Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

June 21, 2011

10 CFR 50.36

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

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: Watts Bar Nuclear Plant (WBN) Unit 2 - Response to NRC Staff Comments on Developmental Revisions of the Unit 2 Technical Specifications (TS) and Technical Specifications Bases (TS Bases); Submittal of Developmental Revision F

TVA's letter to NRC dated March 4, 2009 (Reference 1), included Developmental Revision A of the Unit 2 TS and TS Bases. Developmental Revisions B through E were submitted to the NRC by TVA's letters dated February 2, 2010; August 16, 2010; October 12, 2010; and January 27, 2011, respectively (References 2 through 5).

TVA's letter dated February 16, 2011 (Reference 6), provided supplemental information to assist the NRC staff in Review of Developmental Revision A of the Unit 2 TSs and TS Bases.

In mid-April 2011, the NRC staff provided TVA with a CD containing the Unit 2 TS and TS Bases with staff comments noted. Applicable pages from the TS and TS Bases and TVA's response are provided in Enclosures 1 through 4.

A recurring NRC comment concerning TVA not justifying Unit 2's deletion of verbiage similar to "movable incore detectors" is not included because the staff considered this comment resolved based on TVA input that noted that Unit 2's incore detectors are fixed. For example, Unit 2 Final Safety Analysis Report (FSAR) 4.4.5.1 (Incore Instrumentation) includes "core characteristics for all core quadrants using fixed incore neutron detector information."

Enclosures 5 through 8 provide Developmental Revision F of the Unit 2 TS and TS Bases to incorporate changes resulting from TVA's review of the NRC comments.

D030
NRR

Enclosure 9 provides a list of the new regulatory commitments contained in this letter. If you have any questions, please contact Bill Crouch at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of June, 2011.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

References:

1. TVA to NRC letter dated March 4, 2009, "Watts Bar Nuclear Plant (WBN) Unit 2 - Operating License Application Update" (ADAMS Accession No. ML090700378) [Developmental Revision A]

2. TVA to NRC letter dated February 2, 2010, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Developmental Revision B of the Technical Specifications (TS), TS Bases, Technical Requirements Manual (TRM), TRM Bases; and Pressure and Temperature Limits Report (PTLR)" (ADAMS Accession No. ML100550326)

3. TVA to NRC letter dated August 16, 2010, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Change to Developmental TS Section 4.2.2, 'Control Rod Assemblies'" (ADAMS Accession No. ML102290075) [Developmental Revision C]

4. TVA to NRC letter dated October 12, 2010, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Change to Developmental Technical Specification (TS) Sections 3.6.11, 'Ice Bed,' and 3.1.8, 'Rod Position Indication'" (ADAMS Accession No. ML1028505200) [Developmental Revision D]

5. TVA to NRC letter dated January 27, 2011, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Change to Developmental Technical Specification (TS) Section 3.1.8, 'Rod Position Indication'" (ADAMS Accession No. ML110270108) [Developmental Revision E]

6. TVA to NRC letter dated February 16, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Supplemental Information For Review of Developmental Revision A of the Unit 2 Technical Specifications (TS) and Technical Specifications Bases (TS Bases)" (ADAMS Accession No. ML110490570)

7. TVA to NRC letter dated April 6, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Safety Evaluation Report Supplement 22 (SSER22) - Response to NRC Required Action Items" (ADAMS Accession ML110980637)

8. CD provided to the NRC for use in conjunction with the information submitted via Reference 2

Enclosures:

1. NRC Comments on Unit 2 Technical Specifications
2. TVA Responses to NRC Comments on Unit 2 Technical Specifications
3. NRC Comments on Unit 2 Technical Specifications Bases
4. TVA Responses to NRC Comments on Unit 2 Technical Specifications Bases
5. Proposed Unit 2 Technical Specifications
6. Marked-up Version of Unit 2 Technical Specifications With Justifications for Revisions
7. Proposed Unit 2 Technical Specifications Bases
8. Marked-up Version of Unit 2 Technical Specifications Bases With Justifications for Revisions
9. New Regulatory Commitments

cc (Enclosures):

U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

ENCLOSURE 1

NRC Comments on Unit 2 Technical Specifications

3.2 POWER DISTRIBUTION LIMITS

3.2.4 QUADRANT POWER TILT RATIO (QPTR)

LCO 3.2.4 The QPTR shall be ≤ 1.02.

APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. QPTR not within limit.	A.1	Reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00.	2 hours
	<u>AND</u>		
	A.2	Perform SR 3.2.4.1 and reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00.	Once per 12 hours thereafter
	<u>AND</u>		
	A.3	Perform SR 3.2.1.1 and SR 3.2.2.1.	24 hours <u>AND</u> Once per 7 days thereafter
	<u>AND</u>		
move up from page 3.2-10	A.4	Reevaluate safety analyses and confirm results remain valid for duration of operation under this condition.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
	<u>AND</u>		(continued)

Open Item
By Carl Schulten on 03/17/2011 9:29 AM

delete and move up to page 3.2-9

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	AND		
	A.5	------------NOTE------------ Perform Required Action A.5 only after Required Action A.4 is completed. ---------------------------------	
		Calibrate excore detectors to show QPTR of 1.0.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
	AND		
	A.6	------------NOTE------------ Perform Required Action A.6 only after Required Action A.5 is completed. ---------------------------------	
		Perform SR 3.2.1.1 and SR 3.2.2.1.	Within 24 hours after reaching RTP OR Within 48 hours after increasing THERMAL POWER above the limit of Required Action A.1
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to ≤ 50% RTP.	4 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
M. One channel inoperable.	-------------------NOTE------------------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ---		
	M.1	Place channel in trip.	72 hours
	OR		
	M.2	Reduce THERMAL POWER to < P-7.	78 hours
N. One Reactor Coolant Flow - Low channel inoperable.	-------------------NOTE------------------- One channel may be bypassed for up to 12 hours for surveillance testing. ---		
	N.1	Place channel in trip.	72 hours
	OR		
	N.2	Reduce THERMAL POWER to < P-8.	78 hours

(continued)

Discrepancy:U1 A68 (TSTF-169) shows P-8 revised to P-7

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Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOW-ABLE VALUE	NOMINAL TRIP SETPOINT
1.	Manual Reactor Trip	1, 2	2	B	SR 3.3.1.13	NA	NA
		3 (a), 4 (a), 5 (a)	2	C	SR 3.3.1.13	NA	NA
2.	Power Range Neutron Flux						
	a. High	1, 2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 111.4% RTP	109% RTP
	b. Low	1 (~~b~~d), 2	4	E	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 27.4% RTP	25% RTP
3.	Power Range Neutron Flux Rate						
	a. High Positive Rate	1, 2	4	E	SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c)	≤ 6.3% R TP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
	b. High Negative Rate – DELETED						
4.	Intermediate Range Neutron Flux	1 (~~b~~d), 2 (~~c~~e)	2	F, G	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 40% R TP	25% RTP
		2 (~~d~~f)	2	H	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 40% R TP	25% RTP

"RTP" not "R TP"

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

(d) Below the P-10 (Power Range Neutron Flux) interlocks.

Revise Note (c) to specify a UFSAR citation.

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By Carl Schulten on 03/17/2011 9:29 AM

Table 3.3.1-1 (page 2 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOW-ABLE VALUE	NOMINAL TRIP SETPOINT
5.	Source Range Neutron Flux	2 (~~d~~f)	2	I, J	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 1.5 E5 cps	1.0 E5 cps
		3 (a), 4 (a), 5 (a)	2	J, K	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 1.5 E5 cps	1.0 E5 cps
		3 (~~e~~g), 4 (~~e~~g)~~, 5~~ (~~e~~g)	1	L	SR 3.3.1.1 SR 3.3.1.11 (b)(c)	N/A	N/A
6.	Overtemperature ΔT	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	Refer to Note 1 (Page 3.3 -21)	Refer to Note 1 (Page 3.3-21)
7.	Overpower ΔT	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	Refer to Note 2 (Page 3.3 -22)	Refer to Note 2 (Page 3.3-22)
8.	Pressurizer Pressure						
	a. Low	1 (~~f~~h)	4	X	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 1964.8 psig	1970 psig
	b. High	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≤ 2390.2 psig	2385 psig

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.
(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(g) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication.

Revise Note (c) to specify a UFSAR citation.

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A47 and A68 retained 89.7%. NTSP. JFD-8(TSTF-493) shown in Bases markup does not apply to AV changes. Bases JFD-7 describes change as specific to Unit 1; Bases text changes AV from % indicated loop flow to %thermal design flow. EICB needs to confirm.

Table 3.3
Reactor Trip S

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
9.	Pressurizer Water Level-High	1 (h)	3	X	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	≤ 92.7% span	92% span
10.	Reactor Coolant Flow - Low	1 (h)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 89.6~~7~~% flow	90% flow
11.	Undervoltage RCPs	1 (h)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 4734 V	4830 V
12.	Underfrequency RCPs	1 (h)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 56.9 Hz	57.5 Hz

(continued)

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock.

Revise Note (c) to specify a UFSAR citation.

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Table 3.3.1-1 (page 4 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
13. SG Water Level – Low-Low	1, 2	3/SG	U	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 16.4% of narrow range span	17% of narrow range span
Coincident with:						
a) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one steam generator is affected			licensee confirmatory item		≤ 1.01 T_s (Refer to Note 3, Page 3.3-23)	T_s (Refer to Note 3, Page 3.3-23)
or						
A time delay (T_m) if two or more steam generators are affected	"or"				≤ 1.01 T_m (Refer to Note 3, Page 3.3-23)	T_m (Refer to Note 3, Page 3.3-23)
~~OR~~						
b) Vessel ΔT Equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
14. Turbine Trip		Provide plant-specific design to justify not applying footnotes (a) and (b) per TSTF-493.				
a. Low Fluid Oil Pressure	1 (i)	3	O	SR 3.3.1.10 SR 3.3.1.14	≥ 43 psig	45 psig
b. Turbine Stop Valve Closure	1 (i)	4	Y	SR 3.3.1.10 SR 3.3.1.14	≥ 1% ope n	1% open

open

(continued)

(i) Above the P-9 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 5 of 9)
Reactor Trip System Instrumentation

APPROVED
By Carl Schulten at 3:32 pm, Aug 03, 2010

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	REQUIREMENTS	VALUE	SETPOINT
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1, 2	2 trains	P	SR 3.3.1.13	NA	NA
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6						
(1) Enable Manual Block of SR Trip	2 (~~d~~f)	2	R	SR 3.3.1.11 SR 3.3.1.12	NA	1.66E-04% RTP
(2) Auto Reset (Unblock Manual Block of SR Trip)	2 (~~d~~f)	2	R	SR 3.3.1.11 SR 3.3.1.12	≥ 7.65E-5% RTP	0.47E-4% RTP below setpoint
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.11 SR 3.3.1.12	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 50.4% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 52.4% RTP	50% RTP
e. Power Range Neutron Flux, P-10	1, 2	4	R	SR 3.3.1.11 SR 3.3.1.12	"RTP" ≥ 7.6% R TP and ≤ 12.4% RTP	10% RTP
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.10 SR 3.3.1.12	≤ 12.4% full-power pressure	10% full-power pressure

(continued)

(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

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By Carl Schulten on 03/17/2011 9:29 AM

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
I. One Steam Generator Water Level – High High channel inoperable.	I.1 -------------NOTE------------ One channel may be **APPROVED** ***By Carl Schulten at 12:27 pm, Jul 22, 2010*** Place channel in trip. <u>OR</u> I.2.1 Be in Mode 3. <u>~~OR~~AND</u> I.2.2 Be in Mode 4.	 72 hours 78 hours 84 hours
License Amendment No.? J. One <u>or more</u> <u>Turbine Driven</u> Main Feedwater Pumps trip channel<u>(s)</u> inoperable.	J.1 Restore channel to OPERABLE status. <u>OR</u> J.2 Be in Mode 3.	48 hours 54 hours
K. One channel inoperable.	K.1 -------------NOTE------------ One channel may be bypassed for up to 12 hours for surveillance testing. --------------------------------- Place channel in bypass. <u>OR</u> K.2.1 Be in Mode 3. <u>AND</u> K.2.2 Be in Mode 5.	 72 hours 78 hours 108 hours

(continued)

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SURVEILLANCE REQUIREMENTS

REVIEWED
By Carl Schulten at 3:28 pm, Jul 30, 2010

--NOT
Refer to Table 3.3.2-1 to determine which SRs a

SURVEILLANCE		FREQUENCY
SR 3.3.2.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.2.2	Perform ACTUATION LOGIC TEST.	92 days on a STAGGERED TEST BASIS
SR 3.3.2.3	Perform MASTER RELAY TEST.	92 days on a STAGGERED TEST BASIS
SR 3.3.2.4	Perform COT.	184 days
SR 3.3.2.5	------------------------------NOTE------------------------------ Slave relays tested by SR 3.3.2.7 are excluded from this surveillance. -- Perform SLAVE RELAY TEST.	92 days <u>OR</u> 18 months for Westinghouse type AR <u>and Potter & Brumfield MDR Series</u> relays

(continued)

JFD7. RAI: Need staff SE approving 18 Frequency for MDR relay tests.

Table 3.3.2-1 (page 1 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1.	Safety Injection						
a.	Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
c.	Containment Pressure – High	1, 2, 3	3	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 1.6 psig	1.5 psig
d.	Pressurizer Pressure – Low	1, 2, 3[a]	3	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 1864.8 psig	1870 psig
e.	Steam Line Pressure - Low	1, 2, 3[a]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 666.6[bd] psig	675[bd] psig
2.	Containment Spray						
a.	Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c.	Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig

(a) Above the P-11 (Pressurizer Pressure) Interlock.

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

(d) Time constants used in the lead/lag controller are t1 > 50 seconds and t2 < 5 seconds.

(continued)

Revise Note (c) to specify a UFSAR citation.

Table 3.3.2-1 (page 2 of 9)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation						
a. Phase A Isolation						
(1) Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
b. Phase B Isolation						
(1) Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
(3) Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig

(continued)

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

Revise Note (c) to specify a UFSAR citation.

Table 3.3.2-1 (page 3 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4.	Steam Line Isolation						
a.	Manual Initiation	1, 2 (~~e~~g), 3 (~~e~~g)	1/valve	F	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2 (~~e~~g), 3 (~~e~~g)	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c.	Containment Pressure – High High	1, 2 (~~e~~g), 3 (~~e~~g)	4	E	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig
d.	Steam Line Pressure						
	(1) Low	1, 2 (~~e~~g), 3 (a)(~~e~~g)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 666.6 (~~b~~d) psig	675 (~~b~~d) psig
	(2) Negative Rate - High	3 (~~e~~g)(~~d~~f)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≤ 108.5 (~~e~~g) psi	100 (~~e~~g) psi

(continued)

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

(d) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(e) Except when all MSIVs are closed and de-activated.

(f) Function automatically blocked above P-11 (Pressurizer Interlock) setpoint and is enabled below P-11 when safety injection on Steam Line Pressure Low is manually blocked.

(g) Time constants utilized in the rate/lag controller are t_3 and $t_4 \geq 50$ seconds.

Revise Note (c) to specify a UFSAR citation.

Table 3.3.2-1 (page 4 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5.	Turbine Trip and Feedwater Isolation						
	a. Automatic Actuation Logic and Actuation Relays	1, 2 (~~f~~h), 3 (~~f~~h)	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
	b. SG Water Level – High High (P-14)	1, 2 (~~f~~h), 3 (~~f~~h)	3 per SG	I	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 83.1%	82.4%
	c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
	d. North MSV Vault Room Water Level – High	1, 2 (~~f~~h)(~~g~~i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9 (b) (c)	≤ 5.31 inches	4 inches
	e. South MSV Vault Room Water Level – High	1, 2 (~~f~~h)(~~g~~i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9 (b) (c)	≤ 4.56 inches	4 inches

(continued)

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

(h) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

(i) Mode 2 if Turbine Driven Main Feed Pumps are operating.

Revise Note (c) to specify a UFSAR citation.

Table 3.3.2-1 (page 5 of 9)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. SG Water Level – Low Low	1, 2, 3	3 per SG	M	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 16.4%	17.0%
Coincident with:						
1) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	N	SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one SG is affected			licensee confirmatory item		≤ 1.01 T_s (Note 1, Page 3.3-40)	T_s (Note 1, Page 3.3-40)
Or "or"						
A time delay (T_m) if two or more SGs are affected					≤ 1.01 T_m (Note 1, Page 3.3-40)	T_m (Note 1, Page 3.3-40)
OR						
2) Vessel ΔT equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	N	SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

Revise Note (c) to specify a UFSAR citation.

Open Item
By Carl Schulten on 03/17/2011 9:29 AM

JFD 8. Notes (b) & (c) not reviewed on this page.

Table 3.3.2-1 (page 6 of 9)
Engineered Safety Featu

REVIEWED
By Carl Schulten at 12:31 pm, Jul 22, 2010

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRE CHANNEL				INAL RIP POINT
6. Auxiliary Feedwater (continued)						
d. Loss of Offsite Power	1, 2, 3	4 per bus	F	Refer to Function 4 of Table 3.3.5-1 for SRs and Allowable Values.		
e. Trip of all Turbine Driven Main Feedwater Pumps	1,(j) 2(k)	1 per pump	J	SR 3.3.2.8 SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 48 psig	50 psig
f. Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3	3	F	SR 3.3.2.6 SR 3.3.2.9 (b)(c) SR 3.3.2.10	A) ≥ 0.5 psig B) ≥ 1.33 psig	A) 1.2 psig B) 2.0 psig
7. Automatic Switchover to Containment Sump						
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. Refueling Water Storage Tank (RWST) Level - Low	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 155.6 inches from Tank Base	158 inches from Tank Base
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
And						
Coincident with Containment Sump Level - High	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 37.2 inches above el. 702.8 ft	38.2 inches above el. 702.8 ft

APPROVED
By Carl Schulten at 3:33 pm, Jul 30, 2010

"and"

(continued)

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

(j) Entry into Condition J may be suspended for up to 4 hours when placing the second Turbine Driven Main Feedwater (TDMFW) Pump in service or removing one of two TDMFW pumps from service.

(k) When one or more Turbine Driven Feedwater Pump(s) are supplying feedwater to steam generators.

Revise Note (c) to specify a UFSAR citation.

Table 3.3.2-1 (page 8 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8.	ESFAS Interlocks						
	a. Reactor Trip, P-4	1, 2, 3	1 per train, 2 trains	F	SR 3.3.2.11	NA	NA
	b. Pressurizer Pressure, P-11						
	(1) Unblock (Auto Reset of SI Block)	1, 2, 3	3	L	SR 3.3.2.1 SR 3.3.2.4 [(b) (c)] SR 3.3.2.9 [(b) (c)]	≤ 1975.2 psig	1970 psig
	(2) Enable Manual Block of SI	1, 2, 3	3	L	SR 3.3.2.1 SR 3.3.2.4 [(b) (c)] SR 3.3.2.9 [(b) (c)]	≥ 1956.8 psig	1962 psig

(b) If the as-found channel setpoint is outside its redefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.

Revise Note (c) to specify a UFSAR citation.

Open Item
By Carl Schulten on 03/17/2011 9:29 AM

REVIEWED
By Carl Schulten at 3:51 pm, Jul 21, 2010

Table 3.3.3-1 (pa
Post Accident Monitoring

Justify deviations from WBN1 on this page.

(a) Below the P-10 (Power Range Neutron Flux) interlocks.

(b) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(c) Below the P-6 (Intermediate Range Neutron Flux) interlocks

(d) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, pressure relief valve, or check valve with flow through the valve secured.

(e) A channel consists of two core exit thermocouples (CETs).

(f) The ~~ICCM~~Common Q Post Accident Monitoring System provides these functions on a ~~plasma~~flat screen display.

(g) Regulatory Guide 1.97, non-Type A, Category 1 Variables.

(h) This function is displayed on the ~~ICCM plasma~~Common Q Post Accident Monitoring System flat screen display and digital panel meters.

(i) Only one position indication channel is required for penetration flow paths with only one installed control room indication channel.

(j) Watts Bar specific (not required by Regulatory Guide 1.97) non-Type A Category 1 variable.

3.3 INSTRUMENTATION

3.3.4 Remote Shutdown System

LCO 3.3.4 The Remote Shutdown System Functions in Table 3.3.4-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3 insert period (.)

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required Functions inoperable.	A.1 Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 4.	6 hours 12 hours

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REVIEWED
By Carl Schulten at 3:40 pm, Jul 30, 2010

SURVEILLANCE REQUIREMENTS

---NOTE---
Refer to Table 3.3.6-1 to determine which SRs apply for each Containment Vent Isolation Function.

SURVEILLANCE		FREQUENCY
SR 3.3.6.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.6.2	----------------------------NOTE---------------------------- This surveillance is only applicable to the actuation logic of the ESFAS instrumentation. --- Perform ACTUATION LOGIC TEST.	92 days on a STAGGERED TEST BASIS
SR 3.3.6.3	----------------------------NOTE---------------------------- This surveillance is only applicable to the master relays of the ESFAS instrumentation. --- Perform MASTER RELAY TEST.	92 days on a STAGGERED TEST BASIS
SR 3.3.6.4	Perform COT.	92 days
SR 3.3.6.5	Perform SLAVE RELAY TEST.	92 days <u>OR</u> 18 months for Westinghouse type AR <u>and Potter & Brumfield MDR Series</u> relays

JFD7. RAI: Need staff SE approving 18 Frequency for MDR relay tests.

(continued)

Table 3.3.6-1 (p
Containment Vent Isolat

REVIEWED
By Carl Schulten at 12:17 pm, Jul 22, 2010

FUNCTION	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Manual Initiation	2	SR 3.3.6.6	NA
2. Automatic Actuation Logic and Actuation Relays	2 trains	SR 3.3.6.2 SR 3.3.6.3 SR 3.3.6.5	NA
3. Containment Purge Exhaust Radiation Monitors	2	SR 3.3.6.1 SR 3.3.6.4 SR 3.3.6.7	$\leq$ 8.41E-02 μCi/cc[(a)] (~~8.41E+04~~3.43x10^4 cpm) < 2.8E-02 μCi/cc[(b)] (1.14x10^4 cpm)
4. Safety Injection	Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.		

(a) During movement of irradiated fuel assemblies within containment.

(b) Modes 1, 2, 3, and 4.

WBN1 deviation not justified

WBN1 deviation not justified

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified below:

a. Pressurizer pressure ≥ 2214 psig;

b. RCS average temperature ≤ 593.2°F; and

c. RCS total flow rate ≥ 380,000 gpm (process computer or control board indication).

APPLICABILITY: MODE 1.

---NOTE---
Pressurizer pressure limit does not apply during:

a. THERMAL POWER ramp > 5% RTP per minute; or

b. THERMAL POWER step > 10% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more RCS DNB parameters not within limits.	A.1	Restore RCS DNB parameter(s) to within limit.	2 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 2.	6 hours

Explain what changes were made to Developmental A. Note that TS A47 revised page 3.4-2, but not page 3.4-1.

B

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	Verify pressurizer pressure is ≥ 2214 psig.	12 hours
SR 3.4.1.2	Verify RCS average temperature is ≤ 593.2°F.	12 hours
SR 3.4.1.3	Verify RCS total flow rate is ≥ 380,000 gpm (process computer or control board indication).	12 hours
SR 3.4.1.4	-----------------------------NOTE----------------------------- Required to be performed within 24 hours after ≥ 90% RTP. -- Verify by precision heat balance ~~or elbow tap Δp~~ method that RCS total flow rate ~~is~~ ≥ 380,000 gpm.	18 months

A47 change made for WBN1 is deleted for WBN2

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops - MODE 4

LCO 3.4.6 Two loops shall be OPERABLE, and consist of either:

a. Any combination of RCS loops and residual heat removal (RHR) loops, and one loop shall be in operation, when the rod control system is not capable of rod withdrawal; or

SRXB Confirmatory item

b. Two RCS loops, and both loops shall be in operation, when the rod control system is capable of rod withdrawal.

--NOTE--

No RCP shall be started with any RCS cold leg temperature ≤ ~~350°F~~the COMS arming temperature specified in the PTLR unless the secondary side water temperature of each steam generator (SG) is ≤ 50°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Only one RCS loop OPERABLE. AND Two RHR loops inoperable.	A.1	Initiate action to restore a second loop to OPERABLE status	Immediately
B. One required RHR loop inoperable. AND No RCS loops OPERABLE.	B.1	Be in MODE 5.	24 hours

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops - MODE 5, Loops Filled

LCO 3.4.7 One residual heat removal (RHR) loop shall be OPERABLE and in operation, and either:

a. One additional RHR loop shall be OPERABLE; or

b. The secondary side water level of at least two steam generators (SGs) shall be greater than or equal to 6% narrow range.

SRXB Confirmatory item

---NOTES---

1. One required RHR loop may be inoperable for up to 2 hours for surveillance testing provided that the other RHR loop is OPERABLE and in operation.

2. No reactor coolant pump shall be started with one or more RCS cold leg temperatures ≤ ~~350°F~~the COMS arming temperature specified in the PTLR unless the secondary side water temperature of each SG is ≤ 50°F above each of the RCS cold leg temperatures.

3. All RHR loops may be removed from operation during planned heatup to MODE 4 when at least one RCS loop is in operation.

APPLICABILITY: MODE 5 with RCS loops filled.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One RHR loop inoperable. AND Required SGs secondary side water levels not within limits.	A.1	Initiate action to restore a second RHR loop to OPERABLE status	Immediately
	OR		
	A.2	Initiate action to restore required SG secondary side water levels to within limits	Immediately

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2410 psig and ≤ 2560 psig.

APPLICABILITY: MODES 1, 2, and 3.
MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR.

SRXB confirmatory item

---NOTE---
The lift settings are not required to be within the LCO limits during MODE 3 and MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1	Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. OR Two or more pressurizer safety valves inoperable.	B.1 AND B.2	Be in MODE 3. Be in MODE 4 with any RCS cold leg temperature < the COMS arming temperature specified in the PTLR.	6 hours 12 hours

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3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Cold Overpressure Mitigation System (COMS)

LCO 3.4.12

A COMS 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 either a or b below.

a. Two RCS relief valves, as follows:

1. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR, or
2. One PORV with a lift setting within the limits specified in the PTLR and the RHR suction relief valve with a setpoint ≥ 436.5 psig and ≤ 463.5 psig.

b. The RCS depressurized and an RCS vent capable of relieving > 475 gpm water flow.

-----NOTE-----

1. Two charging pumps may be made capable of injecting for less than or equal to one 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.

SRXB confirmatory item

APPLICABILITY: ~~MODES 4 and 5,~~MODE 4 with any RCS cold leg temperature < the COMS arming temperature specified in the PTLR, MODE 5, and MODE 6 when the reactor vessel head is on

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ACTIONS

---NOTE---
LCO 3.0.4.b is not applicable when entering MODE 4.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more safety injection pumps capable of injecting into the RCS.	A.1	Initiate action to verify no safety injection pumps are capable of injecting into the RCS.	Immediately
B. Two or more charging pumps capable of injecting into the RCS.	B.1	Initiate action to verify a maximum of one charging pump is capable of injecting into the RCS.	Immediately
C. An accumulator not isolated when the accumulator pressure is greater than or equal to the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	C.1	Isolate affected accumulator.	1 hour
D. Required Action and associated Completion Time of Condition C not met. SRXB confirmatory item	D.1	Increase RCS cold leg temperature to > ~~350°F~~the COMS arming temperature specified in the PTLR.	12 hours
	OR		
	D.2	Depressurize affected accumulator to less than the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. One required RCS relief valve inoperable in MODE 4 with any RCS cold leg temperature < the COMS arming temperature specified in the PTLR.	E.1	Restore required RCS relief valve to OPERABLE status.	7 days
F. One required RCS relief valve inoperable in MODE 5 or 6.	F.1	Restore required RCS relief valve to OPERABLE status.	24 hours
G. Two required RCS relief valves inoperable. OR Required Action and associated Completion Time of Condition A, B, D, E, or F not met. OR COMS inoperable for any reason other than Condition A, B, C, D, E, or F.	G.1	Depressurize RCS and establish RCS vent.	8 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.4.12.5	Verify PORV block valve is open for each required PORV.	72 hours
SR 3.4.12.6	Verify both RHR suction isolation valves are locked open with operator power removed for the required RHR suction relief valve.	31 days
SR 3.4.12.7	-----------------------------NOTE----------------------------- Required to be met within 12 hours after ~~decreasing~~ RCS cold leg temperature to ≤ ~~350°F~~the COMS arming temperature specified in the PTLR. -- Perform a COT on each required PORV, excluding actuation.	SRXB confirmatory item 31 days
SR 3.4.12.8	Perform CHANNEL CALIBRATION for each required PORV actuation channel.	18 months

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

LCO 3.4.14 Leakage from each RCS PIV shall be within limit.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4, except valves in the residual heat removal (RHR) flow path when in, or during the transition to or from, the RHR mode of operation.

ACTIONS

-----NOTES-----
1. Separate Condition entry is allowed for each flow path.
2. Enter applicable Conditions and Required Actions for systems made inoperable by an inoperable PIV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more flow paths with leakage from one or more RCS PIVs not within limit.	-----NOTE----- Each valve used to satisfy Required Action A.1 must have been verified to meet SR 3.4.14.1 and be in the reactor coolant pressure boundary. -----	
	A.1 Isolate the high pressure portion of the affected system from the low pressure portion by use of one closed manual, deactivated automatic, or check valve.	4 hours
		(continued)

insert "<u>AND</u>"

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	AND	delete "AND"	
	A.2	Restore RCS PIV to within limits	72 hours
B. Required Action and associated Completion Time for Condition A not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 The following RCS leakage detection instrumentation shall be OPERABLE:

No deviations result from markup. Why is this Developmental B?

1. ~~One containment pocket sump level monitor; and~~
2. One lower containment atmosphere particulate radioactivity monitor ~~(gaseous and particulate)~~.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment pocket sump level monitor inoperable.	A.1 Perform SR 3.4.13.1. AND A.2 Restore required containment pocket sump level monitor to OPERABLE status.	Once per 24 hours 30 days
B. Required containment atmosphere particulate radioactivity monitor inoperable.	B.1.1 Analyze grab samples of the containment atmosphere. OR B.1.2 Perform SR 3.4.13.1. AND B.2 Restore required containment atmosphere particulate radioactivity monitor to OPERABLE status.	Once per 24 hours Once per 24 hours 30 days

(continued)

REVIEWED
By Carl Schulten at 1:45 pm, Jul 21, 2010

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

Make change per LCO 3.4.15.2. Make conforming change to WNB1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the required containment atmosphere particulate radioactivity monitor.	12 hours
SR 3.4.15.2	Perform COT of the required containment atmosphere particulate radioactivity ~~level~~ monitor.	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment pocket sump level monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the required containment atmosphere particulate radioactivity monitor.	18 months

APPROVED
By Carl Schulten at 1:28 pm, Jul 22, 2010

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.1 Accumulators

LCO 3.5.1 Four ECCS accumulators shall be OPERABLE.

JFC Rev B TS/TS Bases 3.5, item 1

APPLICABILITY: MODES 1 and 2,
MODE 3 with pressurizer pressure > 1000 psig.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One accumulator inoperable due to boron concentration not within limits.	A.1	Restore boron concentration to within limits.	72 hours
B. One accumulator inoperable for reasons other than Condition A.	B.1	Restore accumulator to OPERABLE status.	~~1~~24 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 AND C.2	Be in MODE 3. Reduce pressurizer pressure to ≤ 1000 psig.	6 hours 12 hours
D. Two or more accumulators inoperable.	C.3	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Verify each accumulator isolation valve is fully open.	12 hours
SR 3.5.1.2	Verify borated water volume in each accumulator is ≥ 7630 gallons and ≤ 8000 gallons.	12 hours
SR 3.5.1.3	Verify nitrogen cover pressure in each accumulator is ≥ 610 psig and ≤ 660 psig.	12 hours
SR 3.5.1.4	Verify boron concentration in each accumulator is ≥ 3000 ppm and ≤ 3300 ppm.	31 days <u>AND</u> ----------NOTE--------- Only required to be performed for affected accumulators --------------------------- Once within 6 hours after each solution volume increase of ≥ 75 gallons, that is not the result of addition from the refueling water storage tank
SR 3.5.1.5	Verify power is removed from each accumulator isolation valve operator when pressurizer pressure is ≥ 1000 psig.	31 days

Need to justify deviation from Unit 1 which includes TPBARs. Revise page to Developmental B.

Open Pending Receipt of Information

Justifications for Rev B Changes to TS/TS Bases 3.5 (3.5.1-3.5.5) item 2 references Westinghouse letter WBT-D-1177 dated October 19, 2009 as affecting TS 3.5.4 (see report page E2-3 of 11). Justify why RWST TS are unchanged from Developmental A.

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.4 Refueling Water Storage Tank (RWST)

LCO 3.5.4 The RWST shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RWST boron concentration not within limits. <u>OR</u> RWST borated water temperature not within limits.	A.1	Restore RWST to OPERABLE status.	8 hours
B. RWST inoperable for reasons other than Condition A.	B.1	Restore RWST to OPERABLE status.	1 hour
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	C.2	Be in MODE 5.	36 hours

APPROVED
By Carl Schulten at 11:30 am, Nov 08, 2010

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued) Matches U1 RA A.2 Notes. Why is this Developmental B?	A.2 -----------NOTES------------ 1. Isolation devices in high radiation areas may be verified by use of administrative means. 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ---------------------------------- Verify the affected penetration flow path is isolated.	Once per 31 days for isolation devices outside containment <u>AND</u> Prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days for isolation devices inside containment

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. ------------NOTE---------------- Only applicable to penetration flow paths with two containment isolation valves. ------------------------------------ One or more penetration flow paths with two containment isolation valves inoperable except for purge valve or shield building bypass leakage not within limit.	B.1	Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange	1 hour
C. ------------NOTE---------------- Only applicable to penetration flow paths with only one containment isolation valve and a closed system. ------------------------------------ One or more penetration flow paths with one containment isolation valve inoperable.	C.1	Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange	4 hours
	AND		
	C.2	-----------NOTES------------ 1. Isolation devices in high radiation areas may be verified by use of administrative means. 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ---------------------------------	
			(continued)

Matches U1 RA C.2 Notes. Why is this Developmental B?

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.3.1	Verify each containment purge valve is closed, except when the containment purge valves are open for pressure control, ALARA or air quality considerations for personnel entry, or for Surveillances that require the valves to be open.	31 days
SR 3.6.3.2	-----------------------------NOTE---------------------------- Valves and blind flanges in high radiation areas may be verified by use of administrative controls. --- Verify each containment isolation manual valve and blind flange that is located outside containment, the containment annulus, and the Main Steam Valve Vault Rooms, <u>and not locked, sealed, or otherwise secured</u> and required to be closed during accident conditions is closed, except for containment isolation valves that are open under administrative controls.	 31 days
SR 3.6.3.3	-----------------------------NOTE---------------------------- Valves and blind flanges in high radiation areas may be verified by use of administrative controls. --- Verify each containment isolation manual valve and blind flange that is located inside containment, the containment annulus, and the Main Steam Valve Vault Rooms, <u>and not locked, sealed, or otherwise secured</u> and required to be closed during accident conditions is closed, except for containment isolation valves that are open under administrative controls.	 Prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days
SR 3.6.3.4	Verify the isolation time of each power operated and each automatic containment isolation valve is within limits.	In accordance with the Inservice Testing Program or 92 days

Matches U1; why Development B?

(continued)

3.7 PLANT SYSTEMS

3.7.1 Main Steam Safety Valves (MSSVs)

LCO 3.7.1 Five MSSVs per steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

"59" is from U1 A31 which is not in U2.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more steam generators with one MSSV inoperable.	A.1 Reduce THERMAL POWER to ≤ 58 % RTP.	4 hours
B. One or more steam generators with two or more MSSVs inoperable.	B.1 Reduce THERMAL POWER to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs. <u>AND</u> ------------NOTE------------ Only required in MODE 1. ----------------------------- B.2 Reduce the Power Range Neutron Flux - High reactor trip setpoint to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	4 hours

(continued)

3.7 PLANT SYSTEMS

3.7.6 Condensate Storage Tank (CST)

LCO 3.7.6 The CST level shall be ≥ 200,000 gal.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. CST level not within limit.	A.1	Verify by administrative means OPERABILITY of ERCW backup water supply.	4 hours AND Once per 12 hours thereafter
	AND		
	A.2	Restore CST level to within limit.	7 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 4, without reliance on steam generator for heat removal.	18 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	<u>AND</u> A.3 Restore offsite circuit to OPERABLE status.	72 hours <u>AND</u> 6 days from discovery of failure to meet LCO
B. One or more ~~required~~ DG(s) in Train A inoperable. <u>OR</u> One or more ~~required~~ DG(s) in Train B inoperable.	B.1 Perform SR 3.8.1.1 for the offsite circuits.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u> B.2 Declare required feature(s) supported by the inoperable DG(s) inoperable when its required redundant feature(s) is inoperable	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u> B.3.1 Determine OPERABLE DG(s) is not inoperable due to common cause failure.	24 hours
	<u>OR</u> B.3.2 Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours
	<u>AND</u>	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.4 Restore required DG to OPERABLE status.	14 days AND 17 days from discovery of failure to meet LCO
C. Two required DGs in Train A inoperable. OR Two required DGs in Train B inoperable.	C.1 Perform SR 3.8.1.1 for the offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND C.2 Declare required feature(s) supported by the inoperable DGs inoperable when its required redundant feature(s) is inoperable.	4 hours from discovery of Condition C concurrent with inoperability of redundant required feature(s)
	AND C.3.1 Determine OPERABLE DGs are not inoperable due to common cause failure.	12 hours
	OR C.3.2 Perform SR 3.8.1.2 for OPERABLE DGs.	12 hours
	AND	(continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. (continued)	C.4	Restore at least one required DG to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
D. Two offsite circuits inoperable.	D.1	Declare required feature(s) inoperable when its redundant required feature(s) is inoperable.	12 hours from discovery of Condition D concurrent with inoperability of redundant required features
	AND		
	D.2	Restore one offsite circuit to OPERABLE status.	24 hours

(continued)

4.0 DESIGN FEATURES

4.1 Site

4.1.1 Site and Exclusion Area Boundaries

The site and exclusion area boundaries shall be as shown in Figure 4.1-1.

4.1.2 Low Population Zone (LPZ)

The LPZ shall be as shown in Figure 4.1-2 (within the 3-mile circle).

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 193 fuel assemblies. Each assembly shall consist of a matrix of ~~Zircalloy or~~ Zirlo fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod Assemblies

The reactor core shall contain 57 control rod assemblies. The control material shall be boron carbide with silver indium cadmium tips as approved by the NRC.

(continued)

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks (shown in Figure 4.3-1) are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.95 + 0.05~~5.0~~ weight percent;

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which, includes an allowance for uncertainties as described in Sections 4.3.2.7 and 9.1 of the FSAR;

c. Distances between fuel assemblies are a nominal 10.375 inch center-to-center spacing in the twenty-four flux trap rack modules.

d. Fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage.

e. Fuel assemblies with initial enrichments greater than 3.80 weight percent and less than a maximum of 5 percent enrichment (nominally 4.95 ± 0.05 percent) may be stored in the spent fuel racks in one of four arrangements with specific limits as identified below:

1. Spent fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in Figure 4.3-3, depending upon the specified initial enrichment.

2. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in Figure 4.3-4.

3. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material.

(continued)

5.7.2.12 Steam Generator (SG) Program (continued)

2. Accident induced leakage performance criterion: The primary-to-secondary accident induced leakage rate for any design basis accident, other than an SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. For design basis accidents that have a faulted steam generator, accident induced leakage is not to exceed 1.0 gallon per minute (gpm) for the faulted steam generator and 150 gallons per day (gpd) for the non-faulted steam generators. For design basis accidents that do not have a faulted steam generator, accident induced leakage is not to exceed 150 gpd per steam generator.

3. The operational leakage performance criterion is specified in LCO~~0~~ 3.4.13, "RCS Operational LEAKAGE."

c. Provisions for SG tube repair criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1~~7~~, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage~~ following SG replacement~~.

(continued)

5.7 Procedures, Programs, and Manuals

5.7.2.12 Steam Generator (SG) Program (continued)

Open Pending Receipt of Information

What's the justification for the deviation.

2. Inspect 100% of the tubes at sequential periods of ~~144, 108, 72, and thereafter,~~ 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. ~~In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period.~~ No SGs shall operate for more than 24~~72~~ effective full power months or one~~three~~ refueling outages (whichever is less) without being inspected.

3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

e. Provisions for monitoring operational primary-to-secondary LEAKAGE.

5.7.2.13 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation and low pressure turbine disc stress corrosion cracking. The program shall include:

a. Identification of a sampling schedule for the critical variables and control points for these variables;

b. Identification of the procedures used to measure the values of the critical variables;

c. Identification of process sampling points, which shall include monitoring the discharge of the condensate pumps for evidence of condenser in leakage;

d. Procedures for the recording and management of data;

(continued)

5.7 Procedures, Programs, and Manuals (continued)

5.7.2.13 Secondary Water Chemistry Program (continued)

e. Procedures defining corrective actions for all off control point chemistry conditions; and

f. A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events, which is required to initiate corrective action.

5.7.2.14 Ventilation Filter Testing Program (VFTP)

A program shall be established to implement the following required testing of Engineered Safety Feature (ESF) filter ventilation systems at the frequencies specified in accordance with Regulatory Guide 1.52, Revision 2; ASME N510-1989, and the exceptions noted for each ESF system in Tables 6.5-1, 6.5-2, 6.5-3, and 6.5-4 of the FSAR.

a. Demonstrate for each of the ESF systems that an inplace test of the high efficiency particulate air (HEPA) filters shows a penetration and system bypass within acceptance criterion when tested in accordance with Regulatory Guide 1.52, Revision 2, the exceptions noted for each ESF system in Tables 6.5-1, 6.5-2, 6.5-3, and 6.5-4 of the FSAR, and ASME N510-1989 at the system flowrate specified below.

ESF VENTILATION SYSTEM	ACCEPTANCE CRITERIA	FLOW RATE
Reactor Building Purge	< 1.00%	14,000 cfm ± 10%
Emergency Gas Treatment	< 0.05%	4,000 cfm ± 10%
Auxiliary Building Gas Treatment	< 0.05%	9,000 cfm ± 10%
Control Room Emergency	< 1.00%	4,000 cfm ± 10%

(continued)

5.7 Procedures, Programs, and Manuals

5.7.2.14 Ventilation Filter Testing Program (VFTP) (continued)

b. Demonstrate for each of the ESF systems that an inplace test of the charcoal adsorber shows a penetration and system bypass within acceptance criterion when tested in accordance with Regulatory Guide 1.52, Revision 2, the exceptions noted for each ESF system in Tables 6.5-1, 6.5-2, 6.5-3, and 6.5-4 of the FSAR, and ASME N510-1989 at the system flowrate specified below.

ESF VENTILATION SYSTEM	ACCEPTANCE CRITERIA	FLOW RATE
Reactor Building Purge	< 1.00%	14,000 cfm ± 10%
Emergency Gas Treatment	< 0.05%	4,000 cfm ± 10%
Auxiliary Building Gas Treatment	< 0.05%	9,000 cfm ± 10%
Control Room Emergency	< 1.00%	4,000 cfm ± 10%

(continued)

5.7.2.14 Ventilation Filter Testing Program (VFTP) (continued)

c. Demonstrate for each of the ESF systems that a laboratory test of a sample of the charcoal adsorber, when obtained as described in Regulatory Guide 1.52, Revision 2, and the exceptions noted for each ESF system in Tables 6.5-1, 6.5-2, 6.5-3, and 6.5-4 of the FSAR, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of ≤ 30°C and greater than or equal to the relative humidity specified below.

ESF VENTILATION SYSTEM	METHYL IODIDE PENETRATION	RELATIVE HUMIDITY
Reactor Building Purge	< 10%	95%
Emergency Gas Treatment	< 0.175%	70%
Auxiliary Building Gas Treatment	< 0.175%	70%
Control Room Emergency	< 1.0%	70%

d. Demonstrate for each of the ESF systems that the pressure drop across the entire filtration unit is less than the value specified below when tested in accordance with Regulatory Guide 1.52, Revision 2, the exceptions noted for each ESF system in Tables 6.5-1, 6.5-2, 6.5-3, and 6.5-4 of the FSAR, and ASME N510-1989 at the system flowrate specified below.

ESF VENTILATION SYSTEM	PRESSURE DROP	FLOW RATE
Reactor Building Purge	< 4.7 inches water	14,000 cfm ± 10%
Emergency Gas Treatment	< 7.6 inches water	4,000 cfm ± 10%
Auxiliary Building Gas Treatment	< 7.6 inches water	9,000 cfm ± 10%
Control Room Emergency	< 3.5 inches water	4,000 cfm ± 10%

(continued)

5.9 Reporting Requirements (continued)

5.9.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

1. WCAP-9272-P-A, WESTINGHOUSE RELOAD SAFETY EVALUATION METHODOLOGY," July 1985 (W Proprietary). (Methodology for Specifications 3.1.4 - Moderator Temperature Coefficient, 3.1.6 - Shutdown Bank Insertion Limit, 3.1.7 - Control Bank Insertion Limits, 3.2.1 - Heat Flux Hot Channel Factor, 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor, 3.2.3 - Axial Flux Difference, and 3.9.1 - Boron Concentration).

2a. WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," January 2005 (W Proprietary). (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor, and 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).~~WCAP-12945-P-A, Volume 1 (Revision 2) and Volumes 2 through 5 (Revision 1), "Code Qualification Document for Best-Estimate Loss of Coolant Analysis," March 1998 (W Proprietary). (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor, and 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).~~

2b. WCAP-10054-P-A, "Small Break ECCS Evaluation Model Using NOTRUMP Code," August 1985. Addendum 2, Rev. 1: "Addendum to the Westinghouse Small Break ECCS Evaluation Model using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model," July 1997. (W Proprietary). (Methodology for Specifications 3.2.1 - Heat Flux Hot Channel Factor, and 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).

3. WCAP-10216-P-A, Revision 1A, "RELAXATION OF CONSTANT AXIAL OFFSET CONTROL F(Q) SURVEILLANCE TECHNICAL SPECIFICATION," February 1994 (W Proprietary). (Methodology for Specifications 3.2.1 - Heat Flux Hot Channel Factor (W(Z) Surveillance Requirements For F(Q) Methodology) and 3.2.3 - Axial Flux Difference (Relaxed Axial Offset Control).)

4. WCAP-12610-P-A, "VANTAGE + FUEL ASSEMBLY REFERENCE CORE REPORT," April 1995. (W Proprietary). (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor).

(continued)

5.9 Reporting Requirements (continued)

5.9.6 Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

a. RCS pressure and temperature limits for heatup, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

LCO 3.4.3 RCS Pressure and Temperature (P/T) Limits

~~LCO 3.4.12 Cold Overpressure Mitigation System (COMS)~~

SRXB confirmation that changes per Westinghouse WBT-D-1342, dated December 10,2009 are per acceptable.

b. ~~The analytical methods used to determine the RCS pressure and temperature limits shall be those previously reviewed and approved by the NRC. The acceptability of the analytical methods is documented in NRC letter, "WATTS BAR UNIT 1 - ACCEPTANCE FOR REFERENCING OF PRESSURE TEMPERATURE LIMITS METHODOLOGY AND PRESSURE TEMPERATURE LIMITS REPORT (TAC M89048)", September 22, 1995 and "EXEMPTION FROM THE REQUIREMENTS OF 10 CFR Part 50.60, ACCEPTANCE CRITERIA FOR FRACTURE PREVENTION MEASURES FOR LIGHTWATER NUCLEAR POWER REACTORS FOR NORMAL OPERATION - WATTS BAR NUCLEAR PLANT (TAC NO. M99063)." September 29, 1997. Specifically, the analytical methods are described in the following references:~~The power operated relief valve lift settings required to support the Cold Overpressure Mitigation System (COMS) and the COMS arming temperature shall be established and documented in the PTLR for the following:

LCO 3.4.12 Cold Overpressure Mitigation System

c. The analytical methods used to determine the RCS pressure and temperature limits and Cold Overpressure Mitigation System setpoints shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. WCAP-14040-A, Rev. 4 "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves."~~Letter, W. J. Museler to NRC, regarding request for exemption from 10 CFR 50.60, March 10, 1994.~~

2. The PTLR will contain the complete identification for each of the TS reference Topical Reports used to prepare the PTLR (i.e., report number, title, revision, date, and any supplements).~~Letter, D. E. Nunn to NRC, regarding heatup and cooldown curves for normal operation (submitting WCAP-14176 and WCAP-14040, Rev. 1), December 23, 1994.~~

(continued)

~~3. Letter, R. R. Baron to NRC, responding to NRC July 11, 1995, request for additional information, July 31, 1995.~~

~~4. Letter, R. R. Baron to NRC providing more information regarding cold overpressure mitigating system setpoints, September 8, 1995.~~

~~5. Letter, J. A. Scalice to NRC, regarding request for exemption from 10 CFR 50.60, concerning use of Code Case N-514 to determine LTOP setpoints, dated June 20, 1997.~~

~~c.~~d. The PTLR shall be provided to the NRC upon issuance for each reactor vessel fluenc~~y~~e period and for any revision or supplement thereto.

(continued)

5.9.7 EDG Failures Report

If an individual emergency diesel generator (EDG) experiences four or more valid failures in the last 25 demands, these failures and any nonvalid failures experienced by that EDG in that time period shall be reported within 30 days. Reports on EDG failures shall include the information recommended in Regulatory Guide 1.9, Revision 3, Regulatory Position C.4, or existing Regulatory Guide 1.108 reporting requirement.

5.9.8 PAMS Report

When a Report is required by Condition B or F~~G~~ of LCO 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

5.9.9 Steam Generator Tube Inspection Report

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.7.2.12, Steam Generator (SG) Program. The report shall include:

a. The scope of inspections performed on each SG,

b. Active degradation mechanisms found,

c. Nondestructive examination techniques utilized for each degradation mechanism,

d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,

e. Number of tubes plugged during the inspection outage for each active degradation mechanism,

f. Total number and percentage of tubes plugged to date,

g. The results of condition monitoring, including the results of tube pulls and in-situ testing, and

h. The effective plugging percentage for all plugging in each SG.

ENCLOSURE 2

TVA Responses to NRC Comments on Unit 2 Technical Specifications

1. **Page number / Item:**

   3.2-9 and 3.2-10 / "AND" between REQUIRED ACTIONS A.4 and A.5.

   NRC Comment(s):

   Move the "AND" from the top of page 3.2-10 to the bottom of page 3.2-9.

   TVA Response(s):

   Developmental Revision F of the Unit 2 TS moves the "AND" from the top of page 3.2-10 to the bottom of page 3.2-9.

   A search of the Unit 2 TS for the same issue on other pages resulted in the same changes being made to the following page pairs: 3.4-30 / 3.4-31 and 3.8-1 / 3.8-2.

2. **Page number / Item:**

   3.3-5 / REQUIRED ACTION N.2

   NRC Comment(s):

   Discrepancy: U1 A68 (TSTF-169) shows P-8 revised to P-7.

   TVA Response(s):

   Amendment 68 to the Unit 1 TS revised "P-8" to "P-7." The review matrix provided by Reference 1 noted that changes made by Amendment 68 would be implemented on Unit 2. This change was inadvertently missed.

   Developmental Revision F of the Unit 2 TS revises TS LCO 3.3.1, REQUIRED ACTION N.2 to read, "Reduce THERMAL POWER to < P-7." instead of "Reduce THERMAL POWER to < P-8."

3. **Page number / Item:**

   3.3-15 / ALLOWABLE VALUE column for items 3.a. and 4. (three places)

   NRC Comment(s):

   "RTP" is split such that "R" is at the end of the first line and "TP" is on the next line.

   TVA Response(s):

   Developmental Revision B of the Unit 2 TS inadvertently caused formatting issues such as this one.

   Developmental Revision F of the Unit 2 TS corrects font size and column widths in affected instrumentation tables. Change bars are not shown for these format changes.

4. **Page number / Item:**

   3.3-15 / Note "(c)"

   NRC Comment(s):

   The following comment is shown for the last two sentences of this note: "Revise Note (c) to specify a UFSAR citation."

   TVA Response(s):

   Developmental Revision F of the Unit 2 TS includes TSTF-493 changes to applicable instrumentation tables and (where applicable) SRs. This comment is addressed by these changes.

5. **Page number / Item:**

   3.3-17 / APPLICABLE MODES ... column for the third line for Item 5.

   NRC Comment(s):

   "(g)" is separated from "5" on the previous line.

   TVA Response(s):

   See the response to Item 3.

6. **Page number / Item:**

   3.3-17 / Note "(c)", last two sentences

   NRC Comment(s):

   "Revise Note (c) to specify a UFSAR citation."

   TVA Response(s):

   See the response to Item 4.

7. **Page number / Item:**

   3.3-19 / ALLOWABLE VALUE column for Item 10.

   NRC Comment(s):

   "A47 and A68 retained 89.7%. NTSP. JFD-8 (TSTF-493) shown in Bases markup does not apply to AV changes. Bases JFD-7 describes change as specific to Unit 1; Bases text changes AV from % indicated loop flow to % thermal design flow. EICB needs to confirm.

   TVA Response(s):

   1. Per setpoint calculation WCAP-17044, Rev. 0 (Setpoint Methodology for Watts Bar Unit 2), the ALLOWABLE VALUE for item 10. Of Unit 2 TS Table 3.3.1-1 (Reactor Coolant Flow – Low) should be 89.7%. Developmental Revision F of the Unit 2 TS (corrects) this value.

   2. TSTF-493 does not apply to this change.

3. The NTSP and AV units are correctly specified in the TS as % flow.

4. The response to Item 15.b. of Enclosure 4 (TVA Response to NRC Comments on Unit 2 Technical Specifications Bases) addresses the portion of the comment concerning % indicated loop flow vs. % thermal design flow adjusted for uncertainties (95,000 gpm).

8. Page number / Item:

3.3-19 / Note "(c)", last two sentences

NRC Comment(s):

"Revise Note (c) to specify a UFSAR citation."

TVA Response(s):

See the response to Item 4.

9. Page number / Item:

3.3-20 / FUNCTION column for Items 13.a) and 13.b)

NRC Comment(s):

The "OR" just prior to Item 13.b. should be "or."

TVA Response(s):

During TVA meeting with NRC staff on May 10, 2011, it was decided that the "OR" just prior to Item 13.b. needs to be deleted.

Developmental Revision F of the Unit 2 TS deletes the "OR" just prior to Item 13.b.

10. Page number / Item:

3.3-20 / ALLOWABLE VALUE column for the first time delay portion of Item 13.a)

NRC Comment(s):

"licensee confirmatory item" [This comment is for the "(Refer to Note 3, Page 3.3-23)" verbiage in the column.]

TVA Response(s):

The note is currently on the referenced page. TVA will ensure that this and any other cross-reference type items remain correct throughout the TS / TS Bases process.

ENCLOSURE 2

TVA Responses to NRC Comments on Unit 2 Technical Specifications

11. **Page number / Item:**

3.3-20 / SR 3.3.1.10 for Item 14.a.

NRC Comment(s):

"Provide plant-specific design to justify not applying footnotes (a) and (b) per TSTF-493."

TVA Response(s):

See the response to Item 4. As part of these changes, the footnotes were added for SR 3.3.1.10 for Item 14.a.

12. **Page number / Item:**

3.3-20 / ALLOWABLE VALUE column for item 14.b.

NRC Comment(s):

"open" is split such that "o" is at the end of the first line and "pen" is on the next line.

TVA Response(s):

See the response to Item 3.

13. **Page number / Item:**

3.3-21 / ALLOWABLE VALUE column for item 16.e.

NRC Comment(s):

"RTP" is split such that "R" is at the end of the first line and "TP" is on the next line.

TVA Response(s):

See the response to Item 3.

14. **Page number / Item:**

3.3-28 / CONDITION J.

NRC Comment(s):

"License Amendment No.?"

TVA Response(s):

As noted in the TS - TS Bases Review matrix provided by Reference 2, this change was made as a result of Amendment 75 to the Unit 1 TS.

No change is required.

15. Page number / Item:

3.3-31 / FREQUENCY for SR 3.3.2.5

NRC Comment(s):

"JFD7. RAI: Need staff SE approving 18 Frequency for MDR relay tests."

TVA Response(s):

The safety evaluation that approved 18 month frequency for the Potter and Brumfield MDR series relays was documented in NRC to Westinghouse letter dated July 12, 2000, "Review of Westinghouse Topical Reports WCAP-13877, Revision 2-P and WCAP-13878-P, Revision 2 on Solid State Protection System (SSPS) Slave Relays (TAC No. MA7264)."

The first paragraph of this letter stated, "The NRC staff has completed its review of the subject Westinghouse Electric Company (WEC) topical reports (TRs) which were submitted by letter dated November 5, 1999. The NRC staff had previously reviewed and approved Revision 1 of these TRs. A May 31, 1996, letter from Bruce A. Boger of the NRC to Tom Green, Chairman of the Westinghouse Owners Group (WOG), documents the NRC's acceptance of WCAP-13878, Revision 1, and an October 26, 1998, letter from Thomas E. Essig of the NRC to Louis F. Liberatori of the WOG documents the NRC acceptance of WCAP-13877, Revision 1. However, WEC subsequently discovered certain errors in the TRs and therefore submitted Revision 2 of these TRs to the NRC for review and approval. WEC has further determined that the changes do not affect the conclusions of the WCAPs and the NRC safety evaluations. The NRC staff has reviewed the changes and finds them acceptable. The enclosed safety evaluation (SE) confirms the acceptability of the proposed changes."

4.0 (Conclusion) of WCAP-13878, Revision 1, read as follows:

> "Based on the review of the WCAP-13878, Rev. 1., WCAP-14117, Rev. 1, and WCAP-13900, Rev. 0, the staff concludes that the failure data provided for P&B MDR slave relays support the proposed test interval extension to every refueling outage. The staff, therefore, finds the above topical reports acceptable for proposed extensions of P&B MDR ESFAS slave relay tests to a refueling outage frequency. However, the staff further concludes that if two or more P&B MDR ESFAS subgroup relays fail in a 12-month period, a referencing licensee should reevaluate the adequacy of the extended surveillance interval. The reevaluation should consider design, maintenance and testing of all P&B MDR ESFAS subgroup relays. If the licensee determines that the surveillance interval is inadequate for detecting a single relay failure, the surveillance interval should be decreased. The revised surveillance interval should be such that the licensee can detect an ESFAS subgroup relay failure prior to the occurrence of a second failure.
>
> Additionally, licensees that use WCAP-13878, Rev. 1 and WCAP-13900, Rev. 0 to implement plant specific TS changes for test interval extensions involving P&B MDR relays for ESFAS slave applications should also:
>
> 1. Confirm the applicability of the WCAP-13878, Rev. 1 analyses for their plant.

2. Ensure that their procurement program for P&B MDR relays is adequate for detecting the types of failures that are discussed in References 9, 10, 11 and 12.

3. Ensure that all pre-1992 P&B MDR relays which are used in either normally energized or a 20% duty cycle have been removed from ESFAS applications.

4. Ensure that the contact loading analysis for P&B MDR relays has been performed to determine the acceptability of these relays."

TVA will address the items in the paragraph as follows: The WBN Maintenance Rule program implements the requirements of 10 CFR 50.65 and provides instructions for initiation, analysis, retrieval, trending, and periodic reporting of data relative to performance indicators of plant systems and components. The program includes guidance for trending and reporting of repetitive preventable failures of functions which are within the scope of the Maintenance Rule. It also includes performance of cause determinations for failures to meet performance criteria and for repetitive failures. The program assigns plant system engineers responsibility for identifying when performance criteria are not met and increased monitoring under paragraph (a)(1) of the Maintenance Rule is required, along with the corrective actions necessary to restore acceptable performance. The functions performed by the slave relays are in the scope of the program.

Applicable attachment(s) of WBN Technical Instruction TI-119, Maintenance Rule Performance Indicator Monitoring, Trending, And Reporting, will be revised prior to implementation of the approved Unit 2 TS. This procedure change will require that the surveillance interval be evaluated and reduced, when needed, if two or more P&B MDR series relays used for Unit 2 TS LCOs 3.3.2 and 3.3.6 fail within a 12-month interval.

TVA addressed each of the numbered items above as follows:

1. Prior to implementation of the approved Unit 2 TS, TVA will confirm the applicability of the WCAP-13878, Rev. 1 analyses for P&B MDR series relays.

2. Prior to implementation of the approved Unit 2 TS, TVA will develop a Procurement Engineering Group package for procurement of P&B MDR series relays. This document will ensure TVA's procurement program for P&B MDR relays is adequate for detecting the types of failures that are discussed in References 9, 10, 11 and 12 of WCAP-13878, Revision 1.

3. WBN Unit 2 did not install any P&B MDR series relays as SSPS slave relays until the SSPS output cabinet refurbishment in 2010. P&B MDR series relays for the SSPS refurbishment were procured new.

4. Calculation WBNEEBIDQ00209920100002, Rev. 0 (SSPS ESFAS Slave Relay Contact Loading) concludes that the contact loading analysis for P&B MDR relays is acceptable.

16. **Page number / Item:**

    3.3-33 (page 1 of Table 3.3.2-1) / Note "(c)", last two sentences

    NRC Comment(s):

    "Revise Note (c) to specify a UFSAR citation."

    TVA Response(s):

    See the response to Item 4.

17. **Page number / Item:**

    3.3-34 (page 2 of Table 3.3.2-1) / Note "(c)", last two sentences

    NRC Comment(s):

    "Revise Note (c) to specify a UFSAR citation."

    TVA Response(s):

    See the response to Item 4.

18. **Page number / Item:**

    3.3-35 (page 3 of Table 3.3.2-1) / Note "(c)", last two sentences

    NRC Comment(s):

    "Revise Note (c) to specify a UFSAR citation."

    TVA Response(s):

    See the response to Item 4.

19. **Page number / Item:**

    3.3-36 (page 4 of Table 3.3.2-1) / Note "(c)", last two sentences

    NRC Comment(s):

    "Revise Note (c) to specify a UFSAR citation."

    TVA Response(s):

    See the response to Item 4.

20. **Page number / Item:**

3.3-37 (page 5 of Table 3.3.2-1) / FUNCTION column for Item 6.b.1) and 6.b.2)

NRC Comment(s):

a. *The "Or" between the two time delay items should be "or."*

b. *The "OR" just prior to Item 6.b.2) should be "or."*

TVA Response(s):

a. Developmental Revision F of the Unit 2 TS corrects this typographical error.

b. During TVA meeting with NRC staff on May 10, 2011, it was decided that the "OR" just prior to Item 6.b.2) needs to be deleted.

Developmental Revision F of the Unit 2 TS deletes the "OR" just prior to Item 6.b.2).

21. **Page number / Item:**

3.3-37 (page 5 of Table 3.3.2-1) / ALLOWABLE VALUE column for the first time delay portion of Item 6.b.1)

NRC Comment(s):

"licensee confirmatory item" [This comment is for the "(Note 1, Page 3.3-40)" verbiage in the column.]

TVA Response(s):

See the response to Item 10.

22. **Page number / Item:**

3.3-37 (page 5 of Table 3.3.2-1) / Note "(c)", last two sentences

NRC Comment(s):

"Revise Note (c) to specify a UFSAR citation."

TVA Response(s):

See the response to Item 4.

23. **Page number / Item:**

3.3-38 (page 6 of Table 3.3.2-1) / Top of the page

NRC Comment(s):

"JFD 8. Notes (b) & (c) not reviewed on this page."

TVA Response(s):

Comment withdrawn by NRC staff during May 10, 2011, meeting with TVA.

24. **Page number / Item:**

3.3-38 (page 6 of Table 3.3.2-1) / FUNCTION column for Item 7.b.

NRC Comment(s):

The "And" just prior to the last portion of Item 7.b. should be "and."

TVA Response(s):

Developmental Revision F of the Unit 2 TS corrects this typographical error.

25. **Page number / Item:**

3.3-38 (page 6 of Table 3.3.2-1) / Note "(c)", last two sentences

NRC Comment(s):

"Revise Note (c) to specify a UFSAR citation."

TVA Response(s):

See the response to Item 4.

26. **Page number / Item:**

3.3-39 (showed as page 8 of Table 3.3.2-1; was actually page 9 of Table 3.3.2-1) / Note "(c)", last two sentences

NRC Comment(s):

"Revise Note (c) to specify a UFSAR citation."

TVA Response(s):

Developmental Revision F of the Unit 2 TS includes TSTF-493 changes to applicable instrumentation tables and (where applicable) SRs. This deletes the footnotes for SRs 3.3.2.4 and 3.3.2.9 for Functions 8.b.(1) and 8.b.(2).

The review of TS Table 3.3.2-1 to address this item noted the discrepancy in the "(Page X of y)" portion of the table header. Developmental Revision F of the Unit 2 TS also corrects this.

27. **Page number / Item:**

    3.3-46 / Items (f) and (h)

    NRC Comment(s):

    "Justify deviations from WBN1 on this page."

    TVA Response(s):

    The portion of revision of interest is the replacement of "ICCM" with "Common Q." The TS markup did not provide justification for this change. The markup of the equivalent TS Bases provided the following justification for its changes: "Revised for Unit 2 specific configuration."

    The marked-up pages for Developmental Revision F of the Unit 2 TS include a corrected markup with the applicable justification.

28. **Page number / Item:**

    3.3-47 / APPLICABILITY

    NRC Comment(s):

    "Insert period (.)" [following "MODES 1, 2, and 3"]

    TVA Response(s):

    Developmental Revision F of the Unit 2 TS corrects this editorial / formatting error with the APPLICABILITY.

    A search of the Unit 2 TS for the same issue on other pages resulted in the correction of editorial / formatting error with the APPLICABILITY on the following pages: 3.1-15, 3.4-20, 3.4-18, 3.4-23, 3.4-28, 3.4-38, 3.5-6, 3.6-2, 3.6-22, 3.6-31, 3.7-1, 3.7-18, 3.7-21, 3.7-24, 3.9-1, 3.9-2, and 3.9-3.

29. **Page number / Item:**

    3.3-56 / FREQUENCY for SR 3.3.6.5.

    NRC Comment(s):

    "JFD7. RAI: Need staff SE approving 18 Frequency for MDR relay tests."

    TVA Response(s):

    See the response to Item 15.

30. **Page number / Item:**

3.3-58 / ALLOWABLE VALUE for Item 3.

NRC Comment(s):

"WBN1 deviation not justified"

TVA Response(s):

As noted in the TS - TS Bases Review matrix provided by Reference 2, this portion of the Unit 2 TS was revised to be consistent with change made to Unit 1 TS by Amendment 74. However, the values in parentheses are not consistent with the Unit 1 values contained in parentheses.

A review of calculations 1-RE-90-130 (*Demonstrated Accuracy Calculation For Containment Building Purge And Exhaust Monitors*) and 2-RE-090-130 (*Containment Building Purge Air Exhaust Monitors*) confirms that the ALLOWABLE value for item 3. of TS Table 3.3.6-1 is correct as shown in both the Unit 1 TS and the Unit 2 TS.

The values in parentheses are different for the two units because of differences in the detector sensitivities for the instruments in Units 1 and 2. The cpm values in the Unit 2 TS reflect the preliminary detector sensitivity values provided by the manufacturer. The detector has been assembled and tested, and the final sensitivity value is different from the preliminary value. TVA will revise the calculation and submit a change to the Unit 2 TS using the manufacturer's final detector sensitivity value.

31. **Page number / Item:**

3.4-1 / "B" in lower right hand corner (i.e., the revision number)

NRC Comment(s):

"Explain what changes were made to Developmental A. Note that TS A47 revised page 3.4-2, but not page 3.4-1."

TVA Response(s):

Comment withdrawn by NRC staff during May 10, 2011, meeting with TVA.

32. **Page number / Item:**

3.4-2 / SR 3.4.1.4

NRC Comment(s):

"A47 change made for WBN1 is deleted for WBN2"

TVA Response(s):

The TS - TS Bases Review matrix provided by Reference 2 noted the following for TS 3.4.1:

"A47 amended the Unit 1 TS to allow an alternate method for the measurement of RCS total flow rate via measurement of the RCS elbow tap differential pressures. This change will not be made on Unit 2 at this time.

NRC approved A47 via letter dated 10/03/2003."

The justification provided in Reference 8 for this change provided the following:

"Revised to delete TS A47 Reactor Coolant System Flow Measurement Using Elbow Tap Methodology and associated open item in TS 3.4 Bases:

In TS A47, NRC approved the use of an alternative method for measurement of reactor coolant system (RCS) total flow rate via measurement of the RCS elbow tap differential pressures (Δp).

Unit 2 may implement the elbow tap methodology at a future date; however, for now, Unit 2 will use the precision calorimetric flow measurement methodology."

No change is required.

33. **Page number / Item:**

3.4-9 / NOTE

NRC Comment(s):

"SRXB Confirmatory item" points toward "the COMS arming temperature specified in the PTLR."

TVA Response(s):

Reference 7 provided the responses to several of the required action items contained in Appendix HH of NUREG-0847, Supplement 22, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2."

Required action 45. and the response to it from that letter were:

"45. *TVA stated in its response to RAI 5.3.2-2, dated July 31, 2010, that the PTLR would be revised to incorporate the COMS arming temperature. (Section 5.3.2)*

Response: Revision 1 (effective August 12, 2010) to the Unit 2 System Description for the Reactor Coolant System (WBN2-68-4001) was revised to reflect the required revisions to the PTLR. Appendix B, Section 3.2 (*Arming Temperature*) states, "COMS shall be armed when any RCS cold leg temperature is <225°F."

This is a Confirmatory item for the NRC.

No change is required.

34. **Page number / Item:**

3.4-12 / NOTE 2.

NRC Comment(s):

"SRXB Confirmatory item" points toward "the COMS arming temperature specified in the PTLR."

TVA Response(s):

See the response to item 33.

35. **Page number / Item:**

3.4-18 / APPLICABILITY, NOTE, and REQUIRED ACTION B.2

NRC Comment(s):

"SRXB Confirmatory item" points toward:

- *"... > the COMS arming temperature specified in the PTLR." in the APPLICABILITY;*
- *"the COMS arming temperature specified in the PTLR" in NOTE 2; and*
- *"with any RCS temperature < the COMS arming temperature specified in the PTLR." In REQUIRED ACTION B.2.*

TVA Response(s):

See the response to item 33.

36. **Page number / Item:**

3.4-23 / APPLICABILITY

NRC Comment(s):

"SRXB Confirmatory item" points toward "... ≤ the COMS arming temperature specified in the PTLR." in the APPLICABILITY.

TVA Response(s):

See the response to item 33.

37. **Page number / Item:**

3.4-24 / REQUIRED ACTION D.1

NRC Comment(s):

"SRXB Confirmatory item" points toward > the COMS arming temperature specified in the PTLR.

TVA Response(s):

See the response to item 33.

38. **Page number / Item:**

    3.4-25 / CONDITION E.

    NRC Comment(s):

    "SRXB Confirmatory item" points toward "... ≤ the COMS arming temperature specified in the PTLR."

    TVA Response(s):

    See the response to item 33.

39. **Page number / Item:**

    3.4-27 / NOTE for SR 3.4.12.7

    NRC Comment(s):

    "SRXB Confirmatory item" points toward "... ≤ the COMS arming temperature specified in the PTLR."

    TVA Response(s):

    See the response to item 33.

40. **Page number / Item:**

    Pages 3.4-30 and 3.4-31 / "AND" between REQUIRED ACTIONS A.1 and A.2.

    NRC Comment(s):

    Move the "AND" from the top of page 3.4-31 to the bottom of page 3.4-30.

    TVA Response(s):

    See the response to Item 1.

41. **Page number / Item:**

    3.4-33 / LCO 3.4.15, portion 2.

    NRC Comment(s):

    "No deviations result from markup. Why is this Developmental B?"

    TVA Response(s):

    The second page of the cover letter for Reference 2 noted, "The Developmental Revision B of the TS and TS Bases was compared to the WBN Unit 1 TS and TS Bases through Amendment 82 and Revision 100, respectively."

    The TS - TS Bases Review matrix provided by Reference 2 noted the following:

    "A71 amended the Unit 1 TS to remove the operability requirement for the containment atmospheric gaseous radiation monitor. This change is to be applied to Unit 2.

NRC approved A71 via letter dated 11/25/2008."

No change is required.

42. **Page number / Item:**

3.4-34 / SR 3.4.15.2

NRC Comment(s):

"Make change per LCO 3.4.15.2. Make conforming change to WNB1."

TVA Response(s):

Developmental Revision F of the Unit 2 TS deletes "level" from SR 3.4.15.2 to be consistent with the requirements of LCO 3.4.15.

43. **Page number / Item:**

3.5-1 / COMPLETION TIME for REQUIRED ACTION B.1

NRC Comment(s):

"JFC Rev B TS/TS Bases 3.5, item 1"

TVA Response(s):

The TS - TS Bases Review matrix provided by Reference 2 noted the following:

"A81 amended the Unit 1 TS to extend the Completion Time for TS LCO 3.5.1, Condition B from 1 hour to 24 hours. This change is to be applied to Unit 2.

NRC approved A81 via letter dated 09/09/2009."

Reference 8 provided the following justification for the change to page 3.5-1:

"A81 amended the Unit 1 TS to extend the Completion Time for TS LCO 3.5.1, Condition B from 1 hour to 24 hours. R98 made the associated changes to the Unit 1 TS Bases. These changes are to be applied to Unit 2.

NRC approved A81 via letter dated 09/09/2009."

No change is required.

44. **Page number / Item:**

3.5-2 / "≥ 1000 psig" portion of SR 3.5.1.5

NRC Comment(s):

"Need to justify deviation from Unit 1 which includes TPBARs. Revise page to Developmental B."

TVA Response(s):

This value has not been revised since the initial approval / issuance of the Unit 1 TS; Unit 2 TS is consistent with the Unit 1 TS.

During TVA meeting with NRC staff on May 10, 2011, it was noted that this comment should have been made against SR 3.5.1.4.

Unit 2's SR 3.5.1.4 is different than Unit 1's because the Unit 1 version includes information concerning the number of TPBARS. The boron concentration ranges are the same.

Information previously provided concerning Unit 1 TS Amendments to this SR include:

a. The review matrix provided by Reference 1 noted:

"A40 amended the Unit 1 TS to allow Watts Bar to irradiate up to 2304 Tritium Producing Burnable Absorber Rods (TPBARs) in the reactor core each fuel cycle. TPBARS will NOT be used on Unit 2.

NRC approved A40 via letter dated 09/23/2002.

A48 amended the Unit 1 TS to revise the boron concentration requirements and limit the number of Tritium Producing Burnable Absorber Rods (TPBARs) that could be loaded and irradiated in the core to a corresponding value. TPBARS will NOT be used on Unit 2.

NRC approved A48 via letter dated 10/08/2003.

A67 amended the Unit 1 TS to revise the maximum number of TPBARs that can be irradiated in the Unit 1 reactor core to 400. TPBARS will NOT be used on Unit 2; however, the boron concentration changes per this amendment will be used on Unit 2.

NRC approved A67 via letter dated 01/18/2008."

b. The TS - TS Bases Review matrix provided by Reference 2 noted:

"A77 amended the Unit 1 TS to revise the maximum number of TPBARs that can be irradiated in the Unit 1 reactor core to 704. TPBARS will NOT be used on Unit 2.
NRC approved A77 via letter dated 05/04/2009."

No change is required.

45. **Page number / Item:**

3.5-8 / NRC's comment in the upper right hand corner

NRC Comment(s):

"Justifications for Rev B Changes to TS/TS Bases 3.5 (3.5.1-3.5.5) item 2 references Westinghouse letter WBT-D-1177 dated October 19, 2009 as affecting TS 3.5.4 (see report page E2-3 of 11). Justify why RWST TS are unchanged from Developmental A."

TVA Response(s):

The only change made to the Bases for 3.5.4 was minor and did not use a Westinghouse letter as justification.

No change is required.

46. **Page number / Item:**

3.6-8 / REQUIRED ACTION A.2, NOTE 2.

NRC Comment(s):

"Matches U1 RA A.2 Notes. Why is this Developmental B?"

TVA Response(s):

The second page of the cover letter for Reference 2 noted, "The Developmental Revision B of the TS and TS Bases was compared to the WBN Unit 1 TS and TS Bases through Amendment 82 and Revision 100, respectively."

Additionally, the TS - TS Bases Review matrix provided by Reference 2 provided the following:

"A79 amended the Unit 1 TS to allow administrative means of position verification for locked or sealed containment isolation valves. This change is to be applied to Unit 2.

NRC approved A79 via letter dated 09/30/2009."

No change is required.

47. **Page number / Item:**

3.6-9 / REQUIRED ACTION C.2, NOTE 2.

NRC Comment(s):

"Matches U1 RA C.2 Notes. Why is this Developmental B?"

TVA Response(s):

See the response to Item 46.

48. **Page number / Item:**

3.6-12 / SR 3.6.3.2 and SR3.6.3.3

NRC Comment(s):

"Matches U1. Why Developmental B?"

TVA Response(s):

See the response to Item 46.

49. **Page number / Item:**

3.7-1 / REQUIRED ACTION A.1

NRC Comment(s):

"'59' is from U1 A31 which is not in U2."

"TVA February 16, 2011 Letter, Enclosure 5, Commitments, Item #1, future Developmental Revision to revise the RTP value in Required Action A.1."

TVA Response(s):

Item 1 of Enclosure 5 of Reference 3 stated, "A future Developmental Revision to the Unit 2 TS will correct the '58%' value in Unit 2 TS LCO 3.7.1, REQUIRED ACTION A.1 to '59%.'"

Developmental Revision F of the Unit 2 TS corrects the "58%" value in Unit 2 TS LCO 3.7.1, REQUIRED ACTION A.1 to "59%."

50. **Page number / Item:**

3.7-14 / REQUIRED ACTION A.1

NRC Comment(s):

"Spell out 'ERCW.'"

TVA Response(s):

Unit 2 TS is consistent with Unit 1 TS.

No change is required.

51. **Page number / Item:**

3.8-2 / as indicated

NRC Comment(s):

a. Just after REQUIRED ACTION A.3: "Confirmatory"

b. CONDITION B.: "Justify Unit 2 difference." [two places]

c. lower right corner of page: "Verify Unit 2 deviation."

TVA Response(s):

a. This is a Confirmatory item for the NRC.

No change is required.

b. The TS - TS Bases Review matrix provided by Reference 2 provided the following:

"A request was submitted to the NRC via letter dated 11/30/2009 to change the AOT from '14 days' to '72 hours.' This change was made to Unit 2 TS in revision A.

This information is being provided for continuity purpose."

Reference 8 provided the following justification for the changes to this page: "Deleted 'required' from Condition B to remain consistent with TVA license amendment request submittal dated November 30, 2009 (ADAMS Accession ML093640790), requesting a similar change for Unit 1."

The NRC approved the requested changes for Unit 1 as Unit 1 TS Amendment 84 on July 6, 2010 (ADAMS Accession No. ML101390154). Developmental Revision B of the Unit 2 TS is the same as that approved by the NRC in Unit 1 TS Amendment 84.

c. This is a Confirmatory item for the NRC.

No change is required.

52. **Page number / Item:**

4.0-1 / 4.2.1

NRC Comment(s):

"Justify U2 deviation."

TVA Response(s):

The TS - TS Bases Review matrix provided by Reference 2 provided the following:

Reference 8 provided the following justification for this change: "To provide accurate information for fuel composition. The revised information is consistent with information provided in FSAR 4.0."

No change is required.

53. **Page number / Item:**

4.0-2 / 4.3.1.1.a.

NRC Comment(s):

"Justify U2 deviation."

TVA Response(s):

Reference 8 provided the following justification for this change: "This is an editorial change; provides consistency with FSAR 4.3.2.7."

During TVA meeting with the NRC staff on May 10, 2011, the decision was made to go back to "5.0 weight percent."

Developmental Revision F of the Unit 2 TS revised "4.95 $\pm$ 0.05" to "5.0."

54. **Page number / Item:**

5.0-16 / 5.7.2.12.d.1.

NRC Comment(s):

"Justify U2 deviation."

TVA Response(s):

Reference 8 provided the following justification for this change: "Revised various typographical and minor editorial errors."

The version of 5.7.2.12.d.1. prior to the change made per Developmental Revision B of the Unit 2 TS was based on wording approved by NRC for Unit 1 via Amendment 65 on November 3, 2006. The change was based on TSTF-449 and was approved in conjunction with SG replacement.

Per Westinghouse Letter WBT-D-1323, dated December 3, 2009, "The Guidelines still require 100% inspection of the tubes during the first In-Service inspection following the first refueling outage ...."

"Guidelines" mean the Steam Generator Program Guidelines, NEI 97-06. Indirectly, this refers also to the EPRI Steam Generator Guidelines, which are six documents referenced in Section 1.5 of NEI 97-06.

No change is required.

55. **Page number / Item:**

5.0-17 / 5.7.2.12.d.2.

NRC Comment(s):

"What's the justification for the deviation."

TVA Response(s):

Reference 8 provided the following justification for this change: "Corrected / updated information in response to Westinghouse Letter WBT-D-1323, dated December 3, 2009."

The version of 5.7.2.12.d.2. prior to the change made per Developmental Revision B was based on wording approved by NRC for Unit 1 via Amendment 65 on November 3, 2006. The change was based on TSTF-449 and was approved in conjunction with SG replacement.

Per Westinghouse Letter WBT-D-1323, dated December 3, 2009, "The inspection intervals in the draft tech spec are appropriate for a plant with alloy 690 thermally treated tubing. Watts Bar 2 has Alloy 600 Mill-Annealed tubing, and the above change makes the tech spec consistent with the guidelines."

A review of TSTF-449, R4 shows that the changes made by Developmental Revision B of the Unit 2 TS match the first proposed version of d.2. in the TSTF. The Unit 1 TS version of this paragraph matches the third (last) proposed version of d.2. in the TSTF.

References to the "Guidelines" mean the Steam Generator Program Guidelines, NEI 97-06. Indirectly, this refers also to the EPRI Steam Generator Guidelines, which are six documents referenced in Section 1.5 of NEI 97-06.

Section 5 (Frequency of Verification of SG Tube Integrity) of TSTF-449 includes, "The maximum inspection interval requirement for Alloy 600 mill annealed tubing (600MA) is 'Inspect 100% of the tubes at sequential periods of 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. No SG shall operate for more than 24 effective full power months or one refueling outage (whichever is less) without being inspected.' This Frequency is at least as conservative as the current technical specification requirement."

WBN Unit 2 has the original model D3 steam generators, which have Alloy 600 mill-annealed tubing. Thus, the wording proposed for 5.7.2.12.d.2 by Developmental Revision B is that specified by TSTF-493.

No change is required.

56. **Page number / Item:**

5.0-18 / 5.7.2.14 and 5.7.2.14.a. (three places)

NRC Comment(s):

"Justify U2 deviation."

TVA Response(s):

Reference 8 provided the following justification for the changes on this page: "Revised various typographical and minor editorial errors."

The "Table 6.5" is not a valid number for either unit's FSAR. The table numbers provided in Developmental Revision B provide the complete / accurate table numbers for the systems as shown below:

- Table 6.5-1: EGT
- Table 6.5-2: ABGT
- Table 6.5-3: Reactor Building Purge
- Table 6.5-4: Control Room

These changes were made for completeness / consistency with the NRC.

No change is required.

57. **Page number / Item:**

5.0-19 / 5.7.2.14.b.

NRC Comment(s):

"Justify U2 deviation."

TVA Response(s):

See the response to Item 56.

58. **Page number / Item:**

5.0-20 / 5.7.2.14.c.

NRC Comment(s):

"Justify U2 deviation."

TVA Response(s):

See the response to Item 56.

59. **Page number / Item:**

5.0-30 / 5.9.5.2a.

NRC Comment(s):

"Justify U2 deviations."

TVA Response(s):

Reference 8 provided the following justification for the change on this page: "Corrected / updated information in response to Westinghouse Letter WBT-D-1177, dated October 19, 2009."

The revision to 5.9.5.2a. replaced WCAP-12945-P-A with WCAP-16009-P-A. As noted in Section 15.4 of the Unit 2 FSAR:

"A LOCA evaluation methodology for three- and four-loop Pressurized Water Reactor (PWR) plants based on the revised10 CFR 50.46 rules was developed by Westinghouse with support of EPRI and Consolidated Edison and has been approved by the NRC (WCAP-12945-P-A [46]).

More recently, Westinghouse developed an alternative methodology called ASTRUM, which stands for Automated Statistical TReament of Uncertainty Method (WCAP- 16009-P-A [49]). This method is still based on the CQD methodology and follows the steps in the CSAU methodology (NUREG/CR-5249 [45]). However, the uncertainty analysis (Element 3 in the CSAU) is replaced by a technique based on order statistics. The ASTRUM methodology replaces the response surface technique with a statistical sampling method where the uncertainty parameters are simultaneously sampled for each case. The ASTRUM methodology has received NRC approval for referencing in licensing calculations in WCAP-16009-P-A [49]."

No change is required.

60. <u>Page number / Item</u>:

5.0-32 and 5.0-33 / 5.9.6.a. and 5.9.6.c.2 through 5.9.6.c.5

<u>NRC Comment(s)</u>:

"SRXB confirmation that changes per Westinghouse WBT-D-1342, dated December 10, 2009 are per acceptable."

<u>TVA Response(s)</u>:

This is a Confirmatory item for the NRC.

No change is required.

61. <u>Page number / Item</u>:

5.0-34 / 5.9.8

<u>NRC Comment(s)</u>:

"Validate" (Confirm that the "or F" portion of the first sentence is correct.).

<u>TVA Response(s)</u>:

"F" is the correct reference for the second Condition LCO 3.3.3 that has a REQUIRED ACTION that requires a report per 5.9.8.

Developmental Revision B deleted Condition D. which resulted in Condition G. being renumbered as Condition F. Thus, "F" is the correct reference.

No change is required.

ENCLOSURE 3

NRC Comments on Unit 2 Technical Specifications Bases

REVIEWED
By Carl Schulten at 2:44 pm, Jul 30, 2010

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.2.1

In MODE 5, the SDM is verified by performing a reactivity balance calculation, considering the following reactivity effects:

a. RCS boron concentration;

b. Control bank position;

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration; and

g. Design isothermal temperature coefficient (ITC).

Using the ITC accounts for Doppler reactivity in this calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident occurring without the required SDM. This allows time enough for the operator to collect the required data, which includes performing a boron concentration analysis, and complete the calculation.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 26, "Reactivity Control System Redundancy and Capability."

2. Watts Bar FSAR, Section 15.2.4, "Uncontrolled Boron Dilution."

3. [ ]WAT-D-7909, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit Numbers 1 and 2, Uncontrolled Boron Dilution Event Reanalysis and Interim Operating Procedure, FSAR Revision Section 15.2.4 and Licensing Verification Open Item Report OILV-4060 R0", March 31, 1989.

JFD1: Editorial correction. Tech Br. Confirmatory item

Open Pending Receipt of Information

APPROVED
By Carl Schulten at 2:29 pm, Jul 22, 2010

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 13, "Instrumentation and Control."
2. Watts Bar FSAR, Section 15.2.1, "Uncontrolled Rod Cluster Control Assembly Bank Withdrawal From a Subcritical Condition."
3. Watts Bar FSAR, Section 15.2.2, "Uncontrolled Rod Cluster Control Assembly Bank Withdrawal At Power."
4. Watts Bar FSAR, Section 15.2.3, "Rod Cluster Control Assembly Misalignment."
5. Watts Bar FSAR, Section 15.2.4, "Uncontrolled Boron Dilution."
6. Watts Bar FSAR, Section 15.2.5, "Partial Loss of Forced Reactor Coolant Flow."
7. Watts Bar FSAR, Section 15.2.13, "Accidental Depressurization of the Main Steam System."
8. Watts Bar FSAR, Section 15.3.4, "Complete Loss of Forced Reactor Coolant Flow."
9. Watts Bar FSAR, Section 15.3.6, "Single Rod Cluster Control Assembly Withdrawal At Full Power."
10. Watts Bar FSAR, Section 15.4.2.1, "Major Rupture of Main Steam Line."
11. Watts Bar FSAR, Section 15.4.4, "Single Reactor Coolant Pump Locked Rotor."
12. Watts Bar FSAR, Section 15.4.6, "Rupture of a Control Rod Drive Mechanism Housing (Rod Cluster Control Assembly Ejection)."
13. Watts Bar FSAR, Section 4.3, "Nuclear Design."
14. Watts Bar FSAR, Section 7.7.1.3.2, "Main Control Room Rod Position Indication."
15. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (Addendum 2, April 2002).

Confirmatory approval needed from SCPB

SURVEILLANCE REQUIREMENTS

SR 3.1.9.4 (continued)

Using the ITC accounts for Doppler reactivity in the calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident without the required SDM.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."
2. Title 10, Code of Federal Regulations, Part 50.59, "Changes, Tests, and Experiments."
3. Regulatory Guide 1.68, Revision 2, "Initial Test Programs for Water-Cooled Nuclear Power Plants," August 1978.
4. ANSI/ANS-19.6.1, "Reload Startup PHYSICS TESTS for Pressurized Water Reactors," American National Standards Institute.
5. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology Report," July 1985.
6. Watts Bar FSAR, Section 14.2, "Test Program."
7. WCAP-11618, "MERITS Program - Phase II, Task 5, Criteria Application," dated November 1987, including Addendum 1, April 1989.
8. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (Addendum 2, April 2002).

Confirmatory approval needed from SCPB

BASES (continued)

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."
2. Title 10, Code of Federal Regulations, Part 50.59, "Changes, Tests and Experiments."
3. Regulatory Guide 1.68, Revision 2, "Initial Test Programs for Water-Cooled Nuclear Power Plants," August 1978.
4. ANSI/ANS-19.6.1, "Reload Startup Physics Tests for Pressurized Water Reactors," American National Standards Institute.
5. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology Report," July 1985.
6. WCAP-11618, "MERITS Program - Phase II, Task 5, Criteria Application," dated November 1987, including Addendum 1, April 1989.
7. ~~Watts Bar Drawing [ ], "Electrical Tech Spec Compliance Tables."~~

Confirmatory approval needed from SCPB

REVIEWED
By Carl Schulten at 9:58 am, Jul 23, 2010

BASES

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors."

2. Regulatory Guide 1.77, Rev. 0, "Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized water Reactors," May 1974.

3. Title 10, Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," GDC 26, "Reactivity Control System Redundancy and Capability."

~~4. WCAP-7308-L-P-A, "Evaluation of Nuclear Hot Channel Factor Uncertainties," June 1988.~~

APPROVED
By Carl Schulten at 2:17 pm, Jul 30, 2010

4. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994, (Addendum 2, April 2002).

~~5.~~ Westinghouse Technical Bulletin (TB) 08-4, "F_Q Surveillance at Part Powers," July 15, 2008.

Revision 99 to WBN1 TS Bases per Westinghouse Technical Bulletin 08-04. Technical Branch Confirmatory

Open Pending Receipt of Information

BASES

BACKGROUND (continued)	Operation outside the LCO limits may produce unacceptable consequences if a DNB limiting event occurs. The DNB design basis ensures that there is no overheating of the fuel that results in possible cladding perforation with the release of fission products to the reactor coolant.

APPLICABLE SAFETY ANALYSES

Limits on $F^N_{\Delta H}$ preclude core power distributions that exceed the following fuel design limits:

a. There must be at least 95% probability at the 95% confidence level (the 95/95 DNB criterion) that the hottest fuel rod in the core does not experience a DNB condition;

b. During a loss of coolant accident (LOCA), the peak cladding temperature (PCT) must not exceed 2200°F for small breaks, and there must be a high level of probability that the peak cladding temperature does not exceed 2200°F for large breaks (Ref. 3);

c. During an ejected rod accident, the energy deposition to the fuel must not exceed 280 cal/gm (Ref. 1); and

d. Fuel design limits required by GDC 26 (Ref. 2) for the condition when control rods must be capable of shutting down the reactor with a minimum required SDM with the highest worth control rod stuck fully withdrawn.

Open Pending Receipt of Information

RAI: JFD 3.
Editorial correction to delete non-applicable Tech Branch Confirmatory item.

For transients that may be DNB limited, $F^N_{\Delta H}$ is a significant core parameter. The limits on $F^N_{\Delta H}$ ensure that the DNB design basis is met for normal operation, operational transients, and any transients arising from events of moderate frequency. The DNB design basis is met by limiting the minimum local DNB heat flux ratio to a value which satisfies the 95/95 criterion for the DNB correlation used. Refer to the Bases for the Reactor Core Safety Limits, B 2.1.1, for a discussion of the applicable DNBR limits. The W-3 Correlation with a DNBR limit of 1.3 is applied in the heated region below the first mixing vane grid. In addition, the W-3 DNB correlation is applied in the analysis of accident conditions where the system pressure is below the range of the ~~WRB-1 correlation for VANTAGE 5H and VANTAGE+ fuel or the~~ WRB-2M correlation for RFA-2 fuel with IFMs. For system pressures in the range of 500 to 1000 psia, the W-3 correlation DNBR limit is 1.45 instead of 1.3.

Application of these criteria provides assurance that the hottest fuel rod in the core does not experience a DNB.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.2.3.1

The AFD is monitored on an automatic basis using the unit process computer, which has an AFD monitor alarm. The computer determines the 1 minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for two or more OPERABLE excore channels is outside its specified limits.

This Surveillance verifies that the AFD, as indicated by the NIS excore channel, is within its specified limits and is consistent with the status of the AFD monitor alarm. With the AFD monitor alarm inoperable, the AFD is monitored every hour to detect operation outside its limit. The Frequency of 1 hour is based on operating experience regarding the amount of time required to vary the AFD, and the fact that the AFD is closely monitored. With the AFD monitor alarm OPERABLE, the Surveillance Frequency of 7 days is adequate considering that the AFD is monitored by a computer and any deviation from requirements is alarmed.

REFERENCES

Confirmatory approval needed from SCPB

1. WCAP-8385 (Proprietary), "Power Distribution Control and Load Following Procedures," Westinghouse Electric Corporation, September 1974.

2. R. W. Miller et al., "Relaxation of Constant Axial Offset Control: F_Q Surveillance Technical Specification," WCAP-10216-P-A, June 1983.

3. Watts Bar FSAR, Section 7.7, "Control Systems."

BASES

~~The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, QPTR can be used to confirm that QPTR is within limits.~~

~~With one NIS channel inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore result may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the Surveillance should be within 2% of the tilt shown by the most recent flux map data.~~

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors."

2. Regulatory Guide 1.77, Rev. 0, "Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors," May 1974.

Confirmation needed from SCPB

3. Title 10, Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," GDC 26, "Reactivity Control System Redundancy and Capability."

4. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (Addendum 2, April 2002).

APPROVED
By Carl Schulten at 1:27 pm, Aug 03, 2010

BASES

BACKGROUND (continued)

3. Solid State Protection System (SSPS), including input, logic, and output bays: initiates proper unit shutdown and/or ESF actuation in accordance with the defined logic, which is based on the bistable, setpoint comparators, or contact outputs from the signal process control and protection system; and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as five, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the ~~Trip Setpoint~~NTSP and Allowable Values. The OPERABILITY of each transmitter or sensor is determined by either ~~can be evaluated when its~~ "as found" calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behaviour observed ~~furing~~ performance of the CHANNEL CHECK.~~are compared against its documented acceptance criteria.~~

Open Pending Receipt of Information

REVISED
2:39 pm, Sep 13, 2010

Signal Process Control and Protection System

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides ~~analog to digital conversion (Digital Protection System),~~ signal conditioning~~,~~ comparable output signals for instruments located on the main control board, and comparison of measured input signals with ~~setpoints~~ NTSPs derived from Analytical Limits established by the safety analyses. ~~These setpoints~~Analytical Limits are defined in Reference 6. If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable, setpoint comparator, or contact is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

(continued)

BACKGROUND (continued)

Signal Process Control and Protection System (continued)

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails, such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation. These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

Two logic trains are required to ensure no single random failure of a logic train will disable the RTS. The logic trains are designed such that testing required while the reactor is at power may be accomplished without causing trip.

~~Trip Setpoints and~~ Allowable Values and Nominal Trip Setpoints

The Trip Setpoints are the nominal values at which the bistables, setpoint comparators, or contact trip outputs are set. Any bistable or trip output is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.

The Trip Setpoints used in the bistables, setpoint comparators, or contact trip outputs are based on the analytical limits stated in Reference 6. The ~~selection~~ calculation of ~~these~~the Nominal Trip Setpoints specified in Table 3.3.1-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the ~~Trip Setpoints~~ specified in Table 3.3.1-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits.

Open Pending Receipt of Information

REVISED
3:04 pm, Sep 13, 2010

(continued)

BACKGROUND (continued)

~~Trip Setpoints and~~ Allowable Values and Nominal Trip Setpoints (continued)

A detailed description of the methodology used to calculate the Allowable Values~~Trip Setpoints~~ and NTSP, including their explicit uncertainties, is provided in the "~~Westinghouse~~ Setpoint Methodology for ~~Protection Systems,~~ Watts Bar ~~1 and~~Unit 2" (Ref. 6). ~~The uncertainties for Reactor Coolant Flow - Low function using the elbow tap Δp flow measurement methodology are provided in Reference 13.~~ The as-left tolerance and as-found tolerance band methodology is provided in Reference 6. The magnitudes of these uncertainties are factored into the determination of each NTSP and corresponding Allowable Value. The trip setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for measurement errors detectable by the COT. The Allowable Value serves as the as-found Technical Specification OPERABILITY limit for the purpose of the COT. The Source Range and Intermediate Range Neutron detector setpoints are based on the requirements and recommendations of ISA 67.04 (Reference 10). ~~standard and recommended practice. The actual nominal Trip Setpoint entered into the bistable/comparator is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.~~

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The NTSP is the value at which the bistable is set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as-left" NTSP value is within the as-left tolerance band for CHANNEL CALIBRATION uncertainty allowance (i.e., + rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal" value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION.~~Setpoints in accordance with the Allowable Value ensure that SLs are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed). Note that in the accompanying LCO 3.3.1, the Trip Setpoints of Table 3.3.1-1 are the LSSS.~~

(continued)

BACKGROUND (continued)

~~Trip Setpoints and~~ Allowable Values and Nominal Trip Setpoints (continued)

Open Pending Receipt of Information

REVISED
3:05 pm, Sep 13, 2010

Nominal Trip Setpoints, in conjunction with the use of ~~as-found and as-left~~ tolerances, together with the requirements of the Allowable Value ensure that SLs are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions are designed).–Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

Note that the Allowable Values listed in Table 3.3.1-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, CHANNEL OPERATIONAL TESTS, or a TRIP ACTUATING DEVICE OPERATIONAL TEST that requires trip setpoint verification. The Process Protection System is designed to permit any one channel to be tested and maintained at power in a bypassed mode. If a channel has been bypassed for any purpose, the bypass is continuously indicated in the control room.

Open Pending Receipt of Information

REVISED
3:10 pm, Sep 13, 2010

The NTSP~~Trip Setpoints~~ and Allowable Values listed in Table 3.3.1-1 are based on the methodology described in References 6 and 10~~13, and ISA 67.04 (Ref. 10)~~, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each ~~Trip Setpoint~~. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of setpoint comparator trip outputs, contact outputs, and bistable outputs from the signal processing equipment. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The

(continued)

When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device is semiautomatic to minimize testing time.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to ~~maintain~~ preserve the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted. ~~RTBs are closed.~~

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 3 takes credit for most RTS trip functions. RTS trip functions that are retained yet not specifically credited in the accident analysis are ~~qualitatively~~ implicitly credited in the safety analysis and the NRC staff approved licensing basis for the unit. These RTS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backups to RTS trip Functions that were credited in the accident analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

~~The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 in the accompanying LCO, to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.~~ The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 to be OPERABLE. The Allowable Value specified in Table 3.3.1-1 is the least conservative value of the as-found setpoint that the channel can have when tested, such that a channel is OPERABLE if the as-found setpoint is within the as-found tolerance and is conservative with the respect to the Allowable Value during a CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount [greater than or] equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of the time as long as the channel has not drifted beyond expected tolerances during the

Decide if [ ] information is to be retained or deleted.

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

10. Reactor Coolant Flow - Low (continued)

In MODE 1 above the P-8 setpoint, a loss of flow in one RCS loop could result in DNB conditions in the core because of the higher power level. In MODE 1 below the P-8 setpoint and above the P-7 setpoint, a loss of flow in two or more loops is required to actuate a reactor trip because of the lower power level and the greater margin to the design limit DNBR. Below the P-7 setpoint, all reactor trips on low flow are automatically blocked since there is insufficient heat production to generate DNB conditions.

The Reactor Coolant Flow-Low Trip Setpoint and Allowable Value are specified in % ~~indicated loop~~thermal design flow adjusted for uncertainties (95,000 gpm); however, the Eagle-21™ values entered through the MMI are specified in an equivalent % differential pressure.

11. Undervoltage Reactor Coolant Pumps

The Undervoltage RCPs trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The voltage to each RCP is monitored. Above the P-7 setpoint, a loss of voltage detected on two or more RCP buses will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow - Low Trip Setpoint is reached in two or more RCS loops. The loss of voltage in two loops must be sustained for a length of time equal to or greater than that set in the time delay. Time delays are incorporated into the Undervoltage RCPs channels to prevent reactor trips due to momentary electrical power transients.

The LCO requires one Undervoltage RCP channel per bus to be OPERABLE.

In MODE 1 above the P-7 setpoint, the Undervoltage RCP trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled.

Bases JFD 9
page 7.2-22
FSAR 7.2.2.1.2 Reactor Coolant Flow Measurement
The elbow taps used on each loop in the primary coolant system are instrument devices that are used to indicate reactor coolant flow. The basic function of this measurement is to ensure that thermal design flow is achieved.

??For Unit 2, precision colorimetric flow measurement used in lieu of elbow tap methodology. FSAR and TS Bases don't align with JFD 9.??

Bases JFD 7
FSAR 15.4.2.1.2 Analysis of Effects and Consequences
page 15.4-17
(9) A thermal design flowrate of 372,400 gpm is used which accounts for the 10% steam generator tube plugging level and instrumentation uncertainty.

?? 95,000 gpm doesn't align with 372,400 gpm??

(continued)

Open Pending Receipt of Information

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

e. Power Range Neutron Flux, P-10 (continued)

OPERABILITY in MODE 1 ensures the Function is available to perform its decreasing power Functions in the event of a reactor shutdown. This Function must be OPERABLE in MODE 2 to ensure that core protection is provided during a startup or shutdown by the Power Range Neutron Flux - Low and Intermediate Range Neutron Flux reactor trips. In MODE 3, 4, 5, or 6, this Function does not have to be OPERABLE because the reactor is not at power and the Source Range Neutron Flux reactor trip provides core protection.

Markup uses JFD 8 (TSTF-493); provide corrected JFD

f. Turbine Impulse Pressure, P-13

The Turbine Impulse Pressure, P-13 interlock is actuated when the pressure ~~in the first stage~~ at the inlet of the high pressure turbine is greater than approximately 10% of the rated full load pressure. This is determined by one-out-of-two pressure detectors. The LCO requirement for this Function ensures that one of the inputs to the P-7 interlock is available.

The LCO requires two channels of Turbine Impulse Pressure, P-13 interlock to be OPERABLE in MODE 1.

Markup uses JFD 8 (TSTF-493); provide corrected

The Turbine Impulse ~~Chamber~~ Pressure, P-13 interlock must be OPERABLE when the turbine generator is operating. The interlock Function is not required OPERABLE in MODE 2, 3, 4, 5, or 6 because the turbine generator is not operating.

17. Reactor Trip Breakers

This trip Function applies to the RTBs exclusive of individual trip mechanisms. The LCO requires two OPERABLE trains of trip breakers. A trip breaker train consists of all trip breakers associated with a single RTS logic train that are racked in, closed, and capable of supplying power to the CRD System. Thus, the train may consist of the main breaker, bypass breaker, or main breaker and bypass breaker, depending upon the system configuration. Two OPERABLE trains ensure no single random failure can disable the RTS trip capability.

(continued)

Open Pending Receipt of Information

BASES

APPROVED
By Carl Schulten at 2:29 pm, Jul 30, 2010

A82 deviation - deletion of moveable incores not justified.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.2 (continued)

The Frequency of every 24 hours is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Together these factors demonstrate the change in the absolute difference between NIS and heat balance calculated powers rarely exceeds 2% in any 24 hour period.

In addition, control room operators periodically monitor redundant indications and alarms to detect deviations in channel outputs.

SR 3.3.1.3

SR 3.3.1.3 compares the power distribution measurement to the NIS channel AFD ~~incore system to the NIS channel~~ output every 31 EFPD. If the absolute difference is ≥ 3%, the NIS channel is still OPERABLE, but must be readjusted. If the NIS channel cannot be properly readjusted, the channel is declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the Overtemperature ΔT Function. The incore power distribution measurement is obtained using the ~~OPERABLE~~ Power Distribution Monitoring System (PDMS) (Ref. 16).

Two Notes modify SR 3.3.1.3. Note 1 indicates that the excore NIS channel shall be adjusted if the absolute difference between the incore and excore AFD is ≥ 3%. Note 2 clarifies that the Surveillance is required only if reactor power is ≥ 15% RTP and that 96 hours is allowed for performing the first Surveillance after reaching 15% RTP. This surveillance is typically performed at greater than or equal to 50% RTP to ensure the results of the evaluation are more accurate and the adjustments more reliable. Ninety-six (96) hours are allowed to ensure Xenon stability and allow for instrumentation alignments.

The Frequency of every 31 EFPD is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Also, the slow changes in neutron flux during the fuel cycle can be detected during this interval.

(continued)

REFERENCES (continued)

5. 10 CFR Part 50.49, "Environmental Qualifications of Electric Equipment Important to Safety for Nuclear Power Plants."

Confirmatory approval from EICB required

6. WCAP-~~12096~~17044, Rev. ~~7~~0, "~~Westinghouse~~ Setpoint Methodology for ~~Protection System,~~ Watts Bar ~~1 and~~ 2~~," March 1997.~~

7. WCAP-10271-P-A, Supplement 1, and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," May 1986 and June 1990.

8. Watts Bar Technical Requirements Manual, Section 3.3.1, "Reactor Trip System Response Times."

9. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar, Westinghouse Letter WAT-D-10128.

10. ISA-DS-67.04, 1982, "Setpoint for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants."

APPROVED
By Carl Schulten at 9:57 am, Aug 05, 2010

11. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996

Per JFD 9 A47 added the reference to WBN1. Justify the deletion.

12. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

13. Deleted~~WCAP-16067-P, Rev. 0, "RCS Flow Measurement Using Elbow Tap Methodology at Watts Bar Unit 1," April 2003.~~

14. WCAP-14333 P-A, Revision 1, "Probablistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," October 1998.

15. WCAP-15376-P-A, Revision 1, "Risk Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," March 2003

APPROVED
By Carl Schulten at 2:31 pm, Jul 30, 2010

16. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (Addendum 2, April 2002).

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety functions(s)." Relying solely on the NTSP to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as-found" value of a protection channel setting during a surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the NTSP due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the NTSP and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as-found" setting of the protection channel. Therefore, the channel would still be OPERABLE since it would have performed its safety function and the only corrective action required would be to reset the channel within the established as-left tolerance around the NTSP to account for further drift during the next surveillance interval.

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

2735 psia

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB),

2. Fuel centerline melt shall not occur, and

3. The RCS pressure SL of 2750 psia ~~shall not be exceeded.~~ Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 50 and 10 CFR 100 criteria during AOOs.

new paragraph

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

(continued)

BACKGROUND (continued)

The ESFAS instrumentation is segmented into three distinct but interconnected modules as identified below:

- Field transmitters or process sensors: provide a measurable electronic signal or contact actuation based on the physical characteristics of the parameter being measured;
- Signal processing equipment including process protection system, and field contacts: provide analog to digital conversion (Digital Protection System), signal conditioning, setpoint comparison, process algorithm actuation (Digital Protection System), compatible electrical signal output to protection system ~~devices~~channels, and control board/control room/ miscellaneous indications; and
- Solid State Protection System (SSPS) including input, logic, and output bays: initiates the proper unit shutdown or engineered safety feature (ESF) actuation in accordance with the defined logic and based on the bistable, setpoint comparators, or contact outputs from the signal process control and protection system.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as five, field transmitters or sensors are used to measure unit parameters. In many cases, field transmitters or sensors that input to the ESFAS are shared with the Reactor Trip System (RTS). In some cases, the same channels also provide control system inputs. To account for calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the ~~Trip Setpoint~~NTSP and Allowable Value~~s~~. The OPERABILITY of each transmitter or sensor ~~can be evaluated when its~~ "as found" calibration data ~~are compared against its documented acceptance criteria~~.

(continued)

BASES

BACKGROUND (continued)

Signal Processing Equipment

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides analog to digital conversion (Digital Protection System), signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with ~~setpoints~~ NTSPs derived from Analytical Limits established by the safety analyses. These ~~setpoints~~ NTSPs are defined in Reference 6. If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a setpoint comparator or contact is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

analytical limits

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

(continued)

REVIEWED
By Carl Schulten at 8:52 am, Sep 13, 2010

REVISED
8:52 am, Sep 13, 2010

BACKGROUND (continued)

~~Trip Setpoints~~NTSPs and Allowable Values

The ~~Trip Setpoints~~ are the nominal values at which the setpoint comparators or contact outputs are set. Any output is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.

Allowable Values and ESFAS

The ~~Trip Setpoints~~ used in the bistables, setpoint comparators, or contact outputs are based on the analytical limits stated in Reference 6. The ~~selection of these~~calculation of the Nominal Trip Setpoints specified in Table 3.3.2-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and ~~severe~~ environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the ~~Trip Setpoint~~NTSPs specified in Table 3.3.2-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the NTSPs ~~Trip Setpoints,~~ including their explicit uncertainties, is provided in the ~~"Westinghouse~~ "Setpoint Methodology for ~~Protection Systems,~~ Watts Bar ~~1 and~~Unit 2" (Ref. 6). The as-left tolerance and as-found tolerance band methodology is provided in Reference 6. The ~~actual~~ nominal Trip Setpoint entered into the comparator or contact output is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT.~~One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the trip output is considered OPERABLE.~~

The NTSP is the value at which the bistables are set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as-left" ~~setpoint~~ NTSP value is within the ~~band~~ as-left tolerance for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal value" (i.e., expressed as a value without inequalities) for the purposes of the COT and CHANNEL CALIBRATION.

(continued)

BACKGROUND (continued)

Nominal Trip Setpoints, in conjunction with the use of as-left and as-found tolerances together with the requirements of the ~~accordance with the~~ Allowable Value ensure that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

Note that the Allowable Values listed in Table 3.3.2-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, COT, or a TADOT.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

The ~~Trip Setpoint~~NTSPs and Allowable Values listed in Table 3.3.2-1 are based on the methodology described in Reference 6, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each ~~Trip Setpoint~~NTSP. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

(continued)

BASES

BACKGROUND (continued)

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

The SSPS performs the decision logic for most ESF equipment actuation; generates the electrical output signals that initiate the required actuation; and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various transients. If a required logic matrix combination is completed, the system will send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

Each SSPS train has a built in testing ~~device~~ that can automatically test the decision logic matrix functions and the actuation ~~devices~~ channels while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing ~~device~~ is semiautomatic to minimize testing time.

The actuation of most ESF components is accomplished through master and slave relays. Some ESF components are actuated by relay logic. The SSPS energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave relays, which then cause actuation of the end devices. The master and slave relays are routinely tested to ensure operation. The test of the master relays energizes the relay, which then operates the contacts and applies a low voltage to the associated slave relays. The low voltage is not sufficient to actuate the slave relays but only demonstrates signal path continuity. The SLAVE RELAY TEST actuates the devices if their operation will not interfere with continued unit operation. For the latter

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO requires all instrumentation performing an ESFAS Function listed in Table 3.3.2-1 in the accompanying LCO, to be OPERABLE. The Allowable Value specified in Table 3.3.2-1 is the least conservative value of the as-found setpoint that the channel can have when tested, such that a channel is OPERABLE if the as-found setpoint is within the as-found tolerance and is conservative with respect to the Allowable Value during the CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount [greater than or] equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as-left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as-left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as-found criteria).

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as-found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance) and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel can be restored to service at the completion of the surveillance.~~Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.~~

A trip setpoint may be set more conservative than the NTSP as necessary in response to plant conditions. However, in this case, the operability of this instrument must be verified based on the [field setting] and not the NTSP. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

c. Safety Injection - Containment Pressure - High (continued)

Containment Pressure - High provides no input to any control functions. Thus, three OPERABLE channels are sufficient to satisfy protective requirements with a two-out-of-three logic. The transmitters (d/p cells) and electronics are located outside of containment, inside the containment annulus, with the sensing line (high pressure side of the transmitter) located inside containment.

Thus, the high pressure Function will not experience any adverse environmental conditions and the NTSP reflects only steady state instrument uncertainties.~~The transmitters and electronics are located inside the containment annulus, but outside containment, and experience more adverse environmental conditions than if they were located outside containment altogether. However, the environmental effects are less severe than if the transmitters were located inside containment. The Trip Setpoint reflects the inclusion of both steady state instrument uncertainties and slightly more adverse environmental instrument uncertainties.~~

Containment Pressure - High must be OPERABLE in MODES 1, 2, and 3 when there is sufficient energy in the primary and secondary systems to pressurize the containment following a pipe break. In MODES 4, 5, and 6, there is insufficient energy in the primary or secondary systems to pressurize the containment.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

e. Auxiliary Feedwater - Trip Of All Main Turbine Driven Feedwater Pumps

A Trip of both turbine driven MFW pumps is an indication of a loss of MFW and the subsequent need for some method of decay heat and sensible heat removal to bring the reactor back to no load temperature and pressure. A turbine driven MFW pump is equipped with one pressure switch on the control oil line for the speed control system. A low pressure signal from this pressure switch indicates a trip of that pump. A trip of both turbine driven MFW pumps starts the motor driven and turbine driven AFW pumps to ensure that enough water is available to act as the heat sink for the reactor.

This Function must be OPERABLE in MODES 1 and 2. This ensures that at least one SG is provided with water to serve as the heat sink to remove reactor decay heat and sensible heat in the event of an accident. Mode 2 applicability is when one or more turbine driven MFW pump(s) are supplying feedwater to the steam generators. In Mode 2 the AFW system pump(s) will be used for startup/shutdown conditions. During startup, a turbine driven MFW pump is placed in service along with the operating AFW System pump(s). During the process of placing the first turbine driven MFW pump in service, the anticipatory AFW auto-start channel for the non-operating turbine driven MFW pump is placed in "bypass" (electrical control circuit is de-energized) to prevent inadvertent AFW auto-start during rollup trip testing and overspeed trip testing. Once the operating turbine driven MFW pump has established sufficient feed flow to maintain SG level, the anticipatory AFW auto-start channel for the non-operating turbine driven MFW pump is placed in the "trip" condition, and the AFW pumps secured. Under these conditions, the AFW auto start circuit will be in a half trip condition (one-out-of-two) in Mode 2 and during transitions from Mode 2 to Mode 1. If the operating turbine driven MFW pump were to trip during this time period, an AFW auto start signal would be generated causing all three AFW pumps to start. Having the requirement for auto start of the AFW pumps to be required only when one or more turbine driven MFW pumps are in service limits the potential for an overcooling transient due to inadvertent AFW actuation. Mode 1 applicability allows

License amendment No.?

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

License amendment No.?

e. Auxiliary Feedwater - Trip Of All Main Turbine Driven Feedwater Pumps (continued)

entry into LCO 3.3.2, Condition J to be suspended for up to 4 hours when placing the second turbine driven MFW pump in service or removing one of two turbine driven MFW pumps from service. This provision will reduce administrative burden on the plant. Plant safety is not compromised during this short period because the safety grade AFW auto start channels associated with steam generator low-low levels are operable. In MODES 3, 4, and 5, the RCPs and MFW pumps may be normally shut down, and thus neither pump trip is indicative of a condition requiring automatic AFW initiation.

f. Auxiliary Feedwater - Pump Suction Transfer on Suction Pressure - Low

A low pressure signal in the AFW pump suction line protects the AFW pumps against a loss of the normal supply of water for the pumps, the CST. Three pressure switches are located on each motor driven AFW pump suction line from the CST. A low pressure signal sensed by two switches of a set will cause the emergency supply of water for the respective pumps to be aligned. ERCW (safety grade) is then lined up to supply the AFW pumps to ensure an adequate supply of water for the AFW System to maintain at least one of the SGs as the heat sink for reactor decay heat and sensible heat removal.

Since the detectors are located in an area not affected by HELBs or high radiation, they will not experience any adverse environmental conditions and the ~~Trip Setpoint~~NTSP reflects only steady state instrument uncertainties.

These Functions must be OPERABLE in MODES 1, 2, and 3 to ensure a safety grade supply of water for the AFW System to maintain the SGs as the heat sink for the reactor. These Functions do not have to be OPERABLE in MODES 5 and 6 because there is not enough heat being generated in the reactor to require the SGs as a heat sink.

(continued)

ACTIONS

E.1, E.2.1, and E.2.2 (continued)

To avoid the inadvertent actuation of containment spray and Phase B containment isolation, the inoperable channel should not be placed in the tripped condition. Instead it is bypassed. Restoring the channel to OPERABLE status, or placing the inoperable channel in the bypass condition within 72 hours, is sufficient to assure that the Function remains OPERABLE and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The Completion Time is further justified based on the low probability of an event occurring during this interval. Failure to restore the inoperable channel to OPERABLE status, or place it in the bypassed condition within 72 hours, requires the plant be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODE 4, these Functions are no longer required OPERABLE.

OPEN ITEM U1/U2
WCAP-14333 (Ref 17) did not approve testing a channel in bypass with the inoperable channel also in bypass.

The Required Actions are modified by a Note that allows placing one channel in bypass for up to 12 hours while performing routine surveillance testing. The channel to be tested can be tested in bypass with the inoperable channel also in bypass. The time limit is justified in Reference 17.

F.1, F.2.1, and F.2.2

Condition F applies to:

- Manual Initiation of Steam Line Isolation;
- Loss of Offsite Power;
- Auxiliary Feedwater Pump Suction Transfer on Suction Pressure - Low; and
- P-4 Interlock.

For the Manual Initiation and the P-4 Interlock Functions, this action addresses the train orientation of the SSPS. For the Loss of Offsite Power Function, this action recognizes the lack of manual trip provision for a failed channel. For the AFW System pump suction transfer channels, this action recognizes that placing a failed channel in trip during operation is not necessarily a conservative action. Spurious trip of

(continued)

BASES

ACTIONS

K.1, K.2.1 and K.2.2 (continued)

However, placing a failed channel in the tripped condition could result in a premature switchover to the sump, prior to the injection of the minimum volume from the RWST. Placing the inoperable channel in bypass results in a two-out-of-three logic configuration, which satisfies the requirement to allow another failure without disabling actuation of the switchover when required.

Restoring the channel to OPERABLE status or placing the inoperable channel in the bypass condition within 72 hours is sufficient to ensure that the Function remains OPERABLE, and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The 72 hour Completion Time is justified in References 10, 17, and 19. If the channel cannot be returned to OPERABLE status or placed in the bypass condition within 72 hours, the plant must be brought to MODE 3 within the following 6 hours and MODE 5 within the next 30 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODE 5, the plant does not have any analyzed transients or conditions that require the explicit use of the protection functions noted above.

OPEN ITEM U1/U2
WCAP-14333 (Ref 17) did not approve testing a channel in bypass with the inoperable channel also in bypass.

The Required Actions are modified by a Note that allows placing one channel in bypass for up to 12 hours while performing routine surveillance testing. The channel to be tested can be tested in bypass with the inoperable channel also in bypass. The time limit is justified in Reference 17.

L.1, L.2.1 and L.2.2

Condition L applies to the P-11 Interlock.

With one channel inoperable, the operator must verify that the interlock is in the required state for the existing unit condition. This action manually accomplishes the function of the interlock. Determination must be made within 1 hour. The 1 hour Completion Time is equal to the time allowed by LCO 3.0.3 to initiate shutdown actions in the event of a complete loss of ESFAS function. If the interlock is not in the required state (or placed in the required state) for the existing plant condition, the plant must be placed in MODE 3 within the next 6 hours and MODE 4 within the following 6 hours.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.1 (continued)

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and reliability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

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

SR 3.3.2.2

SR 3.3.2.2 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 92 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and that there is an intact voltage signal path to the master relay coils. The Frequency of every 92 days on a STAGGERED TEST BASIS is justified in Reference 18.

SR 3.3.2.3

SR 3.3.2.3 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The Frequency of 92 days is justified in Reference 18.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a COT.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found ~~within~~ the Allowable Values specified in Table 3.3.2~~1~~-1.

conservative with respect to

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.4 (continued)

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as found" and "as left" values must also be recorded and reviewed for consistency with the assumptions of Reference 6.

The Frequency of 184 days is justified in Reference 18, except for Function 7. The Frequency for Function 7 is justified in References 10 and 18.

SR 3.3.2.4 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

--------------------------------REVIEWER'S NOTE--------------------------------

The bracketed section 't[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1.

The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.2.7

SR 3.3.2.7 is the performance of a SLAVE RELAY TEST for slave relays K603A, K603B, K604A, K604B, K607A, K607B, K609A, K609B, K612A, K625A, and K625B. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment which may be operated in the design mitigation MODE is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment which may not be operated in the design mitigation MODE is prevented from operation by the slave relay test circuit.

For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 18 months. The Frequency is justified by TVA correspondence to the NRC dated November 9, 1984 (Ref. 9) and Design Change Notice W-38238-A associated documentation (Reference 12), and for relays K607A, K607B, and K612A, Westinghouse letter to TVA (Ref. 11).

SR 3.3.2.8

Justify deviation from TSTF-493 Bases for F.6.e, Trip of All Turbine Driven Main Feedwater Pumps see Bases page B 3.3.2-60, B 3.3.2-61 for replacement text.

SR 3.3.2.8 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and AFW pump start on trip of all MFW pumps. It is performed every 18 months. The Frequency is based on industry operating experience and is consistent with the typical refueling cycle. The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation functions. The manual initiation functions have no associated setpoints.

SR 3.3.2.9

SR 3.3.2.9 is the performance of a CHANNEL CALIBRATION.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the Watts Bar setpoint methodology. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.2.9 (continued)

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of sensor/transmitter drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. For channels with a trip time delay (TTD), this test shall include verification that the TTD coefficients are adjusted correctly.

SR 3.3.2.9 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable.

REVIEWER'S NOTE-----------------------------
The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1.

The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR].

SR 3.3.2.10

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in Technical Requirements Manual, Section 3.3.2 (Ref. 8). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the ~~Trip Setpoint~~NTSP value at the sensor, to the point at which

(continued)

NOT APPROVED

REFERENCES (continued)

OPEN
Confirmatory item - need license amendment for change to Unit 1 licensing basis?

6. WCAP-~~12096~~17044, Rev. ~~7~~0, "~~Westinghouse~~ Setpoint Methodology for ~~Protection System,~~ Watts Bar ~~1 and~~Unit 2,~~" March 1997.~~

7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," and "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation System." May 1986 and June 1990.

8. Watts Bar Technical Requirements Manual, Section 3.3.2, "Engineered Safety Feature Response Times."

9. TVA Letter to NRC, November 9, 1984, "Request for Exemption of Quarterly Slave Relay Testing, (L44 841109 808)."

10. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar, Westinghouse letter to TVA WAT-D-10128.

11. Westinghouse letter to TVA (WAT-D-8347), September 25, 1990, "Charging/Letdown Isolation Transients" (T33 911231 810).

12. Unit 1 Design Change Notice W-38238 and Unit 2 Engineering Document Construction Release 53352 and associated documentation.

13. WCAP-13877-P-A, Revision 2~~. 1~~, "Reliability Assessment of Westinghouse Type AR Relays Used As SSPS Slave Relays.~~,~~" ~~August 1998.~~

14. Not Applicable for Unit 2

15. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

Unit 1 & Unit 2 Open Item

16. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

17. WCAP-14333-P-A, Revision 1, "Probablistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," October 1998

WCAP-14333 did not approve and therefore cannot be used as a basis for plant-specific approval to perform testing with two channels in bypass...

(continued)

BASES

REFERENCES (continued)

18. WCAP-15376-P-A, Revision 1, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," March 2003

19. Westinghouse letter to TVA, WAT-D-11248, "Revised Justification for Applicability of Instrumentation Technical Specification Improvements to the Automatic Switchover to Containment Sump Signal," June 2004.

20. Letter from John G. Lamb (NRC) to Mr. Preston D. Swafford (TVA) dated March 4, 2009, Includes Enclosures (a) Amendment No. 75 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1 and (b) NRC Safety Evaluation (SE) for Amendment No. 75.

21. Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.

22. WCAP-13878-P-A, Revision 2, "Reliability Assessment of Potter & Brumfield MDR Series Relays."

OPEN
Confirmatory item - need license amendment for change to Unit 1 license basis

BASES (continued)

REFERENCES

Confirmatory item - reference #3 applies to Unit 2.

1. Title 10, Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria 19, "Control Room."
2. Watts Bar FSAR Section 7.4, "Systems Required for Safe Shutdown."
3. TVA Calculation WBN-OSG4-193, "Auxiliary Control System Required Equipment per GDC 19."
4. Design Criteria WB-DC-40-58, "Auxiliary Control System."

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2 (continued)

A CHANNEL CALIBRATION is performed every 6 months. CHANNEL CALIBRATION is a check of the four functions. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency of 6 months is based on operating experience and is justified by the assumption of a 6-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.3

SR 3.3.5.3 is the performance of a CHANNEL CALIBRATION.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the four functions. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency of 18 months is based on operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

REFERENCES

1. Watts Bar FSAR, Section 8.3, "Onsite (Standby) Power System."
2. Watts Bar FSAR, Section 15.0, "Accident Analysis."

Confirmatory item - reference #3 applies to Unit 2.

3. TVA Calculation WPE2119202001, "6.9 kV Shutdown and Logic Boards Undervoltage Relays Requirements/Demonstrated Accuracy Calculation."

(continued)

BASES

A similar reference was not provided for LCO 3.3.1 or LCO 3.3.2 TSTF-493 Surveillance Requirement Notes. Why?

4. Technical Requirements Manual, Section 3.3.2, "Engineered Safety Features Actuation System (ESFAS) Instrumentation ~~Response Times~~."

5. TVA Calculation TDR SYS.211-LV1, "Demonstrated Accuracy Calculation TDR SYS.211-LV1."

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.6

SR 3.3.6.6 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the master relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).
~~SR 3.3.6.6 (continued)~~

For these tests, the relay trip setpoints are verified and adjusted as necessary. The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.6.7

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance."

2. NUREG-1366, "Improvement to Technical Specification Surveillance Requirements," December 1992.

3. WCAP-13877-P-A, Revision 2,~~Rev. 1.~~ "Reliability Assessment of Westinghouse Type AR Relays Used as SSPS Slave Relays~~,~~." ~~August 1998.~~

OPEN
Confirmatory item - need a licensing basis for deviation from Unit 1.

(continued)

BASES

REFERENCES (continued)

4. WCAP-15376-P-A, Revision 1, “Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times,” March 2003

5. WCAP-13878-P-A, Revision 2, “Reliability Assessment of Potter & Brumfield MDR Series Relays.”

OPEN
Confirmatory item - need a licensing basis for deviation from Unit 1.

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.3 RCS Pressure and Temperature (P/T) Limits

Open Pending Receipt of Information

BASES

BACKGROUND

All components of the RCS are designed to withstand effects of cyclic loads due to system pressure and temperature changes. These loads are introduced by startup (heatup) and shutdown (cooldown) operations, power transients, and reactor trips. This LCO limits the pressure and temperature changes during RCS heatup and cooldown, within the design assumptions and the stress limits for cyclic operation.

The PTLR contains P/T limit curves for heatup, cooldown, inservice leak and hydrostatic (ISLH) testing, and data for the maximum rate of change of reactor coolant temperature (Ref. 1).

Each P/T limit curve defines an acceptable region for normal operation. The usual use of the curves is operational guidance during heatup or cooldown maneuvering, when pressure and temperature indications are monitored and compared to the applicable curve to determine that operation is within the allowable region.

The LCO establishes operating limits that provide a margin to brittle failure of the reactor vessel and piping of the reactor coolant pressure boundary (RCPB). The vessel is the component most subject to brittle failure, and the LCO limits apply mainly to the vessel. The limits do not apply to the pressurizer, which has different design characteristics and operating functions.

10 CFR 50, Appendix G (Ref. 2), requires the establishment of P/T limits for specific material fracture toughness requirements of the RCPB materials. Reference 2 requires an adequate margin to brittle failure during normal operation, anticipated operational occurrences, and system hydrostatic tests. It mandates the use of the American Society of Mechanical Engineers (ASME) Code, Section XI~~II~~, Appendix G (Ref. 3).

The neutron embrittlement effect on the material toughness is reflected by increasing the nil ductility reference temperature (RT_{NDT}) as exposure to neutron fluence increases.

CPNB to verify acceptability of deviation from WBN1. (JFD-5)

(continued)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.7 RCS Loops - MODE 5, Loops Filled

BASES

BACKGROUND

In MODE 5 with the RCS loops filled, the primary function of the reactor coolant is the removal of decay heat and the transfer of this heat to either the steam generator (SG) secondary side coolant or the component cooling water via the residual heat removal (RHR) heat exchangers. While the principal means for decay heat removal is via the RHR System, the SGs are specified as a backup means for redundancy. Even though the SGs cannot produce steam in this MODE, they are capable of being a heat sink due to their large contained volume of secondary water. As long as the SG secondary side water is at a lower temperature than the reactor coolant, heat transfer will occur. The rate of heat transfer is directly proportional to the temperature difference. The secondary function of the reactor coolant is to act as a carrier for soluble neutron poison, boric acid.

In MODE 5 with RCS loops filled, the reactor coolant is circulated by means of two RHR loops connected to the RCS, each loop containing an RHR heat exchanger, an RHR pump, and appropriate flow and temperature instrumentation for control, protection, and indication. One RHR pump circulates the water through the RCS at a sufficient rate to prevent boric acid stratification.

The number of loops in operation can vary to suit the operational needs. The intent of this LCO is to provide forced flow from at least one RHR loop for decay heat removal and transport. The flow provided by one RHR loop is adequate for decay heat removal. The other intent of this LCO is to require that a second path be available to provide redundancy for heat removal.

OPEN
confirmatory item
Unit 1, Revision 79,
A61 changes do
not apply to U2

The LCO provides for redundant paths of decay heat removal capability. The first path can be an RHR loop that must be OPERABLE and in operation. The second path can be another OPERABLE RHR loop or maintaining two SGs with secondary side water levels ~~greater than or equal to~~ 6% narrow range to provide an alternate method for decay heat removal.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.2 and SR 3.5.1.3

Every 12 hours, borated water volume and nitrogen cover pressure are verified for each accumulator (Refer to the note below.). This Frequency is sufficient to ensure adequate injection during a LOCA. Because of the static design of the accumulator, a 12-hour Frequency usually allows the operator to identify changes before limits are reached. Operating experience has shown this Frequency to be appropriate for early detection and correction of off normal trends.

Note: In the discussion contained in the Applicable Safety Analyses of this Bases section, the borated water volume and nitrogen cover pressure specified for SR 3.5.1.2 and SR 3.5.1.3 account for instrument accuracy ~~(Ref. 6)~~. stet per A81

SR 3.5.1.4

The boron concentration should be verified to be within required limits for each accumulator every 31 days since the static design of the accumulators limits the ways in which the concentration can be changed. The 31-day Frequency is adequate to identify changes that could occur from mechanisms such as stratification or inleakage. Sampling the affected accumulator within 6 hours after a 75 gallons (1% volume) increase will identify whether inleakage has caused a reduction in boron concentration to below the required limit. This is consistent with the recommendation of NUREG-1366 (Ref. 5).

SR 3.5.1.5

Verification every 31 days that power is removed from each accumulator isolation valve operator when the pressurizer pressure is ≥1000 psig ensures that an active failure could not result in the undetected closure of an accumulator motor operated isolation valve. If this were to occur, only two accumulators would be available for injection given a single failure coincident with a LOCA. Since power is removed under administrative control, the 31-day Frequency will provide adequate assurance that power is removed.

This SR allows power to be supplied to the motor operated isolation valves when pressurizer pressure is < 1000 psig, thus allowing operational flexibility by avoiding unnecessary delays to manipulate the breakers during plant startups or shutdowns. Even with power supplied to the valves, inadvertent closure is prevented by the RCS pressure interlock associated with the valves.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The limiting event for the condensate volume is the large feedwater line break coincident with a loss of offsite power. Single failures that also affect this event include the following:

a. Failure of the diesel generator powering the motor driven AFW pump to the unaffected steam generators (requiring additional steam to drive the remaining AFW pump turbine); and

b. Failure of the steam driven AFW pump (requiring a longer time for cooldown using only one motor driven AFW pump).

These are not usually the limiting failures in terms of consequences for these events.

A non-limiting event considered in CST inventory determinations is a break in either the main feedwater bypass line or AFW line near where the two join. This break has the potential for dumping condensate until terminated by operator action. This loss of condensate inventory is partially compensated for by the retention of steam generator inventory.

Because the CST is the preferred source of feedwater and is relied on almost exclusively for accidents and transients, the CST satisfies Criterion 3 of the NRC Policy Statement.

LCO

was "102", A31, Rev 41 not on U2.

As the preferred water source to satisfy accident analysis assumptions, the CST must contain sufficient cooling water to remove decay heat for 2 hours following a reactor trip from ~~100.6~~% RTP, and then to cool down the RCS to RHR entry conditions, assuming a coincident loss of offsite power and the most adverse single failure. In doing this, it must retain sufficient water to ensure adequate net positive suction head for the AFW pumps during cooldown, as well as account for any losses from the steam driven AFW pump turbine, or before isolating AFW to a broken line.

The CST level required is equivalent to a usable volume of ≥ 200,000 gallons, which is based on holding the unit in MODE 3 for 2 hours, followed by a cooldown to RHR entry conditions at 50°F/hour. This basis is established in Reference 4 and exceeds the volume required by the accident analysis.

The OPERABILITY of the CST is determined by maintaining the tank level at or above the minimum required level.

(continued)

ACTIONS

B.2 (continued)

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one or more DGs inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one or more required DGs in Train A or one or more DGs in Train B inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DGs, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is Acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

In this Condition, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

For the perfromance of a Surveillance, Required Action B.3.1 is considered satisfied sicne the cause of the DG being inoperable is apparent.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other DG(s), the other DG(s) would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered if the other

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.14 (continued)

~~Prior to performance of this SR in Modes 1 or 2, actions are taken to establish that adequate conditions exist for performance of the SR. The required actions are defined in Bases Table 3.8.1-2.~~

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The minimum voltage and frequency stated in the SR are those necessary to ensure the DG can accept DBA loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential to establishing DG OPERABILITY, but a time constraint is not imposed. This is because a typical DG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. This period may extend beyond the 10 seconds acceptance criteria and could be a cause for failing the SR. In lieu of a time constraint in the SR, WBN will monitor and trend the actual time to reach steady state operation as a means of ensuring there is no voltage regulator or governor degradation which could cause a DG to become inoperable. The 10 seconds time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1.

The DG engines for WBN have an oil circulation and soakback system that operates continuously to preclude the need for a prelube and warmup when a DG is started from standby.

This SR is modified by a Note to ensure that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test.

(continued)

ENCLOSURE 4

TVA Responses to NRC Comments on Unit 2 Technical Specifications Bases

1. **Page number / Item:**

   B 3.1-10 / Reference 3

   NRC Comment(s):

   "JFD1: Editorial correction. Tech Br. Confirmatory item." Also, "Open Pending Receipt of Information" is noted at the bottom of the page (i.e., just below Reference 3).

   TVA Response(s):

   Reference 5 provided the following as the justification for this change: "Editorial correction to provide missing information."

   No change is required.

2. **Page number / Item:**

   B 3.1-55 / Reference 15.

   NRC Comment(s):

   "Confirmatory approval needed from SCPB."

   TVA Response(s):

   Reference 5 provided the following justification for this change:

   "Revised to incorporate the Power Distribution Monitoring System (PDMS) (Reference WCAP-12472-P-A, 'BEACON Core Monitoring and Operations Support System,' August 1994, and WCAP-12472-P-A, 'BEACON Core Monitoring and Operations Support System,' Addendum 2, April 2002).

   Amendment 82 amended the Unit 1 TS to implement the Beacon Core Power Distribution and Monitoring System. A change similar to this is to be applied to Unit 2.

   NRC approved A82 via letter dated 10/27/2009. The Bases is being revised as needed to agree with the TS amendment."

   No change is required.

3. **Page number / Item:**

   B 3.1-62 / References 5 and 8

   NRC Comment(s):

   "Confirmatory approval needed from SCPB."

   TVA Response(s):

   See response to Item 2.

4. **Page number / Item:**

   B 3.1-69 / References 5 and 6

   NRC Comment(s):

   "Confirmatory approval needed from SCPB."

   TVA Response(s):

   Comment withdrawn by NRC staff during May 10, 2011, meeting with TVA.

5. **Page number / Item:**

   B 3.2-10 / Reference 5

   NRC Comment(s):

   "Revision 99 to WBN1 TS Bases per Westinghouse Technical Bulletin 08-04. Technical Branch Confirmatory." Also, "Open Pending Receipt of Information" is noted at the bottom of the page (i.e., just below Reference 5).

   TVA Response(s):

   Reference 5 provided the following justification for adding Reference 5:

   "Revision 99 to the Unit 1 TS Bases revised the Bases to incorporate Westinghouse Technical Bulletin (TB) 08-04. This change is to be applied to Unit 2.

   This revision was approved on 10/09/2009."

   No change is required.

6. **Page number / Item:**

   B 3.2-13 / change in next to last paragraph

   NRC Comment(s):

   "RAI: JFD 3.Editorial correction to delete non-applicable Tech Branch Confirmatory item." Also, "Open Pending Receipt of Information" applies to the same change.

   TVA Response(s):

   Reference 5 provided the following justification for the change to this page: "Editorial correction to delete information that is not applicable to the Unit 2 fuel."

   No change is required.

7. <u>Page number / Item</u>:

   B 3.2-22 / References 1. and 2.

   NRC Comment(s):

   "Confirmatory approval needed from SCPB."

   TVA Response(s):

   Comment withdrawn by NRC staff during May 10, 2011, meeting with TVA.

8. **Page number / Item**:

   B 3.2-30 / Reference 4

   NRC Comment(s):

   "Confirmation needed from SCPB."

   TVA Response(s):

   See response to Item 2.

9. **Page number / Item**:

   B 3.3-4 / middle paragraph

   NRC Comment(s):

   Last sentence should end with "behaviour observed during performance of the CHANNEL CHECK." versus "behaviour observed furing performance of the CHANNEL CHECK."

   TVA Response(s):

   Developmental Revision F of the Unit 2 TS Bases replaced "behaviour observed furing performance of the CHANNEL CHECK." with "behavior observed during performance of the CHANNEL CHECK."

10. **Page number / Item**:

    B 3.3-5 / last paragraph

    NRC Comment(s):

    The last sentence should read, "... (Ref. 5), the NTSP specified in ..." instead of "... (Ref. 5), the Trip Setpoints specified in ..."

    TVA Response(s):

    Developmental Revision F of the Unit 2 TS Bases revised the last sentence to read "... (Ref. 5), the Allowable Values specified in ..." This verbiage is consistent with TSTF-493.

11. **Page number / Item:**

    B 3.3-6 / middle of first paragraph

    NRC Comment(s):

    "Licensee to justify the setpoint basis."

    TVA Response(s):

    Developmental Revision F of the Unit 2 TS Bases revised the first sentence of the paragraph to read, "A detailed description of the methodology used to calculate the Allowable Values, NTSPs, and as left and as found tolerance bands is provided in Reference 2." Reference 2 is "Watts Bar FSAR, Section 7.0, 'Instrumentation and Controls.'"

12. **Page number / Item:**

    B 3.3-7 / first paragraph

    NRC Comment(s):

    a. *In the first sentence, replace "as found and as left" with "as-left and as-found."*

    b. *Add the following after the existing first sentence of this paragraph: "NEW PARAGRAPH: Note that the Allowable Values listed in Table 3.3.1-1 are the least conservative value of the as-found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, CHANNEL OPERATIONAL TESTS, or a TRIP ACTUATING DEVICE OPERATIONAL TEST that requires trip setpoint verification."*

    c. *Add a paragraph break just prior to the existing sentence that begins with "Each channel ..."*

    TVA Response(s):

    a. TVA has noted inconsistent use of "as found," "as-found", "as left," and "as-left." Developmental Revision F of the Unit 2 TS Bases made changes such that these words are used consistently, and that a hyphen is not used.

    b. The noted paragraph to be added already existed as the second paragraph on the page. Developmental Revision F of the Unit 2 TS Bases deleted the verbiage, "Each channel ... SRs for the channels are specified in the SRs section." from the end of the first paragraph. End result is that the NRC comment is incorporated.

    c. Developmental Revision F of the Unit 2 TS Bases revised this section to align it with the standard and the TSTF changes. The initial incorporation of the TSTF changes resulted in duplication of information and was hard to follow. This paragraph contained information discussed elsewhere in the section, albeit maybe different wording. The cited paragraph was deleted.

13. **Page number / Item:**

B 3.3-7 / second paragraph

NRC Comment(s):

In the second sentence, replace "Trip Setpoint" with "NTSP."

TVA Response(s):

Developmental Revision F of the Unit 2 TS Bases revised this section to align it with the standard and the TSTF changes. The initial incorporation of the TSTF changes resulted in duplication of information and was hard to follow. This paragraph contained information discussed elsewhere in the section, albeit maybe different wording. The paragraph was deleted.

14. **Page number / Item:**

B 3.3-9 / last paragraph

NRC Comment(s):

"Decide if [ ] information is to be retained or deleted."

TVA Response(s):

The TS Bases submitted to the NRC by Reference 1 showed the brackets as being deleted. The brackets do not apply. Note that the marked-up version which showed the brackets was not submitted.

A search of Developmental Revision E of the Unit 2 TS shows that brackets remain in three locations:

a. page B 3.3-73: This set of brackets should have been removed previously. Developmental Revision F of the Unit 2 TS Bases deleted this set of brackets.

b. page B 3.6-64: The set of brackets used on this page is used intentionally. This is consistent with the equivalent page in the Unit 1 TS Bases (i.e., page B 3.6-70). This was approved with Unit 1 TS Amendment A33 which was approved by the NRC on November 29, 2001. No change is required.

c. page B 3.6-73: The set of brackets used on this page is used intentionally. This is consistent with the equivalent page in the Unit 1 TS Bases (i.e., page B 3.6-78). This was approved as part of Unit 1 TS Amendment A25 which was approved by the NRC on July 17, 2000. No change is required.

15. <u>Page number / Item</u>:

B 3.3-23 / second paragraph under item 10

<u>NRC Comment(s)</u>:

a. *<u>Bases JFD 9</u>*

page 7.2-22

FSAR 7.2.2.1.2 Reactor Coolant Flow Measurement

The elbow taps used on each loop in the primary coolant system are instrument devices that are used to indicate reactor coolant flow. The basic function of this measurement is to ensure that thermal design flow is achieved.

??For Unit 2, precision colorimetric flow measurement used in lieu of elbow tap methodology. FSAR and TS Bases don't align with JFD 9.??

b. *<u>Bases JFD 7</u>*

FSAR 15.4.2.1.2 Analysis of Effects and Consequences

page 15.4-17

(9) A thermal design flowrate of 372,400 gpm is used which accounts for the 10% steam generator tube plugging level and instrumentation uncertainty.

?? 95,000 gpm doesn't align with 372,400 gpm??

<u>TVA Response(s)</u>:

a. The marked-up version of the TS Bases provided by Reference 5 provided the following justification for the changes to the last paragraph of item 10: "Revised for Unit 2 specific configuration."

Item (4)(a) (Low Reactor Coolant Flow Trip portion of Reactor Trips) on the bottom of page 7.2-7 of the Unit 2 FSAR discusses this RTS value. The TS, TS Bases, and FSAR are consistent.

No change is required.

b. The change made per Developmental Revision B should not have been made on this page; the previous version was consistent with Unit 1, and was correct.

Developmental Revision F of the Unit 2 TS Bases corrects "% thermal design flow adjusted for uncertainties (95,000 gpm)" to read, "% indicated loop flow." As defined in Unit 2 FSAR Chapter 15, the thermal design flow value of 372,400 gpm is the "minimum measured flow" minus measurement (instrument) uncertainty. The minimum measured flow value is 380,000 gpm (rounded) or 95,000 gpm/loop. The ALLOWABLE VALUE and NOMINAL TRIP SETPOINT values for item 10. of Unit 2 TS Table 3.3.1-1 are the same for either the precision calorimetric or the elbow tap dp methods of flow measurement.

16. **Page number / Item**:

    B 3.3-35 / item f.

    NRC Comment(s):

    a. *first paragraph: "Markup uses JFD 8 (TSTF-493); provide corrected JFD."*

    b. *last paragraph: "Markup uses JFD 8 (TSTF-493); provide corrected"*

    TVA Response(s):

    a. The change was required due to physical differences in the Unit 1 and Unit 2 turbines. The justification was in error.

    No change is required.

    b. See response to "a."

17. **Page number / Item**:

    B 3.3-54 / as indicated

    NRC Comment(s):

    Last sentence of first paragraph of SR 3.3.1.3: "Editorial recommendation.... the use of OPERABLE in the sentence is unnecessary, and begs more questions than it provides answers to."

    TVA Response(s):

    The use of "OPERABLE" is consistent with the Unit 1 TS Bases; no change is recommended.

18. **Page number / Item**:

    B 3.3-65 (one for B 3.3.1) / as noted below

    NRC Comment(s):

    a. *References 6, 7, 14, and 15: "Confirmatory approval from EICB required."*

    b. *Reference 13: "Per JFD 9 A47 added the reference to WBN1. Justify the deletion."*

    TVA Response(s):

    a. Reference 5 provided the following justification for the change to Reference 6: "Incorporated Technical Specification Tracking Form (TSTF) 493, R4." This is the reference to the setpoint methodology for Unit 2.

    References 7, 14, and 15 were not affected by Developmental Revision B.

    No change is required.

b. Reference 5 provided the following justification for this change:

"Revised to delete TS A47 Reactor Coolant System Flow Measurement Using Elbow Tap Methodology and associated open item in TS 3,4 Bases:

In TS A47, NRC approved the use of an alternative method for measurement of reactor coolant system (RCS) total flow rate via measurement of the RCS elbow tap differential pressures (Δp).

Unit 2 may implement the elbow tap methodology at a future date; however, for now, Unit 2 will use the precision calorimetric flow measurement methodology."

No change is required.

19. <u>Page number / Item</u>:

B 3.3-65 (one for 3.3.2) / item 3.

<u>NRC Comment(s)</u>:

a. *"2750 psia" should be "2735 psia."*

b. *Add paragraph break after the first sentence.*

<u>TVA Response(s)</u>:

a. 2750 psia - 14.7 = 2735 psig.

Unit 2 TS 2.1.2 (RCS Pressure SL) states, "In MODES 1, 2, 3, 4, and 5, the RCS pressure shall be maintained ≤ 2735 psig."

It is not apparent why the TS uses psig and the TS Bases uses psia; however, they are both correct as is.

The use of "2750 psia" in the Bases for 3.3.2 is consistent with the same usage in Unit 1 TS Bases 3.3.1 and Unit 2 TS Bases 3.3.1.

A search of the TS Bases for the RCS pressure SL showed that "2735 psig" is used in TS Bases 2.1.2 and 3.4.10.

For consistency and clarity, Developmental Revision F of the Unit 2 TS Bases revised TS Bases 2.1.2, 3.3.1, 3.3.2, and 3.4.10 such that references to the RCS pressure SL use "2735 psig (2750 psia)."

b. Developmental Revision F of the Unit 2 TS Bases added the paragraph break as noted.

20. **Page number / Item:**

    B 3.3-66 / last sentence of last paragraph

    NRC Comment(s):

    a. Replace "can be evaluated when its" with "is determined by either."

    b. Replace "are compared against its documented acceptance criteria" with "evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behavior observed during performance of CHANNEL CALIBRATION."

    TVA Response(s):

    Developmental Revision F of the Unit 2 TS Bases revised the last sentence to read, "The OPERABILITY of each transmitter or sensor is determined by either 'as found' calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behavior observed during performance of the CHANNEL CHECK."

21. **Page number / Item:**

    B 3.3-67 / third sentence of first paragraph

    NRC Comment(s):

    Replace "NTSPs" with "analytical limits."

    TVA Response(s):

    Developmental Revision F of the Unit 2 TS Bases replaced, "These NTSPs are defined in Reference 6." with "Analytical Limits are defined in FSAR ..."

22. **Page number / Item:**

    B 3.3-68 / as indicated

    NRC Comment(s):

    a. The first sentence of the first paragraph should read "The field setting..." instead of "The Trip Setpoints ..."

    b. The first sentence of the second paragraph should read, "The trip setpoints ..." instead of "the Trip Setpoints ..."

    c. Eleventh line of the second paragraph: "Allowable Values and ESFAS" points towards "NTSPs." [Does this mean to replace the existing wording with the new wording?]

    d. Fifteenth line of the second paragraph: Add the following after "Reference 6.": The magnitudes of these uncertainties are factored into the determination of each NTSP and corresponding Allowable Value."

e. *Sixth line of the last paragraph: this line should read "... 'as-left' NTSP value is within the as-left tolerance for ..." instead of "... 'as-left' setpoint NTSP value is within the band as-left tolerance for ..."*

<u>TVA Response(s)</u>:

a. Developmental Revision F of the Unit 2 TS Bases revised this section to align it with the standard and the TSTF changes. The initial incorporation of the TSTF changes resulted in duplication of information and was hard to follow. This paragraph contained information discussed elsewhere in the section, albeit maybe different wording. The cited paragraph was deleted.

b. Developmental Revision F of the Unit 2 TS Bases revised the sentence to read, "The trip setpoints ..." instead of "the Trip Setpoints ..."

c. Developmental Revision F of the Unit 2 TS Bases revised the sentence to read, "A detailed description of the methodology used to calculate NTSPs and as left and as found tolerance bands is provided in Reference 2." instead of "A detailed description of the methodology used to calculate the NTSPs including their explicit uncertainties, is provided in the 'Setpoint Methodology for Watts Bar Unit 2' (Ref. 6)." Reference 2 is "Watts Bar FSAR, Section 7.0, 'Instrumentation and Controls.'"

d. As part of the revision to this paragraph made by Developmental Revision F of the Unit 2 TS Bases, parts of two sentences were combined into one which reads, "All of the known uncertainties applicable for each channel are factored into the determination of each NTSP and corresponding Allowable Value."

e. Developmental Revision F of the Unit 2 TS Bases revised this sentence to read, "Any bistable is considered to be properly adjusted when the 'as left' setpoint NTSP value is within the as left tolerance band for ..."

23. **Page number / Item:**

B 3.3-69 / second paragraph

NRC Comment(s):

"COMMENT (JFD7) TADOT surveillances do not have performance NOTES. Why is the TADOT included."

TVA Response(s):

The change implements TSTF-493 for SRs including 3.3.2.8 (i.e., the TADOT for Auxiliary Feedwater start on trip of all Main Feedwater Pumps).

No change is required.

24. **Page number / Item:**

B 3.3-70 / first and fifth lines of fourth paragraph

NRC Comment(s):

Replace "device" with "channel." (two places)

TVA Response(s):

Developmental Revision F of the Unit 2 TS Bases replaced "device" with "channel" in the two places.

25. **Page number / Item:**

B 3.3-72 / as indicated

NRC Comment(s):

a. *Ninth line of the first paragraph: for "[greater than or]":*

"COMMENT (JFD8) reconcile the application of the bracketed information to WBN-2"

b. *Third line of the last paragraph: comment sticky is next to "[field setting]"; however, no comment is contained in it. It appears that the comment for item a. applies here also.*

TVA Response(s):

See response to Item 14.

26. Page number / Item:

B 3.3-76 - second paragraph

NRC Comment(s):

"What is amendment made these Bases changes?"

TVA Response(s):

Reference 5 provided the following justification: "Incorporated Technical Specification Tracking Form (TSTF) 493, R4."

No change is required.

27. Page number / Item:

B 3.3-96 / last paragraph

NRC Comment(s):

"License amendment No.?"

TVA Response(s):

Reference 5 provided the following justification:

"A75 amended the Unit 1 TS to modify the TS requirements related to Mode 1 and 2 applicability for Function 6.e of TS Table 3.3.2-1, 'Engineered Safety Feature Actuation System Instrumentation,' and the Bases for TS 3.3.2. In addition, Limiting Condition for Operation (LCO) 3.3.2, Condition J, has been revised to be consistent with the design basis for WBN Unit 1.

This change is to be applied to Unit 2.

The NRC approved A75 in a letter dated March 4, 2009."

No change is required.

28. Page number / Item:

B 3.3-97 / first paragraph

NRC Comment(s):

"License amendment No.?"

TVA Response(s):

See the response to Item 27.

29. Page number / Item:

B 3.3-107 / second paragraph, last two sentences

NRC Comment(s):

"OPEN ITEM U1/U2: WCAP-14333 (Ref 17) did not approve testing a channel in bypass with the inoperable channel also in bypass."

TVA Response(s):

The Unit 1 TS were issued by an NRC to TVA letter dated November 9, 1995 (Issuance of Facility Operating License No. NPF-20, Watts Bar Nuclear Plant, Unit 1 [TAC M91489]).

ACTIONS E.1, E.2.1, and E.2.2 of Revision 0 of the Unit 1 TS Bases read as follow:

"Condition E applies to:

* Containment Spray Containment Pressure-High High;
* Steam Line Isolation Containment Pressure-High High; and
* Containment Phase B Isolation Containment Pressure-High High.

None of these signals has input to a control function. Thus, two-out-of-three logic is necessary to meet acceptable protective requirements. However, a two-out-of-three design would require tripping a failed channel. This is undesirable because a single failure would then cause spurious containment spray initiation. Spurious spray actuation is undesirable because of the cleanup problems presented. Therefore, these channels are designed with two-out-of four logic so that a failed channel may be bypassed rather than tripped. Note that one channel may be bypassed and still satisfy the single failure criterion. Furthermore, with one channel bypassed, a single instrumentation channel failure will not spuriously initiate containment spray.

To avoid the inadvertent actuation of containment spray and Phase B containment isolation, the inoperable channel should not be placed in the tripped condition. Instead it is bypassed. Restoring the channel to OPERABLE status, or placing the inoperable channel in the bypass condition within 6 hours, is sufficient to assure that the Function remains OPERABLE and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The Completion Time is further justified based on the low probability of an event occurring during this interval. Failure to restore the inoperable channel to OPERABLE status, or place it in the bypassed condition within 6 hours, requires the plant be placed in MODE 3 within the following 6 hours and MODE 4 within the next 6 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODE 4, these Functions are no longer required OPERABLE.

The Required Actions are modified by a Note that allows one additional channel to be bypassed for up to 4 hours for surveillance testing. Placing a second channel in the bypass condition for up to 4 hours for testing purposes is acceptable based on the results of Reference 7."

Reference 7 was "WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, 'Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation

System,' and 'Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation System,' May 1986 and June 1990."

Reference 10 for this section was "Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar."

Thus, the approval for testing a channel in bypass with the inoperable channel also in bypass is Revision 0 of the Unit 1 TS, and not WCAP-14333.

No change is required.

30. <u>Page number / Item</u>:

B 3.3-111 / third paragraph, last two sentences

<u>NRC Comment(s)</u>:

***"OPEN ITEM U1/U2:** WCAP-14333 (Ref 17) did not approve testing a channel in bypass with the inoperable channel also in bypass."*

<u>TVA Response(s)</u>:

The Unit 1 TS were issued by an NRC to TVA letter dated November 9, 1995 (Issuance of Facility Operating License No. NPF-20, Watts Bar Nuclear Plant, Unit 1 [TAC M91489]).

ACTIONS K.1, K.2.1 and K.2.2 of Revision 0 of the Unit 1 TS bases read as follows:

"Condition K applies to RWST Level - Low Coincident with Safety Injection and Coincident with Containment Sump Level - High.

RWST Level -Low Coincident With SI and Coincident With Containment Sump Level -High provides actuation of switchover to the containment sump. Note that this Function requires the comparators to energize to perform their required action. The failure of up to two channels will not prevent the operation of this Function. However, placing a failed channel in the tripped condition could result in a premature switchover to the sump, prior to the injection of the minimum volume from the RWST. Placing the inoperable channel in bypass results in a two-out-of-three logic configuration, which satisfies the requirement to allow another failure without disabling actuation of the switchover when required. Restoring the channel to OPERABLE status or placing the inoperable channel in the bypass condition within 6 hours is sufficient to ensure that the Function remains OPERABLE, and minimizes the time that the Function may be in a partial trip condition (assuming the inoperable channel has failed high). The 6 hour Completion Time is justified in Reference 7. If the channel cannot be returned to OPERABLE status or placed in the bypass condition within 6 hours, the plant must be brought to MODE 3 within the following 6 hours and MODE 5 within the next 30 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODE 5, the plant does not have any analyzed transients or conditions that require the explicit use of the protection functions noted above.

The Required Actions are modified by a Note that allows placing a second channel in the bypass condition for up to 4 hours for surveillance testing. The total of 12 hours to reach MODE 3 and 4 hours for a second channel to be bypassed is acceptable based on the results of Reference 7."

Reference 10 for this section was "Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar."

Thus, the approval for testing a channel in bypass with the inoperable channel also in bypass is Revision 0 of the Unit 1 TS, and not WCAP-14333.

No change is required.

31. **Page number / Item:**

B 3.3-115 / last line

NRC Comment(s):

Should read "conservative with respect to the Allowable Values ..." instead of "within the Allowable Values ..."

TVA Response(s):

Developmental Revision F of the Unit 2 TS Bases replaced "within the Allowable Values ..." with "conservative with respect to the Allowable Values ..."

32. **Page number / Item:**

B 3.3-116 / last paragraph

NRC Comment(s):

a. "The bracketed section 't[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1."

b. The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]."

TVA Response(s):

These comments appear to be suitable to the TS instead of the TS Bases. For example, see TS comment 4 and the response to it.

No change is required.

33. **Page number / Item:**

B 3.3-118 / SR 3.3.2.8

NRC Comment(s):

"Justify deviation from TSTF-493 Bases for F.6.e, Trip of All Turbine Driven Main Feedwater Pumps see Bases page B 3.3.2-60, B 3.3.2-61 for replacement text."

TVA Response(s):

Developmental Revision F of the Unit 2 TS Bases revised SR 3.3.2.8 to be consistent with TSTF-493 by adding a new paragraph.

34. **Page number / Item:**

B 3.3-119 / end of SR 3.3.2.9

NRC Comment(s):

a. *"The bracketed section '[NTSP and the]' of the sentence in Note (c) in Table 3.3.2-1 is not required in plant-specific Technical Specifications which include a [Nominal Trip Setpoint] column in Table 3.3.2-1."*

b. *"The second Note also requires that the [NTSP and the] methodologies for calculating the as-left and the as-found tolerances be in [insert the name of a document controlled under 10 CFR 50.59 such as the Technical Requirements Manual or any document incorporated into the facility FSAR]."*

TVA Response(s):

See the response to Item 32.

35. **Page number / Item:**

B 3.3-122 / as indicated

NRC Comment(s):

a. *References 6, 12, and 13:* ***OPEN*** *Confirmatory item - need license amendment for change to Unit 1 licensing basis?*

b. *Reference 17: "Unit 1 & Unit 2 OPEN ITEM The Required Actions are modified by a Note that allows placing one channel in bypass for up to 12 hours while performing routine surveillance testing. The channel to be tested can be tested in bypass with the inoperable channel also in bypass. The total of [12] hours to reach MODE 3 and [4] hours for a second channel to be bypassed is acceptable based on the results of Reference 10. Issue: Reference 10 cannot be WCAP-14333. WCAP-14333 did not approve and therefore cannot be used as a basis for plant-specific approval to perform testing with two channels in bypass."*

TVA Response(s):

a. Reference 5 provided the following justifications for the noted references:

- Reference 6: "Incorporated Technical Specification Tracking Form (TSTF) 493, R4." This is the reference to the setpoint methodology for Unit 2.
- Reference 12: "Revised for Unit 2 specific configuration."
- Reference 13: "Editorial"

b. See response to Items 29 and 30.

36. Page number / Item:

B 3.3-123 / References 20, 21, 22

NRC Comment(s):

*"**OPEN** Confirmatory item - need license amendment for change to Unit 1 license basis "*

TVA Response(s):

Reference 5 provided the following justifications for the noted references:

- Reference 20:

  "A75 amended the Unit 1 TS to modify the TS requirements related to Mode 1 and 2 applicability for Function 6.e of TS Table 3.3.2-1, 'Engineered Safety Feature Actuation System Instrumentation,' and the Bases for TS 3.3.2. In addition, Limiting Condition for Operation (LCO) 3.3.2, Condition J, has been revised to be consistent with the design basis for WBN Unit 1.

  This change is to be applied to Unit 2.

  The NRC approved A75 in a letter dated March 4, 2009."

- Reference 21: "Incorporated Technical Specification Tracking Form (TSTF) 493, R4." This is the reference to the setpoint methodology for Unit 2.

- Reference 22: "Revised for Unit 2 specific configuration."

No change is required.

37. **Page number / Item:**

B 3.3-135 / Reference 3

NRC Comment(s):

Confirmatory item - reference #3 applies to Unit 2.

TVA Response(s):

This reference was not affected by Developmental Revision B.

No change is required.

38. **Page number / Item:**

B 3.3-141 / Reference 3 (for B 3.3.5)

NRC Comment(s):

Confirmatory item - reference #3 applies to Unit 2.

TVA Response(s):

This reference was not affected by Developmental Revision B; however, during discussion of this comment during TVA's meeting with the NRC on May 10, 2011, TVA noted that the calculation number is incorrect. Review of the calculation's cover sheet shows that it has "001 & 002" in the UNITS field.

Developmental Revision F of the Unit 2 TS Bases corrects "WPE2119202001" to "WBPE2119202001."

39. **Page number / Item:**

B 3.3-142 / Reference 4 (for B 3.3.5)

NRC Comment(s):

"A similar reference was not provided for LCO 3.3.1 or LCO 3.3.2 TSTF-493 Surveillance Requirement Notes. Why?"

TVA Response(s):

Both Unit 1 and Unit 2 TS Bases have references to similar TRM sections:

- The Bases for SR 3.3.1.15 refers to "Ref. 8." Reference 8 is "Watts Bar Technical Requirements Manual, Section 3.3.1, 'Reactor Trip System Response Times'."
- The Bases for SR 3.3.2.10 refers to "Ref. 8." Reference 8 is "Watts Bar Technical Requirements Manual, Section 3.3.2, 'Engineered Safety Feature Response Times'."

During the review of the TS Bases to respond to this comment, TVA noted that Reference 4 on page B 3.3-153 is not used in TS Bases 3.3.5.

Developmental Revision F of the Unit 2 TS Bases deletes existing Reference 4 and renumbers existing References 5 and 6 (and references to them).

40. Page number / Item:

B 3.3-150 / Reference 3

NRC Comment(s):

*"**OPEN** Confirmatory item - need a licensing basis for deviation from Unit 1."*

TVA Response(s):

Reference 5 provided the following justification for this change: "Revised for Unit 2 specific configuration."

No change is required.

41. Page number / Item:

B 3.3-151 / Reference 5

NRC Comment(s):

*"**OPEN** Confirmatory item - need a licensing basis for deviation from Unit 1."*

TVA Response(s):

Refer to response to Item 15 of the TS comments.

42. Page number / Item:

B 3.4-10 / fifth paragraph

NRC Comment(s):

"CPNB to verify acceptability of deviation from WBN1. (JFD-5)"

Also, "Open Pending Receipt of Information" at the top of the page.

TVA Response(s):

Reference 1 provided the following justification for this change: "Corrected / updated information in response to Westinghouse letter WBT-D-1342, dated December 10, 2009. This Westinghouse letter provides the final Pressure Temperature Limits Report and associated FSAR, Technical Specifications and TS Bases markups."

This paragraph of the Unit 2 TS Bases states, "10 CFR 50, Appendix G (Ref. 2), requires the establishment of P/T limits for specific material fracture toughness requirements of the RCPB materials. Reference 2 requires an adequate margin to brittle failure during normal operation, anticipated operational occurrences, and system hydrostatic tests. ..."

IV.2.b. of 10 CFR 50, Appendix G states, "The pressure-temperature limits identified as 'ASME Appendix G limits' in Table 3 require that the limits must be at least as conservative as limits obtained by following the methods of analysis and the margins of safety of Appendix G of Section XI of the ASME Code."

Thus, the change from "Section III" to "Section XI" is justified.

43. Page number / Item:

B 3.4-34 / last paragraph

NRC Comment(s):

a. "OPEN confirmatory item Unit 1, Revision 79, A61 changes do not apply to U2"

b. In the last sentence, replace "greater than or equal to" with "above."

TVA Response(s):

a. The review matrix for TS Bases 3.4.7 provided by Reference 4 stated:

"R79 revised the Unit 1 TS Bases to reflect changes to the Unit 1 TS approved by Unit 1 TS A61 (authorize change in SG level requirement from greater than or equal to 6% to greater than or 32% following SG replacement). This change will NOT be made on Unit 2 at this time.

NRC approved A61 via letter dated 05/05/2006."

No change is required.

b. The existing wording is consistent with the Unit 1 TS Bases; STS uses "≥."

No change is required.

44. Page number / Item:

B 3.5-7 / Note following SR 3.5.1.2 and SR 3.5.1.3

NRC Comment(s):

"stet per A81"

TVA Response(s):

This deletion was intentional and consistent with deletion of similar verbiage in other Unit 2 TS Bases portions.

No change is required.

45. **Page number / Item:**

B 3.7-34 / "100.6%" in third line of first paragraph under LCO

NRC Comment(s):

"was '102', A31, Rev 41 not on U2."

TVA Response(s):

This was not affected by Unit 2 Developmental Revision B.

The review matrix for TS Bases 3.7.6 provided by Reference 4 stated:

"R41 revised the Unit 1 TS Bases to reflect changes to the Unit 1 TS approved by A31 {approve Power Uprate using Leading Edge Flow Meter (LEFM) for Unit 1}.

This change will NOT be implemented on Unit 2 at this time.

NRC approved A31 via letter dated 01/19/2001."

No change is required.

46. **Page number / Item:**

B 3.8-8 / as indicated

NRC Comment(s):

a. *sticky at top of page: "Revision 50, Amendment 39 is not on U2. The added sentence is from U1 and should apply to U2, but was omitted."*

b. *last paragraph on page: add the following after the second sentence: "For the performance of a Surveillance, Required Action B.3.1 is considered satisfied since the cause of the DG being inoperable is apparent."*

TVA Response(s):

a. The review matrix for TS Bases 3.8.1 provided by Reference 4 included the following:

"R50 revised the Unit 1 TS Bases to reflect changes to the Unit 1 TS approved by Unit 1 TS A39 (revise LCO 3.8.1's allowed outage time to restore an inoperable emergency diesel generator to operable status from 72 hours to 14 days). This change will NOT be applied to Unit 2.

NRC approved A39 via letter dated 07/01/2002."

No change is required.

b. The review matrix for TS Bases 3.8.1 provided by Reference 4 Included the following:

"R65 revised the Unit 1 TS Bases to clarify that a common cause assessment is not required when a DG is made inoperable due to the performance of a surveillance. This change is to be applied to Unit 2.

R65 was provided to NRC via letter dated 04/20/2004."

This change was inadvertently omitted. Developmental Revision F of the Unit 2 TS Bases added the missing sentence.

47. **Page number / Item:**

B 3.8-26 / SR 3.8.1.14

NRC Comment(s):

"TVA February 16, 2011 Letter, Enclosure 5, Commitments, item #2; a future Developmental revision to delete the Revision 50, Amendment 39 U1 paragraph lined out on page B 3.8-28"

TVA Response(s):

Item 2 of Enclosure 5 of Reference 3 stated, "A future Developmental Revision to the Unit 2 TS Bases will remove the 'Prior to performance of this SR in Modes 1 or 2, actions are taken to establish that adequate conditions exist for performance of the SR. The required actions are defined in Bases Table 3.8.1-2.' wording from the TS Bases for SR 3.8.1.14.

Developmental Revision F of the Unit 2 TS Bases deleted the 'Prior to performance of this SR in Modes 1 or 2, actions are taken to establish that adequate conditions exist for performance of the SR.' The required actions are defined in Bases Table 3.8.1-2. 'verbiage from the TS Bases for SR 3.8.1.14.'"

ENCLOSURE 5

Proposed Unit 2 Technical Specifications

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Rod Position Indication

LCO 3.1.8 The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each inoperable rod position indicator per group and each demand position indicator per bank.

CONDITION	REQUIRED ACTION	COMPLETION TIME
---------------NOTE--------------- Rod position monitoring by Required Actions A.2.1 and A.2.2 may only be applied to one inoperable RPI and shall only be allowed: (1) until the end of the current cycle, or (2) until an entry into MODE 5 of sufficient duration, whichever occurs first, when the repair of the inoperable RPI can safely be performed. Required Actions A.2.1, A.2.2 and A.2.3 shall not be allowed after the plant has been in MODE 5 or other plant condition, for a sufficient period of time, in which the repair of the inoperable RPI could have safely been performed. -------------------------------------- A. One RPI per group inoperable for one or more groups.	A.1 Verify the position of the rods with inoperable position indicators by using the PDMS. <u>OR</u> A.2.1 Verify the position of the rod with the inoperable position indicator by using the PDMS. <u>AND</u>	Once per 8 hours 8 hours <u>AND</u> Once every 31 days thereafter <u>AND</u> 8 hours, if rod control system parameters indicate unintended movement (continued)

3.2 POWER DISTRIBUTION LIMITS

3.2.4 QUADRANT POWER TILT RATIO (QPTR)

LCO 3.2.4 The QPTR shall be ≤ 1.02.

APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. QPTR not within limit.	A.1	Reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00.	2 hours
	AND		
	A.2	Perform SR 3.2.4.1 and reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00.	Once per 12 hours thereafter
	AND		
	A.3	Perform SR 3.2.1.1 and SR 3.2.2.1.	24 hours AND Once per 7 days thereafter
	AND		
	A.4	Reevaluate safety analyses and confirm results remain valid for duration of operation under this condition.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
	AND		

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A.	A.5	------------NOTE------------ Perform Required Action A.5 only after Required Action A.4 is completed. --------------------------------- Calibrate excore detectors to show QPTR of 1.0.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
	<u>AND</u>		
	A.6	------------NOTE------------ Perform Required Action A.6 only after Required Action A.5 is completed. --------------------------------- Perform SR 3.2.1.1 and SR 3.2.2.1.	Within 24 hours after reaching RTP <u>OR</u> Within 48 hours after increasing THERMAL POWER above the limit of Required Action A.1
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to ≤ 50% RTP.	4 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
M. One channel inoperable.	-------------------NOTE------------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ---	
	M.1 Place channel in trip.	72 hours
	<u>OR</u>	
	M.2 Reduce THERMAL POWER to < P-7.	78 hours
N. One Reactor Coolant Flow - Low channel inoperable.	-------------------NOTE------------------ One channel may be bypassed for up to 12 hours for surveillance testing. ---	
	N.1 Place channel in trip.	72 hours
	<u>OR</u>	
	N.2 Reduce THERMAL POWER to < P-7.	78 hours

(continued)

Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1.	Manual Reactor Trip	1, 2	2	B	SR 3.3.1.13	NA	NA
		3 (a), 4 (a), 5 (a)	2	C	SR 3.3.1.13	NA	NA
2.	Power Range Neutron Flux						
	a. High	1, 2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 111.4% RTP	109% RTP
	b. Low	1 (d), 2	4	E	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 27.4% RTP	25% RTP
3.	Power Range Neutron Flux Rate						
	a. High Positive Rate	1, 2	4	E	SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c)	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
	b. High Negative Rate – DELETED						
4.	Intermediate Range Neutron Flux	1 (d), 2 (e)	2	F, G	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 40% RTP	25% RTP
		2 (f)	2	H	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 40% RTP	25% RTP

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) If the as found channel setpoint is outside its predefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(d) Below the P-10 (Power Range Neutron Flux) interlocks.

(e) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

Table 3.3.1-1 (page 2 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5.	Source Range Neutron Flux	2 (f)	2	I, J	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 1.5 E5 cps	1.0 E5 cps
		3 (a), 4 (a), 5 (a)	2	J, K	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 1.5 E5 cps	1.0 E5 cps
		3 (g), 4 (g), 5 (g)	1	L	SR 3.3.1.1 SR 3.3.1.11 (b)(c)	N/A	N/A
6.	Overtemperature ΔT	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	Refer to Note 1 (Page 3.3-21)	Refer to Note 1 (Page 3.3-21)
7.	Overpower ΔT	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	Refer to Note 2 (Page 3.3-22)	Refer to Note 2 (Page 3.3-22)
8.	Pressurizer Pressure						
	a. Low	1 (h)	4	X	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 1964.8 psig	1970 psig
	b. High	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≤ 2390.2 psig	2385 psig

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) If the as found channel setpoint is outside its predefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(g) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock.

Table 3.3.1-1 (page 3 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
9.	Pressurizer Water Level-High	1 (h)	3	X	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	≤ 92.7% span	92% span
10.	Reactor Coolant Flow - Low	1 (h)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 89.7% flow	90% flow
11.	Undervoltage RCPs	1 (h)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 4734 V	4830 V
12.	Underfrequency RCPs	1 (h)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 56.9 Hz	57.5 Hz

(continued)

(b) If the as found channel setpoint is outside its predefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(h) Above the P-7 (Low Power Reactor Trips Block) interlock.

Table 3.3.1-1 (page 4 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
13. SG Water Level – Low-Low	1, 2	3/SG	U	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 16.4% of narrow range span	17% of narrow range span
Coincident with:						
a) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one steam generator is affected					≤ 1.01 T_s (Refer to Note 3, Page 3.3-23)	T_s (Refer to Note 3, Page 3.3-23)
or						
A time delay (T_m) if two or more steam generators are affected					≤ 1.01 T_m (Refer to Note 3, Page 3.3-23)	T_m (Refer to Note 3, Page 3.3-23)
b) Vessel ΔT Equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
14. Turbine Trip						
a. Low Fluid Oil Pressure	1 (i)	3	O	SR 3.3.1.18 (b)(c) SR 3.3.1.14	≥ 43 psig	45 psig
b. Turbine Stop Valve Closure	1 (i)	4	Y	SR 3.3.1.10 SR 3.3.1.14	≥ 1% open	1% open

(continued)

(b) If the as found channel setpoint is outside its predefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(i) Above the P-9 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 5 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
15. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1, 2	2 trains	P	SR 3.3.1.13	NA	NA
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6						
(1) Enable Manual Block of SR Trip	2 [(f)]	2	R	SR 3.3.1.11 SR 3.3.1.12	NA	1.66E-04% RTP
(2) Auto Reset (Unblock Manual Block of SR Trip)	2 [(f)]	2	R	SR 3.3.1.11 SR 3.3.1.12	≥ 7.65E-5% RTP	0.47E-4% RTP below setpoint
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.11 SR 3.3.1.12	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 50.4% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.12	≤ 52.4% RTP	50% RTP
e. Power Range Neutron Flux, P-10	1, 2	4	R	SR 3.3.1.11 SR 3.3.1.12	≥ 7.6% RTP and ≤ 12.4% RTP	10% RTP
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.10 SR 3.3.1.12	≤ 12.4% full-power pressure	10% full-power pressure

(continued)

(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.2.6	------------------------------NOTE------------------------------ Verification of relay setpoints not required. --- Perform TADOT.	 92 days
SR 3.3.2.7	Perform SLAVE RELAY TEST on slave relays K603A, K603B, K604A, K604B, K607A, K607B, K609A, K609B, K612A, K625A, and K625B,	18 months
SR 3.3.2.8	------------------------------NOTE------------------------------ Verification of setpoint not required for manual initiation. --- Perform TADOT.	 18 months
SR 3.3.2.9	------------------------------NOTE------------------------------ This Surveillance shall include verification that the time constants are adjusted to the prescribed values. --- Perform CHANNEL CALIBRATION.	 18 months
SR 3.3.2.10	------------------------------NOTE------------------------------ Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 1092 psig in the steam generator. --- Verify ESFAS RESPONSE TIMES are within limit.	 18 months on a STAGGERED TEST BASIS
SR 3.3.2.11	------------------------------NOTE------------------------------ Verification of setpoint not required. --- Perform TADOT.	 Once per reactor trip breaker cycle

Table 3.3.2-1 (page 1 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Safety Injection						
a. Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
c. Containment Pressure – High	1, 2, 3	3	D	SR 3.3.2.1 SR 3.3.2.4 [(b) (c)] SR 3.3.2.9 [(b) (c)] SR 3.3.2.10	≤ 1.6 psig	1.5 psig
d. Pressurizer Pressure – Low	1, 2, 3[(a)]	3	D	SR 3.3.2.1 SR 3.3.2.4 [(b) (c)] SR 3.3.2.9 [(b) (c)] SR 3.3.2.10	≥ 1864.8 psig	1870 psig
e. Steam Line Pressure - Low	1, 2, 3[(a)]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 [(b) (c)] SR 3.3.2.9 [(b) (c)] SR 3.3.2.10	≥ 666.6[(d)] psig	675[(d)] psig
2. Containment Spray						
a. Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c. Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 [(b) (c)] SR 3.3.2.9 [(b) (c)] SR 3.3.2.10	≤ 2.9 psig	2.8 psig

(a) Above the P-11 (Pressurizer Pressure) Interlock.

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(d) Time constants used in the lead/lag controller are t1 > 50 seconds and t2 < 5 seconds.

(continued)

Table 3.3.2-1 (page 2 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation						
a. Phase A Isolation						
1) Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
b. Phase B Isolation						
1) Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
3) Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

Table 3.3.2-1 (page 3 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Steam Line Isolation						
a. Manual Initiation	1, 2 (e), 3 (e)	1/valve	F	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1, 2 (e), 3 (e)	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c. Containment Pressure – High High	1, 2 (e), 3 (e)	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig
d. Steam Line Pressure						
1) Low	1, 2 (e), 3 (a)(e)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 666.6 (d) psig	675 (d) psig
2) Negative Rate - High	3 (e)(f)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 108.5 (g) psi	100 (g) psi

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(d) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(e) Except when all MSIVs are closed and de-activated.

(f) Function automatically blocked above P-11 (Pressurizer Interlock) setpoint and is enabled below P-11 when safety injection on Steam Line Pressure Low is manually blocked.

(g) Time constants utilized in the rate/lag controller are t_3 and $t_4 \geq 50$ seconds.

Table 3.3.2-1 (page 4 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5. Turbine Trip and Feedwater Isolation						
a. Automatic Actuation Logic and Actuation Relays	1, 2 (h), 3 (h)	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. SG Water Level – High High (P-14)	1, 2 (h), 3 (h)	3 per SG	I	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 83.1%	82.4%
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. North MSV Vault Room Water Level – High	1, 2 (h)(i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9	≤ 5.31 inches	4 inches
e. South MSV Vault Room Water Level – High	1, 2 (h)(i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9	≤ 4.56 inches	4 inches

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(h) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

(i) Mode 2 if Turbine Driven Main Feed Pumps are operating.

Table 3.3.2-1 (page 5 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. SG Water Level – Low Low	1, 2, 3	3 per SG	M	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	$\geq$ 16.4%	17.0%
Coincident with:						
1) Vessel ΔT Equivalent to power $\leq$ 50% RTP	1, 2	3	N	SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c)	Vessel ΔT variable input $\leq$ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one SG is affected					$\leq 1.01\ T_s$ (Note 1, Page 3.3-40)	T_s (Note 1, Page 3.3-40)
or						
A time delay (T_m) if two or more SGs are affected					$\leq 1.01\ T_m$ (Note 1, Page 3.3-40)	T_m (Note 1, Page 3.3-40)
2) Vessel ΔT equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	N	SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c)	Vessel ΔT variable input $\leq$ 52.6% RTP	Vessel ΔT variable input 50% RTP
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

Table 3.3.2-1 (page 6 of 8)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6.	Auxiliary Feedwater (continued)						
d.	Loss of Offsite Power	1, 2, 3	4 per bus	F	Refer to Function 4 of Table 3.3.5-1 for SRs and Allowable Values. Notes (b) and (c) are applicable to SR 3.3.5.2 for this function.		
e.	Trip of all Turbine Driven Main Feedwater Pumps	1 (j), 2 (k)	1 per pump	J	SR 3.3.2.8 (b)(c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 48 psig	50 psig
f.	Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3	3	F	SR 3.3.2.6 SR 3.3.2.9 (b) (c) SR 3.3.2.10	A) ≥ 0.5 psig B) ≥ 1.33 psig	A) 1.2 psig B) 2.0 psig
7.	Automatic Switchover to Containment Sump						
a.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	Refueling Water Storage Tank (RWST) Level - Low	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 155.6 inches from Tank Base	158 inches from Tank Base
	Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
	and						
	Coincident with Containment Sump Level - High	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 37.2 inches above el. 702.8 ft	38.2 inches above el. 702.8 ft

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(j) Entry into Condition J may be suspended for up to 4 hours when placing the second Turbine Driven Main Feedwater (TDMFW) Pump in service or removing one of two TDMFW pumps from service.

(k) When one or more Turbine Driven Feedwater Pump(s) are supplying feedwater to steam generators.

Table 3.3.2-1 (page 7 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1, 2, 3	1 per train, 2 trains	F	SR 3.3.2.11	NA	NA
b. Pressurizer Pressure, P-11						
(1) Unblock (Auto Reset of SI Block)	1, 2, 3	3	L	SR 3.3.2.1 SR 3.3.2.4 SR 3.3.2.9	≤ 1975.2 psig	1970 psig
(2) Enable Manual Block of SI	1, 2, 3	3	L	SR 3.3.2.1 SR 3.3.2.4 SR 3.3.2.9	≥ 1956.8 psig	1962 psig

Table 3.3.2-1 (page 8 of 8)
Engineered Safety Feature Actuation System Instrumentation

NOTE 1: Steam Generator Water Level Low-Low Trip Time Delay:

$$T_s = A(P)^3 + B(P)^2 + C(P) + D$$

$$T_m = E(P)^3 + F(P)^2 + G(P) + H$$

Where:

P = Vessel ΔT Equivalent to power (% RTP), P ≤ 50% RTP.

T_s = Time Delay for Steam Generator Water Level – Low-Low Reactor Trip, one Steam Generator affected.

T_m = Time Delay for Steam Generator Water Level – Low-Low Reactor Trip, two or more Steam Generators affected.

A = -0.0085041

B = 0.9266400

C = -33.85998

D = 474.6060

E = -0.0047421

F = 0.5682600

G = -23.70753

H = 357.9840

3.3 INSTRUMENTATION

3.3.4 Remote Shutdown System

LCO 3.3.4 The Remote Shutdown System Functions in Table 3.3.4-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required Functions inoperable.	A.1	Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 4.	12 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings $\geq$ 2410 psig and $\leq$ 2560 psig.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR.

---NOTE---
The lift settings are not required to be within the LCO limits during MODE 3 and MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1	Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. <u>OR</u> Two or more pressurizer safety valves inoperable.	B.1 <u>AND</u> B.2	Be in MODE 3. Be in MODE 4 with any RCS cold leg temperature $\leq$ the COMS arming temperature specified in the PTLR.	6 hours 12 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1	Close and maintain power to associated block valve	1 hour
B. One PORV inoperable and not capable of being manually cycled.	B.1	Close associated block valve	1 hour
	AND		
	B.2	Remove power from associated block valve.	1 hour
	AND		
	B.3	Restore PORV to OPERABLE status	72 hours

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Cold Overpressure Mitigation System (COMS)

LCO 3.4.12

A COMS 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 either a or b below.

a. Two RCS relief valves, as follows:

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

   2. One PORV with a lift setting within the limits specified in the PTLR and the RHR suction relief valve with a setpoint $\geq$ 436.5 psig and $\leq$ 463.5 psig.

b. The RCS depressurized and an RCS vent capable of relieving > 475 gpm water flow.

--NOTE--

1. Two charging pumps may be made capable of injecting for less than or equal to one 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.

APPLICABILITY:

MODE 4 with any RCS cold leg temperature $\leq$ the COMS arming temperature specified in the PTLR,
MODE 5,
MODE 6 when the reactor vessel head is on

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.13 RCS Operational LEAKAGE

LCO 3.4.13 RCS operational LEAKAGE shall be limited to:

a. No pressure boundary LEAKAGE;

b. 1 gpm unidentified LEAKAGE;

c. 10 gpm identified LEAKAGE; and

d. 150 gallons per day primary-to-secondary LEAKAGE through any one steam generator (SG).

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCS operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary-to-secondary LEAKAGE.	A.1	Reduce LEAKAGE to within limits.	4 hours
B. Required Action and associated Completion Time of Condition A not met. OR Pressure boundary LEAKAGE exists. OR Primary-to-secondary LEAKAGE not within limit.	B.1 AND B.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

LCO 3.4.14 Leakage from each RCS PIV shall be within limit.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4, except valves in the residual heat removal (RHR) flow path when in, or during the transition to or from, the RHR mode of operation.

ACTIONS

-----NOTES-----
1. Separate Condition entry is allowed for each flow path.

2. Enter applicable Conditions and Required Actions for systems made inoperable by an inoperable PIV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more flow paths with leakage from one or more RCS PIVs not within limit.	-----NOTE----- Each valve used to satisfy Required Action A.1 must have been verified to meet SR 3.4.14.1 and be in the reactor coolant pressure boundary. -----	
	A.1 Isolate the high pressure portion of the affected system from the low pressure portion by use of one closed manual, deactivated automatic, or check valve.	4 hours
	<u>AND</u>	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2	Restore RCS PIV to within limits	72 hours
B. Required Action and associated Completion Time for Condition A not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the required containment atmosphere particulate radioactivity monitor.	12 hours
SR 3.4.15.2	Perform COT of the required containment atmosphere particulate radioactivity monitor.	92 days
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment pocket sump level monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the required containment atmosphere particulate radioactivity monitor.	18 months

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.17 Steam Generator (SG) Tube Integrity

LCO 3.4.17 SG tube integrity shall be maintained

<u>AND</u>

All SG tubes satisfying the tube repair criteria shall be plugged in accordance with the Steam Generator Program.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

---NOTE---

Separate Condition entry is allowed for each SG tube.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more SG tubes satisfying the tube repair criteria and not plugged in accordance with the Steam Generator Program	A.1	Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or SG tube inspection	7 days
	<u>AND</u>		
	A.2	Plug the affected tube(s) in accordance with the Steam Generator Program	Prior to entering MODE 4 following the next refueling outage or SG tube inspection
B. Required Action and associated Completion Time of Condition A not met	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
<u>OR</u>	B.2	Be in MODE 5.	36 hours
SG tube integrity not maintained			

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS - Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

APPLICABILITY: MODE 4.

ACTIONS

-----NOTE-----
LCO 3.0.4.b is not applicable to ECCS high head (centrifugal charging) subsystem.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS residual heat removal (RHR) subsystem inoperable.	-----NOTE----- The required ECCS residual heat removal (RHR) subsystem may be inoperable for up to 1 hour for surveillance testing of valves provided that alternate heat removal methods are available via the steam generators to maintain the Reactor Coolant System T_{avg} less than 350°F and provided that the required subsystem is capable of being manually realigned to the ECCS mode of operation from the main control room. -----	
	A.1 Initiate action to restore required ECCS RHR subsystem to OPERABLE status	Immediately

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.2 Containment Air Locks

LCO 3.6.2 Two containment air locks shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

--NOTES--

1. Entry and exit is permissible to perform repairs on the affected air lock components.
2. Separate Condition entry is allowed for each air lock.
3. Enter applicable Conditions and Required Actions of LCO 3.6.1, "Containment," when air lock leakage results in exceeding the overall containment leakage rate.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment air locks with one containment air lock door inoperable.	------------------NOTES------------------ 1. Required Actions A.1, A.2, and A.3 are not applicable if both doors in the same air lock are inoperable and Condition C is entered. 2. Entry and exit is permissible for 7 days under administrative controls if both air locks are inoperable. ---	(continued)

3.6 CONTAINMENT SYSTEMS

3.6.9 Emergency Gas Treatment System (EGTS)

LCO 3.6.9 Two EGTS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One EGTS train inoperable.	A.1 Restore EGTS train to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.9.1	Operate each EGTS train for ≥ 10 continuous hours with heaters operating.	31 days
SR 3.6.9.2	Perform required EGTS filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.13 Divider Barrier Integrity

LCO 3.6.13 Divider barrier integrity shall be maintained.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. -----------NOTE----------------- For this action, separate Condition entry is allowed for each personnel access door or equipment hatch. ----------------------------------- One or more personnel access doors or equipment hatches between upper and lower containment open or inoperable, other than for personnel transit.	A.1 Restore personnel access doors and equipment hatches to OPERABLE status and closed positions.	1 hour
B. Divider barrier seal inoperable.	B.1 Restore seal to OPERABLE status.	1 hour
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours 36 hours

3.7 PLANT SYSTEMS

3.7.1 Main Steam Safety Valves (MSSVs)

LCO 3.7.1 Five MSSVs per steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more steam generators with one MSSV inoperable.	A.1	Reduce THERMAL POWER to ≤ 59 % RTP.	4 hours
B. One or more steam generators with two or more MSSVs inoperable.	B.1	Reduce THERMAL POWER to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	4 hours
	<u>AND</u>	------------NOTE------------ Only required in MODE 1. --------------------------------	
	B.2	Reduce the Power Range Neutron Flux - High reactor trip setpoint to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	

(continued)

3.7 PLANT SYSTEMS

3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ERCW train inoperable.	A.1	------------NOTES----------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for emergency diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. -----------------------------------	
		Restore ERCW train to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

3.7 PLANT SYSTEMS

3.7.10 Control Room Emergency Ventilation System (CREVS)

LCO 3.7.10 Two CREVS trains shall be OPERABLE.

---NOTE---
The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One CREVS train inoperable for reasons other than Condition B.	A.1	Restore CREVS train to OPERABLE status.	7 days
B. One or more CREVS trains inoperable due to inoperable CRE boundary in MODE 1, 2, 3, or 4.	B.1	Initiate action to implement mitigating actions.	Immediately
	<u>AND</u>		
	B.2	Verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits and CRE occupants are protected from smoke hazards.	24 hours
	<u>AND</u>		
	B.3	Restore CRE boundary to OPERABLE status.	90 days

(continued)

3.7 PLANT SYSTEMS

3.7.11 Control Room Emergency Air Temperature Control System (CREATCS)

LCO 3.7.11 Two CREATCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREATCS train inoperable.	A.1 Restore CREATCS train to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 5.	6 hours 36 hours
C. Required Action and associated Completion Time of Condition A not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	C.1 Place OPERABLE CREATCS train in operation. <u>OR</u> C.2 Suspend movement of irradiated fuel assemblies.	Immediately Immediately
D. Two CREATCS trains inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	D.1 Suspend movement of irradiated fuel assemblies	Immediately
E. Two CREATCS trains inoperable in MODE 1, 2, 3, or 4.	E.1 Enter LCO 3.0.3.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and

b. Four diesel generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

--NOTE--
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND		
	A.2	Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND		
			(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Restore offsite circuit to OPERABLE status.	72 hours <u>AND</u> 6 days from discovery of failure to meet LCO
B. One or more DG(s) in Train A inoperable. <u>OR</u> One or more DG(s) in Train B inoperable.	B.1	Perform SR 3.8.1.1 for the offsite circuits.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>		
	B.2	Declare required feature(s) supported by the inoperable DG(s) inoperable when its required redundant feature(s) is inoperable	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u>		
	B.3.1	Determine OPERABLE DG(s) is not inoperable due to common cause failure.	24 hours
	<u>OR</u>		
	B.3.2	Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours
	<u>AND</u>		
			(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify vital battery terminal voltage is ≥ 128 V (132 V for vital battery V) on float charge.	7 days
SR 3.8.4.2	Verify DG battery terminal voltage is ≥ 124 V on float charge.	7 days
SR 3.8.4.3	Verify for the vital batteries that the alternate feeder breakers to each required battery charger are open.	7 days
SR 3.8.4.4	Verify correct breaker alignment and indicated power availability for each DG 125 V DC distribution panel and associated battery charger	7 days
SR 3.8.4.5	Verify no visible corrosion at terminals and connectors for the vital batteries. <u>OR</u> Verify connection resistance for the vital batteries is ≤ 80 E-6 ohm for inter-cell connections, ≤ 50 E-6 ohm for inter-rack connections, ≤ 120 E-6 ohm for inter-tier connections, and ≤ 50 E-6 ohm for terminal connections.	92 days
SR 3.8.4.6	Verify no visible corrosion at terminals and connectors for the DG batteries. <u>OR</u> Verify connection resistance for the DG batteries is ≤ 80 E-6 ohm for inter-cell connections, ≤ 50 E-6 ohm for inter-tier connections, and ≤ 50 E-6 ohm for terminal connections.	92 days
SR 3.8.4.7	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration.	12 months

(continued)

3.9 REFUELING OPERATIONS

3.9.1 Boron Concentration

LCO 3.9.1 Boron concentrations of the Reactor Coolant System, the refueling canal, and the refueling cavity shall be maintained within the limit specified in the COLR.

APPLICABILITY: Mode 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Boron concentration not within limit.	A.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2	Suspend positive reactivity additions.	Immediately
	AND		
	A.3	Initiate action to restore boron concentration to within limit.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.1.1	Verify boron concentration is within the limit specified in COLR.	72 hours

3.9 REFUELING OPERATIONS

3.9.2 Unborated Water Source Isolation Valves

LCO 3.9.2 Each valve used to isolate unborated water sources shall be secured in the closed position.

APPLICABILITY: Mode 6.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each unborated water source isolation valve.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. -----NOTE----- Required Action A.3 must be completed whenever Condition A is entered. ----- One or more valves not secured in closed position.	A.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2	Initiate action to secure valve in closed position.	Immediately
	<u>AND</u>		
	A.3	Perform SR 3.9.1.1.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.2.1	Verify each valve that isolates unborated water sources is secured in the closed position.	31 days

3.9 REFUELING OPERATIONS

3.9.3 Nuclear Instrumentation

LCO 3.9.3 Two source range neutron flux monitors shall be OPERABLE.

APPLICABILITY: Mode 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required source range neutron flux monitor inoperable.	A.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2	Suspend positive reactivity additions.	Immediately
B. Two required source range neutron flux monitors inoperable.	B.1	Initiate action to restore one source range neutron flux monitor to OPERABLE status.	Immediately
	<u>AND</u>		
	B.2	Perform SR 3.9.1.1.	4 hours <u>AND</u> Once per 12 hours thereafter

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks (shown in Figure 4.3-1) are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent;

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which, includes an allowance for uncertainties as described in Sections 4.3.2.7 and 9.1 of the FSAR;

c. Distances between fuel assemblies are a nominal 10.375 inch center-to-center spacing in the twenty-four flux trap rack modules.

d. Fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage.

e. Fuel assemblies with initial enrichments greater than 3.80 weight percent and less than a maximum of 5 percent enrichment (nominally 4.95 ± 0.05 percent) may be stored in the spent fuel racks in one of four arrangements with specific limits as identified below:

1. Spent fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in Figure 4.3-3, depending upon the specified initial enrichment.

2. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in Figure 4.3-4.

3. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material.

(continued)

ENCLOSURE 6

Marked-up Version of Unit 2 Technical Specifications With Justifications for Revisions

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Rod Position Indication

LCO 3.1.8 The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE.

add "." ①

APPLICABILITY: MODES 1 and 2

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each inoperable rod position indicator per group and each demand position indicator per bank.

CONDITION	REQUIRED ACTION	COMPLETION TIME
-----NOTE----- Rod position monitoring by Required Actions A.2.1 and A.2.2 may only be applied to one inoperable RPI and shall only be allowed: (1) until the end of the current cycle, or (2) until an entry into MODE 5 of sufficient duration, whichever occurs first, when the repair of the inoperable RPI can safely be performed. Required Actions A.2.1, A.2.2 and A.2.3 shall not be allowed after the plant has been in MODE 5 or other plant condition, for a sufficient period of time, in which the repair of the inoperable RPI could have safely been performed. ----------	A.1 Verify the position of the rods with inoperable position indicators by using the PDMS.	Once per 8 hours
	<u>OR</u>	
	A.2.1 Verify the position of the rod with the inoperable position indicator by using the PDMS.	8 hours <u>AND</u> Once every 31 days thereafter <u>AND</u> 8 hours, if rod control system parameters indicate unintended movement
A. One RPI per group inoperable for one or more groups.	<u>AND</u>	(continued)

3.2 POWER DISTRIBUTION LIMITS

3.2.4 QUADRANT POWER TILT RATIO (QPTR)

LCO 3.2.4 The QPTR shall be ≤ 1.02.

APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. QPTR not within limit.	A.1	Reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00.	2 hours
	AND		
	A.2	Perform SR 3.2.4.1 and reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00.	Once per 12 hours thereafter
	AND		
	A.3	Perform SR 3.2.1.1 and SR 3.2.2.1.	24 hours AND Once per 7 days thereafter
	AND		
	A.4	Reevaluate safety analyses and confirm results remain valid for duration of operation under this condition.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
	AND		(continued)

2

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	~~AND~~		2
	A.5	------------NOTE------------ Perform Required Action A.5 only after Required Action A.4 is completed. -------------------------------- Calibrate excore detectors to show QPTR of 1.0.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
	<u>AND</u>		
	A.6	------------NOTE------------ Perform Required Action A.6 only after Required Action A.5 is completed. -------------------------------- Perform SR 3.2.1.1 and SR 3.2.2.1.	Within 24 hours after reaching RTP <u>OR</u> Within 48 hours after increasing THERMAL POWER above the limit of Required Action A.1
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to ≤ 50% RTP.	4 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
M. One channel inoperable.	-------------------NOTE------------------ The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. --		
	M.1	Place channel in trip.	72 hours
	<u>OR</u>		
	M.2	Reduce THERMAL POWER to < P-7.	78 hours
N. One Reactor Coolant Flow - Low channel inoperable.	-------------------NOTE------------------ One channel may be bypassed for up to 12 hours for surveillance testing. --		
	N.1	Place channel in trip.	72 hours
	<u>OR</u>		
	N.2	Reduce THERMAL POWER to < ~~P-8~~.	78 hours 3

P-7

(continued)

Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOW-ABLE VALUE	NOMINAL TRIP SETPOINT
1.	Manual Reactor Trip	1, 2	2	B	SR 3.3.1.13	NA	NA
		3 (a), 4 (a), 5 (a)	2	C	SR 3.3.1.13	NA	NA
2.	Power Range Neutron Flux						
	a. High	1, 2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 111.4% RTP	109% RTP
	b. Low	1 (d), 2	4	E	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c) SR 3.3.1.15	≤ 27.4% RTP	25% RTP
3.	Power Range Neutron Flux Rate						
	a. High Positive Rate	1, 2	4	E	SR 3.3.1.7 (b)(c) SR 3.3.1.11 (b)(c)	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
	b. High Negative Rate – DELETED						
4.	Intermediate Range Neutron Flux	1 (d), 2 (e)	2	F, G	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 40% RTP	25% RTP
		2 (f)	2	H	SR 3.3.1.1 SR 3.3.1.8 (b)(c) SR 3.3.1.11 (b)(c)	≤ 40% RTP	25% RTP

4 as found

as left 4

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
(b) If the ~~as-found~~ channel setpoint is outside its predefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~
(d) Below the P-10 (Power Range Neutron Flux) interlocks.
(e) Above the P-6 (Intermediate Range Neutron Flux) interlocks.
(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

Insert "A" 5 & 4

INSERT A

The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

Table 3.3.1-1 (page 2 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOW-ABLE VALUE	NOMINAL TRIP SETPOINT
5. Source Range Neutron Flux	2 [f]	2	I, J	SR 3.3.1.1 SR 3.3.1.8 [b][c] SR 3.3.1.11 [b][c]	≤ 1.5 E5 cps	1.0 E5 cps
	3 [a], 4 [a], 5 [a]	2	J, K	SR 3.3.1.1 SR 3.3.1.8 [b][c] SR 3.3.1.11 [b][c] SR 3.3.1.15	≤ 1.5 E5 cps	1.0 E5 cps
	3 [g], 4 [g], 5 [g]	1	L	SR 3.3.1.1 SR 3.3.1.11 [b][c]	N/A	N/A
6. Overtemperature ΔT	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 [b][c] SR 3.3.1.10 [b][c] SR 3.3.1.15	Refer to Note 1 (Page 3.3 -21)	Refer to Note 1 (Page 3.3-21)
7. Overpower ΔT	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.7 [b][c] SR 3.3.1.10 [b][c] SR 3.3.1.15	Refer to Note 2 (Page 3.3 -22)	Refer to Note 2 (Page 3.3-22)
8. Pressurizer Pressure						
a. Low	1 [h]	4	X	SR 3.3.1.1 SR 3.3.1.7 [b][c] SR 3.3.1.10 [b][c] SR 3.3.1.15	≥ 1964.8 psig	1970 psig
(4) b. High	1, 2	4	W	SR 3.3.1.1 SR 3.3.1.7 [b][c] SR 3.3.1.10 [b][c] SR 3.3.1.15	≤ 2390.2 psig	2385 psig

as found

as left (4)

(continued)

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
(b) If the ~~as-found~~ channel setpoint is outside its predefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP-17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~
(f) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(g) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication.
(h) Above the P-7 (Low Power Reactor Trips Block) interlock.

Insert "A" (5) & (4)

Table 3.3.1-1 (page 3 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOW-ABLE VALUE	NOMINAL TRIP SETPOINT
9. Pressurizer Water Level-High	1 (h)	3	X	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	≤ 92.7% span 89.7%	92% span
10. Reactor Coolant Flow - Low	1 (h)	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ ~~89.6%~~ flow	90% flow
11. Undervoltage RCPs	1 (h)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 4734 V	4830 V
12. Underfrequency RCPs	1 (h)	1 per bus	M	SR 3.3.1.9 SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 56.9 Hz	57.5 Hz

18

4

as found

(continued)

(b) If the ~~as-found~~ channel setpoint is outside its predefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

as left 4

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP-17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

(h) Above the P-7 (Low Power Reactor Trips Block) interlock.

Insert "A" 4 & 5

Table 3.3.1-1 (page 4 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOW-ABLE VALUE	NOMINAL TRIP SETPOINT
13. SG Water Level – Low-Low	1, 2	3/SG	U	SR 3.3.1.1 SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c) SR 3.3.1.15	≥ 16.4% of narrow range span	17% of narrow range span
Coincident with:						
a) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one steam generator is affected					≤ 1.01 T_s (Refer to Note 3, Page 3.3-23)	T_s (Refer to Note 3, Page 3.3-23)
or						
A time delay (T_m) if two or more steam generators are affected					≤ 1.01 T_m (Refer to Note 3, Page 3.3-23)	T_m (Refer to Note 3, Page 3.3-23)
(6) ~~OR~~						
b) Vessel ΔT Equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	V	SR 3.3.1.7 (b)(c) SR 3.3.1.10 (b)(c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
14. Turbine Trip				(5a) (b)(c)		
a. Low Fluid Oil Pressure	1 (i)	3	O	SR 3.3.1.10 SR 3.3.1.14	≥ 43 psig	45 psig
b. Turbine Stop Valve Closure	1 (i)	4	Y	SR 3.3.1.10 SR 3.3.1.14	≥ 1% open	1% open

(continued)

(i) Above the P-9 (Power Range Neutron Flux) interlock.

Insert "B"
Insert "A"
(4) & (5)

INSERT B

If the as found channel setpoint is outside its predefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.3.2.6	------NOTE------ Verification of relay setpoints not required. ------ Perform TADOT.	92 days
SR 3.3.2.7	Perform SLAVE RELAY TEST on slave relays K603A, K603B, K604A, K604B, K607A, K607B, K609A, K609B, K612A, K625A, and K625B,	18 months
SR 3.3.2.8	------NOTE------ Verification of setpoint not required for manual initiation. ------ Perform TADOT.	18 months
SR 3.3.2.9	------NOTE------ This Surveillance shall include verification that the time constants are adjusted to the prescribed values. ------ Perform CHANNEL CALIBRATION.	18 months
SR 3.3.2.10	------NOTE------ Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 1092 psig in the steam generator. ------ Verify ESFAS RESPONSE TIMES are within limit.	18 months on a STAGGERED TEST BASIS
SR 3.3.2.11	------NOTE------ Verification of setpoint not required. ------ Perform TADOT.	Once per reactor trip breaker cycle

(1)

8 (8)

Table 3.3.2-1 (page 1 of ~~9~~ 8)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1.	Safety Injection						
a.	Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
c.	Containment Pressure – High	1, 2, 3	3	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 1.6 psig	1.5 psig
d.	Pressurizer Pressure – Low	1, 2, 3(a)	3	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 1864.8 psig	1870 psig
e.	Steam Line Pressure - Low	1, 2, 3(a)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 666.6(d) psig	675(d) psig
2.	Containment Spray						
a.	Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c.	Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig

as found (4)

as left (4)

(a) Above the P-11 (Pressurizer Pressure) Interlock.

(b) If the ~~as-found~~ channel setpoint is outside its predefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP-17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

(d) Time constants used in the lead/lag controller are t1 > 50 seconds and t2 < 5 seconds.

(continued)

Insert "A" (4) & (5)

8 (8)

Table 3.3.2-1 (page 2 of ~~9~~ 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation						
a. Phase A Isolation						
(1) Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
(3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
b. Phase B Isolation						
(1) Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
(2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
(3) Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig

(4)

(continued)

as found

as left (4)

(b) If the ~~as-found~~ channel setpoint is outside its redefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

Insert "A" (4) & (5)

8 (8)

Table 3.3.2-1 (page 3 of ~~7~~)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4.	Steam Line Isolation						
a.	Manual Initiation	1, 2 (e), 3 (e)	1/valve	F	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2 (e), 3 (e)	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c.	Containment Pressure – High High	1, 2 (e), 3 (e)	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 2.9 psig	2.8 psig
d.	Steam Line Pressure						
	(1) Low	1, 2 (e), 3 (a)(e)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 666.6 (d) psig	675 (d) psig
	(2) Negative Rate - High	3 (e)(f)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 108.5 (g) psi	100 (g) psi

(continued)

(4) as found as left (4)

(b) If the ~~as-found~~ channel setpoint is outside its redefined ~~as-found tolerance~~, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

(d) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(e) Except when all MSIVs are closed and de-activated.

(f) Function automatically blocked above P-11 (Pressurizer Interlock) setpoint and is enabled below P-11 when safety injection on Steam Line Pressure Low is manually blocked.

(g) Time constants utilized in the rate/lag controller are t_3 and $t_4 \geq 50$ seconds.

Insert "A"
~~4~~ & (5)

8

Table 3.3.2-1 (page 4 of ~~9~~)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5.	Turbine Trip and Feedwater Isolation						
a.	Automatic Actuation Logic and Actuation Relays	1, 2 (h), 3 (h)	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	SG Water Level – High High (P-14)	1, 2 (h), 3 (h)	3 per SG	I	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 83.1%	82.4%
c.	Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d.	North MSV Vault Room Water Level – High	1, 2 (h)(i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9 ~~(b)(c)~~	≤ 5.31 inches 9	4 inches
e.	South MSV Vault Room Water Level – High	1, 2 (h)(i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9 ~~(b)(c)~~	≤ 4.56 inches	4 inches

(continued)

as found (4)   as left (4)

(b) If the ~~as-found~~ channel setpoint is outside its redefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP-17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

(h) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

(i) Mode 2 if Turbine Driven Main Feed Pumps are operating.

Insert "A" (4) & (5)

8 (8)

Table 3.3.2-1 (page 5 of ~~9~~ 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b. SG Water Level – Low Low	1, 2, 3	3 per SG	M	SR 3.3.2.1 SR 3.3.2.4 [b] [c] SR 3.3.2.9 [b] [c] SR 3.3.2.10	$\geq$ 16.4%	17.0%
Coincident with:						
1) Vessel ΔT Equivalent to power $\leq$ 50% RTP	1, 2	3	N	SR 3.3.2.4 [b] [c] SR 3.3.2.9 [b] [c]	Vessel ΔT variable input $\leq$ 52.6% RTP	Vessel ΔT variable input 50% RTP
With a time delay (T_s) if one SG is affected					$\leq$ 1.01 T_s (Note 1, Page 3.3-40)	T_s (Note 1, Page 3.3-40)
~~OR~~ or (8)						
A time delay (T_m) if two or more SGs are affected					$\leq$ 1.01 T_m (Note 1, Page 3.3-40)	T_m (Note 1, Page 3.3-40)
~~OR~~ (6)						
2) Vessel ΔT equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	N	SR 3.3.2.4 [b] [c] SR 3.3.2.9 [b] [c]	Vessel ΔT variable input $\leq$ 52.6% RTP	Vessel ΔT variable input 50% RTP
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

as found (4) as left (4)

(continued)

(b) If the ~~as-found~~ channel setpoint is outside its redefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP-17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents~~.

Insert "A" (4) & (5)

8 (8)

Table 3.3.2-1 (page 6 of ~~9~~ 8)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6.	Auxiliary Feedwater (continued)				Insert "C"	(10)	
d.	Loss of Offsite Power	1, 2, 3	4 per bus	F	Refer to Function 4 of Table 3.3.5-1 for SRs and Allowable Values.		
e.	Trip of all Turbine Driven Main Feedwater Pumps	1,[j] 2[k]	1 per pump	J	SR 3.3.2.8 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 48 psig	50 psig (16)
f.	Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3	3	F	SR 3.3.2.6 SR 3.3.2.9 (b)(c) SR 3.3.2.10	A) ≥ 0.5 psig B) ≥ 1.33 psig	A) 1.2 psig B) 2.0 psig
7.	Automatic Switchover to Containment Sump						
a.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	Refueling Water Storage Tank (RWST) Level - Low	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 155.6 inches from Tank Base	158 inches from Tank Base
	Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
	~~And~~ and (8)						
	Coincident with Containment Sump Level - High	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b)(c) SR 3.3.2.9 (b)(c) SR 3.3.2.10	≥ 37.2 inches above el. 702.8 ft	38.2 inches above el. 702.8 ft

as found (4)   as left (4)

(continued)

(b) If the ~~as-found~~ channel setpoint is outside its redefined ~~as-found~~ tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the ~~as-left~~ tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. ~~Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

(j) Entry into Condition J may be suspended for up to 4 hours when placing the second Turbine Driven Main Feedwater (TDMFW) Pump in service or removing one of two TDMFW pumps from service.

(k) When one or more Turbine Driven Feedwater Pump(s) are supplying feedwater to steam generators.

Insert "A" (4) & (5)

INSERT C

Notes (b) and (c) are applicable to SR 3.3.5.2 for this function.

8

Table 3.3.2-1 (page 7 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1, 2, 3	1 per train, 2 trains	F	SR 3.3.2.11	NA	NA
b. Pressurizer Pressure, P-11						
(1) Unblock (Auto Reset of SI Block)	1, 2, 3	3	L 11	SR 3.3.2.1 SR 3.3.2.4 ~~(b)(c)~~ SR 3.3.2.9 ~~(b)(c)~~	≤ 1975.2 psig	1970 psig
(2) Enable Manual Block of SI	1, 2, 3	3	L 11	SR 3.3.2.1 SR 3.3.2.4 ~~(b)(c)~~ SR 3.3.2.9 ~~(b)(c)~~	≥ 1956.8 psig	1962 psig

~~(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.~~

~~(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and allowable values are specified in WCAP 17044, Setpoint Methodology for Watts Bar Unit 2. The as-found and as-left tolerances are defined in the Nuclear Engineering Setpoint and Scaling Documents.~~

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8

Table 3.3.2-1 (page ~~9~~ 8 of ~~9~~ 8)
Engineered Safety Feature Actuation System Instrumentation

NOTE 1: Steam Generator Water Level Low-Low Trip Time Delay:

$$T_s = A(P)^3 + B(P)^2 + C(P) + D$$

$$T_m = E(P)^3 + F(P)^2 + G(P) + H$$

Where:

P	=	Vessel ΔT Equivalent to power (% RTP), $P \leq 50\%$ RTP.
T_s	=	Time Delay for Steam Generator Water Level – Low-Low Reactor Trip, one Steam Generator affected.
T_m	=	Time Delay for Steam Generator Water Level – Low-Low Reactor Trip, two or more Steam Generators affected.

A = -0.0085041

B = 0.9266400

C = -33.85998

D = 474.6060

E = -0.0047421

F = 0.5682600

G = -23.70753

H = 357.9840

Table 3.3.3-1 (page 3 of 3)
Post Accident Monitoring Instrumentation

(a) Below the P-10 (Power Range Neutron Flux) interlocks.

(b) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(c) Below the P-6 (Intermediate Range Neutron Flux) interlocks

(d) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, pressure relief valve, or check valve with flow through the valve secured.

(e) A channel consists of two core exit thermocouples (CETs).

(f) The ~~ICCM~~**Common Q Post Accident Monitoring System** provides these functions on a ~~plasma~~**flat screen** display.

12

(g) Regulatory Guide 1.97, non-Type A, Category 1 Variables.

(h) This function is displayed on the ~~ICCM plasma~~**Common Q Post Accident Monitoring System flat screen** display and digital panel meters.

(i) Only one position indication channel is required for penetration flow paths with only one installed control room indication channel.

(j) Watts Bar specific (not required by Regulatory Guide 1.97) non-Type A Category 1 variable.

3.3 INSTRUMENTATION

3.3.4 Remote Shutdown System

LCO 3.3.4 The Remote Shutdown System Functions in Table 3.3.4-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3. 1

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required Functions inoperable.	A.1	Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	B.2	Be in MODE 4.	12 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 — Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2410 psig and ≤ 2560 psig.

1

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR.

---NOTE---
The lift settings are not required to be within the LCO limits during MODE 3 and MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1	Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
<u>OR</u>	<u>AND</u>		
Two or more pressurizer safety valves inoperable.	B.2	Be in MODE 4 with any RCS cold leg temperature ≤ the COMS arming temperature specified in the PTLR.	12 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1	Close and maintain power to associated block valve	1 hour
B. One PORV inoperable and not capable of being manually cycled.	B.1	Close associated block valve	1 hour
	AND		
	B.2	Remove power from associated block valve.	1 hour
	AND		
	B.3	Restore PORV to OPERABLE status	72 hours

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Cold Overpressure Mitigation System (COMS)

LCO 3.4.12

A COMS 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 either a or b below.

a. Two RCS relief valves, as follows:

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

   2. One PORV with a lift setting within the limits specified in the PTLR and the RHR suction relief valve with a setpoint $\geq$ 436.5 psig and $\leq$ 463.5 psig.

b. The RCS depressurized and an RCS vent capable of relieving > 475 gpm water flow.

-----------------------------------NOTE-----------------------------------

1. Two charging pumps may be made capable of injecting for less than or equal to one 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.

---

new paragraph

APPLICABILITY: MODE 4 with any RCS cold leg temperature $\leq$ the COMS arming
indent temperature specified in the PTLR, MODE 5, ~~and~~
MODE 6 when the reactor vessel head is on

new paragraph

1

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.13 RCS Operational LEAKAGE

LCO 3.4.13 RCS operational LEAKAGE shall be limited to:

a. No pressure boundary LEAKAGE;

b. 1 gpm unidentified LEAKAGE;

c. 10 gpm identified LEAKAGE; and

d. 150 gallons per day primary-to-secondary LEAKAGE through any one steam generator (SG).

APPLICABILITY: MODES 1, 2, 3, and 4 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCS operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary-to-secondary LEAKAGE.	A.1	Reduce LEAKAGE to within limits.	4 hours
B. Required Action and associated Completion Time of Condition A not met. <u>OR</u> Pressure boundary LEAKAGE exists. <u>OR</u> Primary-to-secondary LEAKAGE not within limit.	B.1 <u>AND</u> B.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.14 RCS Pressure Isolation Valve (PIV) Leakage

LCO 3.4.14 Leakage from each RCS PIV shall be within limit.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4, except valves in the residual heat removal (RHR) flow path when in, or during the transition to or from, the RHR mode of operation.

ACTIONS

-----NOTES-----
1. Separate Condition entry is allowed for each flow path.
2. Enter applicable Conditions and Required Actions for systems made inoperable by an inoperable PIV.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more flow paths with leakage from one or more RCS PIVs not within limit.	-----NOTE----- Each valve used to satisfy Required Action A.1 must have been verified to meet SR 3.4.14.1 and be in the reactor coolant pressure boundary. -----	
	A.1 Isolate the high pressure portion of the affected system from the low pressure portion by use of one closed manual, deactivated automatic, or check valve.	4 hours
	AND (2)	(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	~~AND~~	2	
	A.2	Restore RCS PIV to within limits	72 hours
B. Required Action and associated Completion Time for Condition A not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours
D. All required monitors inoperable.	D.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.15.1	Perform CHANNEL CHECK of the required containment atmosphere particulate radioactivity monitor.	12 hours
SR 3.4.15.2	Perform COT of the required containment atmosphere particulate radioactivity ~~level~~ monitor.	92 days 13
SR 3.4.15.3	Perform CHANNEL CALIBRATION of the required containment pocket sump level monitor.	18 months
SR 3.4.15.4	Perform CHANNEL CALIBRATION of the required containment atmosphere particulate radioactivity monitor.	18 months

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.17 Steam Generator (SG) Tube Integrity

LCO 3.4.17 SG tube integrity shall be maintained

AND

All SG tubes satisfying the tube repair criteria shall be plugged in accordance with the Steam Generator Program.

APPLICABILITY: MODES 1, 2, 3, and 4. 1

ACTIONS

--NOTE--
Separate Condition entry is allowed for each SG tube.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more SG tubes satisfying the tube repair criteria and not plugged in accordance with the Steam Generator Program	A.1 Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or SG tube inspection	7 days
	AND	
	A.2 Plug the affected tube(s) in accordance with the Steam Generator Program	Prior to entering MODE 4 following the next refueling outage or SG tube inspection
B. Required Action and associated Completion Time of Condition A not met OR SG tube integrity not maintained	B.1 Be in MODE 3.	6 hours
	AND	
	B.2 Be in MODE 5.	36 hours

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS - Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

APPLICABILITY: MODE 4. 1

ACTIONS

------------------------------NOTE------------------------------
LCO 3.0.4.b is not applicable to ECCS high head (centrifugal charging) subsystem.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS residual heat removal (RHR) subsystem inoperable.	---------NOTE--------- The required ECCS residual heat removal (RHR) subsystem may be inoperable for up to 1 hour for surveillance testing of valves provided that alternate heat removal methods are available via the steam generators to maintain the Reactor Coolant System T_{avg} less than 350°F and provided that the required subsystem is capable of being manually realigned to the ECCS mode of operation from the main control room. ------------------------- A.1 Initiate action to restore required ECCS RHR subsystem to OPERABLE status	 Immediately

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.2 Containment Air Locks

LCO 3.6.2 Two containment air locks shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4. 1

ACTIONS

--NOTES--

1. Entry and exit is permissible to perform repairs on the affected air lock components.
2. Separate Condition entry is allowed for each air lock.
3. Enter applicable Conditions and Required Actions of LCO 3.6.1, "Containment," when air lock leakage results in exceeding the overall containment leakage rate.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment air locks with one containment air lock door inoperable.	-----------------NOTES----------------- 1. Required Actions A.1, A.2, and A.3 are not applicable if both doors in the same air lock are inoperable and Condition C is entered. 2. Entry and exit is permissible for 7 days under administrative controls if both air locks are inoperable. --	(continued)

3.6 CONTAINMENT SYSTEMS

3.6.9 Emergency Gas Treatment System (EGTS)

LCO 3.6.9 Two EGTS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One EGTS train inoperable.	A.1	Restore EGTS train to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.9.1	Operate each EGTS train for ≥ 10 continuous hours with heaters operating.	31 days
SR 3.6.9.2	Perform required EGTS filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.13 Divider Barrier Integrity

LCO 3.6.13 Divider barrier integrity shall be maintained.

APPLICABILITY: MODES 1, 2, 3, and 4 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. ----------NOTE---------------- For this action, separate Condition entry is allowed for each personnel access door or equipment hatch. ----------------------------------- One or more personnel access doors or equipment hatches between upper and lower containment open or inoperable, other than for personnel transit.	A.1	Restore personnel access doors and equipment hatches to OPERABLE status and closed positions.	1 hour
B. Divider barrier seal inoperable.	B.1	Restore seal to OPERABLE status.	1 hour
C. Required Action and associated Completion Time not met.	C.1 <u>AND</u> C.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

3.7 PLANT SYSTEMS

3.7.1 Main Steam Safety Valves (MSSVs)

LCO 3.7.1 Five MSSVs per steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3. 1

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more steam generators with one MSSV inoperable.	A.1	Reduce THERMAL POWER to ≤ ~~58~~ 59 % RTP.	4 hours 17
B. One or more steam generators with two or more MSSVs inoperable.	B.1	Reduce THERMAL POWER to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	4 hours
	<u>AND</u>		
		----------NOTE---------- Only required in MODE 1. ------------------------------	
	B.2	Reduce the Power Range Neutron Flux - High reactor trip setpoint to less than or equal to the Maximum Allowable % RTP specified in Table 3.7.1-1 for the number of OPERABLE MSSVs.	

(continued)

3.7 PLANT SYSTEMS

3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4. 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One ERCW train inoperable.	A.1	------------NOTES----------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for emergency diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. --------------------------------	
		Restore ERCW train to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

3.7 PLANT SYSTEMS

3.7.10 Control Room Emergency Ventilation System (CREVS)

LCO 3.7.10 Two CREVS trains shall be OPERABLE.

------------------------------------NOTE------------------------------------
The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6, 1
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One CREVS train inoperable for reasons other than Condition B.	A.1	Restore CREVS train to OPERABLE status.	7 days
B. One or more CREVS trains inoperable due to inoperable CRE boundary in MODE 1, 2, 3, or 4.	B.1	Initiate action to implement mitigating actions.	Immediately
	AND		
	B.2	Verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits and CRE occupants are protected from smoke hazards.	24 hours
	AND		
	B.3	Restore CRE boundary to OPERABLE status.	90 days

(continued)

3.7 PLANT SYSTEMS

3.7.11 Control Room Emergency Air Temperature Control System (CREATCS)

LCO 3.7.11 Two CREATCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6,
During movement of irradiated fuel assemblies. 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One CREATCS train inoperable.	A.1	Restore CREATCS train to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	B.2	Be in MODE 5.	36 hours
C. Required Action and associated Completion Time of Condition A not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	C.1	Place OPERABLE CREATCS train in operation.	Immediately
	<u>OR</u>		
	C.2	Suspend movement of irradiated fuel assemblies.	Immediately
D. Two CREATCS trains inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	D.1	Suspend movement of irradiated fuel assemblies	Immediately
E. Two CREATCS trains inoperable in MODE 1, 2, 3, or 4.	E.1	Enter LCO 3.0.3.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System; and

b. Four diesel generators (DGs) capable of supplying the onsite Class 1E AC Electrical Power Distribution System.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

-----NOTE-----
LCO 3.0.4.b is not applicable to DGs.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for OPERABLE offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND		
	A.2	Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND	2	(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	~~AND~~ 2		
	A.3	Restore offsite circuit to OPERABLE status.	72 hours AND 6 days from discovery of failure to meet LCO
B. One or more DG(s) in Train A inoperable. OR One or more DG(s) in Train B inoperable.	B.1	Perform SR 3.8.1.1 for the offsite circuits.	1 hour AND Once per 8 hours thereafter
	AND		
	B.2	Declare required feature(s) supported by the inoperable DG(s) inoperable when its required redundant feature(s) is inoperable	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	AND		
	B.3.1	Determine OPERABLE DG(s) is not inoperable due to common cause failure.	24 hours
	OR		
	B.3.2	Perform SR 3.8.1.2 for OPERABLE DG(s).	24 hours
	AND		
			(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify vital battery terminal voltage is ≥ 128 V (132 V for vital battery V) on float charge.	7 days
SR 3.8.4.2	Verify DG battery terminal voltage is ≥ 124 V on float charge.	7 days
SR 3.8.4.3	Verify for the vital batteries that the alternate feeder breakers to each required battery charger are open.	7 days
SR 3.8.4.4	Verify correct breaker alignment and indicated power availability for each DG 125 V DC distribution panel and associated battery charger	7 days
SR 3.8.4.5 14 ≤ 50 E-6	Verify no visible corrosion at terminals and connectors for the vital batteries. <u>OR</u> Verify connection resistance for the vital batteries is ≤ 80 E-6 ohm for inter-cell connections, ~~≤ 50 E-6~~ ohm for inter-rack connections, ≤ 120 E-6 ohm for inter-tier connections, and ≤ 50 E-6 ohm for terminal connections. Keep together	92 days
SR 3.8.4.6	Verify no visible corrosion at terminals and connectors for the DG batteries. <u>OR</u> Verify connection resistance for the DG batteries is ≤ 80 E-6 ohm for inter-cell connections, ≤ 50 E-6 ohm for inter-tier connections, and ~~≤ 50 E-6~~ ohm for terminal connections.	92 days
SR 3.8.4.7	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration.	12 months

(continued)

3.9 REFUELING OPERATIONS

3.9.1 Boron Concentration

LCO 3.9.1 Boron concentrations of the Reactor Coolant System, the refueling canal, and the refueling cavity shall be maintained within the limit specified in the COLR.

APPLICABILITY: Mode 6. 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Boron concentration not within limit.	A.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2	Suspend positive reactivity additions.	Immediately
	<u>AND</u>		
	A.3	Initiate action to restore boron concentration to within limit.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.1.1	Verify boron concentration is within the limit specified in COLR.	72 hours

3.9 REFUELING OPERATIONS

3.9.2 Unborated Water Source Isolation Valves

LCO 3.9.2 Each valve used to isolate unborated water sources shall be secured in the closed position.

APPLICABILITY: Mode ~~6~~ 1

ACTIONS

---NOTE---
Separate Condition entry is allowed for each unborated water source isolation valve.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ------------NOTE------------ Required Action A.3 must be completed whenever Condition A is entered. ------------------------------ One or more valves not secured in closed position.	A.1 Suspend CORE ALTERATIONS. AND A.2 Initiate action to secure valve in closed position. AND A.3 Perform SR 3.9.1.1.	Immediately Immediately 4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.2.1	Verify each valve that isolates unborated water sources is secured in the closed position.	31 days

3.9 REFUELING OPERATIONS

3.9.3 Nuclear Instrumentation

LCO 3.9.3 Two source range neutron flux monitors shall be OPERABLE.

APPLICABILITY: Mode 6. 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required source range neutron flux monitor inoperable.	A.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2	Suspend positive reactivity additions.	Immediately
B. Two required source range neutron flux monitors inoperable.	B.1	Initiate action to restore one source range neutron flux monitor to OPERABLE status.	Immediately
	AND		
	B.2	Perform SR 3.9.1.1.	4 hours AND Once per 12 hours thereafter

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks (shown in Figure 4.3-1) are designed and shall be maintained with:

15

a. Fuel assemblies having a maximum U-235 enrichment of 5.0 ~~4.95 ± 0.05~~ weight percent;

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which, includes an allowance for uncertainties as described in Sections 4.3.2.7 and 9.1 of the FSAR;

c. Distances between fuel assemblies are a nominal 10.375 inch center-to-center spacing in the twenty-four flux trap rack modules.

d. Fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage.

e. Fuel assemblies with initial enrichments greater than 3.80 weight percent and less than a maximum of 5 percent enrichment (nominally 4.95 ± 0.05 percent) may be stored in the spent fuel racks in one of four arrangements with specific limits as identified below:

   1. Spent fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in Figure 4.3-3, depending upon the specified initial enrichment.

   2. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in Figure 4.3-4.

   3. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material.

(continued)

JUSTIFICATION(s) FOR CHANGES

1. Corrects editorial / formatting errors with APPLICABILITY verbiage.

2. Corrects placement of logical connector. They are to be located at the bottom of a page versus at the top of the next page.

3. Amendment 68 to the Unit 1 TS revised "P-8" to "P-7." This change was to have been made during Developmental Revision A. This corrects this omission.

4. Replaces "as-found" and "as-left" with "as found" and "as left", respectively for consistent usage of these terms

5. Makes implementation of TSTF-493 consistent with the FSAR setpoint methodology discussion added by Amendment 102 to the Unit 2 FSAR.

5a. Required by TSTF-493.

6. Deletes unneeded logical connector.

7. Makes this consistent with the TS Bases for SR 3.3.2.8 which states, "The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation functions. The manual initiation functions have no associated setpoints."

   This is consistent with the STS.

8. Editorial corrections.

9. Float type switches are excluded by TSTF-493.

10. TSTF-493 does not apply the notes to TS Section 3.3.5.

11. Permissives and interlocks that are derived from a sensor or adjustable device that is tested as part of another Technical Specifications function are excluded by TSTF-493. P-11 is derived from the pressurizer pressure channels that are tested as required by the SRs for function 3.3.2-1d (Pressurizer Pressure Safety Injection).

12. Corrects information to reflect design change made to Unit 2. The common Q System replaces the outdated ICCM-86 system.

13. Makes this wording consistent with that of the LCO.

JUSTIFICATION(s) FOR CHANGES

14. Editorial change that keeps all portions of the criterion on the same line.

15. Restores consistency with Unit 1.

16. Required by TSTF-493.

17. Amendment 31 to the Unit 1 approved Power Uprate using Leading Edge Flow Meter (LEFM).

The review matrix provided by Reference 1 stated, "This change will NOT be implemented on Unit 2 at this time." The change was inadvertently made to this section.

This corrects that error

18. Per setpoint calculation WCAP-17044, Rev. 0 (Setpoint Methodology for Watts Bar Unit 2), the ALLOWABLE VALUE for item 10. Of Unit 2 TS Table 3.3.1-1 (Reactor Coolant Flow – Low) should be 89.7%.

ENCLOSURE 7

Proposed Unit 2 Technical Specifications Bases

BASES (continued)

APPLICABLE SAFETY ANALYSES

The RCS pressurizer safety valves, the main steam safety valves (MSSVs), and the reactor high pressure trip have settings established to ensure that the RCS pressure SL will not be exceeded.

The RCS pressurizer safety valves are sized to prevent system pressure from exceeding the design pressure by more than 10%, as specified in Section III of the ASME Code for Nuclear Power Plant Components (Ref. 2). The transient that establishes the required relief capacity, and hence valve size requirements and lift settings, is a complete loss of external load without a direct reactor trip. During the transient, no control actions are assumed, except that the safety valves on the secondary plant are assumed to open when the steam pressure reaches the secondary plant safety valve settings.

The Reactor Trip System setpoints (Ref. 5), together with the settings of the MSSVs (Ref. 8), provide pressure protection for normal operation and AOOs. The reactor high pressure trip setpoint is specifically set to provide protection against overpressurization (Ref. 5). The safety analyses for both the high pressure trip and the RCS pressurizer safety valves are performed using conservative assumptions relative to pressure control devices.

More specifically, no credit is taken for operation of the following:

a. Pressurizer power operated relief valves (PORVs);

b. Steam line power operated relief valve (PORV);

c. Steam Dump System;

d. Reactor Control System;

e. Pressurizer Level Control System; or

f. Pressurizer spray valve.

SAFETY LIMITS

The maximum transient pressure allowed in the RCS pressure vessel, piping, valves, and fittings under the ASME Code, Section III, is 110% of design pressure. Therefore, the SL on maximum allowable RCS pressure is 2735 psig (2750 psia).

(continued)

BASES

BACKGROUND (continued)

The Nominal Trip Setpoint (NTSP) specified in Table 3.3.1-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the NTSP accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the NTSP ensures that SLs are not exceeded. Therefore, the NTSP meets the definition of an LSSS (Ref. 6).

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in the Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the NTSP to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the NTSP due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the NTSP and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as found" setting of the protection channel. Therefore, the channel would still be OPERABLE since it would have performed its safety function and the only corrective action required would be to reset the channel within the established as left tolerance around the NTSP to account for further drift during the next surveillance interval.

(continued)

BASES

BACKGROUND (continued)

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB);
2. Fuel centerline melt shall not occur; and
3. The RCS pressure SL of 2735 psig (2750 psia) shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 20 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

The RTS instrumentation is segmented into four distinct but interconnected modules as illustrated in Figure 7.1-1, FSAR, Section 7 (Ref. 2), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal or contact actuation based upon the physical characteristics of the parameter being measured;
2. Signal Process Control and Protection System, including Process Protection System, Nuclear Instrumentation System (NIS), and field contacts: provides analog to digital conversion (Digital Protection System), signal conditioning, setpoint comparison, process algorithm actuation (Digital Protection System), compatible electrical signal output to protection system channels, and control board/control room/miscellaneous indications;
3. Solid State Protection System (SSPS), including input, logic, and output bays: initiates proper unit shutdown and/or ESF actuation in accordance with the defined logic, which is based on the bistable, setpoint comparators, or contact outputs from the signal process control and protection system; and

(continued)

BASES

BACKGROUND (continued)

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as five, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the NTSP and Allowable Value. The OPERABILITY of each transmitter or sensor is determined by either "as found" calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behavior observed during performance of the CHANNEL CHECK.

Signal Process Control and Protection System

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with NTSPs derived from Analytical Limits established by the safety analyses. Analytical Limits are defined in FSAR, Chapter 6 (Reference 1), Chapter 7 (Reference 2), and Chapter 15 (Reference 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable, setpoint comparator, or contact is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

(continued)

BASES

BACKGROUND

Signal Process Control and Protection System (continued)

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails, such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation. These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

Two logic trains are required to ensure no single random failure of a logic train will disable the RTS. The logic trains are designed such that testing required while the reactor is at power may be accomplished without causing trip.

Allowable Values and Nominal Trip Setpoints

The Trip Setpoints used in the bistables, setpoint comparators, or contact trip outputs are based on the analytical limits defined in Reference 2. The calculation of the Nominal Trip Setpoints specified in Table 3.3.1-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the Allowable Values specified in Table 3.3.1-1 in the accompanying LCO are conservative with respect to the analytical limits.

(continued)

BASES

BACKGROUND

Allowable Values and Nominal Trip Setpoints (continued)

A detailed description of the methodology used to calculate the Allowable Values, NTSPs, and as left and as found tolerance bands is provided in Reference 2. All of the known uncertainties applicable for each channel are factored into the determination of each NTSP and corresponding Allowable Value. The trip setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for measurement errors detectable by the COT. The Allowable Value serves as the as found Technical Specification OPERABILITY limit for the purpose of the COT.

The NTSP is the value at which the bistable is set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as left" NTSP value is within the as left tolerance band for CHANNEL CALIBRATION uncertainty allowance (i.e., $\pm$ rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal" value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION.

Nominal Trip Setpoints, in conjunction with the use of as found and as left tolerances, together with the requirements of the Allowable Value ensure that SLs are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions are designed).

(continued)

BASES

BACKGROUND

Allowable Values and Nominal Trip Setpoints (continued)

Note that the Allowable Values listed in Table 3.3.1-1 are the least conservative value of the as found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, CHANNEL OPERATIONAL TESTS, or a TRIP ACTUATING DEVICE OPERATIONAL TEST that requires trip setpoint verification.

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section. The Process Protection System is designed to permit any one channel to be tested and maintained at power in a bypassed mode. If a channel has been bypassed for any purpose, the bypass is continuously indicated in the control room.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of setpoint comparator trip outputs, contact outputs, and bistable outputs from the signal processing equipment. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The system has been designed to trip in the event of a loss of power, directing the unit to a safe shutdown condition.

The SSPS performs the decision logic for actuating a reactor trip or ESF actuation, generates the electrical output signal that will initiate the required trip or actuation, and provides the status, permissive, and annunciator output signals to the main control room of the unit.

(continued)

BASES

BACKGROUND

Solid State Protection System (continued)

The setpoint comparator trip outputs, contact outputs and bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various unit upset and accident transients. If a required logic matrix combination is completed, the system will initiate a reactor trip and/or send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

Reactor Trip Switchgear

The RTBs are in the electrical power supply line from the control rod drive motor generator set power supply to the CRDMs. Opening of the RTBs interrupts power to the CRDMs, which allows the shutdown rods and control rods to fall into the core by gravity. Each RTB is equipped with a bypass breaker to allow testing of the RTB while the unit is at power. During normal operation the output from the SSPS is a voltage signal that energizes the undervoltage coils in the RTBs and bypass breakers, if in use. When the required logic matrix combination is completed, the SSPS output voltage signal is removed, the undervoltage coils are de-energized, the breaker trip lever is actuated by the de-energized undervoltage coil, and the RTBs and bypass breakers are tripped open. This allows the shutdown rods and control rods to fall into the core. In addition to the de-energization of the undervoltage coils, each breaker is also equipped with a shunt trip device that is energized to trip the breaker open upon receipt of a reactor trip signal from the SSPS. Either the undervoltage coil or the shunt trip mechanism is sufficient by itself, thus providing a diverse trip mechanism.

The decision logic matrix Functions are described in the functional diagrams included in Reference 2. In addition to the reactor trip or ESF, these diagrams also describe the various "permissive interlocks" that are associated with unit conditions. Each train has a built in testing device that can automatically test the decision logic matrix Functions and the actuation channels while the unit is at power.

When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing device is semiautomatic to minimize testing time.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to preserve the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 3 takes credit for most RTS trip functions. RTS trip functions that are retained yet not specifically credited in the accident analysis are implicitly credited in the safety analysis and the NRC staff approved licensing basis for the unit. These RTS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backups to RTS trip Functions that were credited in the accident analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 to be OPERABLE. The Allowable Value specified in Table 3.3.1-1 is the least conservative value of the as found setpoint that the channel can have when tested, such that a channel is OPERABLE if the as found setpoint is within the as found tolerance and is conservative with the respect to the Allowable Value during a CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount greater than or equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as found criteria).

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance), and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as found condition will be entered into the Corrective Action Program for further evaluation.

A trip setpoint may be set more conservative than the NTSP as necessary in response to plant conditions. However, in this case, the operability of this instrument must be verified based on the field setting and not the NTSP. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

The LCO generally requires OPERABILITY of four or three channels in each instrumentation Function, two channels of Manual Reactor Trip in each logic Function, and two trains in each Automatic Trip Logic Function. Four OPERABLE instrumentation channels in a two-out-of-four configuration are required when one RTS channel is also used as a control system input. This configuration accounts for the possibility of the shared channel failing in such a manner that it creates a transient that requires RTS action. In this case, the RTS will still provide protection, even with random failure of one of the other three protection channels. Three operable instrumentation channels in a two-out-of-three configuration are generally required when there is no potential for control system and protection system interaction that could simultaneously create a need for RTS trip and disable one RTS channel. The two-out-of-three and two-out-of-four configurations allow one channel to be tripped during maintenance or testing without causing a reactor trip. Specific exceptions to the above general philosophy exist and are discussed below.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

10. Reactor Coolant Flow - Low (continued)

In MODE 1 above the P-8 setpoint, a loss of flow in one RCS loop could result in DNB conditions in the core because of the higher power level. In MODE 1 below the P-8 setpoint and above the P-7 setpoint, a loss of flow in two or more loops is required to actuate a reactor trip because of the lower power level and the greater margin to the design limit DNBR. Below the P-7 setpoint, all reactor trips on low flow are automatically blocked since there is insufficient heat production to generate DNB conditions.

The Reactor Coolant Flow-Low Trip Setpoint and Allowable Value are specified in % indicated loop flow; however, the Eagle-21™ values entered through the MMI are specified in an equivalent % differential pressure.

11. Undervoltage Reactor Coolant Pumps

The Undervoltage RCPs trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The voltage to each RCP is monitored. Above the P-7 setpoint, a loss of voltage detected on two or more RCP buses will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow - Low Trip Setpoint is reached in two or more RCS loops. The loss of voltage in two loops must be sustained for a length of time equal to or greater than that set in the time delay. Time delays are incorporated into the Undervoltage RCPs channels to prevent reactor trips due to momentary electrical power transients.

The LCO requires one Undervoltage RCP channel per bus to be OPERABLE.

In MODE 1 above the P-7 setpoint, the Undervoltage RCP trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.6 (continued)

The Frequency of 92 EFPD is adequate. It is based on industry operating experience, considering instrument reliability and operating history data for instrument drift.

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every 184 days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function.

Setpoints must be conservative with respect to the Allowable Values specified in Table 3.3.1-1.

The difference between the current "as found" values and the NTSP or previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The “as found” and “as left” values must also be recorded and reviewed for consistency with the assumptions of the setpoint methodology.

SR 3.3.1.7 is modified by a Note that this test shall include verification that the P-10 interlock is in the required state for the existing unit condition.

The Frequency of 184 days is justified in Reference 15, except for Function 13. The justification for Function 13 is provided in References 9 and 15.

SR 3.3.1.7 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.7 (continued)

For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except it is modified by two Notes. Note 1 provides a 4 hour delay in the requirement to perform this Surveillance for source range instrumentation when entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for a short time in MODE 3 until the RTBs are open and SR 3.3.1.8 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for greater than 4 hours, this Surveillance must be performed within 4 hours after entry into MODE 3. Note 2 states that this test shall include verification that the P-6 interlock is in the required state for the existing unit condition. The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 31 days prior to reactor startup and 4 hours after reducing power below P-10 and P-6. The Frequency of "prior to startup" ensures this surveillance is performed prior to critical operations and applies to the source and intermediate range instrument channels. The Frequency of "Four hours after reducing power below P-10" (applicable to intermediate channels) and "Four hours after reducing power below P-6" (applicable to source range channels) allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of every 31 days thereafter applies if the plant remains in the MODE of Applicability after the initial performances of prior to reactor startup and 4 hours after reducing power below P-10 or P-6.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.8 (continued)

The MODE of Applicability for this surveillance is < P-10 for the intermediate range channels and < P-6 for the source range channels. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-10 or < P-6 for more than 4 hours, then the testing required by this surveillance must be performed prior to the expiration of the 4 hour limit. Four hours is a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. This test ensures that the NIS source and intermediate range channels are OPERABLE channels prior to taking the reactor critical and after reducing power into the applicable MODE (< P-10 or < P-6) for periods > 4 hours.

SR 3.3.1.8 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.10 (continued)

SR 3.3.1.10 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every 18 months. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors consists of a normalization of the detectors based on a power calorimetric performed above 15% RTP. The CHANNEL CALIBRATION for the source range and intermediate range neutron detectors consists of obtaining the detector plateau or preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data. This Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1, and is not required for the NIS intermediate range detectors for entry into MODE 2, because the unit must be in at least MODE 2 to perform the test for the intermediate range detectors and MODE 1 for the power range detectors.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.11 (continued)

The 18-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 these components usually pass the Surveillance when performed on the 18-month Frequency.

SR 3.3.1.11 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

SR 3.3.1.12

SR 3.3.1.12 is the performance of a COT of RTS interlocks every 18 months.

The Frequency is based on the known reliability of the interlocks and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.15 (continued)

As appropriate, each channel's response must be verified every 18 months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Response times cannot be determined during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed at the 18-month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.15 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

REFERENCES

1. Watts Bar FSAR, Section 6.0, "Engineered Safety Features."
2. Watts Bar FSAR, Section 7.0, "Instrumentation and Controls."
3. Watts Bar FSAR, Section 15.0, "Accident Analysis."
4. Institute of Electrical and Electronic Engineers, IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," April 5, 1972.
5. 10 CFR Part 50.49, "Environmental Qualifications of Electric Equipment Important to Safety for Nuclear Power Plants."
6. Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.
7. WCAP-10271-P-A, Supplement 1, and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," May 1986 and June 1990.
8. Watts Bar Technical Requirements Manual, Section 3.3.1, "Reactor Trip System Response Times."
9. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar, Westinghouse Letter WAT-D-10128.

(continued)

BASES

REFERENCES (continued)

10. Deleted

11. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996

12. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

13. Deleted

14. WCAP-14333 P-A, Revision 1, "Probablistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," October 1998.

15. WCAP-15376-P-A, Revision 1, "Risk Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," March 2003

16. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (Addendum 2, April 2002).

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

The NTSP specified in Table 3.3.2-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the NTSP accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the NTSP ensures that SLs are not exceeded. Therefore, the NTSP meets the definition of an LSSS (Ref. 6).

(continued)

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety functions(s)." Relying solely on the NTSP to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the "as found" value of a protection channel setting during a surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the NTSP due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the NTSP and thus the automatic protective action would still have ensured that the SL would not be exceeded with the "as found" setting of the protection channel. Therefore, the channel would still be OPERABLE since it would have performed its safety function and the only corrective action required would be to reset the channel within the established as left tolerance around the NTSP to account for further drift during the next surveillance interval.

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB),

2. Fuel centerline melt shall not occur, and

3. The RCS pressure SL of 2735 psig (2750 psia) shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 50 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

(continued)

BACKGROUND (continued)

The ESFAS instrumentation is segmented into three distinct but interconnected modules as identified below:

- Field transmitters or process sensors: provide a measurable electronic signal or contact actuation based on the physical characteristics of the parameter being measured;

- Signal processing equipment including process protection system, and field contacts: provide analog to digital conversion (Digital Protection System), signal conditioning, setpoint comparison, process algorithm actuation (Digital Protection System), compatible electrical signal output to protection system channels, and control board / control room / miscellaneous indications; and

- Solid State Protection System (SSPS) including input, logic, and output bays: initiates the proper unit shutdown or engineered safety feature (ESF) actuation in accordance with the defined logic and based on the bistable, setpoint comparators, or contact outputs from the signal process control and protection system.

<u>Field Transmitters or Sensors</u>

To meet the design demands for redundancy and reliability, more than one, and often as many as five, field transmitters or sensors are used to measure unit parameters. In many cases, field transmitters or sensors that input to the ESFAS are shared with the Reactor Trip System (RTS). In some cases, the same channels also provide control system inputs. To account for calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the NTSP and Allowable Value. The OPERABILITY of each transmitter or sensor is determined by either "as found" calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behavior observed during performance of the CHANNEL CHECK.

(continued)

BACKGROUND (continued)

Signal Processing Equipment

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides analog to digital conversion (Digital Protection System), signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with NTSPs derived from Analytical Limits established by the safety analyses. Analytical Limits are defined in FSAR, Chapter 6, (Reference 1), Chapter 7 (Reference 2), and Chapter 15 (Reference 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a setpoint comparator or contact is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

(continued)

BASES

BACKGROUND (continued)

Allowable Values and Nominal Trip Setpoints

The trip setpoints used in the bistables, setpoint comparators, or contact outputs are based on the analytical limits defined in Reference 2. The calculation of the Nominal Trip Setpoints specified in Table 3.3.2-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the NTSPs specified in Table 3.3.2-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits.

A detailed description of the methodology used to calculate NTSPs and as left and as found tolerance bands is provided in Reference 2. All of the known uncertainties applicable for each channel are factored into the determination of each NTSP and corresponding Allowable Value. The nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. The Allowable Value serves as the as found Technical Specification OPERABILITY limit for the purpose of the COT.

The NTSP is the value at which the bistables are set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the "as left" setpoint NTSP value is within the as left tolerance band for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal value" (i.e., expressed as a value without inequalities) for the purposes of the COT and CHANNEL CALIBRATION.

Nominal Trip Setpoints, in conjunction with the use of as left and as found tolerances, together with the requirements of the Allowable Value ensure that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

(continued)

BASES

BACKGROUND (continued)

Note that the Allowable Values listed in Table 3.3.2-1 are the least conservative value of the as found setpoint that a channel can have during a periodic CHANNEL CALIBRATION, COT, or a TADOT.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section. The Process Protection System is designed to permit any one channel to be tested and maintained at power in a bypassed mode. If a channel has been bypassed for any purpose, the bypass is continuously indicated in the control room.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

The SSPS performs the decision logic for most ESF equipment actuation; generates the electrical output signals that initiate the required actuation; and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various transients. If a required logic matrix combination is completed, the system will send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

(continued)

BACKGROUND

Solid State Protection System (continued)

Each SSPS train has a built in testing channel that can automatically test the decision logic matrix functions and the actuation channels while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing channel is semiautomatic to minimize testing time.

The actuation of most ESF components is accomplished through master and slave relays. Some ESF components are actuated by relay logic. The SSPS energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave relays, which then cause actuation of the end devices. The master and slave relays are routinely tested to ensure operation. The test of the master relays energizes the relay, which then operates the contacts and applies a low voltage to the associated slave relays. The low voltage is not sufficient to actuate the slave relays but only demonstrates signal path continuity. The SLAVE RELAY TEST actuates the devices if their operation will not interfere with continued unit operation. For the latter case, actual component operation is prevented by the SLAVE RELAY TEST circuit, and slave relay contact operation is verified by a continuity check of the circuit containing the slave relay.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal for that accident. An ESFAS Function may be the primary actuation signal for more than one type of accident. An ESFAS Function may also be a secondary, or backup, actuation signal for one or more other accidents. For example, Pressurizer Pressure - Low is a primary actuation signal for small loss of coolant accidents (LOCAs) and a backup actuation signal for steam line breaks (SLBs) outside containment. Functions such as manual initiation, not specifically credited in the accident safety analysis, are implicitly credited in the safety analysis and the NRC staff approved licensing basis for the unit. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions may also serve as backups to Functions that were credited in the accident analysis (Ref. 3).

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

The LCO requires all instrumentation performing an ESFAS Function listed in Table 3.3.2-1 in the accompanying LCO, to be OPERABLE. The Allowable Value specified in Table 3.3.2-1 is the least conservative value of the as found setpoint that the channel can have when tested, such that a channel is OPERABLE if the as found setpoint is within the as found tolerance and is conservative with respect to the Allowable Value during the CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount [greater than or] equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the as left tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (as left criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (as found criteria).

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the as found tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance) and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel as found condition will be entered into the Corrective Action Program for further evaluation.

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SURVEILLANCE REQUIREMENTS

SR 3.3.2.1 (continued)

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and reliability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

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

SR 3.3.2.2

SR 3.3.2.2 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 92 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and that there is an intact voltage signal path to the master relay coils. The Frequency of every 92 days on a STAGGERED TEST BASIS is justified in Reference 18.

SR 3.3.2.3

SR 3.3.2.3 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The Frequency of 92 days is justified in Reference 18.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a COT.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found conservative with respect to the Allowable Values specified in Table 3.3.2-1.

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SURVEILLANCE REQUIREMENTS

SR 3.3.2.4 (continued)

The difference between the current "as found" values and the NTSP or previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as found" and "as left" values must also be recorded and reviewed for consistency with the assumptions of the setpoint methodology.

The Frequency of 184 days is justified in Reference 18, except for Function 7. The Frequency for Function 7 is justified in References 10 and 18.

SR 3.3.2.4 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.7

SR 3.3.2.7 is the performance of a SLAVE RELAY TEST for slave relays K603A, K603B, K604A, K604B, K607A, K607B, K609A, K609B, K612A, K625A, and K625B. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment which may be operated in the design mitigation MODE is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment which may not be operated in the design mitigation MODE is prevented from operation by the slave relay test circuit.

For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 18 months. The Frequency is justified by TVA correspondence to the NRC dated November 9, 1984 (Ref. 9) and Design Change Notice W-38238-A associated documentation (Reference 12), and for relays K607A, K607B, and K612A, Westinghouse letter to TVA (Ref. 11).

SR 3.3.2.8

SR 3.3.2.8 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and AFW pump start on trip of all MFW pumps. It is performed every 18 months. The Frequency is based on industry operating experience and is consistent with the typical refueling cycle. The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation functions. The manual initiation functions have no associated setpoints.

SR 3.3.2.8 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition.

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SURVEILLANCE REQUIREMENTS

SR 3.3.2.8 (continued)

The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

SR 3.3.2.9

SR 3.3.2.9 is the performance of a CHANNEL CALIBRATION.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the Watts Bar setpoint methodology. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of sensor/transmitter drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. For channels with a trip time delay (TTD), this test shall include verification that the TTD coefficients are adjusted correctly.

SR 3.3.2.9 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.9 (continued)

performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

SR 3.3.2.10

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in Technical Requirements Manual, Section 3.3.2 (Ref. 8). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the NTSP value at the sensor, to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate FSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of sequential tests such that the entire response time is measured.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.2.10 (continued)

channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g., vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements" (Reference 15), provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests" (Reference 16), provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may be replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

ESF RESPONSE TIME tests are conducted on an 18 month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. The final actuation device in one train is tested with each channel.

Therefore, staggered testing results in response time verification of these devices every 18 months. The 18 month Frequency is consistent with the typical refueling cycle and is based on unit operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

This SR is modified by a Note indicating that the SR should be deferred until suitable test conditions are established. This deferral is required because there may be insufficient steam pressure to perform the test.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.11

SR 3.3.2.11 is the performance of a TADOT as described in SR 3.3.2.8, except that it is performed for the P-4 Reactor Trip Interlock, and the Frequency is once per RTB cycle. This Frequency is based on operating experience demonstrating that undetected failure of the P-4 interlock sometimes occurs when the RTB is cycled.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Function tested has no associated setpoint.

REFERENCES

1. Watts Bar FSAR, Section 6.0, "Engineered Safety Features."
2. Watts Bar FSAR, Section 7.0, "Instrumentation and Controls."
3. Watts Bar FSAR, Section 15.0, "Accident Analyses."
4. Institute of Electrical and Electronic Engineers, IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," April 5, 1972.
5. Code of Federal Regulations, Title 10, Part 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants."
6. Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.
7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," and "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation System." May 1986 and June 1990.
8. Watts Bar Technical Requirements Manual, Section 3.3.2, "Engineered Safety Feature Response Times."
9. TVA Letter to NRC, November 9, 1984, "Request for Exemption of Quarterly Slave Relay Testing, (L44 841109 808)."

(continued)

REFERENCES (continued)

10. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar, Westinghouse letter to TVA WAT-D-10128.

11. Westinghouse letter to TVA (WAT-D-8347), September 25, 1990, "Charging/Letdown Isolation Transients" (T33 911231 810).

12. Unit 1 Design Change Notice W-38238 and Unit 2 Engineering Document Construction Release 53352 and associated documentation.

13. WCAP-13877-P-A, Revision 2, "Reliability Assessment of Westinghouse Type AR Relays Used As SSPS Slave Relays."

14. Not Applicable for Unit 2

15. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

16. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

17. WCAP-14333-P-A, Revision 1, "Probablistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," October 1998

18. WCAP-15376-P-A, Revision 1, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," March 2003

19. Westinghouse letter to TVA, WAT-D-11248, "Revised Justification for Applicability of Instrumentation Technical Specification Improvements to the Automatic Switchover to Containment Sump Signal," June 2004.

20. Letter from John G. Lamb (NRC) to Mr. Preston D. Swafford (TVA) dated March 4, 2009, Includes Enclosures (a) Amendment No. 75 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1 and (b) NRC Safety Evaluation (SE) for Amendment No. 75.

21. Deleted

22. WCAP-13878-P-A, Revision 2, "Reliability Assessment of Potter & Brumfield MDR Series Relays."

B 3.3 INSTRUMENTATION

B 3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

BACKGROUND

The DGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start if a loss of voltage or degraded voltage condition occurs in the switchyard. There are four LOP start signals, one for each 6.9 kV shutdown board.

Three degraded voltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for detecting a sustained undervoltage condition. The relays are combined in a two-out-of-three logic configuration to generate a supply breaker trip signal if the voltage is below 96% for 10 seconds (nominal). Additionally, three undervoltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for the purpose of detecting a loss of voltage condition. These relays are combined in a two-out-of-three logic to generate a supply breaker trip signal if the voltage is below 87% for 0.75 seconds (nominal).

Once the supply breakers have been opened, either one of two induction disk type relays, which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 0.5 seconds (nominal) at zero volts, will start the diesel generators. Four additional induction disk type relays, in a logic configuration of one-of-two taken twice which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 3 seconds (nominal), at zero volts, will initiate load shedding of the 6.9 kV shutdown board loads and selected loads on the 480 V shutdown boards and close the 480 V shutdown boards' current limiting reactor bypass breaker. The LOP start actuation is described in FSAR Section 8.3, "Onsite (Standby) Power System" (Ref. 1).

<u>Trip Setpoints and Allowable Values</u>

The Trip Setpoints used in the relays and timers are based on the analytical limits presented in TVA calculations (References 3, 4, and 5). The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and time delays are taken into account.

(continued)

BASES

ACTIONS (continued)

C.1

Condition C applies to each of the LOP DG start Functions when the Required Action and associated Completion Time for Condition A or B are not met.

In these circumstances the Conditions specified in LCO 3.8.1, "AC Sources - Operating," or LCO 3.8.2, "AC Sources - Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

SURVEILLANCE REQUIREMENTS

A Note has been added to refer to Table 3.3.5-1 to determine which Surveillance Requirements apply for each LOP Function.

SR 3.3.5.1

SR 3.3.5.1 is the performance of a TADOT. This test is performed every 92 days. The test checks operation of the undervoltage and degraded voltage relays that provide actuation signals. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology. The Frequency is based on the known reliability of the relays and timers and the redundancy available, and has been shown to be acceptable through operating experience.

This SR has been modified by a Note that excludes verification of setpoints for relays/timers. Relay/timer setpoints require elaborate bench calibration and are verified during a CHANNEL CALIBRATION.

SR 3.3.5.2

SR 3.3.5.2 is the performance of a CHANNEL CALIBRATION.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2 (continued)

A CHANNEL CALIBRATION is performed every 6 months. CHANNEL CALIBRATION is a check of the four functions. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

The Frequency of 6 months is based on operating experience and is justified by the assumption of a 6-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.3

SR 3.3.5.3 is the performance of a CHANNEL CALIBRATION.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the four functions. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

The Frequency of 18 months is based on operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

(continued)

BASES

REFERENCES

1. Watts Bar FSAR, Section 8.3, "Onsite (Standby) Power System."
2. Watts Bar FSAR, Section 15.0, "Accident Analysis."
3. TVA Calculation WBPE2119202001, "6.9 kV Shutdown & Logic Boards Undervoltage Relays Requirements / Demonstrated Accuracy Calculation."
4. TVA Calculation TDR SYS.211-LV1, "Demonstrated Accuracy Calculation TDR SYS.211-LV1."
5. TVA Calculation TDR SYS.211-DS1, "Demonstrated Accuracy Calculation TDR SYS.211-DS1."

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.3 (continued)

The SR is modified by a Note stating that the surveillance is only applicable to the master relays of the ESFAS instrumentation.

SR 3.3.6.4

A COT is performed every 92 days on each required channel to ensure the entire channel will perform the intended Function. The Frequency is based on the staff recommendation for increasing the availability of radiation monitors according to NUREG-1366 (Ref. 2). This test verifies the capability of the instrumentation to provide the containment vent system isolation. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

SR 3.3.6.5

SR 3.3.6.5 is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation mode is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation mode is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 92 days. The Frequency is acceptable based on instrument reliability and industry operating experience.

For ESFAS slave relays which are Westinghouse type AR or Potter & Brumfield MDR series relays, the SLAVE RELAY TEST is performed every 18 months. The frequency is based on the relay reliability assessments presented in References 3 and 5. These reliability assessments are relay specific and apply only to Westinghouse type AR and Potter & Brumfield MDR series relays with AC coils. Note that for normally energized applications, the relays may require periodic replacement in accordance with the guidance given in References 3 and 5.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.6

SR 3.3.6.6 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the master relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).
For these tests, the relay trip setpoints are verified and adjusted as necessary. The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.6.7

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found settings are consistent with those established by the setpoint methodology.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance."

2. NUREG-1366, "Improvement to Technical Specification Surveillance Requirements," December 1992.

3. WCAP-13877-P-A, Revision 2, “Reliability Assessment of Westinghouse Type AR Relays Used as SSPS Slave Relays.”

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

A Note has been added to the SR Table to clarify that Table 3.3.7-1 determines which SRs apply to which CREVS Actuation Functions.

SR 3.3.7.1

Performance of the CHANNEL CHECK once every 12 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 the two instrument channels could be an indication of excessive instrument drift in one of the channels or of 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 unit 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 sensor or the signal processing equipment has drifted outside its limit.

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

SR 3.3.7.2

A COT is performed once every 92 days on each required channel to ensure the entire channel will perform the intended function. This test verifies the capability of the instrumentation to provide the CREVS actuation. The Frequency is based on the known reliability of the monitoring equipment and has been shown to be acceptable through operating experience. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.7.3

SR 3.3.7.3 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).

The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.7.4

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES None

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.8.2

A COT is performed once every 92 days on each required channel to ensure the entire channel will perform the intended function. This test verifies the capability of the instrumentation to provide the ABGTS actuation. The Frequency of 92 days is based on the known reliability of the monitoring equipment and has been shown to be acceptable through operating experience. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

SR 3.3.8.3

SR 3.3.8.3 is the performance of a TADOT. This test is a check of the manual actuation functions and is performed every 18 months. Each manual actuation function is tested up to, and including, the relay coils. In some instances, the test includes actuation of the end device (e.g., pump starts, valve cycles, etc.). The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.8.4

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. The Frequency is based on operating experience and is consistent with the typical industry refueling cycle. There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found setting are consistent with those established by the setpoint methodology.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance."

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.10 Pressurizer Safety Valves

BASES

BACKGROUND

The pressurizer safety valves provide, in conjunction with the Reactor Protection System, overpressure protection for the RCS. The pressurizer safety valves are totally enclosed pop type, spring loaded, self actuated valves with backpressure compensation. The safety valves are designed to prevent the system pressure from exceeding the system Safety Limit (SL), 2735 psig (2750 psia), which is 110% of the design pressure.

Because the safety valves are totally enclosed and self actuating, they are considered independent components. The relief capacity for each valve, 420,000 lb/hr, is based on postulated overpressure transient conditions resulting from a complete loss of steam flow to the turbine. This event results in the maximum surge rate into the pressurizer, which specifies the minimum relief capacity for the safety valves. The discharge flow from the pressurizer safety valves is directed to the pressurizer relief tank. This discharge flow is indicated by an increase in temperature downstream of the pressurizer safety valves or increase in the pressurizer relief tank temperature or level.

Overpressure protection is required in MODES 1, 2, 3, 4, and 5; however, in MODE 4 with any RCS cold leg temperature ≤ the COMS arming temperature specified in the PTLR, MODE 5, and MODE 6 with the reactor vessel head on, overpressure protection is provided by operating procedures and by meeting the requirements of LCO 3.4.12, "Cold Overpressure Mitigation System (COMS)."

The upper and lower pressure limits are based on a ± 3% tolerance. The lift setting is for the ambient conditions associated with MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR. This requires either that the valves be set hot or that a correlation between hot and cold settings be established.

The pressurizer safety valves are part of the primary success path and mitigate the effects of postulated accidents. OPERABILITY of the safety valves ensures that the RCS pressure will be limited to 110% of design pressure.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.3.7

Verifying that each 24 inch containment lower compartment purge valve is blocked to restrict opening to ≤ 50° is required to ensure that the valves can close under DBA conditions within the times assumed in the analyses of References 1 and 2. If a LOCA occurs, the purge valves must close to maintain containment leakage within the values assumed in the accident analysis. At other times when purge valves are required to be capable of closing (e.g., during movement of irradiated fuel assemblies), pressurization concerns are not present, thus the purge valves can be fully open. The 18-month Frequency is appropriate because the blocking devices are typically removed only during a refueling outage.

SR 3.6.3.8

This SR ensures that the combined leakage rate of all Shield Building bypass leakage paths is less than or equal to the specified leakage rate. This provides assurance that the assumptions in the safety analysis are met. The as left bypass leakage rate prior to the first startup after performing a leakage test, requires calculation using maximum pathway leakage (leakage through the worse of the two isolation valves). If the penetration is isolated by use of one closed and de-activated automatic valve, closed manual valve, or blind flange, then the leakage rate of the isolated bypass leakage path is assumed to be the actual pathway leakage through the isolation device. If both isolation valves in the penetration are closed, the actual leakage rate is the lesser leakage rate of the two valves. At all other times, the leakage rate will be calculated using minimum pathway leakage.

The frequency is required by the Containment Leakage Rate Testing Program. This SR simply imposes additional acceptance criteria. Although not a part of L_a, the Shield Building Bypass leakage path combined leakage rate is determined using the 10 CFR 50, Appendix J, Option B, Type B and C leakage rates for the applicable barriers.

(continued)

BASES

ACTIONS

B.2 (continued)

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one or more DGs inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one or more required DGs in Train A or one or more DGs in Train B inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DGs, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is Acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

In this Condition, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. For the performance of a Surveillance, Required Action B.3.1 is considered satisfied since the cause of the DG being inoperable is apparent. If the cause of inoperability exists on other DG(s), the other DG(s) would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered if the other

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.14

Regulatory Guide 1.9 (Ref. 3), paragraph C2.2.9, requires demonstration once per 18 months that the DGs can start and run continuously for an interval of not less than 24 hours, ≥ 2 hours of which is at a load between 105% and 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of ≥ 0.8 and ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

This Surveillance is modified by three Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. Note 2 establishes that this SR may be performed on only one DG at a time while in MODE 1, 2, 3, or 4. This is necessary to ensure the proper response to an operational transient (i.e., loss of offsite power, ESF actuation). Therefore, three DGs must be maintained operable and in a standby condition during performance of this test. In this configuration, the plant will remain within its design basis, since at all times safe shutdown can be achieved with two DGs in the same train.

Note 3 establishes that credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

1) Unexpected operational events which cause the equipment to perform the function specified by this Surveillance, for which adequate documentation of the required performance is available; and

2) Post-corrective maintenance testing that requires performance of this Surveillance in order to restore the component to OPERABLE, provided the maintenance was required, or performed in conjunction with maintenance required to maintain OPERABILITY or reliability.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The minimum voltage and frequency stated in the SR are those necessary to ensure the DG can accept DBA loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential to establishing DG OPERABILITY, but a time constraint is not imposed. This is because a typical DG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. This period may extend beyond the 10 seconds acceptance criteria and could be a cause for failing the SR. In lieu of a time constraint in the SR, WBN will monitor and trend the actual time to reach steady state operation as a means of ensuring there is no voltage regulator or governor degradation which could cause a DG to become inoperable. The 10 seconds time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1.

The DG engines for WBN have an oil circulation and soakback system that operates continuously to preclude the need for a prelube and warmup when a DG is started from standby.

This SR is modified by a Note to ensure that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.13

A battery service test is a special test of battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to worst case design duty cycle requirements based on References 10 and 12.

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 6) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests, not to exceed 18 months.

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test once per 60 months. The modified performance discharge test is a simulated duty cycle consisting of just two rates: the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one-minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle.) This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

The reason for Note 2 is that performing the Surveillance may perturb the vital electrical distribution system and challenge safety systems. However, this Surveillance may be performed in MODES I, 2, 3, or 4 provided that Vital Battery V is substituted in accordance with LCO Note 1. For the DG DC electrical subsystem, this surveillance may be performed in MODES I, 2, 3, or 4 in conjunction with LCO 3.8.1.B since the supplied loads are only for the inoperable diesel generator and would not otherwise challenge safety system loads which are supplied

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.13 (continued)

from vital electrical distribution systems. Additionally, credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

1) Unexpected operational events which cause the equipment to perform the function specified by this Surveillance, for which adequate documentation of the required performance is available; and

2) Post-corrective maintenance testing that requires performance of this Surveillance in order to restore the component to OPERABLE, provided the maintenance was required, or performed in conjunction with maintenance required to maintain OPERABILITY or reliability.

SR 3.8.4.14

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

A battery modified performance discharge test is described in the Bases for SR 3.8.4.13. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.14; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.14 while satisfying the requirements of SR 3.8.4.13 at the same time.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 9) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

(continued)

ENCLOSURE 8

Marked-up Version of Unit 2 Technical Specifications Bases
With Justifications for Revisions

BASES (continued)

APPLICABLE SAFETY ANALYSES

The RCS pressurizer safety valves, the main steam safety valves (MSSVs), and the reactor high pressure trip have settings established to ensure that the RCS pressure SL will not be exceeded.

The RCS pressurizer safety valves are sized to prevent system pressure from exceeding the design pressure by more than 10%, as specified in Section III of the ASME Code for Nuclear Power Plant Components (Ref. 2). The transient that establishes the required relief capacity, and hence valve size requirements and lift settings, is a complete loss of external load without a direct reactor trip. During the transient, no control actions are assumed, except that the safety valves on the secondary plant are assumed to open when the steam pressure reaches the secondary plant safety valve settings.

The Reactor Trip System setpoints (Ref. 5), together with the settings of the MSSVs (Ref. 8), provide pressure protection for normal operation and AOOs. The reactor high pressure trip setpoint is specifically set to provide protection against overpressurization (Ref. 5). The safety analyses for both the high pressure trip and the RCS pressurizer safety valves are performed using conservative assumptions relative to pressure control devices.

More specifically, no credit is taken for operation of the following:

a. Pressurizer power operated relief valves (PORVs);

b. Steam line power operated relief valve (PORV);

c. Steam Dump System;

d. Reactor Control System;

e. Pressurizer Level Control System; or

f. Pressurizer spray valve.

SAFETY LIMITS

The maximum transient pressure allowed in the RCS pressure vessel, piping, valves, and fittings under the ASME Code, Section III, is 110% of design pressure. Therefore, the SL on maximum allowable RCS pressure is 2735 psig ~~.~~ (2750 psia). 1

(continued)

BASES

BACKGROUND (continued)

The Nominal Trip Setpoint (NTSP) specified in Table 3.3.1-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the NTSP accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the NTSP ensures that SLs are not exceeded. Therefore, the NTSP meets the definition of an LSSS (Ref. ~~1~~). 6 2

3 in

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined ~~is~~ the Technical Specifications as "...being capable of performing its safety function(s)." Relying solely on the NTSP to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the ~~"as-found"~~ value of a protection channel setting during a surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the NTSP due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the NTSP and thus the automatic protective action would still have ensured that the SL would not be exceeded with the ~~"as-found"~~ setting of the protection channel. Therefore, the channel would still be OPERABLE since it would have performed its safety function and the only corrective action required would be to reset the channel within the established ~~as-left~~ tolerance around the NTSP to account for further drift during the next surveillance interval.

"as found"

4

as left 5

(continued)

BASES

BACKGROUND (continued)

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB);

① 2735 psig

2. ~~Fuel~~ centerline ~~melt~~ shall not occur; and

3. The RCS pressure SL of 2750 psig shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 20 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

The RTS instrumentation is segmented into four distinct but interconnected modules as illustrated in Figure 7.1-1, FSAR, Section 7 (Ref. 2), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal or contact actuation based upon the physical characteristics of the parameter being measured;

2. Signal Process Control and Protection System, including Process Protection System, Nuclear Instrumentation System (NIS), and field contacts: provides analog to digital conversion (Digital Protection System), signal conditioning, setpoint comparison, process algorithm actuation (Digital Protection System), compatible electrical signal output to protection system channels, and control board/control room/miscellaneous indications;

③ (3)

3. Solid State Protection System (SSPS), including input, logic, and output bays: initiates proper unit shutdown and/or ESF actuation in accordance with the defined logic, which is based on the bistable, setpoint comparators, or contact outputs from the signal process control and protection system; and

(continued)

BASES

BACKGROUND (continued)

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as five, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the NTSP and Allowable Value~~s~~. The OPERABILITY of each transmitter or sensor is determined by either "as found" calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel ~~behaviour~~ behavior observed ~~furing~~ during performance of the CHANNEL CHECK.

3 3 3

Signal Process Control and Protection System

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning comparable output signals for instruments located on the main control board, and comparison of measured input signals with NTSPs derived from Analytical Limits established by the safety analyses. Analytical Limits are defined in ~~Reference 6~~ FSAR, Chapter 6 (Reference 1), Chapter 7 (Reference 2), and Chapter 15 (Reference 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable, setpoint comparator, or contact is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

2

(continued)

BASES

(3)

BACKGROUND ~~(continued)~~

Signal Process Control and Protection System (continued)

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails, such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation. These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

Two logic trains are required to ensure no single random failure of a logic train will disable the RTS. The logic trains are designed such that testing required while the reactor is at power may be accomplished without causing trip.

Allowable Values and Nominal Trip Setpoints

~~The Trip Setpoints are the nominal values at which the bistables, setpoint comparators, or contact trip outputs are set. Any bistable or trip output is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.~~

defined 2

(2)

The Trip Setpoints used in the bistables, setpoint comparators, or contact trip outputs are based on the analytical limits ~~stated~~ in Reference ~~6~~. The calculation of the Nominal Trip Setpoints specified in Table 3.3.1-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the ~~Trip Setpoints~~ specified in Table 3.3.1-1 in the accompanying LCO are ~~conservatively adjusted~~ with respect to the analytical limits.

Allowable Values Conservative

(continued)

All of the known uncertainties applicable for each channel (2)

(3) BASES ~~(continued)~~

(3) BACKGROUND ~~(continued)~~

Allowable Values and Nominal Trip Setpoints (continued)

and as left and as found (A)

A detailed description of the methodology used to calculate the Allowable Values ~~and~~ NTSP, ~~including their explicit uncertainties, is provided in the "Setpoint Methodology for Watts Bar Unit 2" (Ref. 6). The as-left tolerance and as-found~~ tolerance band ~~methodology~~ is provided in Reference 6. ~~The magnitudes of these uncertainties~~ are factored into the determination of each NTSP and corresponding Allowable Value. The trip setpoint entered into the bistable is more conservative than ~~that specified~~ by the Allowable Value to account for measurement errors detectable by the COT. The Allowable Value serves as the ~~as-found~~ Technical Specification OPERABILITY limit for the purpose of the COT. ~~The Source Range and Intermediate Range Neutron detector setpoints are based on the requirements and recommendations of ISA 67.04 (Reference 10).~~ (2)

2

(4) as found (2)

The NTSP is the value at which the bistable is set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the ~~"as-left"~~ NTSP value is within the ~~as-left~~ tolerance band for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal" value (i.e., expressed as a value without inequalities) for the purposes of COT and CHANNEL CALIBRATION.

as left (4)

(A) "as left"

Allowable Values and Nominal Trip Setpoints (continued)

as left

as found (4)

Nominal Trip Setpoints, in conjunction with the use of ~~as-found~~ and ~~as-left~~ tolerances, together with the requirements of the Allowable Value ensure that SLs are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions are designed). ~~Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.~~ (2)

top of page B 3.3-7

(3)

(continued)

④ as found

BASES ~~(continued)~~ ③

③ BACKGROUND ~~(continued)~~

Note that the Allowable Values listed in Table 3.3.1-1 are the least conservative value of the ~~as found~~ setpoint that a channel can have during a periodic CHANNEL CALIBRATION, CHANNEL OPERATIONAL TESTS, or a TRIP ACTUATING DEVICE OPERATIONAL TEST that requires trip setpoint verification. ~~The Process Protection System is designed to permit any one channel to be tested and maintained at power in a bypassed mode. If a channel has been bypassed for any purpose, the bypass is continuously indicated in the control room.~~ ②

Insert "A" ②

~~The NTSP and Allowable Values listed in Table 3.3.1-1 are based on the methodology described in References 6 and 10, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.~~ ②

Solid State Protection System

The SSPS equipment is used for the decision logic processing of setpoint comparator trip outputs, contact outputs, and bistable outputs from the signal processing equipment. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The system has been designed to trip in the event of a loss of power, directing the unit to a safe shutdown condition.

The SSPS performs the decision logic for actuating a reactor trip or ESF actuation, generates the electrical output signal that will initiate the required trip or actuation, and provides the status, permissive, and annunciator output signals to the main control room of the unit.
The setpoint comparator trip outputs, contact outputs and bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various unit upset and accident transients. If a required logic matrix combination is completed, the system will initiate a reactor trip and/or send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

(continued)

INSERT "A"

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section. The Process Protection System is designed to permit any one channel to be tested and maintained at power in a bypassed mode. If a channel has been bypassed for any purpose, the bypass is continuously indicated in the control room.

BASES (continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RTS functions to preserve the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 3 takes credit for most RTS trip functions. RTS trip functions that are retained yet not specifically credited in the accident analysis are implicitly credited in the safety analysis and the NRC staff approved licensing basis for the unit. These RTS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backups to RTS trip Functions that were credited in the accident analysis.

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

4 as found

The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 to be OPERABLE. The Allowable Value specified in Table 3.3.1-1 is the least conservative value of the ~~as-found~~ setpoint that the channel can have when tested, such that a channel is OPERABLE if the ~~as-found~~ setpoint is within the ~~as-found~~ tolerance and is conservative with the respect to the Allowable Value during a CHANNEL CALIBRATION or CHANNEL OPERATIONAL TEST (COT). As such, the Allowable Value differs from the NTSP by an amount greater than or equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of the time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the ~~as-left~~ tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (~~as-left~~ criteria), and confirmed to be operating within the statistical allowances of the uncertainty terms assigned (~~as-found criteria~~).

3

as left

4

as found

(continued)

(3) (4) as found

BASES ~~(continued)~~

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the ~~as found~~ tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance) and evaluating the channel response. If the channel is functioning as required and is expected to pass the next surveillance, then the channel is OPERABLE and can be restored to service at the completion of the surveillance. After the surveillance is completed, the channel ~~as found~~ condition will be entered into the Corrective Action Program for further evaluation.

A trip setpoint may be set more conservative than the NTSP as necessary in response to plant conditions. However, in this case, the operability of this instrument must be verified based on the field setting and not the NTSP. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

The LCO generally requires OPERABILITY of four or three channels in each instrumentation Function, two channels of Manual Reactor Trip in each logic Function, and two trains in each Automatic Trip Logic Function. Four OPERABLE instrumentation channels in a two-out-of-four configuration are required when one RTS channel is also used as a control system input. This configuration accounts for the possibility of the shared channel failing in such a manner that it creates a transient that requires RTS action. In this case, the RTS will still provide protection, even with random failure of one of the other three protection channels. Three operable instrumentation channels in a two-out-of-three configuration are generally required when there is no potential for control system and protection system interaction that could simultaneously create a need for RTS trip and disable one RTS channel. The two-out-of-three and two-out-of-four configurations allow one channel to be tripped during maintenance or testing without causing a reactor trip. Specific exceptions to the above general philosophy exist and are discussed below.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

10. Reactor Coolant Flow - Low (continued)

In MODE 1 above the P-8 setpoint, a loss of flow in one RCS loop could result in DNB conditions in the core because of the higher power level. In MODE 1 below the P-8 setpoint and above the P-7 setpoint, a loss of flow in two or more loops is required to actuate a reactor trip because of the lower power level and the greater margin to the design limit DNBR. Below the P-7 setpoint, all reactor trips on low flow are automatically blocked since there is insufficient heat production to generate DNB conditions.

% indicated loop flow

(8)

The Reactor Coolant Flow-Low Trip Setpoint and Allowable Value are specified in ~~% thermal design flow adjusted for uncertainties (95,000 gpm)~~; however, the Eagle-21™ values entered through the MMI are specified in an equivalent % differential pressure.

11. Undervoltage Reactor Coolant Pumps

The Undervoltage RCPs trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The voltage to each RCP is monitored. Above the P-7 setpoint, a loss of voltage detected on two or more RCP buses will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow - Low Trip Setpoint is reached in two or more RCS loops. The loss of voltage in two loops must be sustained for a length of time equal to or greater than that set in the time delay. Time delays are incorporated into the Undervoltage RCPs channels to prevent reactor trips due to momentary electrical power transients.

The LCO requires one Undervoltage RCP channel per bus to be OPERABLE.

In MODE 1 above the P-7 setpoint, the Undervoltage RCP trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled.

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

SR 3.3.1.6 (continued)

The Frequency of 92 EFPD is adequate. It is based on industry operating experience, considering instrument reliability and operating history data for instrument drift.

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every 184 days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function.

Setpoints must be conservative with respect to the Allowable Values specified in Table 3.3.1-1.

NTSP or ②

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit ~~specific setpoint~~ methodology.

④ "as found" "as left" ④

The ~~"as found"~~ and ~~"as left"~~ values ~~must~~ also be recorded and reviewed for consistency with the assumptions of ~~References 6 and 7.~~ the setpoint methodology. ②

SR 3.3.1.7 is modified by a Note that this test shall include verification that the P-10 interlock is in the required state for the existing unit condition.

The Frequency of 184 days is justified in Reference 15, except for Function 13. The justification for Function 13 is provided in References 9 and 15.

③ Keep together

as found ④

SR 3.3.1.7 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the ~~as found~~ setting for the channel setpoint is outside its ~~as found~~ tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service.

④ as found

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~ 3

SR 3.3.1.7 (continued)

For channels determined to be OPERABLE but degraded, after returning the channel to service the channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the ~~as-left~~ setting for the channel be returned to within the ~~as-left~~ tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the ~~as-left~~ and ~~as-found~~ tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the ~~as-left~~ channel setting cannot be returned to a setting within the ~~as-left~~ tolerance of the NTSP, then the channel shall be declared inoperable.

as left

4 as found

as left 4

SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except it is modified by two Notes. Note 1 provides a 4 hour delay in the requirement to perform this Surveillance for source range instrumentation when entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for a short time in MODE 3 until the RTBs are open and SR 3.3.1.8 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for greater than 4 hours, this Surveillance must be performed within 4 hours after entry into MODE 3. Note 2 states that this test shall include verification that the P-6 interlock is in the required state for the existing unit condition. The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 31 days prior to reactor startup and 4 hours after reducing power below P-10 and P-6. The Frequency of "prior to startup" ensures this surveillance is performed prior to critical operations and applies to the source and intermediate range instrument channels. The Frequency of "Four hours after reducing power below P-10" (applicable to intermediate channels) and "Four hours after reducing power below P-6" (applicable to source range channels) allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of every 31 days thereafter applies if the plant remains in the MODE of Applicability after the initial performances of prior to reactor startup and 4 hours after reducing power below P-10 or P-6.

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

3

SR 3.3.1.8 (continued)

The MODE of Applicability for this surveillance is < P-10 for the intermediate range channels and < P-6 for the source range channels. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-10 or < P-6 for more than 4 hours, then the testing required by this surveillance must be performed prior to the expiration of the 4 hour limit. Four hours is a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. This test ensures that the NIS source and intermediate range channels are OPERABLE channels prior to taking the reactor critical and after reducing power into the applicable MODE (< P-10 or < P-6) for periods > 4 hours. Keep together

SR 3.3.1.8 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the ~~as-found~~ setting for the channel setpoint is outside its ~~as-found~~ tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the ~~as-left~~ setting for the channel be returned to within the ~~as-left~~ tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the ~~as-left~~ and ~~as-found~~ tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the ~~as-left~~ channel setting cannot be returned to a setting within the ~~as-left~~ tolerance of the NTSP, then the channel shall be declared inoperable.

replace as-left with as left

replace as-found with as found

4

(continued)

4

BASES

as found

SURVEILLANCE REQUIREMENTS ~~(continued)~~

3

SR 3.3.1.10 (continued)

SR 3.3.1.10 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the ~~as-found~~ setting for the channel setpoint is outside its ~~as-found~~ tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the ~~performance of these~~ channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the ~~as-left~~ setting for the channel be ~~returned to within~~ the ~~as-left~~ tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures ~~(field setting)~~, the ~~as-left~~ and ~~as-found~~ tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the ~~as-left~~ channel setting cannot be returned to a setting within the ~~as-left~~ tolerance of the NTSP, then the channel shall be declared inoperable.

4

as left

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every 18 months. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors consists of a normalization of the detectors based on a power calorimetric performed above 15% RTP. The CHANNEL CALIBRATION for the source range and intermediate range neutron detectors consists of obtaining the detector plateau or preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data. This Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1, and is not required for the NIS intermediate range detectors for entry into MODE 2, because the unit must be in at least MODE 2 to perform the test for the intermediate range detectors and MODE 1 for the power range detectors.

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

SR 3.3.1.11 (continued)

The 18-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 these components usually pass the Surveillance when performed on the 18-month Frequency.

as found (4)

SR 3.3.1.11 is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where the ~~as-found~~ setting for the channel setpoint is outside its ~~as-found~~ tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the ~~as-left~~ setting for the channel be returned to within ~~the~~ ~~as-left~~ tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures ~~(field setting)~~, the ~~as-left~~ and ~~as-found~~ tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the ~~as-left~~ channel setting cannot be returned to a setting within ~~the~~ ~~as-left~~ tolerance of the NTSP, then the channel shall be declared inoperable.

(4) as left

SR 3.3.1.12

SR 3.3.1.12 is the performance of a COT of RTS interlocks every 18 months.

The Frequency is based on the known reliability of the interlocks and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

SR 3.3.1.15 (continued)

As appropriate, each channel's response must be verified every 18 months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Response times cannot be determined during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed at the 18-month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.15 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

REFERENCES

1. Watts Bar FSAR, Section 6.0, "Engineered Safety Features."
2. Watts Bar FSAR, Section 7.0, "Instrumentation and Controls."
3. Watts Bar FSAR, Section 15.0, "Accident Analysis."
4. Institute of Electrical and Electronic Engineers, IEEE-279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," April 5, 1972.
5. 10 CFR Part 50.49, "Environmental Qualifications of Electric Equipment Important to Safety for Nuclear Power Plants."
6. ~~WCAP-17044, Rev. 0, "Setpoint Methodology for Watts Bar 2~~

Insert "B" 2

7. WCAP-10271-P-A, Supplement 1, and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," May 1986 and June 1990.
8. Watts Bar Technical Requirements Manual, Section 3.3.1, "Reactor Trip System Response Times."
9. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar, Westinghouse Letter WAT-D-10128.

(continued)

INSERT "B"

Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.

BASES

Deleted (2)

REFERENCES (continued)

10. ~~ISA-DS-67.04, 1982, "Setpoint for Nuclear Safety Related Instrumentation Used in Nuclear Power Plants."~~

11. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996

12. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

13. Deleted

14. WCAP-14333 P-A, Revision 1, "Probablistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," October 1998.

15. WCAP-15376-P-A, Revision 1, "Risk Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," March 2003

16. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (Addendum 2, April 2002).

B 3.3 INSTRUMENTATION

B 3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary, and to mitigate accidents. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the ESFAS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical Specifications are required by 10 CFR 50.36 to include LSSS for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a protective action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

The NTSP specified in Table 3.3.2-1 is a predetermined setting for a protection channel chosen to ensure automatic actuation prior to the process variable reaching the Analytical Limit and thus ensuring that the SL would not be exceeded. As such, the NTSP accounts for uncertainties in setting the channel (e.g., calibration), uncertainties in how the channel might actually perform (e.g., repeatability), changes in the point of action of the channel over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the NTSP ensures that SLs are not exceeded. Therefore, the NTSP meets the definition of an LSSS (Ref. ~~2~~).

~~2~~ 6 2

(continued)

BASES

BACKGROUND (continued)

Technical Specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is defined in Technical Specifications as "...being capable of performing its safety functions(s)." Relying solely on the NTSP to define OPERABILITY in Technical Specifications would be an overly restrictive requirement if it were applied as an OPERABILITY limit for the ~~"as-found"~~ value of a protection channel setting during a surveillance. This would result in Technical Specification compliance problems, as well as reports and corrective actions required by the rule which are not necessary to ensure safety. For example, an automatic protection channel with a setting that has been found to be different from the NTSP due to some drift of the setting may still be OPERABLE since drift is to be expected. This expected drift would have been specifically accounted for in the setpoint methodology for calculating the NTSP and thus the automatic protective action would still have ensured that the SL would not be exceeded with the ~~"as-found"~~ setting of the protection channel. Therefore, the channel would still be OPERABLE since it would have performed its safety function and the only corrective action required would be to reset the channel within the ~~established~~ ~~as-left~~ tolerance around the NTSP to ~~account for~~ further drift during the next surveillance interval.

4 "as found"

4 as left

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB),

2. Fuel ~~centerline melt~~ shall not occur, and

New paragraph 3

3. The RCS pressure SL ~~of~~ (2750 psia) shall not be exceeded. Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 50 and 10 CFR 100 criteria during AOOs.

2735 psig

1

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

(continued)

BASES

BACKGROUND (continued)

The ESFAS instrumentation is segmented into three distinct but interconnected modules as identified below:

- Field transmitters or process sensors: provide a measurable electronic signal or contact actuation based on the physical characteristics of the parameter being measured;
- Signal processing equipment including process protection system, and field contacts: provide analog to digital conversion (Digital Protection System), signal conditioning, setpoint comparison, process algorithm actuation (Digital Protection System), compatible electrical signal output to protection system channels, and control board/control room/ miscellaneous indications; and
- Solid State Protection System (SSPS) including input, logic, and output bays: initiates the proper unit shutdown or engineered safety feature (ESF) actuation in accordance with the defined logic and based on the bistable, setpoint comparators, or contact outputs from the signal process control and protection system.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as five, field transmitters or sensors are used to measure unit parameters. In many cases, field transmitters or sensors that input to the ESFAS are shared with the Reactor Trip System (RTS). In some cases, the same channels also provide control system inputs. To account for calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the NTSP and Allowable Value. The OPERABILITY of each transmitter or sensor ~~can be evaluated when its "as found" calibration data are compared against its documented acceptance criteria.~~

Insert "C"

2

(continued)

INSERT "C"

is determined by either "as found" calibration data evaluated during the CHANNEL CALIBRATION or by qualitative assessment of field transmitter or sensor as related to the channel behavior observed during performance of the CHANNEL CHECK.

BASES

BACKGROUND (continued)

Signal Processing Equipment

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides analog to digital conversion (Digital Protection System), signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with NTSPs derived from Analytical Limits established by the safety analyses. ~~These NTSPs are defined in Reference 6.~~ If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a setpoint comparator or contact is forwarded to the SSPS for decision evaluation. Channel separation is maintained up to and through the input bays. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

Insert "D"
2

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation.

These requirements are described in IEEE-279-1971 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 2.

(continued)

INSERT "D"

Analytical Limits are defined in FSAR, Chapter 6, (Reference 1), Chapter 7 (Reference 2), and Chapter 15 (Reference 3).

BASES

BACKGROUND (continued)

2

~~NTSPs and~~ Allowable Values and Nominal Trip Setpoints

2

~~The Trip Setpoints are the nominal values at which the setpoint comparators or contact outputs are set. Any output is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.~~

defined 27 2

The Trip Setpoints used in the bistables, setpoint comparators, ~~or~~ contact outputs are based on the analytical limits ~~stated~~ in Reference ~~6~~. The calculation of the Nominal Trip Setpoints specified in Table 3.3.2-1 is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment ~~errors for those ESFAS channels~~ that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the NTSPs specified in Table 3.3.2-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate ~~the NTSPs including their explicit uncertainties, is provided in the "Setpoint Methodology for Watts Bar Unit 2" (Ref. 6). The as left tolerance and as found tolerance band methodology is provided in Reference 6.~~ The nominal Trip Setpoint entered into the ~~comparator or contact output~~ is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT.

New paragraph

2

Insert "E"

bistable

Insert "F"

The NTSP is the value at which the bistables are set and is the expected value to be achieved during calibration. The NTSP value is the LSSS and ensures the safety analysis limits are met for the surveillance interval selected when a channel is adjusted based on stated channel uncertainties. Any bistable is considered to be properly adjusted when the ~~"as left" setpoint~~ NTSP value is within the ~~band as left~~ tolerance for CHANNEL CALIBRATION uncertainty allowance (i.e., ± rack calibration and comparator setting uncertainties). The NTSP value is therefore considered a "nominal value" (i.e., expressed as a value without inequalities) for the purposes of the COT and CHANNEL CALIBRATION.

band

2

"as left"

4

4

as left

as found

Nominal Trip Setpoints, in conjunction with the use of ~~as left~~ and ~~as found~~ tolerances together with the requirements of the Allowable Value ensure that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

3

(continued)

INSERT "E"

NTSPs and as left and as found tolerance bands is provided in Reference 2. All of the known uncertainties applicable for each channel are factored into the determination of each NTSP and corresponding Allowable Value.

INSERT "F"

The Allowable Value serves as the as found Technical Specification OPERABILITY limit for the purpose of the COT.

as found (4)

BASES

BACKGROUND (continued)

Note that the Allowable Values listed in Table 3.3.2-1 are the least conservative value of the ~~as found~~ setpoint that a channel can have during a periodic CHANNEL CALIBRATION, COT, or a TADOT.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements of Reference 2. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

Insert "G"

(2)

~~The NTSPs and Allowable Values listed in Table 3.3.2-1 are based on the methodology described in Reference 6, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each NTSP. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.~~

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

The SSPS performs the decision logic for most ESF equipment actuation; generates the electrical output signals that initiate the required actuation; and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various transients. If a required logic matrix combination is completed, the system will send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

(continued)

INSERT "G"

The Process Protection System is designed to permit any one channel to be tested and maintained at power in a bypassed mode. If a channel has been bypassed for any purpose, the bypass is continuously indicated in the control room.

(2) Channel

BASES

BACKGROUND (continued)

Each SSPS train has a built in testing ~~device~~ that can automatically test the decision logic matrix functions and the actuation channels while the unit is at power. When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. The testing ~~device~~ is semiautomatic to minimize testing time.

The actuation of most ESF components is accomplished through master and slave relays. Some ESF components are actuated by relay logic. The SSPS energizes the master relays appropriate for the condition of the unit. Each master relay then energizes one or more slave relays, which then cause actuation of the end devices. The master and slave relays are routinely tested to ensure operation. The test of the master relays energizes the relay, which then operates the contacts and applies a low voltage to the associated slave relays. The low voltage is not sufficient to actuate the slave relays but only demonstrates signal path continuity. The SLAVE RELAY TEST actuates the devices if their operation will not interfere with continued unit operation. For the latter case, actual component operation is prevented by the SLAVE RELAY TEST circuit, and slave relay contact operation is verified by a continuity check of the circuit containing the slave relay.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Each of the analyzed accidents can be detected by one or more ESFAS Functions. One of the ESFAS Functions is the primary actuation signal for that accident. An ESFAS Function may be the primary actuation signal for more than one type of accident. An ESFAS Function may also be a secondary, or backup, actuation signal for one or more other accidents. For example, Pressurizer Pressure - Low is a primary actuation signal for small loss of coolant accidents (LOCAs) and a backup actuation signal for steam line breaks (SLBs) outside containment. Functions such as manual initiation, not specifically credited in the accident safety analysis, are implicitly credited in the safety analysis and the NRC staff approved licensing basis for the unit. These Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. These Functions may also serve as backups to Functions that were credited in the accident analysis (Ref. 3).

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Permissive and interlock setpoints allow the blocking of trips during plant startups, and restoration of trips when the permissive conditions are not satisfied, but they are not explicitly modeled in the Safety Analyses. These permissives and interlocks ensure that the starting conditions are consistent with the safety analysis, before preventive or mitigating actions occur. Because these permissives or interlocks are only one of multiple conservative starting assumptions for the accident analysis, they are generally considered as nominal values without regard to measurement accuracy.

4 as found

The LCO requires all instrumentation performing an ESFAS Function ~~listed~~ in Table 3.3.2-1 in the accompanying LCO, to be OPERABLE. The ~~Allowable~~ Value specified in Table 3.3.2-1 is the least conservative value of the ~~as-found~~ setpoint that the channel can have when tested, such that ~~a channel is OPERABLE if~~ the ~~as-found~~ setpoint is within ~~the as-found~~ tolerance and is conservative with respect to ~~the Allowable~~ Value during the CHANNEL CALIBRATION ~~or CHANNEL~~ OPERATIONAL TEST ~~(COT). As such,~~ the Allowable Value differs from the NTSP by an amount ~~greater than or~~ equal to the expected instrument channel uncertainties, such as drift, during the surveillance interval. In this manner, the actual setting of the channel (NTSP) will ensure that a SL is not exceeded at any given point of time as long as the channel has not drifted beyond expected tolerances during the surveillance interval. Note that, although the channel is OPERABLE under these circumstances, the trip setpoint must be left adjusted to a value within the ~~as-left~~ tolerance, in accordance with uncertainty assumptions stated in the referenced setpoint methodology (~~as-left~~ criteria), and confirmed to be operating within the statistical allowances of ~~the uncertainty~~ terms assigned (~~as-found~~ criteria).

as left 4 as found

If the actual setting of the channel is found to be conservative with respect to the Allowable Value but is beyond the ~~as-found~~ tolerance band, the channel is OPERABLE but degraded. The degraded condition of the channel will be further evaluated during performance of the SR. This evaluation will consist of resetting the channel setpoint to the NTSP (within the allowed tolerance) and evaluating the channel response. If the channel is functioning as required and expected to pass the next surveillance, then the channel can be restored to service at the completion of the surveillance.

Insert "H"
2

(continued)

INSERT "H"

After the surveillance is completed, the channel as found condition will be entered into the Corrective Action Program for further evaluation.

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

(3)

SR 3.3.2.1 (continued)

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and reliability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

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

SR 3.3.2.2

SR 3.3.2.2 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 92 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and that there is an intact voltage signal path to the master relay coils. The Frequency of every 92 days on a STAGGERED TEST BASIS is justified in Reference 18.

SR 3.3.2.3

SR 3.3.2.3 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The Frequency of 92 days is justified in Reference 18.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a COT.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found ~~within~~ the Allowable Values specified in Table 3.3.2-1.

(2) Conservative with respect to

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

3

SR 3.3.2.4 (continued)

NTSP or 2

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

the setpoint methodology 2

The "as found" and "as left" values must also be recorded and reviewed for consistency with the assumptions of ~~Reference 6.~~

The Frequency of 184 days is justified in Reference 18, except for Function 7. The Frequency for Function 7 is justified in References 10 and 18.

4 as found

SR 3.3.2.4 is modified by two Notes as identified in Table ~~3.3.2-1.~~ The first Note requires evaluation of channel performance for the condition where the ~~as found~~ setting for the channel setpoint is outside its ~~as found~~ tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service ~~the~~ performance of these channels will be evaluated under the ~~plant~~ Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the ~~as left~~ setting for the channel be returned to within the ~~as left~~ tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the ~~as left~~ and ~~as found~~ tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the ~~as left~~ channel setting cannot be returned to a setting within the ~~as left~~ tolerance of the NTSP, then the channel shall be declared inoperable.

as left 4

as found 4

(continued)

BASES

SURVEILLANCE REQUIREMENTS ~~(continued)~~

SR 3.3.2.7

SR 3.3.2.7 is the performance of a SLAVE RELAY TEST for slave relays K603A, K603B, K604A, K604B, K607A, K607B, K609A, K609B, K612A, K625A, and K625B. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment which may be operated in the design mitigation MODE is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment which may not be operated in the design mitigation MODE is prevented from operation by the slave relay test circuit.

For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 18 months. The Frequency is justified by TVA correspondence to the NRC dated November 9, 1984 (Ref. 9) and Design Change Notice W-38238-A associated documentation (Reference 12), and for relays K607A, K607B, and K612A, Westinghouse letter to TVA (Ref. 11).

SR 3.3.2.8

SR 3.3.2.8 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and AFW pump start on trip of all MFW pumps. It is performed every 18 months. The Frequency is based on industry operating experience and is consistent with the typical refueling cycle. The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation functions. The manual initiation functions have no associated setpoints.

Insert "1"
(2)

SR 3.3.2.9

SR 3.3.2.9 is the performance of a CHANNEL CALIBRATION.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the Watts Bar setpoint methodology. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

(continued)

INSERT "I"

SR 3.3.2.8 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the as found setting for the channel setpoint is outside its as found tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition. The second Note requires that the as left setting for the channel be returned to within the as left tolerance of the NTSP. Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as left and as found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as left channel setting cannot be returned to a setting within the as left tolerance of the NTSP, then the channel shall be declared inoperable.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.9 (continued)

The Frequency of 18 months is based on the assumption of an 18 month calibration interval in the determination of the magnitude of sensor/transmitter drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable. For channels with a trip time delay (TTD), this test shall include ~~verification that the TTD coefficients~~ are adjusted correctly.

4 as found

SR 3.3.2.9 is modified by two Notes as identified in Table 3.3.2-1. The first Note requires evaluation of channel performance for the condition where the ~~as-found~~ setting for the channel setpoint is outside its ~~as-found~~ tolerance but conservative with respect to the Allowable Value. Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. For channels determined to be OPERABLE but degraded, after returning the channel to service the performance of these channels will be evaluated under the plant Corrective ~~Action~~ Program. Entry into the Corrective Action Program will ensure required review ~~and~~ documentation of the condition. The second ~~Note~~ requires that the ~~as-left~~ setting for the channel be returned to within the ~~as-left~~ tolerance of the NTSP. Where a setpoint more ~~conservative than~~ the NTSP is used in the plant surveillance procedures (field setting), the ~~as-left~~ and ~~as-found~~ tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the ~~as-left~~ channel setting cannot be returned to a setting within the ~~as-left~~ tolerance of the NTSP, then the channel ~~shall be declared~~ inoperable.

4 as left

as found 4

SR 3.3.2.10

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in Technical Requirements Manual, Section 3.3.2 (Ref. 8). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the NTSP value at the sensor, to the point at which the

(continued)

Insert "I" ②

BASES

REFERENCES (continued)

6. ~~WCAP-17044, Rev. 0, "Setpoint Methodology for Watts Bar Unit 2."~~

7. WCAP-10271-P-A, Supplement 1 and Supplement 2, Rev. 1, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," and "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation System." May 1986 and June 1990.

8. Watts Bar Technical Requirements Manual, Section 3.3.2, "Engineered Safety Feature Response Times."

9. TVA Letter to NRC, November 9, 1984, "Request for Exemption of Quarterly Slave Relay Testing, (L44 841109 808)."

10. Evaluation of the applicability of WCAP-10271-P-A, Supplement 1, and Supplement 2, Revision 1, to Watts Bar, Westinghouse letter to TVA WAT-D-10128.

11. Westinghouse letter to TVA (WAT-D-8347), September 25, 1990, "Charging/Letdown Isolation Transients" (T33 911231 810).

12. Unit 1 Design Change Notice W-38238 and Unit 2 Engineering Document Construction Release 53352 and associated documentation.

13. WCAP-13877-P-A, Revision 2, "Reliability Assessment of Westinghouse Type AR Relays Used As SSPS Slave Relays."

14. Not Applicable for Unit 2

15. WCAP-13632-P-A Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

16. WCAP-14036-P-A, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," October 1998.

17. WCAP-14333-P-A, Revision 1, "Probablistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," October 1998

(continued)

INSERT "J"

Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.

BASES

REFERENCES (continued)

18. WCAP-15376-P-A, Revision 1, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," March 2003

19. Westinghouse letter to TVA, WAT-D-11248, "Revised Justification for Applicability of Instrumentation Technical Specification Improvements to the Automatic Switchover to Containment Sump Signal," June 2004.

20. Letter from John G. Lamb (NRC) to Mr. Preston D. Swafford (TVA) dated March 4, 2009, Includes Enclosures (a) Amendment No. 75 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1 and (b) NRC Safety Evaluation (SE) for Amendment No. 75.

21. ~~Regulatory Guide 1.105, "Setpoints for Safety Related Instrumentation," Revision 3.~~ Deleted 2

22. WCAP-13878-P-A, Revision 2, "Reliability Assessment of Potter & Brumfield MDR Series Relays."

B 3.3 INSTRUMENTATION

B 3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

BASES

BACKGROUND

The DGs provide a source of emergency power when offsite power is either unavailable or is insufficiently stable to allow safe unit operation. Undervoltage protection will generate an LOP start if a loss of voltage or degraded voltage condition occurs in the switchyard. There are four LOP start signals, one for each 6.9 kV shutdown board.

Three degraded voltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for detecting a sustained undervoltage condition. The relays are combined in a two-out-of-three logic configuration to generate a supply breaker trip signal if the voltage is below 96% for 10 seconds (nominal). Additionally, three undervoltage relays (one per phase) are provided on each 6.9 kV Shutdown Board for the purpose of detecting a loss of voltage condition. These relays are combined in a two-out-of-three logic to generate a supply breaker trip signal if the voltage is below 87% for 0.75 seconds (nominal).

Once the supply breakers have been opened, either one of two induction disk type relays, which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 0.5 seconds (nominal) at zero volts, will start the diesel generators. Four additional induction disk type relays, in a logic configuration of one-of-two taken twice which have a voltage setpoint of 70% of 6.9 kV (nominal, decreasing) and an internal time delay of 3 seconds (nominal), at zero volts, will initiate load shedding of the 6.9 kV shutdown board loads and selected loads on the 480 V shutdown boards and close the 480 V shutdown boards' current limiting reactor bypass breaker. The LOP start actuation is described in FSAR Section 8.3, "Onsite (Standby) Power System" (Ref. 1).

Trip Setpoints and Allowable Values

5 The Trip Setpoints used in the relays and timers are based on the analytical limits presented in TVA calculations (References 3, ~~5~~ 4, and ~~6~~ 5). The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and time delays are taken into account.

(continued)

BASES

ACTIONS (continued)

C.1

Condition C applies to each of the LOP DG start Functions when the Required Action and associated Completion Time for Condition A or B are not met.

In these circumstances the Conditions specified in LCO 3.8.1, "AC Sources - Operating," or LCO 3.8.2, "AC Sources - Shutdown," for the DG made inoperable by failure of the LOP DG start instrumentation are required to be entered immediately. The actions of those LCOs provide for adequate compensatory actions to assure unit safety.

SURVEILLANCE REQUIREMENTS

A Note has been added to refer to Table 3.3.5-1 to determine which Surveillance Requirements apply for each LOP Function.

A

as found

SR 3.3.5.1

A

as left

SR 3.3.5.1 is the performance of a TADOT. This test is performed every 92 days. The test checks operation of the undervoltage and degraded voltage relays that provide actuation signals. There is a plant specific program which verifies that the instrument channel functions as required by verifying ~~the~~ ~~as left~~ and ~~as found~~ setting are consistent with those established by the setpoint methodology. The Frequency is based on the known reliability of the relays and timers and the redundancy available, and has been shown to be acceptable through operating experience.

This SR has been modified by a Note that excludes verification of setpoints for relays/timers. Relay/timer setpoints require elaborate bench calibration and are verified during a CHANNEL CALIBRATION.

SR 3.3.5.2

SR 3.3.5.2 is the performance of a CHANNEL CALIBRATION.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2 (continued) as left 4

A CHANNEL CALIBRATION is performed every 6 months. CHANNEL CALIBRATION is a check of the four functions. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as left~~ and ~~as found~~ setting are consistent with those established by the setpoint methodology.

as found

The Frequency of 6 months is based on operating experience and is justified by the assumption of a 6-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.3

SR 3.3.5.3 is the performance of a CHANNEL CALIBRATION.

The setpoints, as well as the response to a loss of voltage and a degraded voltage test, shall include a single point verification that the trip occurs within the required time delay, as shown in Reference 1.

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the four functions. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as left~~ and ~~as found~~ setting are consistent with those established by the setpoint methodology.

The Frequency of 18 months is based on operating experience and consistency with the typical industry refueling cycle and is justified by the assumption of an 18-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

as left 4 as found

(continued)

B

BASES

REFERENCES

1. Watts Bar FSAR, Section 8.3, "Onsite (Standby) Power System."

2. Watts Bar FSAR, Section 15.0, "Accident Analysis."

3 3. TVA Calculation WPE2119202001, "6.9 kV Shutdown ~~and~~ & Logic Boards Undervoltage Relays Requirements/Demonstrated Accuracy Calculation."

~~4. Technical Requirements Manual, Section 3.3.2, "Engineered Safety Features Actuation System (ESFAS) Instrumentation."~~

4. ~~5.~~ TVA Calculation TDR SYS.211-LV1, "Demonstrated Accuracy Calculation TDR SYS.211-LV1."

5 5. ~~6.~~ TVA Calculation TDR SYS.211-DS1, "Demonstrated Accuracy Calculation TDR SYS.211-DS1."

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.3 (continued)

The SR is modified by a Note stating that the surveillance is only applicable to the master relays of the ESFAS instrumentation.

SR 3.3.6.4

A COT is performed every 92 days on each required channel to ensure the entire channel will perform the intended Function. The Frequency is based on the staff recommendation for increasing the availability of radiation monitors according to NUREG-1366 (Ref. 2). This test verifies the capability of the instrumentation to provide the containment vent system isolation. ~~The setpoint shall be left consistent with the current unit specific calibration procedure tolerance.~~ There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as-left~~ and ~~as-found~~ setting are consistent with those established by the setpoint methodology.

as left (4) as found

SR 3.3.6.5

SR 3.3.6.5 is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation mode is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation mode is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every 92 days. The Frequency is acceptable based on instrument reliability and industry operating experience.

For ESFAS slave relays which are Westinghouse type AR or Potter & Brumfield MDR series relays, the SLAVE RELAY TEST is performed every 18 months. The frequency is based on the relay reliability assessments presented in References 3 and 5. These reliability assessments are relay specific and apply only to Westinghouse type AR and Potter & Brumfield MDR series relays with AC coils. Note that for normally energized applications, the relays may require periodic replacement in accordance with the guidance given in References 3 and 5.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.6

SR 3.3.6.6 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the master relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).
For these tests, the relay trip setpoints are verified and adjusted as necessary. The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.6.7

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

Insert "K"

(2)

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance."

2. NUREG-1366, "Improvement to Technical Specification Surveillance Requirements," December 1992.

3. WCAP-13877-P-A, Revision 2, "Reliability Assessment of Westinghouse Type AR Relays Used as SSPS Slave Relays."

(continued)

INSERT "K"

There is a plant specific program which verifies that the instrument channel functions as required by verifying the as left and as found settings are consistent with those established by the setpoint methodology.

BASES (continued)

SURVEILLANCE REQUIREMENTS

A Note has been added to the SR Table to clarify that Table 3.3.7-1 determines which SRs apply to which CREVS Actuation Functions.

SR 3.3.7.1

Performance of the CHANNEL CHECK once every 12 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 the two instrument channels could be an indication of excessive instrument drift in one of the channels or of 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 unit 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 sensor or the signal processing equipment has drifted outside its limit.

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

SR 3.3.7.2

A COT is performed once every 92 days on each required channel to ensure the entire channel will perform the intended function. This test verifies the capability of the instrumentation to provide the CREVS actuation. The Frequency is based on the known reliability of the monitoring equipment and has been shown to be acceptable through operating experience. There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as left~~ and ~~as found~~ setting are consistent with those established by the setpoint methodology.

as found

4

as left

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.7.3

SR 3.3.7.3 is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every 18 months. Each Manual Actuation Function is tested up to, and including, the relay coils. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).

The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.7.4

A

as left

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as-left~~ and ~~as-found~~ setting are consistent with those established by the setpoint methodology.

as found A

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES None

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.8.2

A COT is performed once every 92 days on each required channel to ensure the entire channel will perform the intended function. This test verifies the capability of the instrumentation to provide the ABGTS actuation. The Frequency of 92 days is based on the known reliability of the monitoring equipment and has been shown to be acceptable through operating experience. There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as-left~~ and ~~as-found~~ setting are consistent with those established by the setpoint methodology.

as left
4

as found
4

SR 3.3.8.3

SR 3.3.8.3 is the performance of a TADOT. This test is a check of the manual actuation functions and is performed every 18 months. Each manual actuation function is tested up to, and including, the relay coils. In some instances, the test includes actuation of the end device (e.g., pump starts, valve cycles, etc.). The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

SR 3.3.8.4

A CHANNEL CALIBRATION is performed every 18 months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. The Frequency is based on operating experience and is consistent with the typical industry refueling cycle. There is a plant specific program which verifies that the instrument channel functions as required by verifying the ~~as-left~~ and ~~as-found~~ setting are consistent with those established by ~~the~~ setpoint methodology.

as left
4
as found

REFERENCES

1. Title 10, Code of Federal Regulations, Part 100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance."

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.10 Pressurizer Safety Valves

(2750 psia) 1

BASES

BACKGROUND

The pressurizer safety valves provide, in conjunction with the Reactor Protection System, overpressure protection for the RCS. The pressurizer safety valves are totally enclosed pop type, spring loaded, self actuated valves with backpressure compensation. The safety valves are designed to prevent the system pressure from exceeding the system Safety Limit (SL), 2735 psig, which is 110% of the design pressure.

Because the safety valves are totally enclosed and self actuating, they are considered independent components. The relief capacity for each valve, 420,000 lb/hr, is based on postulated overpressure transient conditions resulting from a complete loss of steam flow to the turbine. This event results in the maximum surge rate into the pressurizer, which specifies the minimum relief capacity for the safety valves. The discharge flow from the pressurizer safety valves is directed to the pressurizer relief tank. This discharge flow is indicated by an increase in temperature downstream of the pressurizer safety valves or increase in the pressurizer relief tank temperature or level.

Overpressure protection is required in MODES 1, 2, 3, 4, and 5; however, in MODE 4 with any RCS cold leg temperature $\leq$ the COMS arming temperature specified in the PTLR, MODE 5, and MODE 6 with the reactor vessel head on, overpressure protection is provided by operating procedures and by meeting the requirements of LCO 3.4.12, "Cold Overpressure Mitigation System (COMS)."

The upper and lower pressure limits are based on a ± 3% tolerance. The lift setting is for the ambient conditions associated with MODES 1, 2, 3, and MODE 4 with all RCS cold leg temperatures > the COMS arming temperature specified in the PTLR. This requires either that the valves be set hot or that a correlation between hot and cold settings be established.

The pressurizer safety valves are part of the primary success path and mitigate the effects of postulated accidents. OPERABILITY of the safety valves ensures that the RCS pressure will be limited to 110% of design pressure.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.3.7

Verifying that each 24 inch containment lower compartment purge valve is blocked to restrict opening to ≤ 50° is required to ensure that the valves can close under DBA conditions within the times assumed in the analyses of References 1 and 2. If a LOCA occurs, the purge valves must close to maintain containment leakage within the values assumed in the accident analysis. At other times when purge valves are required to be capable of closing (e.g., during movement of irradiated fuel assemblies), pressurization concerns are not present, thus the purge valves can be fully open. The 18-month Frequency is appropriate because the blocking devices are typically removed only during a refueling outage.

SR 3.6.3.8

as left

A

This SR ensures that the combined leakage rate of all Shield Building bypass leakage paths is less than or equal to the specified leakage rate. This provides assurance that the assumptions in the safety analysis are met. The ~~as left~~ bypass leakage rate prior to the first startup after performing a leakage test, requires calculation using maximum pathway leakage (leakage through the worse of the two isolation valves). If the penetration is isolated by use of one closed and de-activated automatic valve, closed manual valve, or blind flange, then the leakage rate of the isolated bypass leakage path is assumed to be the actual pathway leakage through the isolation device. If both isolation valves in the penetration are closed, the actual leakage rate is the lesser leakage rate of the two valves. At all other times, the leakage rate will be calculated using minimum pathway leakage.

The frequency is required by the Containment Leakage Rate Testing Program. This SR simply imposes additional acceptance criteria. Although not a part of L_a, the Shield Building Bypass leakage path combined leakage rate is determined using the 10 CFR 50, Appendix J, Option B, Type B and C leakage rates for the applicable barriers.

BASES

ACTIONS

B.2 (continued)

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists; and

b. A required feature on the other train (Train A or Train B) is inoperable.

If at any time during the existence of this Condition (one or more DGs inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one or more required DGs in Train A or one or more DGs in Train B inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DGs, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is Acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

In this Condition, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other DG(s), the other DG(s) would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered if the other

6 Insert "L"

(continued)

INSERT "L"

For the performance of a Surveillance, Required Action B.3.1 is considered satisfied since the cause of the DG being inoperable is apparent.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.14

Regulatory Guide 1.9 (Ref. 3), paragraph C2.2.9, requires demonstration once per 18 months that the DGs can start and run continuously for an interval of not less than 24 hours, ≥ 2 hours of which is at a load between 105% and 110% of the continuous duty rating and the remainder of the time at a load equivalent to 90% to 100% of the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of ≥ 0.8 and ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

This Surveillance is modified by three Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. Note 2 establishes that this SR may be performed on only one DG at a time while in MODE 1, 2, 3, or 4. This is necessary to ensure the proper response to an operational transient (i.e., loss of offsite power, ESF actuation). Therefore, three DGs must be maintained operable and in a standby condition during performance of this test. In this configuration, the plant will remain within its design basis, since at all times safe shutdown can be achieved with two DGs in the same train.

Note 3 establishes that credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

1) Unexpected operational events which cause the equipment to perform the function specified by this Surveillance; for which adequate documentation of the required performance is available; and

2) Post-corrective maintenance testing that requires performance of this Surveillance in order to restore the component to OPERABLE, provided the maintenance was required, or performed in conjunction with maintenance required to maintain OPERABILITY or reliability.

3

(continued)

BASES

SURVEILLANCE REQUIREMENTS (Continued)

1

~~SR 3.8.1.14 (continued)~~

~~Prior to performance of this SR in Modes 1 or 2, actions are taken to establish that adequate conditions exist for performance of the SR. The required actions are defined in Bases Table 3.8.1-2.~~

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The minimum voltage and frequency stated in the SR are those necessary to ensure the DG can accept DBA loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential to establishing DG OPERABILITY, but a time constraint is not imposed. This is because a typical DG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. This period may extend beyond the 10 seconds acceptance criteria and could be a cause for failing the SR. In lieu of a time constraint in the SR, WBN will monitor and trend the actual time to reach steady state operation as a means of ensuring there is no voltage regulator or governor degradation which could cause a DG to become inoperable. The 10 seconds time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3), Table 1.

The DG engines for WBN have an oil circulation and soakback system that operates continuously to preclude the need for a prelube and warmup when a DG is started from standby.

This SR is modified by a Note to ensure that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.13 4 as found

A battery service test is a special test of battery capability, ~~as found~~, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to worst case design duty cycle requirements based on References 10 and 12.

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 6) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests, not to exceed 18 months.

This SR is modified by two Notes. Note 1 allows the performance of a modified performance discharge test in lieu of a service test once per 60 months. The modified performance discharge test is a simulated duty cycle consisting of just two rates: the one minute rate published for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a rated one-minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test should remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle.) This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

The reason for Note 2 is that performing the Surveillance may perturb the vital electrical distribution system and challenge safety systems. However, this Surveillance may be performed in MODES I, 2, 3, or 4 provided that Vital Battery V is substituted in accordance with LCO Note 1. For the DG DC electrical subsystem, this surveillance may be performed in MODES I, 2, 3, or 4 in conjunction with LCO 3.8.1.B since the supplied loads are only for the inoperable diesel generator and would not otherwise challenge safety system loads which are supplied

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.13 (continued)

from vital electrical distribution systems. Additionally, credit may be taken for unplanned events that satisfy this SR. Examples of unplanned events may include:

1) Unexpected operational events which cause the equipment to perform the function specified by this Surveillance, for which adequate documentation of the required performance is available; and

2) Post-corrective maintenance testing that requires performance of this Surveillance in order to restore the component to OPERABLE, provided the maintenance was required, or performed in conjunction with maintenance required to maintain OPERABILITY or reliability.

SR 3.8.4.14

as found (A)

A battery performance discharge test is ~~a~~ test of constant current capacity of a battery, normally done in the ~~as found~~ condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

A battery modified performance discharge test is described in the Bases for SR 3.8.4.13. Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.14; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.14 while satisfying the requirements of SR 3.8.4.13 at the same time.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 9) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements.

(continued)

ENCLOSURE 9

New Regulatory Commitments

Prior to implementation of the Unit 2 TS, TVA will:

1. Revise applicable attachment(s) of Technical Instruction TI-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting, to require that the surveillance interval be evaluated and reduced, when needed, if two or more P&B MDR series relays used for Unit 2 TS LCOs 3.3.2 and 3.3.6 fail within a 12-month interval.

2. Confirm the applicability of the WCAP-13878, Rev. 1 analyses for P&B MDR series relays.

3. Develop a Procurement Engineering Group package for procurement of P&B MDR series relays. This document will ensure TVA's procurement program for P&B MDR relays is adequate for detecting the types of failures that are discussed in References 9, 10, 11 and 12 of WCAP-13878, Revision 1.

4. For function 3. of Unit 2 TS Table 3.3.61, revise the calculation and submit a change to the Unit 2 TS using the manufacturer's final detector sensitivity value.