered by LCO 3.5.2.

In MODE 4 with RCS temperature below 350°F, one OPERABLE ECCS train is acceptable without single failure consideration, on the basis of the stable reactivity of the reactor and the limited core cooling requirements.

In MODES 5 and 6, unit conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops-MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops-MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation-High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation-Low Water Level."



BASES

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ACTIONS (continued)

C.1

When the Required Actions of Condition B cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging plant systems or operators.

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SURVEILLANCE  
REQUIREMENTS

SR 3.5.3.1

The applicable Surveillance descriptions from Bases 3.5.2 apply.

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REFERENCES

The applicable references from Bases 3.5.2 apply.

- |   |
|---|
| <ol style="list-style-type: none"><li>1. NRC Information Notice 2010-11.</li><li>2. Westinghouse NSAL-09-8.</li></ol> |
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**ATTACHMENT 5**  
**Proposed Technical Specifications Bases Changes for Byron Station, Units 1 and 2**

**Byron Station, Units 1 and 2**

**Facility Operating License Nos. NPF-37 and NPF-66**

**Mark-up of Technical Specifications Bases Pages**

B 3.5.3 – 2

B 3.5.3 – 4

BASES

LCO

In MODE 4, one of the two independent (and redundant) ECCS trains is required to be OPERABLE to ensure that sufficient ECCS flow is available to the core following a DBA.

In MODE 4, an ECCS train consists of a centrifugal charging subsystem and an RHR subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWST and transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs.

Due

hot leg

containment sump  
(Refs. 1 and 2)

flashing/steam  
voiding

~~The LCO is modified by a Note that allows an RHR train to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4. However, due to the potential for steam binding of the RHR pump suction piping to occur when the RCS hot leg temperature is greater than 260°F and the RHR train is realigned to the RWST, one RHR train must remain aligned for the ECCS mode of operation to satisfy LCO 3.5.3 when RCS hot leg temperature is greater than 260°F.~~

in MODE 4

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APPLICABILITY

In MODES 1, 2, and 3, the OPERABILITY requirements for ECCS are covered by LCO 3.5.2.

In MODE 4 with RCS temperature below 350°F, one OPERABLE ECCS train is acceptable without single failure consideration, on the basis of the stable reactivity of the reactor and the limited core cooling requirements.

In MODES 5 and 6, unit conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops-MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops-MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation-High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation-Low Water Level."

## BASES

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### ACTIONS (continued)

#### C.1

When the Required Actions of Condition B cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging plant systems or operators.

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### SURVEILLANCE REQUIREMENTS

#### SR 3.5.3.1

The applicable Surveillance descriptions from Bases 3.5.2 apply.

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### REFERENCES

The applicable references from Bases 3.5.2 apply.

- |   |
|---|
| <ol style="list-style-type: none"><li>1. NRC Information Notice 2010-11.</li><li>2. Westinghouse NSAL-09-8.</li></ol> |
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