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10 CFR 50.90

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

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Request for Amendment to Technical Specifications Associated With Feedwater System and Main Turbine High Water Level Trip Instrumentation

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) requests an amendment to Renewed Facility Operating License Nos. DPR-29 and DPR-30 for Quad Cities Nuclear Power Station (QCNPS) Units 1 and 2. The proposed change revises Technical Specification (TS) 3.3.2.2, "Feedwater System and Main Turbine High Water Level Trip Instrumentation," to reflect a design change to the instrumentation logic that trips the three feedwater pumps and main turbine. The design change will add a redundant high reactor water level trip channel to both trip systems. The result of this design change is a change to the control logic required to initiate a trip from a two-out-of-two logic to a one-out-of-two twice logic. The proposed change to TS 3.3.2.2 supports the design change which improves system reliability and increases maintenance and testing flexibility.

This request is subdivided as follows:

- Attachment 1 provides an evaluation supporting the proposed change.
- Attachment 2 contains the marked up TS pages with the proposed change indicated.
- Attachment 3 contains the marked up TS Bases pages with the changes indicated. The TS Bases pages are provided for information only.
- Attachment 4 provides the retyped TS pages with the proposed change incorporated.

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EGC requests approval of the proposed amendment by March 13, 2006 to support installing the design change during the QCNPS Unit 2 Spring 2006 refueling outage. For Unit 2, the amendment will be implemented prior to start-up from the Spring 2006 refueling outage. For Unit 1, the amendment will be implemented prior to start-up from the Spring 2007 refueling outage.

The proposed change has been reviewed by the Plant Operations Review Committee, and approved by the Nuclear Safety Review Board in accordance with the EGC Quality Assurance Program.

We are notifying the State of Illinois of this application for a change to the TS by transmitting a copy of this letter and its attachments to the designated State Official.

If you have any questions concerning this letter, please contact Mr. David Gullott at (630) 657-2819.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of June 2005.

Respectfully,

Patrick R. Simpson

Patrick R. Simpson
Manager – Licensing

Attachments:

1. Evaluation of Proposed Change
2. Marked Up Technical Specifications Pages
3. Marked Up Technical Specifications Bases Pages
4. Retyped Technical Specifications Pages

bcc: NRC Project Manager, NRR – Quad Cities Nuclear Power Station, Units 1 and 2
Manager of Energy Practice – Winston & Strawn (w/o attachments)
Illinois Emergency Management Agency – Division of Nuclear Safety
Director – Licensing West
Manager - Licensing, Clinton, Dresden and Quad Cities
Regulatory Assurance Manager – Quad Cities Nuclear Power Station
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D. Gullott

ATTACHMENT 1
Evaluation of Proposed Change

Subject: Request for Amendment to Technical Specifications Associated With Feedwater System and Main Turbine High Water Level Trip Instrumentation

ATTACHMENT 1
Evaluation of Proposed Change

1.0 DESCRIPTION

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) requests an amendment to Renewed Facility Operating License Nos. DPR-29 and DPR-30 for Quad Cities Nuclear Power Station (QCNPS) Units 1 and 2. The proposed change revises Technical Specification (TS) 3.3.2.2, "Feedwater System and Main Turbine High Water Level Trip Instrumentation." Specifically, the TS Limiting Conditions for Operation (LCO) and Actions are revised to ensure consistency with a planned design change that modifies the instrumentation trip logic. The result of this design change is a change to the control logic required to initiate a trip from a two-out-of-two logic to a one-out-of-two twice logic. The proposed change to TS 3.3.2.2 supports the design change which improves system reliability and increases maintenance and testing flexibility.

2.0 PROPOSED CHANGES

The following changes are proposed to TS 3.3.2.2 to support the trip logic design change described in Section 1.0.

- The required number of operable trip channels stated in the LCO is changed from two channels to four channels.
- A note is placed in the Actions section that states, "Separate Condition entry is allowed for each channel."
- Required Action A.1 is revised to state, "Place channel in trip." The completion time for this Required Action has been changed to 7 days. Required Action A.1 is modified by a note that states "Not applicable if inoperable channel is the result of an inoperable feedwater breaker."
- A new Condition B and associated Required Action and Completion Time is added to this TS. This new Condition requires that the Feedwater System and main turbine high water level trip capability be restored within 2 hours, if the inoperable channels result in a loss of trip capability.
- The existing Condition B, associated Required Action (i.e., B.1 and B.2), and Completion Time are revised to reflect the addition of new Condition B.
- The note contained in the Surveillance Requirements is changed from a 2 hour delay to a 6 hour delay provided the instrumentation trip capability is maintained.

3.0 BACKGROUND

The Feedwater System and Main Turbine High Water Level Trip Instrumentation is designed to detect a potential failure of the Feedwater Level Control System that results in excessive feedwater flow to the reactor. Excessive feedwater flow results in two adverse plant conditions. First, the increase in feedwater flow results in an increase in core inlet subcooling, causing an increase in core power. The high water level trip serves to maintain fuel thermal limit margins during this event and precludes a Minimum Critical Power Ratio (MCPR) violation. Second, the

high water level trip prevents reactor overfilling and subsequent damage to the turbine and other steam handling equipment from liquid inventory in the steam lines.

The high water level trip instrumentation performs this protective function by providing a trip signal to all three feedwater pumps and the main turbine. The feedwater pump trip limits further reactor water level increase. The main turbine trip causes the turbine stop valves to close, thereby initiating a reactor scram to mitigate the reduction in MCPR.

The existing high water level trip logic uses a "two-out-of-two" logic scheme. This logic scheme incorporates two independent trip systems, with each trip system fed by a single, independent reactor water level instrument channel. A high reactor water level condition sensed by the level instrument channel will trip its respective trip system. Both trip systems are required to be tripped in order to trip the feedwater pumps and main turbine. The current logic scheme and the associated TS results in limited system redundancy, reliability, and maintenance flexibility. An inoperability in either of the existing channels results in a loss of Feedwater System and main turbine high water level trip capability. Therefore, EGC intends to modify this logic scheme by adding a redundant level instrument channel to each trip system's logic. This will be accomplished by utilizing existing spare level instrumentation trip units, and relays/contacts. The existing spare components are the same design and configuration as those presently utilized to perform this function.

The resultant high water level trip logic will be comprised of two independent trip systems arranged in a "one-out-of-two twice" logic scheme. Each trip system will receive input from two independent level instrument channels. Activation of either of these instrument channels will result in its respective trip system being tripped. This logic provides the ability to withstand an inoperable trip channel(s) while maintaining the feedwater pump and main turbine trip capability. The requirement that both trip systems activate to trip the feedwater pumps and main turbine is not affected. The proposed change also facilitates normal maintenance and surveillance activities.

4.0 TECHNICAL ANALYSIS

The proposed TS change supports a planned design change to the Feedwater System and main turbine high water level trip logic. The design change will add a redundant high reactor water level trip channel to both trip systems. The result of this design change is a change to the logic required to initiate a trip from a "two-out-of-two" logic to a "one-out-of-two twice" logic.

The Feedwater System and main turbine high water level trip is credited in the QCNPS accident analysis to function during an increase in feedwater flow transient. As described in the Updated Final Safety Analysis Report Section 15.1.2, "Increase in Feedwater Flow," this instrumentation and associated trip functions to limit the reactor water level increase resulting from a feedwater controller failure during maximum flow demand. By effecting a turbine trip and associated reactor scram, the instrumentation functions to prevent a nuclear fuel MCPR violation associated with increased subcooling and resultant pressure transient. This trip function also prevents excessive water inventory from entering the Main Steam System and damaging steam-handling equipment.

The design change will utilize existing instruments and transmitters used for Emergency Core Cooling System (ECCS) initiation and installed spare trip units and trip relays of the same

design as those presently utilized for ECCS initiation. The method in which the reactor water level is sensed and the reactor water level setpoints at which a trip is initiated are not impacted. The instrumentation response times and the instrumentation output to the equipment being tripped remains the same. Since there is no change in the instrumentation's ability to protect the nuclear fuel's thermal limits, there is no change to the plant response following an increase in feedwater flow transient.

The proposed design change and associated TS changes do not alter the frequency or severity of an increase in feedwater flow transient. The instrumentation and associated trip equipment does not interface with the feedwater pump flow control logic and is not an initiator of this or any other analyzed accident or transient.

The specific TS changes proposed are based on NUREG-1433, "Standard Technical Specifications General Electric Plants BWR/4" (Reference 1). The TS 3.3.2.2 presented in Reference 1 is based on the feedwater and main turbine trip logic having the ability to withstand one inoperable trip channel while still maintaining trip capability. Since the existing QCNPS Feedwater System and Main Turbine High Water Level Trip Instrumentation does not have the flexibility to maintain trip capability with one trip channel inoperable, the TS 3.3.2.2 provided in Reference 1 could not be adopted during the conversion to Improved Technical Specifications. The proposed design change will add this capability, therefore, the proposed TS changes are based on TS 3.3.2.2 presented in Reference 1. The discussion below describes the justification and bases for the specific proposed changes.

The existing TS LCO requires each installed instrument channel to be operable. This requirement has not changed. However, since the number of installed instrument channels will be increased from two to four, the number of channels required by the TS LCO has been changed accordingly.

Consistent with Reference 1, the proposed change adds a note to the TS Actions that allows for a separate TS Condition entry for each channel. The proposed addition of a redundant trip channel to each trip system provides for the ability of the instrumentation to perform its intended function with multiple channels inoperable. The Required Actions for an inoperable feedwater and main turbine high water level trip included in Reference 1 provide appropriate compensatory measure for separate inoperable channels.

The proposed change to TS Condition A affects the Required Action and Completion Time. Following the proposed design change, the Feedwater System and Main Turbine High Water Level Trip Instrumentation may be capable of maintaining trip capability with one or more trip channels inoperable. However, with one or more inoperable channels, the reliability of the instrumentation is reduced, such that a single failure in one of the remaining channels, concurrent with feedwater controller failure, maximum demand event, may result in the inability of the instrumentation to perform its intended function. Therefore, continued operation is only allowed for a limited time. If the inoperable channel(s) cannot be restored to operable status within the Completion Time, the trip channel(s) must be placed in the trip condition. This Required Action conservatively compensates for the inoperability, restores the capability to accommodate a single failure, and allows operation to continue. Because of the low probability of the event occurring coincident with a single failure of a remaining operable trip channel(s), 7 days is considered to be acceptable to permit restoration of an inoperable channel(s) to operable status or placing the inoperable trip channel(s) in trip. This Completion Time is

consistent with Reference 1 for an inoperable trip channel(s) where trip capability is still maintained.

The proposed changes to Condition A, associated Required Action, and Completion Time are based on Reference 1. TS 3.3.2.2 of Reference 1 includes separate TS Conditions based on the number of trip channels inoperable (i.e., Condition A addresses one inoperable trip channel and Condition B addresses two or more inoperable trip channels). This is based on the fact that Reference 1 assumes a "two-out-of-three" trip logic. In this logic configuration, if one trip channel is inoperable, the remaining two trip channels still provide trip capability, thus Reference 1 justifies a 7 day Completion Time. In the event that two (or more) trip channels are inoperable, trip capability is not maintained and a more limiting 2 hour Completion Time is required. Since QCNPS is proposing a "one-out-of-two twice" logic, the exact wording and structure of Reference 1 is not maintained in the proposed changes, however the limitations and intent of Reference 1 are followed. The proposed Condition A allows one or more trip channels to be inoperable provided the remaining operable trip channels maintain trip capability. Similar to Reference 1, this configuration is allowed for a maximum of 7 days prior to placing the channel(s) in trip. As described below, Condition B addresses the situation where trip capability is not maintained.

This proposed change to the Required Action of Condition A includes a note prohibiting placing the channel in trip with no further restrictions if the inoperable channel is the result of an inoperable feedwater pump breaker. This note is included since placing the channel in trip may not adequately compensate for the inoperable breaker.

The proposed change adds a new TS Condition B. This TS Condition is entered in the event that the Feedwater System and main turbine high water level trip capability is not maintained. This proposed TS Condition B accounts for the same plant configuration as the existing TS Condition A. Therefore, the TS Required Action and Completion Time associated with proposed TS Condition B are the same as the existing TS Condition A and is consistent with Reference 1.

Since the proposed change adds a new TS Condition as described above, the existing TS LCO Condition B has been re-designated as Condition C. No other changes to this Condition are proposed.

The proposed change revises the note included with the Surveillance Requirements. Since the design change will result in the trip capability being maintained with one trip channel inoperable, this note has been revised to be consistent with the note included in Reference 1. As stated in Reference 2, the 6 hour allowance to complete surveillances prior to entering the associated Condition and Required Action is based on a reliability analysis that demonstrated that this provision does not significantly reduce the probability of the feedwater pumps and main turbine tripping when necessary.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license or construction permit," Exelon Generation Company, LLC (EGC) requests an amendment to Renewed Facility

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Evaluation of Proposed Change

Operating License Nos. DPR-29 and DPR-30 for Quad Cities Nuclear Power Station (QCNPS) Units 1 and 2. The proposed change revises Technical Specifications (TS) 3.3.2.2, "Feedwater System and Main Turbine High Water Level Trip Instrumentation," to reflect a design change to the instrumentation logic that trips the three feedwater pumps and main turbine. The design change will add a redundant high reactor water level trip channel to both trip systems. The result of this design change is a change to the control logic required to initiate a trip from a two-out-of-two logic to a one-out-of-two twice logic. The proposed change to TS 3.3.2.2 supports the design change which improves system reliability and increases maintenance and testing flexibility.

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves a no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

EGC has evaluated the proposed change to the TS for QCNPS, Units 1 and 2, using the criteria in 10 CFR 50.92, and has determined that the proposed change does not involve a significant hazards consideration. The following information is provided to support a finding of no significant hazards consideration.

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 TS 3.3.2.2 to reflect a design change to the instrumentation logic that trips the three feedwater pumps and main turbine. The design change will add a redundant high reactor water level trip channel to both trip systems. The Feedwater System and main turbine high water level trip is credited in the QCNPS accident analysis to function during an increase in feedwater flow transient. Specifically, the instrumentation and associated trip limits the reactor water level increase resulting from a feedwater controller failure during maximum flow demand, thus preventing a nuclear fuel minimum critical power ratio violation associated with increased subcooling and resultant pressure transient. Additionally, this trip function prevents excessive water inventory from entering the main steam system and damaging steam-handling equipment.

   TS requirements that govern operability or routine testing of plant instruments are not assumed to be initiators of any analyzed event because these instruments are intended to detect, prevent, or mitigate accidents. The Feedwater System and main turbine trip instrumentation serves to mitigate transients that result in increased reactor water level. The trip instrumentation associated with the proposed changes and design change are

independent from the instrumentation and logic used in the Feedwater Control System and Turbine Control System. Therefore, the proposed change does not involve a significant increase in the probability of an accident previously evaluated.

The proposed design change to add a redundant high reactor water level trip channel to both trip systems, and the associated TS changes, do not adversely impact the instrumentation's ability to perform the functions described above. The design change will utilize installed spare trip units and relay contacts of the same design as those presently credited to meet TS 3.3.2.2 requirements. The method in which the reactor water level is sensed and the reactor water level setpoints at which a trip is initiated are not impacted. The instrumentation response times and the instrumentation output to the equipment being tripped remains the same. Therefore, the proposed change does not involve a significant increase in the consequences of an accident previously evaluated. Furthermore, there will be no change in the types or significant increase in the amounts of any effluents released offsite.

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 does not alter the parameters within which the plant is operated. There are no setpoints at which protective or mitigative actions are initiated that are affected by the proposed change. This proposed change will not alter the manner in which equipment operation is initiated nor will the demands on mitigating equipment be changed. The proposed change to TS 3.3.2.2 adds redundant instrumentation to improve system reliability, and increase maintenance and testing flexibility. The instrumentation being added to the trip logic utilizes the same transmitters, and the same type of trip units and trip relays, as presently used to monitor reactor water level and initiate Emergency Core Cooling System operation.

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

Margins of safety are established in the design of components, the configuration of components to meet certain performance parameters, and in the establishment of setpoints to initiate alarms or actions. The proposed amendment supports a change to the logic that trips the three feedwater pumps and the main turbine from a two-out-of-two initiation logic to a one-out-of-two twice initiation logic. The proposed amendment does not alter the setpoints at which the trip function occurs, the response time of the trip initiation logic, or the plant response following a valid trip signal. The proposed changes

to the TS 3.3.2.2 Required Actions and Completion Times are consistent with other instrumentation TS that incorporate a one-out-of-two twice initiation logic.

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

Based upon the above, EGC concludes that the proposed amendment 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.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50.36 provides the regulatory requirements for the content required by a licensee's Technical Specifications. The Updated Final Safety Analysis Report (UFSAR) sections 7.6.2 "Reactor Vessel Instrumentation," and 15.1.2 "Increase in Feedwater Flow," describe the design basis of the Feedwater System and Main Turbine High Water Level Trip Instrumentation as mitigating a design basis transient that presents a challenge to the integrity of the fuel cladding. This basis is consistent with Criterion 3 of 10 CFR 50.36(c)(2)(ii) for mitigating accidents or transients that assume a failure of or present a challenge to the integrity of a fission product barrier. The proposed design change to the Feedwater System and Main Turbine Trip High Water Level Instrumentation does not alter this basis for inclusion in TS or the ability to mitigate an increase in feedwater flow event described in the UFSAR. 10 CFR 50.36(c)(2) requires that the TS include LCOs. LCOs are the lowest functional capability of equipment required to safely operate the facility. When a LCO is not met, the licensee shall follow the remedial action permitted by the TS until the condition is met.

The proposed changes to TS 3.3.2.2 are based on NUREG-1433 for the Feedwater and Main Turbine High Water Level Trip Instrumentation. EGC's intended design changes to the Feedwater System and Main Turbine High Water Level Trip Instrumentation will modify the trip logic to provide redundant instrument channels in each of the two trip systems. This change will provide for the ability to maintain trip capability with certain instrument channels inoperable. It is this capability on which the NUREG-1433 TS is based.

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.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment 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, "Standards for Protection Against Radiation," 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.

7.0 REFERENCES

1. NUREG-1433, "Standard Technical Specification General Electric BWR/4", Revision 3

2. GENE-770-06-1-A, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for Selected Instrumentation Technical Specifications," December 1992

ATTACHMENT 2

Marked Up Technical Specifications Pages

3.3 INSTRUMENTATION

3.3.2.2 Feedwater System and Main Turbine High Water Level Trip Instrumentation

LCO 3.3.2.2 ~~Two~~ Four channels of Feedwater System and main turbine high water level trip instrumentation shall be OPERABLE.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Feedwater System and main turbine high water level trip channels inoperable.	A.1 ~~Restore Feedwater System and main turbine high water level trip capability.~~ --------- NOTE-------- Not applicable if inoperable channel is the result of an inoperable feedwater pump breaker. ---------- Place channel in Trip.	~~2 hours~~ 7 days
B. Feedwater System and main turbine high water level trip capability not maintained.	B.1 Restore trip capability.	2 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B~~C. Required Actions and associated Completion Times not met.	~~B~~C.1 ---------NOTE-------- Only applicable if inoperable channel is the result of an inoperable feedwater pump breaker. ---------- Remove affected feedwater pump(s) from service.	4 hours
	OR	
	C.2 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to ~~2~~ 6 hours provided Feedwater System and main turbine high water level trip capability is maintained.

SURVEILLANCE		FREQUENCY
SR 3.3.2.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.2.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.2.2.3	Calibrate the trip unit.	92 days
SR 3.3.2.2.4	Perform CHANNEL CALIBRATION. The Allowable Value shall be ≤ 50.34 inches.	24 months
SR 3.3.2.2.5	Perform LOGIC SYSTEM FUNCTIONAL TEST, including breaker and valve actuation.	24 months

ATTACHMENT 3

Marked Up Technical Specifications Bases Pages

B 3.3 INSTRUMENTATION

B 3.3.2.2 Feedwater System and Main Turbine High Water Level Trip Instrumentation

BASES

BACKGROUND

The Feedwater System and Main Turbine High Water Level Trip Instrumentation is designed to detect a potential failure of the Feedwater Level Control System that causes excessive feedwater flow.

With excessive feedwater flow, the water level in the reactor vessel rises toward the high water level reference point, causing the trip of the three feedwater pumps and the main turbine.

Reactor Vessel Water Level–High signals are provided by differential pressure indicating instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level in the reactor vessel (variable leg). ~~The trip logic consists of two independent trip systems, within two channels of Feedwater System and maintenance~~ The trip logic consists of two independent trip systems, with~~in~~ two channels of Feedwater System and main turbine high water level in each trip system. Each trip system is a one-out-of-two logic for this function. Thus, either channel in each trip system is needed to trip a trip system. The outputs of the channels in a trip system are combined in a one-out-of-two taken twice logic so that both trip systems must trip to result in a ~~Two channels of Reactor Vessel Water Level High instrumentation are provided as input to a two-out-of-two~~ initiation logic that trips the three feedwater pumps and the main turbine. The channels include electronic equipment (e.g., trip units) that compares measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel output relay actuates, which then outputs a feedwater pump and main turbine trip signal to the ~~trip logic~~ respective trips system.

A trip of the feedwater pumps limits further increase in reactor vessel water level by limiting further addition of feedwater to the reactor vessel. A trip of the main turbine and closure of the stop valves protects the turbine from damage due to water entering the turbine.

APPLICABLE

The Feedwater System and Main Turbine High Water Level Trip

SAFETY ANALYSES Instrumentation is assumed to be capable of providing a

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

feedwater pump and main turbine trip in the design basis transient analysis for a feedwater controller failure, maximum demand event (Ref. 1). The high level trip indirectly initiates a reactor scram from the main turbine trip (above 38.5% RTP) and trips the feedwater pumps, thereby terminating the event. The reactor scram mitigates the reduction in MCPR.

Feedwater System and Main Turbine High Water Level Trip Instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO requires ~~two~~ four channels of the Reactor Vessel Water Level–High instrumentation to be OPERABLE to ~~trip~~ ensure that no single instrument failure will prevent the feedwater pumps and main turbine trip on a valid high level signal. ~~Two channels~~One of the two channels in each trip system are needed to provide trip signals in order for the feedwater pump and main turbine trips to occur. Each channel must have its setpoint set within the specified Allowable Value of SR 3.3.2.2.4. The Allowable Value is set to ensure that the thermal limits are not exceeded during the event. The actual setpoint is calibrated to be consistent with the applicable setpoint methodology assumptions. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoints do not exceed the Allowable Value between successive CHANNEL CALIBRATIONS. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value.

Trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter exceeds the setpoint, the associated device (e.g., trip unit) changes state. The analytic limits are derived from the limiting values of the process parameters obtained from the safety analysis. The trip setpoints are determined from the analytic limits, corrected for defined process, calibration, and instrument errors. The Allowable Values are then determined, based on the trip setpoint values, by accounting for the calibration based

(continued)

BASES

LCO (continued)

errors. These calibration based errors are limited to reference accuracy, instrument drift, errors associated with measurement and test equipment, and calibration tolerance of loop components. The trip setpoints and Allowable Values determined in this manner provide adequate protection because instrument uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for and appropriately applied for the instrumentation.

APPLICABILITY

The Feedwater System and Main Turbine High Water Level Trip Instrumentation is required to be OPERABLE at ≥ 25% RTP to ensure that the fuel cladding integrity Safety Limit and the cladding 1% plastic strain limit are not violated during the feedwater controller failure, maximum demand event. As discussed in the Bases for LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," and LCO 3.2.3, "LINEAR HEAT GENERATION RATE," sufficient margin to these limits exists below 25% RTP; therefore, these requirements are only necessary when operating at or above this power level.

ACTIONS

A Note has been provided to modify the ACTIONS related to Feedwater System and main turbine high water level trip instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable Feedwater System and main turbine high water level trip instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable channel.

A.1 and A.2

With one or more channels inoperable, but with the Feedwater

(continued)

BASES

ACTIONS (continued)

System and main turbine high water level trip capability maintained (refer to Required Action B.1 Bases), the Feedwater System and Main Turbine High Water Level Trip Instrumentation is capable of performing the intended function. However, the reliability and redundancy of the Feedwater System and Main Turbine High Water Level Trip Instrumentation is reduced, such that a single failure in one of the remaining channels, concurrent with feedwater controller failure, maximum demand event, may result in the inability of the instrumentation to perform the intended function. Therefore, continued operation is only allowed for a limited time. If the inoperable channel(s) cannot be restored to OPERABLE status within the Completion Time, the channel must be placed in the tripped condition per Required Action A.1. Placing the inoperable channel(s) in trip would conservatively compensate for the inoperability(s), restore capability to accommodate a single failure, and allow operation to continue with no further restrictions. As noted, placing the channel in trip with no further restrictions is not allowed if the inoperable channel is the result of an inoperable feedwater pump breaker, since this may not adequately compensate for the inoperable breaker. Alternatively, if it is not desired to place the channel(s) in trip (e.g., as in the case where placing the inoperable channel(s) in trip would result in feedwater pump trip and main turbine trip), or if the inoperable channel(s) is the result of an inoperable breaker, Condition C must be entered and its Required Actions taken.

The Completion Time of 7 days is based on the low probability of the event occurring coincident with a single failure in a remaining OPERABLE channel.

B.1

With the Feedwater System and main turbine high water level trip capability not maintained, the Feedwater System and Main Turbine High Water Level Trip Instrumentation cannot perform its design function. Therefore, continued operation is only permitted for a 2 hour period, during which Feedwater System and main turbine high water level trip capability must be restored. The trip capability is considered maintained when sufficient channels are OPERABLE or in trip such that the Feedwater System and main turbine high water level trip logic will generate a trip signal on a valid signal. If the required channels cannot be restored to OPERABLE status or placed in trip,

(continued)

BASES

ACTIONS (continued)

Condition C must be entered and its Required Action taken. The 2 hour Completion Time is sufficient for the operator to take corrective action, and takes into account the likelihood of an event requiring actuation of Feedwater System and Main Turbine High Water Level Trip Instrumentation occurring during this period. It is also consistent with the 2 hour Completion Time provided in LCO 3.2.2 for Required Action A.1, since this instrumentation's purpose is to preclude a MCPR violation.

~~With one or more channels inoperable, the Feedwater System and Main Turbine High Water Level Trip Instrumentation cannot perform its design function (Feedwater System and main turbine high water level trip capability is not maintained). Therefore, continued operation is only permitted for a 2 hour period, during which Feedwater System and main turbine high water level trip capability must be restored. The trip capability is considered maintained when sufficient channels are OPERABLE or in trip such that the Feedwater System and main turbine high water level trip logic will generate a trip signal on a valid signal. This requires two channels to each be OPERABLE or in trip. If the required channels cannot be restored to OPERABLE status or placed in trip, Condition B must be entered and its Required Action taken.~~

~~The 2 hour Completion Time is sufficient for the operator to take corrective action, and takes into account the likelihood of an event requiring actuation of Feedwater System and Main Turbine High Water Level Trip Instrumentation occurring during this period. It is also consistent with the 2 hour Completion Time provided in LCO 3.2.2 for Required Action A.1, since this instrumentation's purpose is to preclude a MCPR violation.~~

~~(continued)~~

BASES

ACTIONS (continued)

C.1 and C.2

With a channel(s) not restored to OPERABLE status or placed in trip, THERMAL POWER must be reduced to < 25% RTP within 4 hours. As discussed in the Applicability section of the Bases, operation below 25% RTP results in sufficient margin to the required limits, and the Feedwater System and Main Turbine High Water Level Trip Instrumentation is not required to protect fuel integrity during the feedwater controller failure, maximum demand event. Alternatively; if a channel is inoperable solely due to an inoperable feedwater pump breaker, the affected feedwater pump breaker may be removed from service since this performs the intended function of the instrumentation. The allowed Completion Time of 4 hours is based on operating experience to reduce THERMAL POWER to < 25% RTP from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to ~~2~~ 6 hours provided the associated Funtion maintains Feedwater System and main turbine high water level trip capability. ~~.~~ Upon completion of the Surveillance, or expiration of the ~~2~~ 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This note is based on the reliability analysis (Ref. 2) assumption that 6 hours is the average time required to perform a channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the Feedwater pumps and main turbine will trip when necessary.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.2.1

Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels, or something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limits.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel status during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.2.2.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency of 92 days is based on operating experience.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.2.3

Calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analysis. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than that accounted for in the appropriate setpoint methodology.

SR 3.3.2.2.4

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.2.2.5

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The system functional test of the feedwater pump breakers and main turbine stop valves is included as part of this Surveillance and overlaps the LOGIC SYSTEM FUNCTIONAL TEST to provide complete testing of the assumed safety function. Therefore, if a main turbine stop valve or feedwater pump breaker is incapable of operating, the associated instrumentation would also be inoperable. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

(continued)

BASES

REFERENCES

1. UFSAR, Section 15.1.2.

2. GENE-770-06-1-A, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for selected Instrumentation Technical Specifications," December 1992.

ATTACHMENT 4

Retyped Technical Specifications Pages

3.3 INSTRUMENTATION

3.3.2.2 Feedwater System and Main Turbine High Water Level Trip Instrumentation

LCO 3.3.2.2 Four channels of Feedwater System and main turbine high water level trip instrumentation shall be OPERABLE.

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Feedwater System and main turbine high water level trip channels inoperable.	A.1 ---------NOTE-------- Not applicable if inoperable channel is the result of an inoperable feedwater pump breaker. ---------- Place channel in Trip.	 7 days
B. Feedwater System and main turbine high water level trip capability not maintained.	B.1 Restore trip capability.	2 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Actions and associated Completion Times not met.	C.1 ---------NOTE-------- Only applicable if inoperable channel is the result of an inoperable feedwater pump breaker. ---------- Remove affected feedwater pump(s) from service.	4 hours
	OR	
	C.2 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided Feedwater System and main turbine high water level trip capability is maintained.

SURVEILLANCE		FREQUENCY
SR 3.3.2.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.2.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.2.2.3	Calibrate the trip unit.	92 days
SR 3.3.2.2.4	Perform CHANNEL CALIBRATION. The Allowable Value shall be ≤ 50.34 inches.	24 months
SR 3.3.2.2.5	Perform LOGIC SYSTEM FUNCTIONAL TEST, including breaker and valve actuation.	24 months