TENNESSEE VALLEY AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

CNL-21-091

October 22, 2021

10 CFR 50.90
10 CFR 50.91

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555 0001

Sequoyah Nuclear Plant, Unit 2
Renewed Facility Operating License No. DPR-79
NRC Docket No. 50-328

Subject: **Sequoyah Nuclear Plant, Unit 2 – Exigent License Amendment Request to Revise Technical Specification 3.4.12, "Low Temperature Overpressure Protection System" (SQN-TS-21-06)**

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," and 10 CFR 50.91(a)(6), "Notice for public comment; State consultation," Tennessee Valley Authority (TVA) is submitting an exigent request for a one-time amendment to Renewed Facility Operating License No. DPR-79 for Sequoyah Nuclear Plant (SQN), Unit 2. This proposed one-time license amendment will add the following note to Technical Specification (TS) 3.4.12, "Low Temperature Overpressure Protection (LTOP) System":

> During the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS [Reactor Coolant System] with the RCS depressurized and the pressurizer manway cover removed. This note expires when the Unit ascends into Mode 4 from Mode 5.

On October 8, 2021, during performance of a bearing inspection for the 2A-A safety injection pump (SIP), pump shaft and bearing degradation was identified at both inboard and outboard radial bearings. Following coordination between TVA, industry expertise, and the pump vendor, three repair paths were initiated. Following extensive analysis and remediation attempts, the decision was made to replace the shaft utilizing a replacement provided by the vendor, but at a point much later in the SQN refueling outage than planned, impacting reactor re-assembly by almost seven days. Following the shaft replacement and pump rebuild, comprehensive post maintenance and surveillance testing is required that typically is performed with the reactor vessel head off and the refueling cavity flooded to accommodate low temperature over pressure protection conditions. Supporting this testing is currently encumbering scarce and specialized contract and vendor resources required for reactor re-assembly at SQN that are also needed for transition to the Watts Bar Nuclear Plant Unit 1 (WBN1) refueling outage scheduled to begin October 29, 2021.

The delay of these scarce and specialized reactor resources to WBN1 is delaying the start of WBN1 outage activities and directly impacting TVA's winter grid reliability reserve margin requirements for later November and early December 2021 as submitted to TVA's reliability council stakeholders. Therefore, this request to modify the TS to permit the post maintenance testing with the reactor re-assembled but vented via the pressurizer manway is exigent based on the above conditions being unanticipated and unavoidable, and thereby inducing impact on management of contract and vendor reactor outage resources and TVA's required margin for the winter reliability period.

The enclosure to this submittal provides a description and technical evaluation of the proposed change, a regulatory evaluation, and a discussion of environmental considerations. Attachment 1 to the enclosure provides the existing SQN Unit 2 TS page marked up to show the proposed change. Attachment 2 to the enclosure provides the proposed SQN Unit 2 TS page retyped to show the change incorporated. Attachment 3 to the enclosure provides marked up TS 3.4.12 Bases pages, for information only.

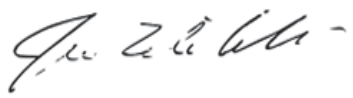
TVA is requesting approval of the proposed amendment on an exigent basis pursuant to 10 CFR 50.91(a)(6) and is requesting approval October 27, 2021, with implementation by October 28, 2021. The TS change will provide a one-time allowance that will be in effect until Mode 4 is entered from Mode 5 during the current U2R24 refueling outage. Once approved, the amendment shall be implemented within 24 hours.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). In accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosure to the Tennessee State Department of Environment and Conservation.

There are no new regulatory commitments associated with this submittal. If you have any questions about this proposed change, please contact Kimberly D. Hulvey, Senior Manager, Fleet Licensing, at (423) 751-3275.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 22nd day of October 2021.

Respectfully,



James T. Polickoski
Director, Nuclear Regulatory Affairs

Enclosure: Evaluation of Proposed Change

cc: See Page 3

cc (Enclosure):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant
NRC Project Manager – Sequoyah Nuclear Plant
Director, Division of Radiological Health – Tennessee State Department of Environment and Conservation

Enclosure

Evaluation of the Proposed Change

Subject: Sequoyah Nuclear Plant, Unit 2 – Exigent License Amendment Request to Revise Technical Specification 3.4.12, "Low Temperature Overpressure Protection System" (SQN-TS-21-06)

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Enclosure

Evaluation of the Proposed Change

1.0 SUMMARY DESCRIPTION

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," and 10 CFR 50.91(a)(6), "Notice for public comment; State consultation," Tennessee Valley Authority (TVA) is submitting an exigent request for a one-time amendment to Renewed Facility Operating License No. DPR-79 for Sequoyah Nuclear Plant (SQN), Unit 2.

This proposed one-time license amendment will add a note to the limiting condition for operation (LCO), for Technical Specification (TS) 3.4.12, "Low Temperature Overpressure Protection (LTOP) System":

> During the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS [Reactor Coolant System] with the RCS depressurized and the pressurizer manway cover removed. This note expires when the Unit ascends into Mode 4 from Mode 5.

2.0 DETAILED DESCRIPTION

2.1 System Design and Operation

The potential for vessel overpressurization is most acute when the RCS is water solid, while shutdown; as a pressure fluctuation can occur more quickly than an operator can react to relieve the condition. Exceeding the RCS limits by a significant amount could cause brittle cracking of the reactor vessel. Limiting Condition for Operation (LCO) 3.4.3, "RCS Pressure and Temperature (P/T) Limits," requires administrative control of RCS pressure and temperature during heatup and cooldown to prevent exceeding the Pressure and Temperature Limits Report limits.

TS 3.4.12 provides RCS overpressure protection by having a minimum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability requires all safety injection pumps and all but one centrifugal charging pump incapable of injection into the RCS and isolating the accumulators. The pressure relief capacity requires either two redundant power-operated relief valves (PORVs) or a depressurized RCS and an RCS vent of sufficient size. One PORV or the open RCS vent is the overpressure protection device that acts to terminate an increasing pressure event.

Administrative procedures aid the operator in controlling RCS pressure during low temperature operation. To provide a back-up to the operator and to minimize the possibility of RCS overpressurization, an automatic low temperature over pressure protection (LTOP) system, when manually armed from the main control room, will mitigate the pressure excursion within the allowable pressure limits. The LTOP mitigation system is required only during low temperature operation and is manually enabled for automatic actuation. The LTOP system for pressure relief consists of two PORVs with reduced lift settings, or a depressurized RCS and an RCS vent of sufficient size.

2.2 Circumstances Establishing Need for the Proposed Exigent Amendment

As provided for in 10 CFR 50.91(a)(6), TVA is required to explain the exigency and why this cannot be avoided.

As background regarding the SQN U2R24 that commenced October 1, 2021, this outage was planned as longer than typical (35 days) based on executing the planned main generator maintenance that was the outage plan's Revision 0 critical path work activity. The planned primary/reactor portion of the SQN2 outage activities (reactor re-assembly, decontamination, and outage equipment demobilization) were originally scheduled to complete on October 20, 2021 in order for the contract and vendor resources to transition by October 27, 2021 to the Watts Bar Nuclear Plant, Unit 1 (WBN1) Refueling Outage # 17 (WBN U1R17) commencing October 29, 2021. This transfer of specialized refueling outage management resources from SQN2 to WBN1 was critical to the outage execution success of both units in this COVID-19 impacted resource environment, but the transfer also ensures minimized shutdown and outage implementation risk based on the extensive and detailed work management and resource planning required for refueling outages utilizing a scarce resource pool.

Following commencement of the SQN2 refueling outage and during planned testing and maintenance on October 8, 2021, the 2A-A safety injection pump (SIP) shaft was discovered damaged. Detailed causal analysis and condition evaluation began immediately in coordination with TVA site and fleet resources, industry expertise, and the pump vendor (FlowServe). Though quarterly vibration data along with oil analysis did not show any concerns coming into the outage, during bearing inspection, damage was identified on the inboard and outboard bearings along with the associated shaft journals. The damage was consistent with a failure mechanism called wire wooling. In this failure mechanism, chromium is turned into chromium carbide by friction between the rotating shaft and the fixed bearings. Embedded chromium carbide particles in the stationary component (bearing) then acts as a cutting tool. The source of the wire wooling was from a gear driven oil pump that was replaced in 2016. Since then, pump testing and maintenance and oil testing did not indicate the continuing presence of chromium in the oil nor equipment damage resulting from the prior chromium condition. Following revelation of the shaft damage, three repair paths were initiated in close coordination between TVA and FlowServe. The three paths included a bearing change with evalution, shaft repair, and fabrication of a replacement shaft at the vendor's facility. Based on extensive analysis and remediation attempts up through October 21, 2021, TVA and FlowServe decided shaft replacement was the only remaining viable repair. The replacement shaft was delivered on October 22, 2021, and pump re-build is expected to be completed by October 26, 2021.

Based on the nature of the pump maintenance, both a pre-service and comprehensive flow test are required to meet post maintenance, in-service, and surveillance testing requirements. Additionally, TS 3.4.12 governs the applicable MODE and plant conditions to conduct these tests for the low temperature overpressure protection conditions with one centrifugal charging pump (CCP) and no SIP permitted. Based on these MODE and plant condition requirements, these pump tests are typically executed with the reactor vessel head off and the refueling cavity flooded providing atmospheric pressure protection conditions and water management control within the refueling cavity. With these needed plant conditions, the contract and vendor service resources supporting the primary/reactor portion of the SQN2 outage activities have been unable to transition to the WBN1 U1R17 refueling outage awaiting completion of the SIP repair and the required follow on testing, thereby inducing reactive planning risk to the WBN1 U1R17 outage and uncertainty regarding retaining the planned contract resources in this COVID-19 stressed resource environment. This outage planning risk impact has a corollary impact to

reliable critical infrastructure grid generation as well in that while SQN2 will delay in providing reliable power to the grid, the commensurate impact to WBN1 will result in an unplanned shift into later November 2021 and early December 2021 for WBN1's ability to provide reliable power to the grid during the region's winter reliability period.

TVA Transmission Operations and Power Supply (TOPS) sets minimum planning reserve margins on a monthly basis for system (grid) reliability and stability. These reserve margins are developed by TVA Transmission Operations and submitted to Southeast Electric Reliability Council (SERC), the direct regulatory body over TVA and other southeast utilities for grid reliability. Because these reserve margins are commitments to SERC, TVA must take documented actions that are submitted as to how these system regulatory minimum margins will be maintained.

In the early part of December 2021, based on current long range weather forecasts, known system loads, current TVA Nuclear and Power Operations (coal, gas, hydro, etc.) outages, derates, and system constraints, the average daily planning reserve margin is below the minimum. If the conflicts with critical reactor personnel for the SQN U2R24 Outage are not resolved, the start of the WBN U1R17 Outage will be delayed. This will cause a corresponding delay for WBN, Unit 1, returning to the grid for generation in December. If that occurs, the average reserve margin will be decreased further below the system minimum planning reserves for the early part of December.

This delay in SIP repair and resultant testing, impact on management of contract and vendor outage resources, and resultant impact to providing reliable power to the grid during the winter reliability period was unanticipated and unavoidable. This exigent LAR requests a one-time change to the LCO for TS 3.4.12 to add a Note as described in Section 2.3. This one-time change will facilitate executing the necessary SIP pre-service and comprehensive flow tests following pump repair while simultaneously completing SQN2 reactor restoration for soonest transition of the contract and vendor resources to WBN1. TVA assesses that this plant configuration associated with this one-time change has no safety impact to the SQN2 over pressure and water management controls and involves no significant hazards consideration, this one-time change will allow resumption of SQN2 plant operation to provide reliable power to the grid and minimize WBN1 refueling outage plan implementation risk for soonest restoration of reliable power to the grid in the winter reliability period.

2.3 Description of the Proposed Change

The license amendment request (LAR) proposes the following change to SQN Unit 2 TS 3.4.12. A new Note 4 would be added to LCO 3.4.12 as shown below. As indicated, this Note will be a one-time allowance that will expire when Mode 4 is entered from Mode 5 during the Unit 2 Cycle 24 Refueling Outage (U2R24).

4. During the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS with the RCS depressurized and the pressurizer manway cover removed. This note expires when the Unit ascends into Mode 4 from Mode 5.

Attachment 1 provides a marked-up version of the affected page of SQN Unit 2 TS 3.4.12 showing the proposed changes. Attachment 2 provides a final typed version of the TS page. Attachment 3 provides a marked-up version of the TS 3.4.12 Bases for information only.

3.0 TECHNICAL EVALUATION

The overpressure protection provided by the LTOP system is designed for the mass input transient that only bounds a charging pump. However, the desired test configuration for the 2A-A SIP comprehensive test is with the reactor head installed/tensioned. This would additionally mean the 2A-A SIP will be capable of injecting to the RCS during the LTOP system LCO 3.4.12 applicability. The LTOP system would have to be capable of relieving both the mass input of its design basis transient (the charging pump) in addition to the 2A-A SIP. To preclude the need for a redesign of the LTOP system, requiring reanalysis and potentially a revision of the setpoints for the pressurizer PORV, the RCS will instead be vented to the containment atmosphere through the pressurizer manway for the duration that the 2A-A SIP will be capable of injecting into the RCS. By venting the RCS to the containment atmosphere, the RCS pressure is assured to never challenge the cold overpressure limits.

Opening a vent in the RCS is sufficient to maintain the RCS pressure at atmospheric conditions, provided the vent is of sufficient size that if the SIP filled the RCS to the vent elevation, the vent would not throttle the flow out the break such that a substantial backpressure developed. The pressurizer provides several sizes of RCS vent options in the form of removing pressurizer PORVs or safety valves, in addition to a much larger manway. A 3-inch vent opening is prescribed in LCO 3.4.12 to protect the RCS without the need for the LTOP system; however, this is based on the LTOP system design basis mass injection transient. Calculations using two methods from the CRANE Technical Paper No. 410 (TP-410) have determined that opening the pressurizer manway (approximately 16-inch diameter) provides several orders of magnitude more relief capacity than needed to pass flow from both the CCP and SIP injecting simultaneously.

Accordingly, provided the manway is removed for the duration that 2A-A SIP is capable of injecting, and provided the other SIP is not capable of injecting during this time, there will be no challenge to the RCS via this configuration.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements and Criteria

General Design Criteria

The Sequoyah Nuclear Plant was designed to meet the intent of the Proposed General Design Criteria for Nuclear Power Plant Construction Permits published in July 1967. The Sequoyah construction permit was issued in May 1970. The Updated Final Safety Analysis Report, however, addresses the NRC General Design Criteria (GDC) published as Appendix A to 10 CFR 50 in July 1971.

Criterion 14 - Reactor Coolant Pressure Boundary. The reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage or rapidly propagating failure and of gross rupture.

Criterion 15 - Reactor Coolant (RC) System Design. The RC System and associated auxiliary, control, and protection systems shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.

> *Criterion 31 - Fracture Prevention of Reactor Coolant Pressure Boundary*. The reactor coolant pressure boundary shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a nonbrittle manner and (2) the probability of rapidly propagating fracture is minimized. The design shall reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing, and postulated accident conditions and the uncertainties in determining (1) material properties, (2) the effects of irradiation on material properties, (3) residual, steady-state and transient stresses, and (4) size of flaws.

Compliance with GDCs 14, 15, 31 is described in Section 3.1.2 of the SQN UFSAR.

With the implementation of the proposed changes, SQN Unit 2 continues to meet the applicable regulations and requirements, subject to the previously approved exceptions.

4.2 Precedent

Though no direct precedent for this exigent LAR has been identified, NUREG-1431, Revision 5, contains the following wording for TS 3.4.12, “Low Temperature Over Protection (LTOP) System,”

> An LTOP System shall be OPERABLE with a maximum of [one] [high pressure injection (HPI)] pump [and one charging pump] capable of injecting into the RCS and the accumulators isolated and one of the following pressure relief capabilities:

Accordingly, with suitable venting analysis, the Standard Technical Specifications essentially allow what this amendment request proposes.

4.3 No Significant Hazards Consideration

Tennessee Valley Authority (TVA) is requesting an exigent amendment to Renewed Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plant (SQN), Unit 2. This proposed one-time license amendment will add a new Note 4 to the limiting condition for operation for Technical Specification (TS) 3.4.12, “Low Temperature Overpressure Protection (LTOP) System”:

> During the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS [Reactor Coolant System] with the RCS depressurized and the pressurizer manway cover removed. This note expires when the Unit ascends into Mode 4 from Mode 5.

TVA 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 amendment involve a significant increase in the probability or consequence of an accident previously evaluated?*

Response: No

The safety analysis of the plant is unaffected by the proposed change. Because the safety analysis is unaffected, the calculated radiological releases associated with the analysis are not affected. Additionally, removing the pressurizer manway while a safety injection pump (SIP) is capable of injecting into the RCS has been shown to provide adequate low-temperature over-pressure protection.

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

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

Response: No.

The proposed change does not adversely alter the design assumptions, conditions, or configuration of the facility or the manner in which the plant is operated. No new accident scenarios, failure mechanisms, or limiting single failures are introduced as a result of allowing operation of one safety injection pump capable of injecting into the reactor coolant system (RCS) with the RCS depressurized and the pressurizer manway cover removed. The proposed change does not challenge the performance or integrity of any safety-related systems or components.

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 amendment involve a significant reduction in a margin of safety?*

Response: No.

The margin of safety is related to the ability of the fission product barriers to perform their design functions during and following an accident. These barriers include the fuel cladding, the reactor coolant system, and the containment. Removing the pressurizer manway during the post-maintenance testing of the SIP has been shown to provide adequate protection against low-temperature over-pressure of the RCS. Thus, the performance of the reactor vessel and the reactor coolant system is unaffected by the proposed change.

The margin of safety associated with the acceptance criteria of any accident is unchanged. The proposed change will have no effect on the availability, operability, or performance of safety-related systems and components.

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

Based on the above, TVA concludes that the proposed amendment does 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 Conclusion

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

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, 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 effluents 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.

Attachment 1

Proposed TS Change (Markup) for SQN Unit 2

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12 An LTOP System shall be OPERABLE with a maximum of one charging pump and no safety injection pump capable of injecting into the RCS and the accumulators isolated and one of the following pressure relief capabilities:

a. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR; or

b. The RCS depressurized and an RCS vent of ≥ 3.0 square inches.

----------NOTES----------

1. Two charging pumps may be made capable of injecting for ≤ 1 hour for pump swap operations.

2. Accumulator may be unisolated when accumulator pressure is less than the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

3. Two safety injection pumps and two charging pumps may be capable of injecting for ≤ 4 hours after entering MODE 4 from MODE 3 or prior to lowering temperature on any RCS loop below 325°F, whichever occurs first.

4. During the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS with the RCS depressurized and the pressurizer manway cover removed. This Note expires when the Unit ascends into MODE 4 from MODE 5.

APPLICABILITY: MODE 4 when any RCS cold leg temperature is ≤ LTOP arming temperature specified in the PTLR,
MODE 5,
MODE 6 when the reactor vessel head is on.

Attachment 2

Proposed TS Change (Final Typed) for SQN Unit 2

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12 An LTOP System shall be OPERABLE with a maximum of one charging pump and no safety injection pump capable of injecting into the RCS and the accumulators isolated and one of the following pressure relief capabilities:

a. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR; or

b. The RCS depressurized and an RCS vent of ≥ 3.0 square inches.

----------NOTES----------

1. Two charging pumps may be made capable of injecting for ≤ 1 hour for pump swap operations.

2. Accumulator may be unisolated when accumulator pressure is less than the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

3. Two safety injection pumps and two charging pumps may be capable of injecting for ≤ 4 hours after entering MODE 4 from MODE 3 or prior to lowering temperature on any RCS loop below 325°F, whichever occurs first.

4. During the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS with the RCS depressurized and the pressurizer manway cover removed. This Note expires when the Unit ascends into MODE 4 from MODE 5.

APPLICABILITY: MODE 4 when any RCS cold leg temperature is ≤ LTOP arming temperature specified in the PTLR,
MODE 5,
MODE 6 when the reactor vessel head is on.

Attachment 3 to CNL-21-091

Proposed TS Bases Changes
(Markups for Information Only)
(2 total pages)

BASES

APPLICABLE SAFETY ANALYSES (continued)

RCS Vent Performance

With the RCS depressurized, analyses show a vent size of 3.0 square inches is capable of mitigating the allowed LTOP overpressure transient. The capacity of a vent this size is greater than the flow of the limiting transient for the LTOP configuration, one charging pump OPERABLE, maintaining RCS pressure less than the maximum pressure on the P/T limit curve.

The RCS vent size will be re-evaluated for compliance each time the P/T limit curves are revised based on the results of the vessel material surveillance.

The RCS vent is passive and is not subject to active failure.

The LTOP System satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires that the LTOP System is OPERABLE. The LTOP System is OPERABLE when the minimum coolant input and pressure relief capabilities are OPERABLE. Violation of this LCO could lead to the loss of low temperature overpressure mitigation and violation of the Reference 1 limits as a result of an operational transient.

To limit the coolant input capability, the LCO requires that no safety injection pumps and a maximum of one charging pump be capable of injecting into the RCS, and all accumulator discharge isolation valves be closed and immobilized (when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed in the PTLR).

four

The LCO is modified by ~~three~~ Notes. Note 1 allows two charging pumps to be made capable of injecting for ≤ 1 hour during pump swap operations. One hour provides sufficient time to safely complete the actual transfer and to complete the administrative controls and Surveillance Requirements associated with the swap. The intent is to minimize the actual time that more than one charging pump is physically capable of injection. Note 2 states that accumulator isolation is only required when the accumulator pressure is more than or at the maximum RCS pressure for the existing temperature, as allowed by the P/T limit curves. This Note permits the accumulator discharge isolation valve Surveillance to be performed only under these pressure and temperature conditions. Note 3 allows a 4 hour maximum time period for rendering both safety injection and one centrifugal charging pump inoperable after entry in MODE 4 from MODE 3. RCS temperature must remain above 325°F until the pumps are rendered incapable of inadvertent injection.

Note 4 allows during the Unit 2 Cycle 24 Refueling Outage, for the purpose of testing the 2A-A safety injection pump, the 2A-A safety injection pump and one charging pump may be capable of injecting into the RCS with the RCS depressurized and the pressurizer manway cover removed. This Note expires when the Unit ascends into MODE 4 from MODE 5

BASES

LCO (continued)

The 4 hour time period is sufficient for completing this activity and is based on low probability for inadvertent pump start.

The elements of the LCO that provide low temperature overpressure mitigation through pressure relief are:

a. Two OPERABLE PORVs,

A PORV is OPERABLE for LTOP when its block valve is open, its lift setpoint is set to the limit required by the PTLR and testing proves its ability to open at this setpoint, and motive power is available to the two valves and their control circuits.

b. A depressurized RCS and an RCS vent.

An RCS vent is OPERABLE when open with an area of ≥ 3.0 square inches.

Each of these methods of overpressure prevention is capable of mitigating the limiting LTOP transient.

APPLICABILITY

This LCO is applicable in MODE 4 when any RCS cold leg temperature is ≤ the LTOP arming temperature specified in the PTLR, in MODE 5, and in MODE 6 when the reactor vessel head is on. The pressurizer safety valves provide overpressure protection that meets the Reference 1 P/T limits above the LTOP arming temperature specified in the PTLR. When the reactor vessel head is off, overpressurization cannot occur.

LCO 3.4.3 provides the operational P/T limits for all MODES.
LCO 3.4.10, "Pressurizer Safety Valves," requires the OPERABILITY of the pressurizer safety valves that provide overpressure protection during MODES 1, 2, and 3.

Low temperature overpressure prevention is most critical during shutdown when the RCS is water solid, and a mass or heat input transient can cause a very rapid increase in RCS pressure when little or no time allows operator action to mitigate the event.

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable LTOP System. There is an increased risk associated with entering MODE 4 from MODE 5 with LTOP inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.