Watts Bar Nuclear Plant Units 1 and 2

Pre-Submittal Meeting for Proposed Request for Alternative from American Society of Mechanical Engineers Operation and Maintenance Code Requirements due to Reactor Coolant Pump 2-2 Number 1 Seal Degradation

June 10, 2026

TVA TENNESSEE VALLEY AUTHORITY

Agenda

- Introduction
- Applicable Code Requirements
- ASME Code Component(s) Affected
- Reason for Request
- Proposed Alternative and Basis for Use
- Test History
- Duration of Proposed Alternative
- Precedents
- Schedule for Submittal

Introduction

- In accordance with 10 CFR 50.55a, “Codes and Standards,” paragraph (z)(2), Tennessee Valley Authority (TVA) requests an alternative to defer quarterly inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code for various Chemical and Volume Control System (CVCS), Component Cooling System (CCS), and Essential Raw Cooling Water (ERCW) components at Watts Bar Nuclear Plant (WBN).

Applicable Code Requirements

- Code of Record for WBN Units 1 and 2: ASME OM Code, 2004 Edition through 2006 Addenda
- Applicable Code Requirements:
  - ISTB-3400, Frequency of Inservice Tests
  - ISTB-3420, Pumps Out of Service
  - ISTC-3510, Exercising Test Frequency. Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, except as provided by ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3570, ISTC-5221, and ISTC-5222
  - ISTC-3570, Valves in Systems Out of Service

ASME Code Component(s) Affected

- Components that are in the Scope of the Proposed Alternative Request:
  - Essential Raw Cooling Water (ERCW) Pumps (4)
  - Chemical and Volume Control System (CVCS) Pumps (2)
  - Component Cooling System (CCS) Pumps (2)
  - ERCW Valves (46)
  - CCS Valves (9)
  - CVCS Valves (4)

Site/Unit	Pump ID	Pump Description	Pump Type	Code Class	OM Group	Test Type
Essential Raw Cooling Water (ERCW)						
Watts Bar (WBN) Unit 1 and 2	0-PMP-67-28	ERCW Pump A-A	Vertical Line Shaft	3	A	Quarterly Group A Test
WBN Unit 1 and 2	0-PMP-67-32	ERCW Pump B-A	Vertical Line Shaft	3	A	Quarterly Group A Test
WBN Unit 1 and 2	0-PMP-67-36	ERCW Pump C-A	Vertical Line Shaft	3	A	Quarterly Group A Test
WBN Unit 1 and 2	0-PMP-67-40	ERCW Pump D-A	Vertical Line Shaft	3	A	Quarterly Group A Test
Chemical and Volume Control System (CVCS)						
WBN Unit 2	2-PMP-62-108-A	CENTRIFUGAL CHARGING PUMP 2A-A	Centrifugal Horizontal	2	A	Quarterly Group A Test
WBN Unit 2	2-PMP-62-104-B	CENTRIFUGAL CHARGING PUMP 2B-B	Centrifugal Horizontal	2	A	Quarterly Group A Test
Component Cooling System (CCS)						
WBN Unit 2	2-PMP-70-59-A	CCS PUMP 2A-A	Centrifugal Horizontal	3	A	Quarterly Group A Test
WBN Unit 2	2-PMP-70-33-B	CCS PUMP 2B-B	Centrifugal Horizontal	3	A	Quarterly Group A Test

ERCW System

Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 1 and 2	0-FCV-67-205	STA AIR COMPR ERCW SUP HDR 1A ISOL	Butterfly (BF)	3	B	Quarterly Stroke Time Close (QSTC)
WBN Unit 1 and 2	0-CKV-67-502A	ERCW PUMP A-A AIR VENT LINE CHECK	Check (CK)	3	C	Quarterly Check Valve Close Exercise Test (QCVC) and Quarterly Check Valve Open Exercise Test (QCVO).
WBN Unit 1 and 2	0-CKV-67-502B	ERCW PUMP B-A AIR VENT LINE CHECK	CK	3	C	QCVC and QCVO
WBN Unit 1 and 2	0-CKV-67-502C	ERCW PUMP C-A AIR VENT LINE CHECK	CK	3	C	QCVC and QCVO
WBN Unit 1 and 2	0-CKV-67-502D	ERCW PUMP D-A AIR VENT LINE CHECK	CK	3	C	QCVC and QCVO
WBN Unit 1 and 2	0-CKV-67-503A	ERCW PUMP A-A DISCH CHECK	CK	3	C	QCVC and QCVO
WBN Unit 1 and 2	0-CKV-67-503B	ERCW PUMP B-A DISCH CHECK	CK	3	C	QCVC and QCVO
WBN Unit 1 and 2	0-CKV-67-503C	ERCW PUMP C-A DISCHARGE CHECK	CK	3	C	QCVC and QCVO
WBN Unit 1 and 2	0-CKV-67-503D	ERCW PUMP D-A DISCH CHECK	CK	3	C	QCVC and QCVO

SEE
RITY

ERCW System						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 1	1-CKV-67-508A	DG HX 1A1/1A2 ERCW SUP HDR 1A CHECK	CK	3	C	Condition Monitoring Quarterly Open Exercise Test (CM)
WBN Unit 2	2-CKV-67-508A	DG HX 2A1/2A2 ERCW SUP HDR 1A CHECK	CK	3	C	Condition Monitoring Quarterly Open Exercise Test (CM)
WBN Unit 1	1-FCV-67-354	PENT ROOM COOLER 1A-A ERCW SUP FLOW CNTL	Globe (GL)	3	B	Quarterly Fail-Safe Open Test (QFSO) and Quarterly Stroke Open Test (QSTO)
WBN Unit 2	2-FCV-67-354	PENT ROOM COOLER 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-350	PENT ROOM COOLER 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 2	2-FCV-67-350	PENT ROOM COOLER 2A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO

ERCW System						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 1	1-FCV-67-346	PENT ROOM COOLER 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 2	2-FCV-67-346	PENT ROOM COOLER 2A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-342	PIPE CHASE COOLER 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 2	2-FCV-67-342	PIPE CHASE COOLER 2A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 2	2-FCV-67-336	EGTS ROOM COOLER 2A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-296	UPPER CNTMT VENT CLR 1C ERCW RET ISOL	Plug (PLG)	2	A	QSTC

ERCW System						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 2	2-FCV-67-296	UPPER CNTMT VENT CLR 2C ERCW RET ISOL	PLG	2	A	QSTC
WBN Unit 1	1-FCV-67-295	UPPER CNTMT VENT CLR 1A ERCW RET ISOL	PLG	2	A	QSTC
WBN Unit 2	2-FCV-67-217	BA XFER/AFW PMP SPACE CLR 2A-A ERCW SUPPLY	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-213	SFP/TBBP SPACE CLR 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-184	CSP ROOM COOLER 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 2	2-FCV-67-184	CSP ROOM COOLER 2A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO

ERCW System						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 1	1-FCV-67-176	SIP ROOM COOLER 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 2	2-FCV-67-176	SIP ROOM COOLER 2A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-162	CCS/AFW PMP SPACE CLR 1A-A ERCW SUP FLOW CNTL	GL	3	B	QFSO and QSTO
WBN Unit 1	1-FCV-67-146	CCS HX A OUTLET ERCW FLOW CNTL	BF	3	B	QSTC and QSTO
WBN Unit 2	2-FCV-67-146	CCS HX B OUTLET ERCW FLOW CNTL BYP	BF	3	B	QSTC and QSTO
WBN Unit 1	1-FCV-67-143	CCS HX A OUTLET ERCW FLOW CNTL BYP	GL	3	B	QSTC and QSTO
WBN Unit 2	2-FCV-67-143	CCS HX B OUTLET ERCW FLOW CNTL BYP	GL	3	B	QSTC and QSTO

ERCW System						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 1	1-FCV-67-134	UPPER CNTMT VENT CLR 1C ERCW RET HDR ISOL	PLG	2	A	QSTC
WBN Unit 2	2-FCV-67-134	UPPER CNTMT VENT CLR 1C ERCW RET HDR ISOL	PLG	2	A	QSTC
WBN Unit 1	1-FCV-67-133	UPPER CNTMT VENT CLR 1C ERCW SUP HDR ISOL	PLG	2	A	QSTC
WBN Unit 2	2-FCV-67-133	UPPER CNTMT VENT CLR 1C ERCW SUP HDR ISOL	PLG	2	A	QSTC
WBN Unit 1	1-FCV-67-131	UPPER CNTMT VENT CLR 1A ERCW RET HDR ISOL	PLG	2	A	QSTC
WBN Unit 1	1-FCV-67-130	UPPER CNTMT VENT CLR 1A ERCW SUP HDR ISOL	PLG	2	A	QSTC

ERCW System						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 1	1-FCV-67-66	DG HX 1A1/1A2 ERCW SUP HDR 1A ISOL	BF	3	B	QSTO
WBN Unit 2	2-FCV-67-66	DG HX 2A1/2A2 ERCW SUP HDR 1A ISOL	BF	3	B	QSTO
WBN Unit 1	1-FCV-67-9A	ERCW STRAINER 1A-A BACKWASH	Ball (BA)	3	B	QSTO
WBN Unit 2	2-FCV-67-9A	ERCW STRAINER 2A-A BACKWASH	BA	3	B	QSTO
WBN Unit 1	1-FCV-67-9B	ERCW STRAINER 1A-A FLUSH CONTROL	BA	3	B	QSTO
WBN Unit 2	2-FCV-67-9B	ERCW STRAINER 2A-A FLUSH	BA	3	B	QSTO

Component Cooling System (CCS)						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 2	2-FCV-70-215	SAMPLE HEAT EXCHANGER CCS INLET	Gate (GA)	3	B	QSTC
WBN Unit 2	2-FCV-70-183	SAMPLE HEAT EXCHANGER CCS OUTLET	GA	3	B	QSTC
WBN Unit 2	2-FCV-70-143	EXCESS LETDOWN HX CCS SUPPLY	BF	2	A	QSTC
WBN Unit 2	2-FCV-70-85	EXCESS LETDOWN HX CCS OUTLET	BF	2	A	Quarterly Fail-Safe Close Test (QFSC) and QSTC
WBN Unit 2	2-FCV-70-156	RHR HEAT EXCHANGER 2A CCS OUTLET	BF	3	B	QSTC and QSTO
WBN Unit 1 and 2	0-FCV-70-194	SFP HEAT EXCHANGER B CCS SUPPLY	BF	3	B	QSTO
WBN Unit 2	2-LCV-70-63	CCS SURGE TANK B MAKEUP	GL	3	B	Quarterly Fail-Safe Close Test (QFSC) and QSTO
WBN Unit 2	2-CKV-70-504A	CCS PUMP 2A-A DISCHARGE CHECK	CK	3	C	Condition Monitoring Test
WBN Unit 2	2-CKV-70-504B	CCS PUMP 2B-B DISCHARGE CHECK	CK	3	C	Condition Monitoring Test

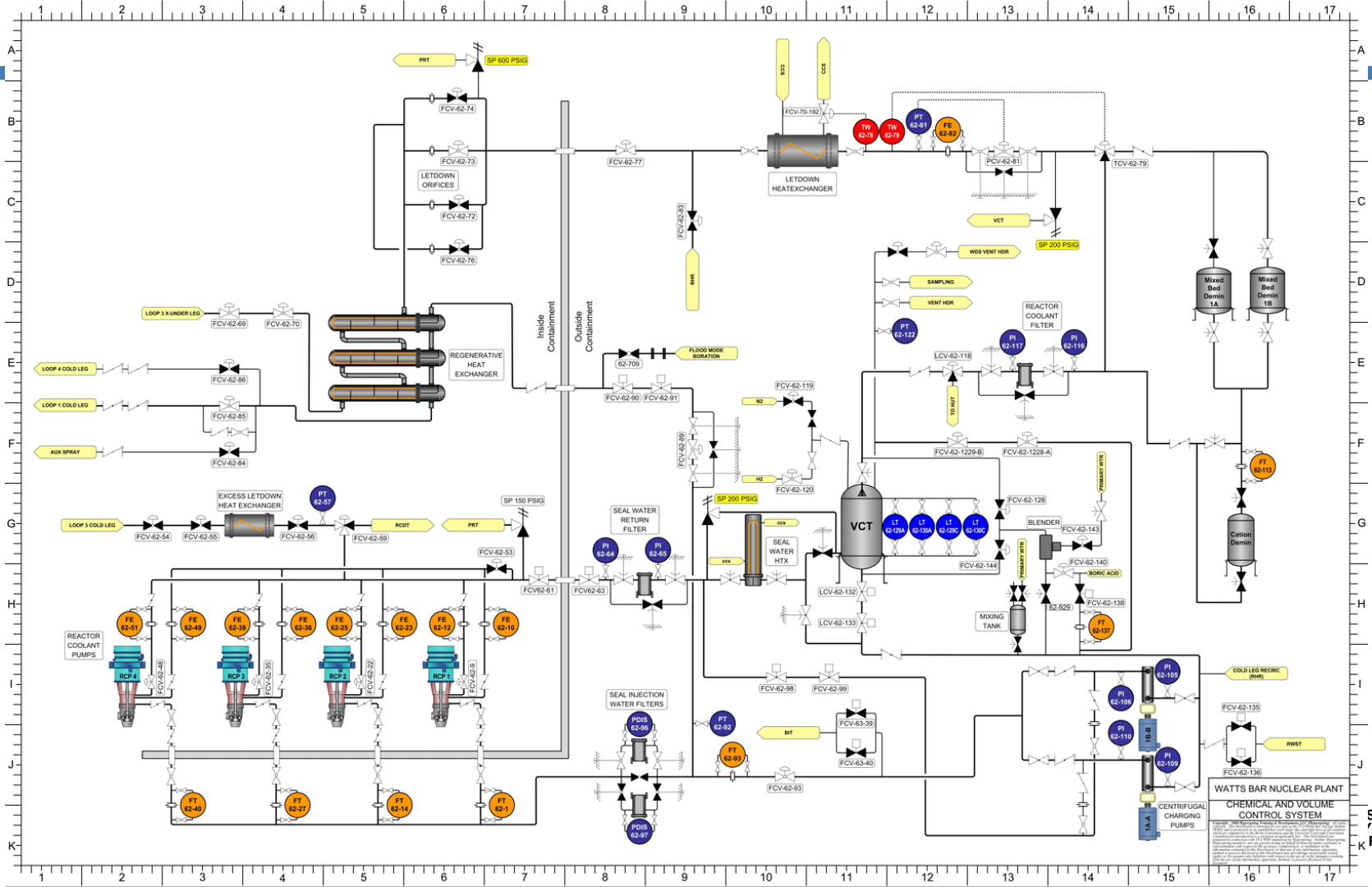
Chemical and Volume Control System (CVCS)						
Site/Unit	Component ID	Component Description	Valve Type	OM Code Class	OM Category	Test Type
WBN Unit 2	2-CKV-62-523	CCP 2A-A MINIFLOW CHECK	CK	2	A/C	QCVC and QCVO
WBN Unit 2	2-CKV-62-530	CCP 2B-B MINIFLOW CHECK	CK	2	A/C	QCVC and QCVO
WBN Unit 2	2-CKV-62-525	CCP 2A-A DISCHARGE CHECK	CK	2	A/C	QCVC and QCVO
WBN Unit 2	2-CKV-62-532	CCP 2B-B DISCHARGE CHECK	CK	2	A/C	QCVC and QCVO

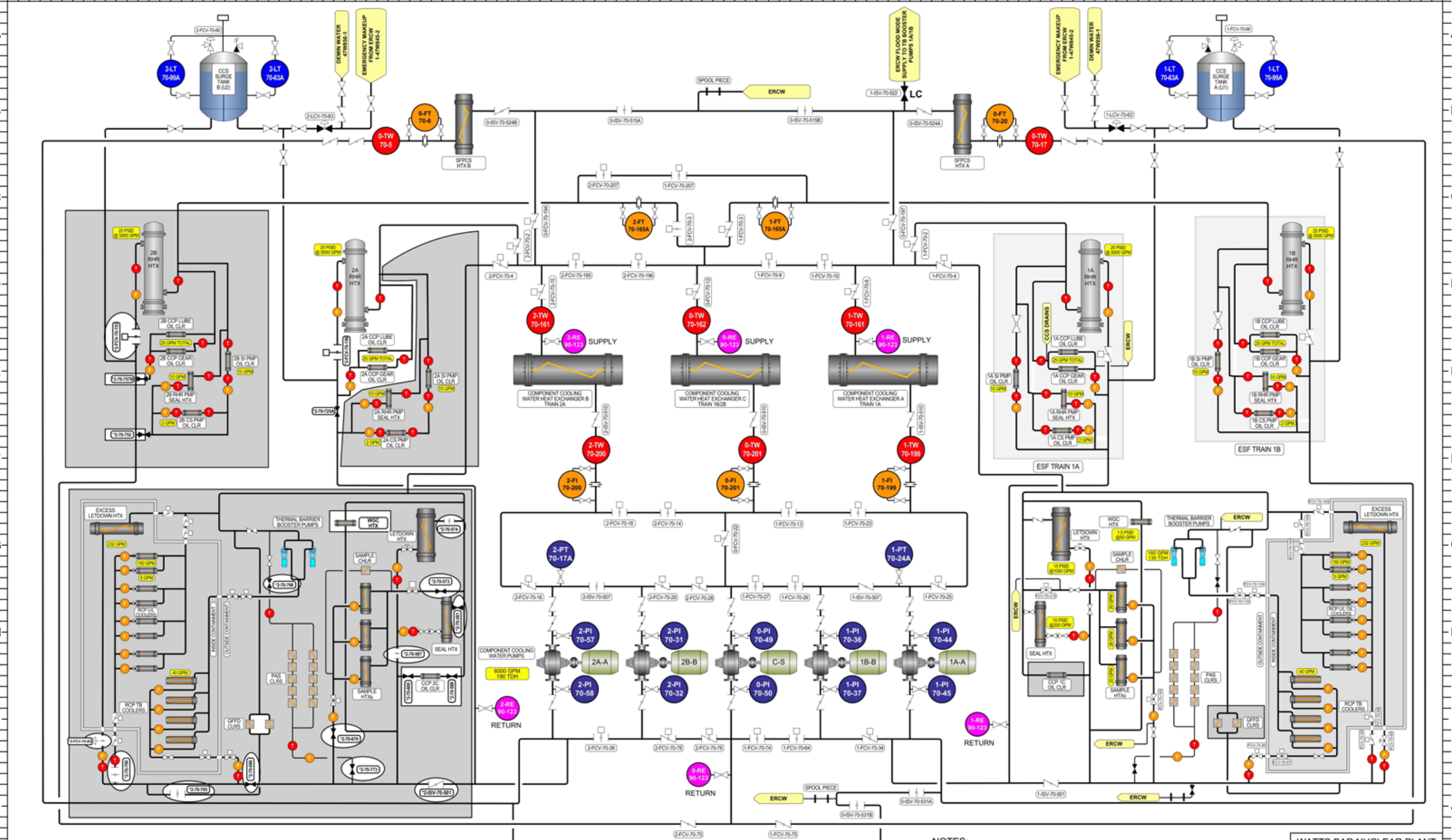
Reason for Request

- WBN Unit 2 RCP 2-2 number 1 seal has been experiencing degrading performance since beginning of cycle in spring 2025. The seal is at end-of-life and is scheduled for replacement during the next refueling outage in fall 2026.
- RCP 2-2 number 1 seal leakoff flow rate is within operating limits (0.8 - 7.0 gpm) but currently in the upper band (~5 gpm).
- Due to its degraded nature, the number 1 seal has become more sensitive to plant manipulations as discovered during the WBN Unit 1 refueling outage in spring 2026. Manipulations of the affected components can cause sudden perturbations within the system which in turn increase seal leakoff therefore we want to minimize the Quarterly ISTs of the components if possible. This will prevent further degradation of the number 1 seal.
- RCP 2-2 is inside containment and inaccessible during power operation. Complete seal replacement requires a unit shutdown and RCS depressurization.

System Drawings

The following Three (3) slides show Chemical and Volume Control System (CVCS), Component Cooling System (CCS), and Essential Raw Cooling Water (ERCW) System Drawings for the WBN Plant.


PRT
SP 600 PSIG
FCV-62-74
FCV-62-73
LETDOWN ORIFICES
FCV-62-72
FCV-62-76
FCV-62-77
CCS
FCV-70-192
LETDOWN HEATEXCHANGER
TW 62-78
TW 62-79
PT 62-81
FE 62-82
PCV-62-81
TCV-62-79
VCT
SP 200 PSIG
FCV-62-83
RHR
WDS VENT HDR
SAMPLING
VENT HDR
PT 62-122
REACTOR COOLANT FILTER
PI 62-117
PI 62-116
LCV-62-118
TO HUT
FCV-62-1229-B
FCV-62-1228-A
Mixed Bed Demin 1A
Mixed Bed Demin 1B
Cation Demin
FT 62-113
LOOP 3 X-UNDER LEG
FCV-62-69
FCV-62-70
REGENERATIVE HEAT EXCHANGER
Inside Containment
Outside Containment
LOOP 4 COLD LEG
FCV-62-86
LOOP 1 COLD LEG
FCV-62-85
AUX SPRAY
FCV-62-84
62-709
FLOOD MODE BORATION
FCV-62-90
FCV-62-91
FCV-62-89
N2
FCV-62-119
H2
FCV-62-120
EXCESS LETDOWN HEAT EXCHANGER
PT 62-57
LOOP 3 COLD LEG
FCV-62-54
FCV-62-55
FCV-62-56
FCV-62-59
RCDT
PRT
SP 150 PSIG
FCV-62-53
FCV62-61
FCV62-63
SEAL WATER RETURN FILTER
PI 62-64
PI 62-65
SP 200 PSIG
SEAL WATER HTX
CCS
VCT
LT 62-129A
LT 62-130A
LT 62-129C
LT 62-130C
FCV-62-128
PRIMARY WTR
BLENDER
FCV-62-143
FCV-62-144
FCV-62-140
BORIC ACID
62-929
FCV-62-138
FT 62-137
MIXING TANK
LCV-62-132
LCV-62-133
REACTOR COOLANT PUMPS
FE 62-51
FE 62-49
FE 62-38
FE 62-36
FE 62-25
FE 62-23
FE 62-12
FE 62-10
RCP 4
RCP 3
RCP 2
RCP 1
FCV-62-48
FCV-62-35
FCV-62-22
FCV-62-9
FT 62-40
FT 62-27
FT 62-14
FT 62-1
SEAL INJECTION WATER FILTERS
PDIS 62-96
PDIS 62-97
PT 62-92
FT 62-93
BIT
FCV-63-39
FCV-63-40
FCV-62-98
FCV-62-99
FCV-62-93
PI 62-105
PI 62-106
PI 62-110
PI 62-109
1B-B
1A-A
CENTRIFUGAL CHARGING PUMPS
COLD LEG RECIRC (RHR)
FCV-62-135
RWST
FCV-62-136
WATTS BAR NUCLEAR PLANT
CHEMICAL AND VOLUME CONTROL SYSTEM



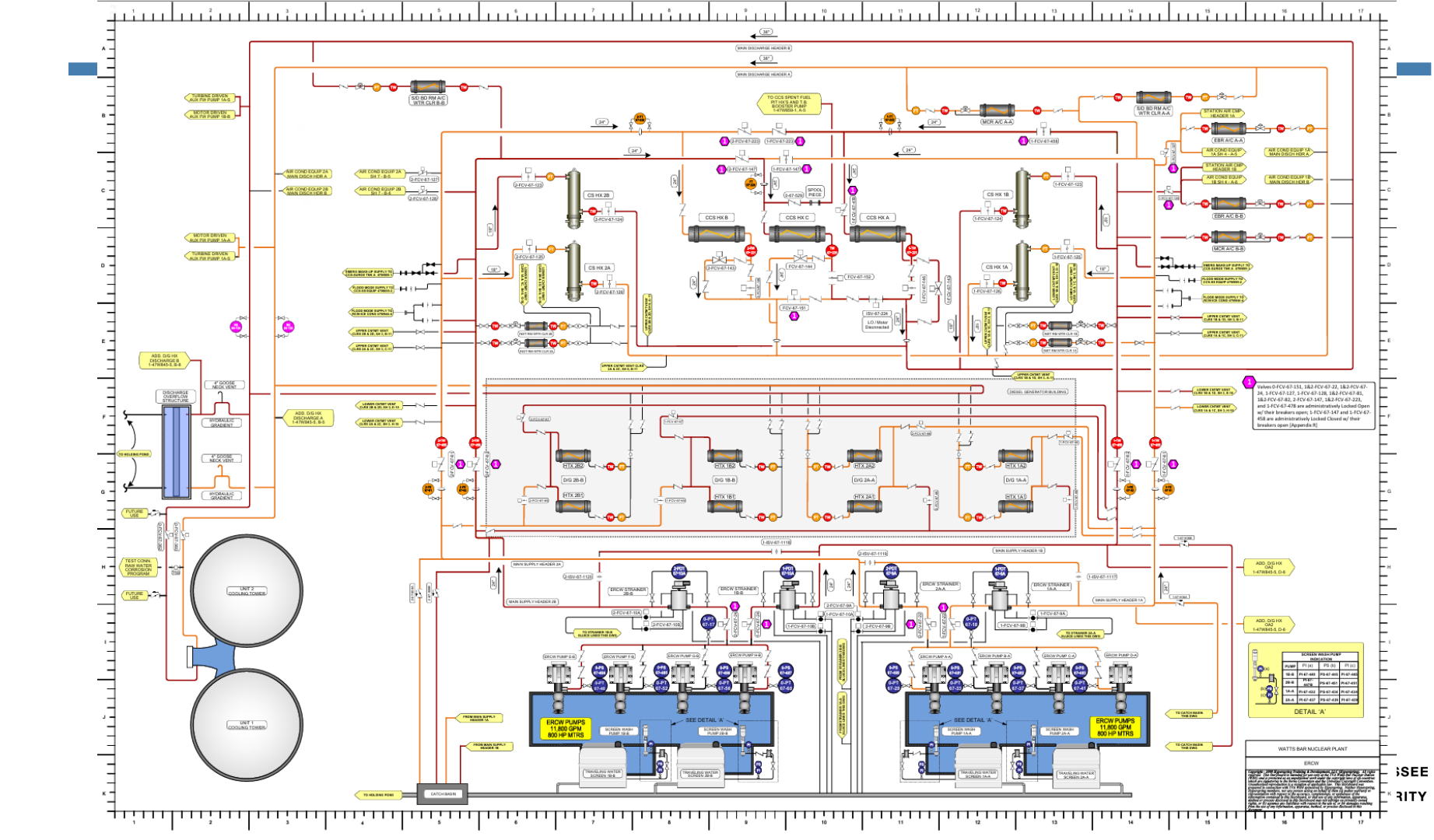
NOTES:

1. Unit 2 Valves with a * indicates a Unit 1– Unit 2 Interface point which is controlled administratively.

2. The hashed marked areas indicate the system/components are not in service.

WATTS BAR NUCLEAR PLANT

COMPONENT COOLING WATER


ERCW PUMPS
11,800 GPM
800 HP MTRS
ERCW PUMPS
11,800 GPM
800 HP MTRS
SEE DETAIL 'A'
SEE DETAIL 'A'
DETAIL 'A'
UNIT 2
COOLING TOWER
UNIT 1
COOLING TOWER
WATTS BAR NUCLEAR PLANT
ERCW

Example of RCP 2-2 number 1 seal leakoff trending

The following Three (3) slides show an example of RCP 2-2 number 1 seal leak off trending. Figure 1 shows a trend of RCP2-2 seal leak off flow by itself. Figure 2 shows RCP 2-2 number seal leak off flow affected by ERCW A-A pump start. Figure 3 shows RCP 2-2 number 1 seal leakoff flow with a decrease in letdown temperature.

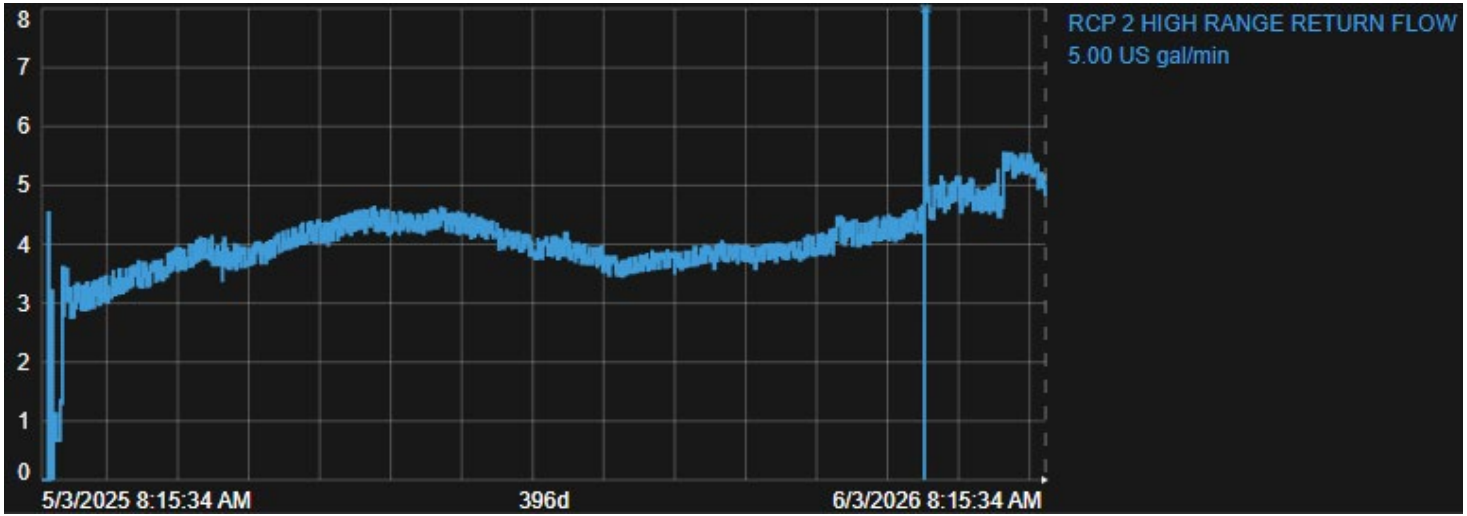


Figure 1: RCP 2-2 number 1 seal leakoff – Spring 2025 to Present. Note: spike seen on the right-hand side of the graph from 0 - 8 gpm is where we rescaled our recorder to better monitor increased leakoff rates.

.

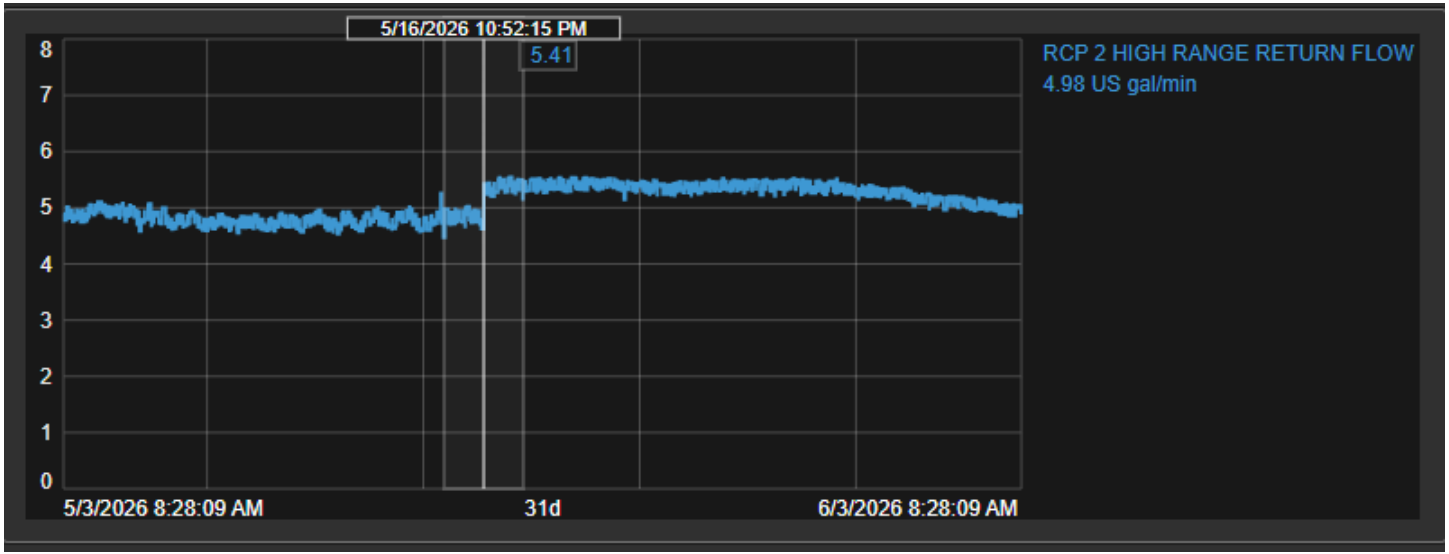


Figure 2: RCP 2-2 number 1 seal leakoff affected by ERCW A-A pump start. Leakoff increased from 4.61 to 5.41 gpm. Note: value of 4.98 gpm listed on right side is the value at the end of chart timeline.

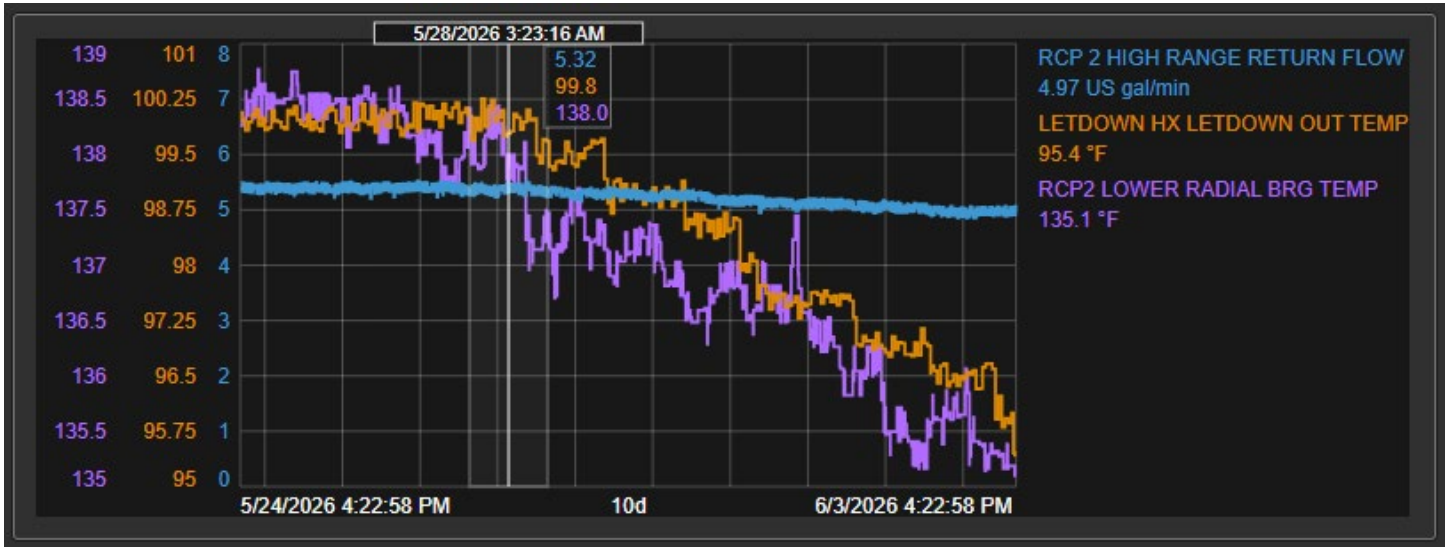


Figure 3: RCP 2-2 number 1 seal leakoff decline with decrease in letdown temperature. Leakoff decreased from 5.32 gpm to 4.97 gpm due to lowering letdown and seal injection temperature per vendor recommendations.

Proposed Alternative and Basis for Use

TVA requests alternative from the planned IST of various CVCS, CCS, and ERCW components at WBN, not to exceed the end of the current IST interval on December 15, 2026, or the completion/ return to operation from the Fall 2026 refueling outage, whichever comes first. (Reference ML26105A760)

Description	Due Date Including the Extension Allowed by ASME OM Code Case OMN-20, "Inservice Test Frequency"	Total Number of Tests for Which an Alternative is Requested	Total Number of Days for Which an Alternative is Requested*
2-SI-70-901-B CCS Pump 2B-B Quarterly Performance Test	7/3/2026	2	126
2-SI-62-901-A Centrifugal Charging Pump 2A-A Quarterly Performance Test -CVCS	7/4/2026	2	125
2-SI-70-901-A CCS Pump 2A-A Quarterly Performance Test	7/4/2026	2	125
2-SI-70-904-A Valve Full Stroke Exercising During Plant Operation Component Cooling Water (Train A) CCS	7/4/2026	2	125
0-SI-67-901-A ERCW Train A Pumps Performance Test	7/5/2026	2	124
2-SI-62-901-B Centrifugal Charging Pump 2B-B Quarterly Performance Test -CVCS	7/11/2026	2	118
1-SI-67-907-A Valve Full Stroke Exercising During Plant Operation - ERCW (Train A)	7/23/2026	1	106
2-SI-67-907-A Valve Full Stroke Exercising During Plant Operation - ERCW (Train 2A)	8/9/2026	1	89

*This column is based on the projected start date of the U2R7 outage

- Earliest test due date is July 3, 2026, which is the basis for the requested NRC approval date of July 2, 2026.

- TVA will perform increased vibration monitoring of the ERCW, CCP, and CCS pumps that are in operation, as a means to identify unexpected degradation. Any step change in pump vibrations could indicate abnormal performance characteristics associated with the bearings and/or impellers of the associated pumps that would need to be investigated. Pump vibration monitoring is non-intrusive and can be completed without impacting the pump operation.

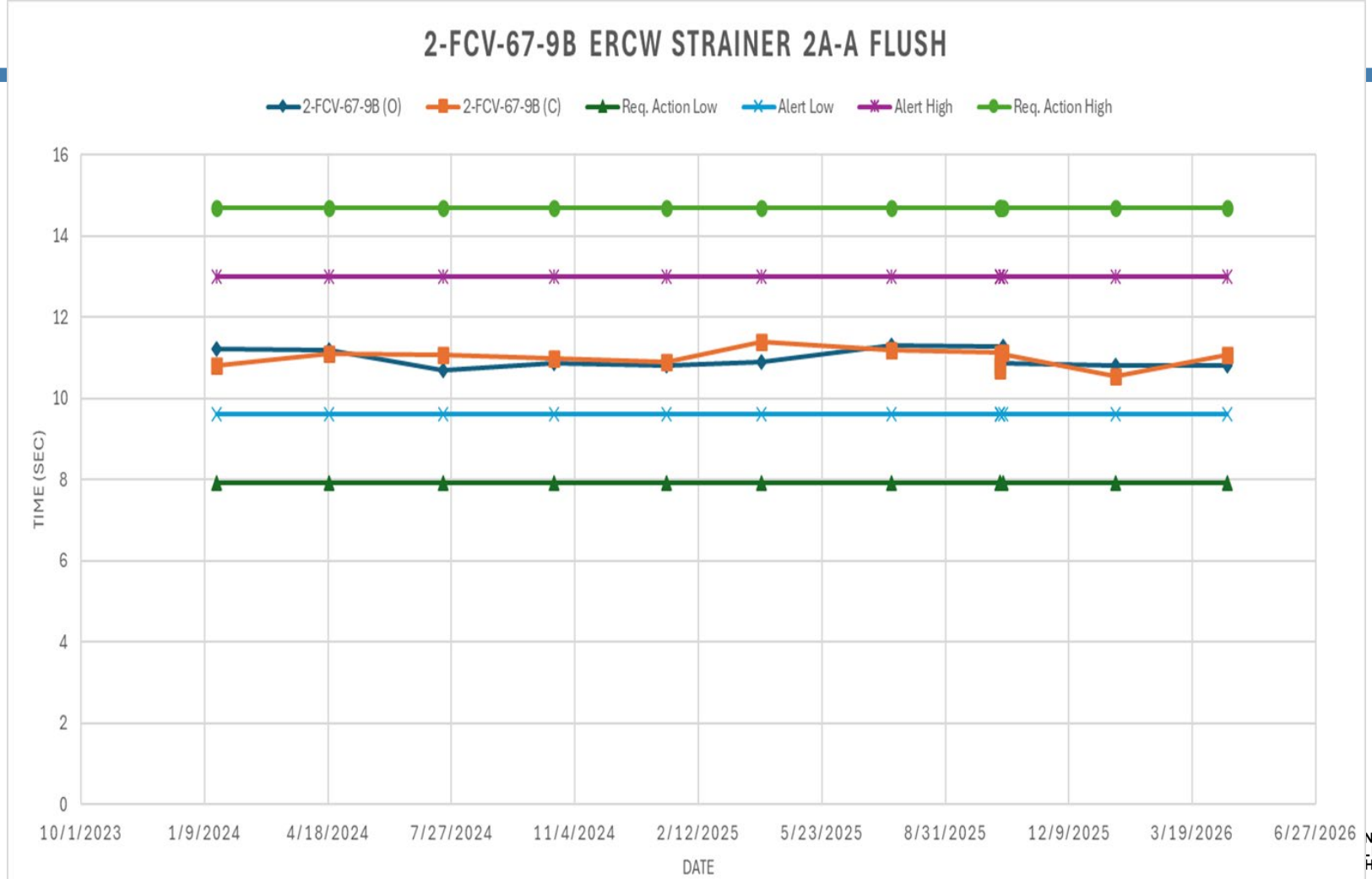
Test History

- Historical test data from the past 2 years for the associated IST components were reviewed. This review did not identify any adverse trends that would indicate the components would not be able to performed its intended functions for the duration of the alternative request period.

An Example of Valve Performance History

2-FCV-67-9B ERCW STRAINER 2B-A FLUSH

Procedure	WID Number	Date	2-FCV-67-9B-A (O)	2-FCV-67-9B-A (C)	Req. Action Low	Alert Low	Alert High	Req. Action High
2-SI-67-907-A	123768213	1/19/2024	11.23	10.80	7.92	9.61	13.01	14.70
2-SI-67-907-A	123992506	4/19/2024	11.18	11.10	7.92	9.61	13.01	14.70
2-SI-67-907-A	124092178	7/20/2024	10.68	11.08	7.92	9.61	13.01	14.70
2-SI-67-907-A	124351183	10/18/2024	10.88	10.99	7.92	9.61	13.01	14.70
2-SI-67-907-A	124526768	1/17/2025	10.81	10.90	7.92	9.61	13.01	14.70
2-SI-67-907-A	124557999	4/4/2025	10.91	11.38	7.92	9.61	13.01	14.70
2-SI-67-907-A	124970966	7/18/2025	11.30	11.18	7.92	9.61	13.01	14.70
2-SI-67-907-A	125146680	10/17/2025	11.27	11.12	7.92	9.61	13.01	14.70
2-SI-67-907-A	125680518	10/14/2025	11.12	10.81	7.92	9.61	13.01	14.70
2-SI-67-907-A	125680518	10/14/2025	10.92	10.68	7.92	9.61	13.01	14.70
2-SI-67-907-A	125680518	10/14/2025	10.88	11.11	7.92	9.61	13.01	14.70
2-SI-67-907-A	125343578	1/16/2026	10.82	10.55	7.92	9.61	13.01	14.70
2-SI-67-907-A	125496569	4/16/2026	10.80	11.08	7.92	9.61	13.01	14.70



Duration of Proposed Alternative

- The duration of the proposed alternative is for the remainder of the current IST interval, ending December 15, 2026, or completion / return to operation from the Fall 2026 refueling outage, whichever occurs first.

Precedents

- Joseph M. Farley Nuclear Plant, Unit 2 (ML24351A040)
  On December 19, 2024, the NRC approved a similar alternative request for Farley Unit 2 charging pumps 2A, 2B, and 2C and mini-flow isolation valves.
- Vogtle Electric Generating Plant, Unit 2 (ML25010A381)
  On January 16, 2025, the NRC approved a similar alternative request for Vogtle Unit 2 charging pumps 2A and 2B.
- Prairie Island Nuclear Generating Plant (ML25099A288)
  On April 10, 2025, the NRC approved a similar alternative request for Unit 2 component cooling water system at Prairie Island.
- Browns Ferry Nuclear Plant, Unit 3 (ML25287A025)
  On October 14, 2025, the NRC approved a similar alternative request for Browns Ferry Unit 3 SLC Pumps 3A and 3B.

Schedule for Submittal

- TVA submits WBN Unit 1 and 2 request for alternative – **June 12, 2026**
- Requested NRC Approval Date – **July 2, 2026** (to support the earliest due date of July 3, 2026)


TVA
TENNESSEE
VALLEY
AUTHORITY