



Sequoyah Units 1 & 2 Watts Bar Units 1 & 2 License Amendment Request to Revise TS 3.5.2 “ECCS - Operating” Note 1 to Add RHR Flow Paths for PIV Testing

August 14, 2024



Agenda

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Introduction

- Tennessee Valley Authority (TVA) is submitting a license amendment request (LAR) for the following:
 - Sequoyah Nuclear Power Plant (SQN), Units 1 and 2 Renewed Facility Operating License Nos. DPR-77 and DPR-79
 - Watts Bar Nuclear Plant (WBN), Units 1 and 2 Facility Operating License Nos. NPF-90 and NPF-96
- LAR applies to Technical Specification (TS) Limiting Condition for Operation (LCO) 3.5.2 “Emergency Core Cooling System (ECCS) – Operating,” Note 1 for both SQN and WBN
- Proposed revisions would allow for both safety injection (SI) pump flow paths and one residual heat removal (RHR) flow path to be isolated for up to 2 hours while in Mode 3 to perform surveillance requirement (SR) 3.4.14.1 pressure isolation valve (PIV) testing.

Description of Proposed Change

SQN and WBN
Units 1 and 2
LCO 3.5.2 Note 1

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS - Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

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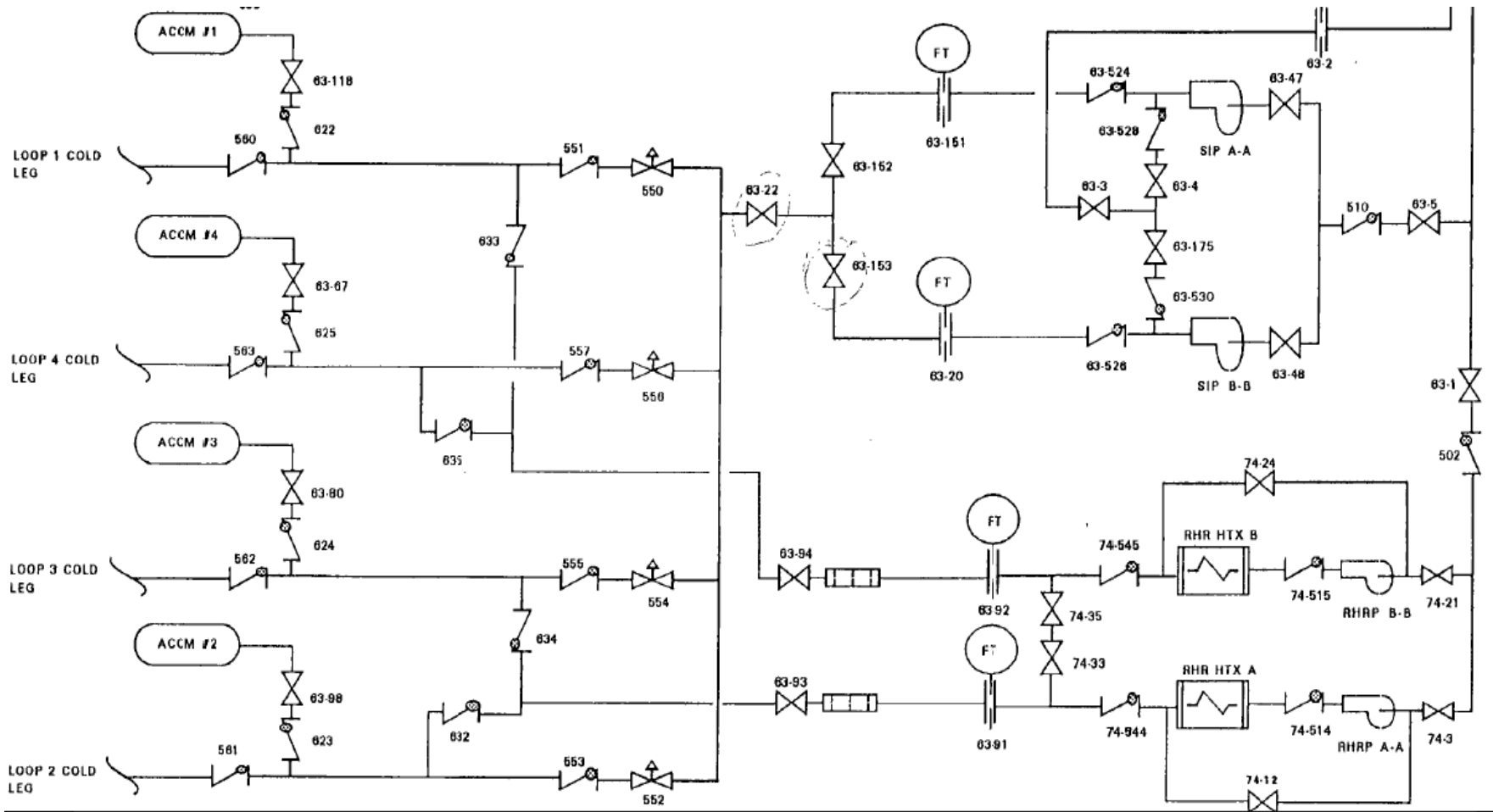
1. In MODE 3, both safety injection (SI) pump flow paths and one RHR pump flow path may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1.

System Description

- The emergency core cooling system (ECCS) provides cooling and negative reactivity to the reactor core after design basis accidents, including the loss of coolant accident (LOCA).
- ECCS automatically actuates upon several accident conditions, such as low pressurizer (PZR) pressure. At shutdown, the low PZR pressure signal may be blocked to prevent spurious actuation at low reactor coolant system (RCS) pressures, requiring manual ECCS actuation in the event of an accident at shutdown.
- ECCS consists of two RHR pumps, two safety injection (SI) pumps, and two centrifugal charging pumps (CCP), which serve as the low-head, intermediate-head, and high-head injection sources, respectively.
- The RHR pumps and SI pumps inject to each RCS cold leg through 4 branch lines shared with the cold leg accumulators (CLAs).
- Loss of RCS via backflow through the injection branch lines is prevented by pressure isolation valves (PIVs) in the form of check valves upstream of the RCS.

Reason for the Proposed Change

- SR 3.4.14.1 requires verification that leakage from each RCS PIV is within limits at operating pressure.
- SR 3.4.14.1 must be performed on an 18-month frequency or prior to startup (Mode 2) whenever the unit has been shutdown to Mode 5 for >7 days, within 24 hours of manual or automatic actuation, or flow through the PIV.
- Isolation of the PIVs from the upstream portion of the ECCS helps avoid false PIV leakage indications, in addition to aiding in determination of which PIV may be leaking.
- Ideal conditions for the PIV test are achieved when the unit is in Mode 3.
- Note 1 in the ECCS LCO permits isolation of the SI pump injection path for this test in Mode 3. However, each pair of SI pump injection branch lines is also connected to an RHR injection header.
- Permitting isolation of one RHR injection header allows isolation of the PIVs from all upstream ECCS features, while 2 branch lines remain available and aligned for ECCS cold leg injection.



Technical Evaluation

- Various Mode 3 LOCA studies bound ECCS capabilities during PIV testing:
 - NS-NRC-86-3144 (1986) WCAP-12476 (1995) PWROG-19021 (2019)
 - Even with reduced ECCS capability (e.g., single CCP or SIP) and delayed ECCS initiation (10 minutes), the studies conclude the 10 CFR 50.46 criteria remain satisfied.
- The requested ECCS isolation for PIV testing occurs at the end of an outage, while the Mode 3 LOCA studies assumed a LOCA 1-4 hours after reactor trip.
 - Decay heat and fuel temperatures are lower than in the Mode 3 LOCA studies.
- During the 2-hour isolation for PIV testing, operators will be aware of the injection line isolations, and can easily open the isolated portions of the ECCS via control room switches.
 - Significantly more ECCS capability will be available to the Mode 3 LOCA within 10 minutes than assumed in the Mode 3 studies.

Technical Evaluation

- The PIV testing in SR 3.4.14.1 confirms PIV leakage will be within limits at full power operation.
 - PIV failure could result in an intersystem LOCA outside containment, a significant contributor to core melt.
- Performing the PIV testing in Mode 3 with RHR isolated reduces possible sources of false indications of leakage and permits easier identification of a leaking PIV.
- Currently, SQN and WBN TS LCO 3.5.2 contain Note 2 allowing ECCS pumps to be rendered incapable of injecting for longer durations (4 hours) for cold overpressure concerns.

The ECCS capabilities during the proposed PIV test allowance are *significantly* bounded by the Mode 3 LOCA study assumptions, the allowance permits more efficient PIV testing, and the timeframe of the isolation is bounded by previously established allowances for ECCS operation.

Precedents

Byron Units 1 & 2 (1986)

Earliest identified request for ECCS isolation for PIV testing

Similar to TVA request for SQN and WBN.

Permits isolation of both RHR paths coincident with both SI pump flow paths.

Applied 1984 Westinghouse scoping study.

Approved by NRC Safety Evaluation ML020850356.

Vogtle Units 1 & 2 (1995)

Improved TS conversion

Vogtle application ML20095K940 references NRC evaluation ML20236K912.

Current Vogtle TS permits isolation of either RHR paths in Mode 3 to perform SR 3.4.14.1 testing.

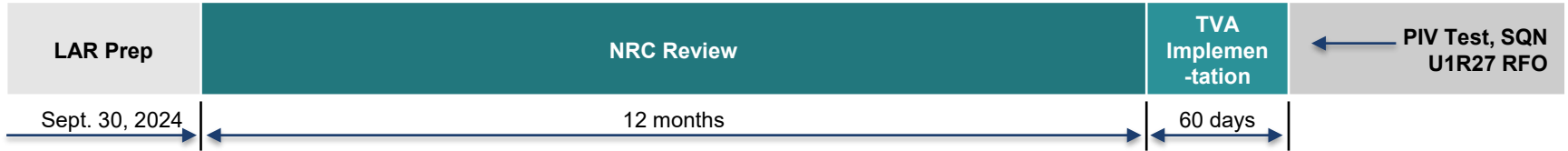
McGuire Units 1 & 2 (1998)

Improved TS conversion

McGuire TS permits isolation of RHR pump flow paths coincident with both SI pump flow paths.

Identified in ML20248L685 as more restrictive than previous TS requirements.

Schedule for Submittal



- Requesting 12-month review with TVA 60-day implementation period
- Supports SR 3.4.14.1 PIV testing during the SQN U1R27 refueling outage

TVA

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