

3.3 INSTRUMENTATION

3.3.1 Reactor Trip System (RTS) Instrumentation

LCO 3.3.1 The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

-----NOTE-----  
Separate Condition entry is allowed for each Function.  
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CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.1-1 for the channel(s).	Immediately
B. One Manual Reactor Trip channel inoperable.	B.1 Restore channel to OPERABLE status.	48 hours
	<u>OR</u>	
	B.2.1 Be in MODE 3.	54 hours
<u>AND</u>		
B.2.2 Open reactor trip breakers (RTBs).		55 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. One channel or train inoperable.</p>	<p>C.1 Restore channel or train to OPERABLE status.</p>	<p>48 hours</p>
	<p><u>OR</u></p> <p>C.2 Open RTBs.</p>	<p>49 hours</p>
<p>D. One Power Range Neutron Flux - High channel inoperable.</p>	<p>-----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing and setpoint adjustment of other channels. -----</p>	
	<p>D.1.1 Place channel in trip.</p> <p><u>AND</u></p>	<p>6 hours</p>
	<p>D.1.2 Reduce THERMAL POWER to ≤ 75% RTP.</p> <p><u>OR</u></p>	<p>12 hours</p>
	<p>D.2.1 Place channel in trip.</p> <p><u>AND</u></p>	<p>6 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	<p>-----NOTE----- Only required to be performed when the Power Range Neutron Flux input to QPTR is inoperable. -----</p> <p>D.2.2 Perform SR 3.2.4.2.</p> <p><u>OR</u></p> <p>D.3 Be in MODE 3.</p>	<p>Once per 12 hours</p> <p>12 hours</p>
E. One channel inoperable.	<p>-----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. -----</p> <p>E.1 Place channel in trip.</p> <p><u>OR</u></p> <p>E.2 Be in MODE 3.</p>	<p>6 hours</p> <p>12 hours</p>
F. THERMAL POWER > P-6 and < P-10, one Intermediate Range Neutron Flux channel inoperable.	<p>F.1 Reduce THERMAL POWER to &lt; P-6.</p> <p><u>OR</u></p> <p>F.2 Increase THERMAL POWER to &gt; P-10.</p>	<p>2 hours</p> <p>2 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. THERMAL POWER > P-6 and < P-10, two Intermediate Range Neutron Flux channels inoperable.	G.1 Suspend operations involving positive reactivity additions.  <u>AND</u>  G.2 Reduce THERMAL POWER to < P-6.	Immediately     2 hours
H. THERMAL POWER < P-6, one or two Intermediate Range Neutron Flux channels inoperable.	H.1 Restore channel(s) to OPERABLE status.	Prior to increasing THERMAL POWER to > P-6
I. One Source Range Neutron Flux channel inoperable.	I.1 Suspend operations involving positive reactivity additions.	Immediately
J. Two Source Range Neutron Flux channels inoperable.	J.1 Open RTBs.	Immediately
K. One Source Range Neutron Flux channel inoperable.	K.1 Restore channel to OPERABLE status.  <u>OR</u>  K.2 Open RTBs.	48 hours     49 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>L. Required Source Range Neutron Flux channels inoperable.</p>	<p>L.1 Suspend operations involving positive reactivity additions.</p> <p><u>AND</u></p> <p>L.2 Close unborated water source isolation valves.</p> <p><u>AND</u></p> <p>L.3 Perform SR 3.1.1.1.</p>	<p>Immediately</p> <p>1 hour</p> <p>1 hour</p> <p><u>AND</u></p> <p>Once per 12 hours thereafter</p>
<p>M. One channel inoperable.</p>	<p>-----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. -----</p> <p>M.1 Place channel in trip.</p> <p><u>OR</u></p> <p>M.2 Reduce THERMAL POWER to &lt; P-7.</p>	<p>6 hours</p> <p>12 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>N. One Reactor Coolant Flow - Low (Single Loop) channel inoperable.</p>	<p>-----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels.</p>	
	<p>N.1 Place channel in trip.</p> <p><u>OR</u></p> <p>N.2 Reduce THERMAL POWER to &lt; P-8.</p>	
<p>O. One Turbine Trip channel inoperable.</p>	<p>-----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels.</p>	
	<p>O.1 Place channel in trip.</p> <p><u>OR</u></p> <p>O.2 Reduce THERMAL POWER to &lt; P-8.</p>	

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>P. One train inoperable.</p>	<p>-----NOTE-----            One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE.            -----</p> <p>P.1 Restore train to OPERABLE status.</p> <p><u>OR</u></p> <p>P.2 Be in MODE 3.</p>	<p>6 hours</p> <p>12 hours</p>
<p>Q. One RTB train inoperable.</p>	<p>-----NOTE-----</p> <p>1. One train may be bypassed for up to 2 hours for surveillance testing, provided the other train is OPERABLE.</p> <p>2. One RTB may be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms, provided the other train is OPERABLE.            -----</p> <p>Q.1 Restore train to OPERABLE status.</p> <p><u>OR</u></p> <p>Q.2 Be in MODE 3.</p>	<p>1 hour</p> <p>7 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
R. One or more channels inoperable.	R.1 Verify interlock is in required state for existing unit conditions.	1 hour
	<u>OR</u> R.2 Be in MODE 3.	7 hours
S. One or more channels inoperable.	S.1 Verify interlock is in required state for existing unit conditions.	1 hour
	<u>OR</u> S.2 Be in MODE 2.	7 hours
T. One trip mechanism inoperable for one RTB.	T.1 Restore inoperable trip mechanism to OPERABLE status.	48 hours
	<u>OR</u> T.2.1 Be in MODE 3.	54 hours
	<u>AND</u> T.2.2 Open RTB.	55 hours
U. Two RTS trains inoperable.	U.1 Enter LCO 3.0.3.	Immediately

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SURVEILLANCE REQUIREMENTS

-----NOTE-----  
Refer to Table 3.3.1-1 to determine which SRs apply for each RTS Function.  
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SURVEILLANCE	FREQUENCY
SR 3.3.1.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.1.2 -----NOTE----- 1. Adjust NIS channel if absolute difference is > 2%. 2. Not required to be performed until 12 hours after THERMAL POWER is $\geq$ 15% RTP. ----- Compare results of calorimetric heat balance calculation to Nuclear Instrumentation System (NIS) channel output.	24 hours
SR 3.3.1.3 -----NOTE----- 1. Adjust NIS channel if absolute difference is $\geq$ 3%. 2. Not required to be performed until 24 hours after THERMAL POWER is $\geq$ 15% RTP. ----- Compare results of the incore detector measurements to NIS AFD.	31 effective full power days (EFPD)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.4</p> <p>-----NOTE----- This Surveillance must be performed on the reactor trip bypass breaker prior to placing the bypass breaker in service. -----</p> <p>Perform TADOT.</p>	<p>31 days on a STAGGERED TEST BASIS</p>
<p>SR 3.3.1.5    Perform ACTUATION LOGIC TEST.</p>	<p>31 days on a STAGGERED TEST BASIS</p>
<p>SR 3.3.1.6</p> <p>-----NOTE----- Not required to be performed until 24 hours after THERMAL POWER is <math>\geq 50\%</math> RTP. -----</p> <p>Calibrate excore channels to agree with incore detector measurements.</p>	<p>92 EFPD</p>
<p>SR 3.3.1.7</p> <p>-----NOTE----- Not required to be performed for source range instrumentation prior to entering MODE 3 from MODE 2 until 4 hours after entry into MODE 3. -----</p> <p>Perform COT.</p>	<p>92 days</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.8</p> <p>-----NOTE-----            This Surveillance shall include verification that interlocks P-6 and P-10 are in their required state for existing unit conditions.            -----</p> <p>Perform COT.</p>	<p>-----NOTE-----            Only required when not performed within previous 92 days            -----</p> <p>Prior to reactor startup</p> <p><u>AND</u></p> <p>Four hours after reducing power below P-10 for power and intermediate instrumentation</p> <p><u>AND</u></p> <p>Four hours after reducing power below P-6 for source range instrumentation</p> <p><u>AND</u></p> <p>Every 92 days thereafter</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.9</p> <p>-----NOTE----- Verification of setpoint is not required. -----</p> <p>Perform TADOT.</p>	<p>92 days</p>
<p>SR 3.3.1.10</p> <p>-----NOTE----- This Surveillance shall include verification that the time constants are adjusted to the prescribed values where applicable. -----</p> <p>Perform CHANNEL CALIBRATION.</p>	<p>18 months</p>
<p>SR 3.3.1.11</p> <p>-----NOTE----- Neutron detectors are excluded from CHANNEL CALIBRATION. -----</p> <p>Perform CHANNEL CALIBRATION.</p>	<p>18 months</p>
<p>SR 3.3.1.12 (deleted)</p>	<p>(deleted)</p>
<p>SR 3.3.1.13 Perform COT.</p>	<p>18 months</p>
<p>SR 3.3.1.14</p> <p>-----NOTE----- Verification of setpoint is not required. -----</p> <p>Perform TADOT.</p>	<p>18 months</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.1.15</p> <p>-----NOTE----- Verification of setpoint is not required. -----</p> <p>Perform TADOT.</p>	<p>-----NOTE----- Only required when not performed within previous 31 days -----</p> <p>Prior to reactor startup</p>
<p>SR 3.3.1.16</p> <p>-----NOTE----- Neutron detectors are excluded from response time testing. -----</p> <p>Verify RTS RESPONSE TIME is within limits.</p>	<p>18 months on a STAGGERED TEST BASIS</p>

Table 3.3.1-1 (page 1 of 7)  
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA
	3 <sup>(a)</sup> ,4 <sup>(a)</sup> ,5 <sup>(a)</sup>	2	C	SR 3.3.1.14	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 SR 3.3.1.11 SR 3.3.1.16	≤ 111.2% RTP	≤ 109% RTP
b. Low	1 <sup>(b)</sup> ,2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 27.2% RTP	≤ 25% RTP
3. Power Range Neutron Flux Rate						
a. High Positive Rate	1,2	4	E	SR 3.3.1.7 SR 3.3.1.11	≤ 5.3% RTP with time constant ≥ 2 sec	≤ 5% RTP with time constant ≥ 2 sec
b. High Negative Rate	1,2	4	E	SR 3.3.1.7 SR 3.3.1.11	≤ 40% RTP with time constant ≥ 2 sec	≤ 35% RTP with time constant ≥ 2 sec
4. Intermediate Range Neutron Flux						
	1 <sup>(b)</sup> ,2 <sup>(c)</sup>	2	F,G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 30% RTP	≤ 25% RTP
	2 <sup>(d)</sup>	2	H	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 30% RTP	≤ 25% RTP

(continued)

- (a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
- (b) Below the P-10 (Power Range Neutron Flux) interlocks.
- (c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.
- (d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

Table 3.3.1-1 (page 2 of 7)  
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
5. Source Range Neutron Flux	2 <sup>(d)</sup>	2	I,J	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 1.4 E5 cps	≤ 1.0 E5 cps
	3 <sup>(a)</sup> ,4 <sup>(a)</sup> ,5 <sup>(a)</sup>	2	I,K	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 1.4 E5 cps	≤ 1.0 E5 cps
	3 <sup>(e)</sup> ,4 <sup>(e)</sup> ,5 <sup>(e)</sup>	1	L	SR 3.3.1.1 SR 3.3.1.11	N/A	N/A
6. Overtemperature ΔT	1,2	3	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	Refer to Note 1 (Page 3.3-19)	Refer to Note 1 (Page 3.3-19)
7. Overpower ΔT	1,2	3	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	Refer to Note 2 (Page 3.3-20)	Refer to Note 2 (Page 3.3-20)
8. Pressurizer Pressure						
a. Low	1 <sup>(f)</sup>	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 135.97 kg/cm <sup>2</sup> (1934 psig)	≥ 136.75 kg/cm <sup>2</sup> (1945 psig)
b. High	1,2	3	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 168.48 kg/cm <sup>2</sup> (2396 psig)	≤ 167.78 kg/cm <sup>2</sup> (2385 psig)

(continued)

- (a) With RTBs closed and Rod Control System capable of rod withdrawal.
- (d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
- (e) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication.
- (f) Above the P-7 (Low Power Reactor Trips Block) interlock.

Table 3.3.1-1 (page 3 of 7)  
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
9. Pressurizer Water Level - High	1 <sup>(f)</sup>	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 93.8%	≤ 92%
10. Reactor Coolant Flow - Low						
a. Single Loop	1 <sup>(g)</sup>	3 per loop	N	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 89.2%	≥ 90%
b. Two Loops	1 <sup>(h)</sup>	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 89.2%	≥ 90%
11. Undervoltage RCPs	1 <sup>(i)</sup>	2 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 68% of rated motor voltage	≥ 76% of rated motor voltage
12. Underfrequency RCPs	1 <sup>(i)</sup>	2 per bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 57.4 Hz	≥ 57.5 Hz
13. Steam Generator (SG) Water Level -Low Low	1,2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 15.3%	≥ 17.0%
14. Steam Line Pressure – Low	1,2,3 <sup>(j)</sup>	3 per steam line	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	39.58 kg/cm <sup>2</sup> (563 psig)	41.13 kg/cm <sup>2</sup> (585 psig)

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- (f) Above the P-7 (Low Power Reactor Trips Block) interlock.
- (g) Above the P-8 (Power Range Neutron Flux) interlock.
- (h) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.
- (i) Above the p-11 (Pressurizer Pressure) interlock.
- (j) Time constant used in the lead/lag controller are  $t_1 \geq 50$  seconds and  $t_2 \leq 5$  seconds.



Table 3.3.1-1 (page 4 of 7)  
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
15. Turbine Trip						
a. Low Fluid Oil Pressure	1 <sup>(g)</sup>	3	O	SR 3.3.1.7 SR 3.3.1.10	≥ 35.16 kg/cm <sup>2</sup> (500 psig)	≥ 42.19 kg/cm <sup>2</sup> (600 psig)
b. Turbine Stop Valve Closure	1 <sup>(g)</sup>	4	O	SR 3.3.1.15	NA	NA
16. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	P	SR 3.3.1.14	NA	NA
17. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2 <sup>(d)</sup>	2	R	SR 3.3.1.11 SR 3.3.1.13	≥ 6E-11 amp	≥ 1E-10 amp
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.11 SR 3.3.1.13	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 32% RTP	≤ 30% RTP
d. Power Range Neutron Flux, P-10	1,2	4	R	SR 3.3.1.11 SR 3.3.1.13	≥ 8.0% RTP and ≤ 12.0% RTP	≥ 10% RTP
e. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.1 SR 3.3.1.10 SR 3.3.1.13	≤ 12.0% turbine impulse pressure equivalent	≤ 10% turbine impulse pressure equivalent

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

(g) Above the P-8 (Power Range Neutron Flux) interlock.

Table 3.3.1-1 (page 5 of 7)  
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
18. Reactor Trip Breaker <sup>(k)</sup>	1,2	2 trains	Q	SR 3.3.1.4	NA	NA
	3 <sup>(a)</sup> ,4 <sup>(a)</sup> ,5 <sup>(a)</sup>	2 trains	C	SR 3.3.1.4	NA	NA
19. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	T	SR 3.3.1.4	NA	NA
	3 <sup>(a)</sup> ,4 <sup>(a)</sup> ,5 <sup>(a)</sup>	1 each per RTB	C	SR 3.3.1.4	NA	NA
20. Automatic Trip Logic	1,2	2 trains	P	SR 3.3.1.5	NA	NA
	3 <sup>(a)</sup> ,4 <sup>(a)</sup> ,5 <sup>(a)</sup>	2 trains	C	SR 3.3.1.5	NA	NA
21. Automatic Seismic Trip System	1,2	3 <sup>(l)</sup>	E	SR 3.3.1.13 SR 3.3.1.10	<u>Aux. Bldg</u> <u>El. 74 ft</u> <u>Horiz./Verti</u> <u>≤0.25g/ ≤0.26g</u>	<u>Aux. Bldg</u> <u>El. 74 ft</u> <u>Horiz./Verti</u> <u>0.20g / 0.21g</u>
					<u>Aux. Bldg</u> <u>El. 126 ft</u> <u>Horiz./Verti</u> <u>≤0.30g/ ≤0.29g</u>	<u>Aux. Bldg</u> <u>El. 126 ft</u> <u>Horiz./Verti</u> <u>0.250g / 0.24g</u>

- (a) With RTBs closed and Rod Control System capable of rod withdrawal.
- (k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.
- (l) Refer to BASE 3.3.1 (page B3.3-35a) item 21 Automatic Seismic Trip System section.

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Table 3.3.1-1 (page 6 of 7)  
Reactor Trip System Instrumentation

Note 1: Overtemperature  $\Delta T$

The Overtemperature  $\Delta T$  Function Allowable Value shall not exceed the following Trip Setpoint by more than 3.1% of  $\Delta T$  span.

$$\Delta T \left( \frac{1 + \tau_1 S}{1 + \tau_2 S} \right) \left( \frac{1}{1 + \tau_3 S} \right) \leq \Delta T_0 \left\{ K_1 - K_2 \left( \frac{1 + \tau_4 S}{1 + \tau_5 S} \right) \left[ T \left( \frac{1}{1 + \tau_6 S} \right) - T' \right] + K_3 (P - P') - f_1(\Delta T) \right\}$$

Where:  $\Delta T$  is measured RCS  $\Delta T$ , °F  
 $\Delta T_0$  is the indicated  $\Delta T$  at RTP, °F  
 $S$  is the Laplace transform operator, sec<sup>-1</sup>  
 $T$  is the measured RCS average temperature, °F  
 $T'$  is the nominal  $T_{avg}$  at RTP,  $\leq 587.8^\circ\text{F}$  ( $308.8^\circ\text{C}$ )

$P$  is the measured pressurizer pressure, psig  
 $P'$  is the nominal RCS operating pressure,  $\leq 2235$  psig ( $157.14\text{kg/cm}^2$ )

$K_1 \leq 1.378$	$K_2 \geq 0.0227/^\circ\text{F}$	$K_3 = 0.0016/\text{psi}$
$\tau_1 \geq 5$ sec	$\tau_2 \leq 3$ sec	$\tau_3 \leq 3$ sec
$\tau_4 \geq 33$ sec	$\tau_5 \leq 10$ sec	$\tau_6 \leq 3$ sec

$f_1(\Delta T) = -2.20 \{ 25\% + (q_t - q_b) \}$	when	$q_t - q_b \leq -25\% \text{ RTP}$
$f_1(\Delta T) = 0\%$	when	$-25\% \text{ RTP} < q_t - q_b \leq 8.0\% \text{ RTP}$
$f_1(\Delta T) = +1.92 \{ (q_t - q_b) - 8.0\% \}$	when	$q_t - q_b > 8.0\% \text{ RTP}$

Where  $q_t$  and  $q_b$  are percent RTP in the upper and lower halves of the core, respectively, and  $q_t + q_b$  is the total THERMAL POWER in percent RTP.

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Table 3.3.1-1 (page 7 of 7)  
Reactor Trip System Instrumentation

Note 2: Overpower  $\Delta T$

The Overpower  $\Delta T$  Function Allowable Value shall not exceed the following Trip Setpoint by more than 2.8% of  $\Delta T$  span.

$$\Delta T \left( \frac{1 + \tau_1 S}{1 + \tau_2 S} \right) \left( \frac{1}{1 + \tau_3 S} \right) \leq \Delta T_0 \left\{ \left[ K_4 - K_5 \left( \frac{\tau_7 S}{1 + \tau_7 S} \right) \left( \frac{1}{1 + \tau_6 S} \right) T - K_6 \left[ T \left( \frac{1}{1 + \tau_6 S} \right) - T'' \right] - f_2(\Delta T) \right] \right\}$$

Where:  $\Delta T$  is measured RCS  $\Delta T$ , °F  
 $\Delta T_0$  is the indicated  $\Delta T$  at RTP, °F  
 $S$  is the Laplace transform operator, sec<sup>-1</sup>  
 $T$  is the measured RCS average temperature, °F  
 $T''$  is the nominal  $T_{avg}$  at RTP,  $\leq 587.8^\circ\text{F}$  ( $308.8^\circ\text{C}$ )

$$K_4 \leq 1.092$$

$$K_5 \geq 0.02/^\circ\text{F} \text{ for increasing } T_{avg}$$

$$K_5 = 0/^\circ\text{F} \text{ for decreasing } T_{avg}$$

$$K_6 \geq 0.0026/^\circ\text{F} \text{ when } T > T''$$

$$K_6 = 0/^\circ\text{F} \text{ when } T \leq T''$$

$$\tau_1 \geq 5 \text{ sec}$$

$$\tau_2 \leq 3 \text{ sec}$$

$$\tau_3 \leq 3 \text{ sec}$$

$$\tau_6 \leq 3 \text{ sec}$$

$$\tau_7 \geq 5 \text{ sec}$$

$$f_2(\Delta T) = 0\% \text{ RTP for all } \Delta T$$

3

3.3 INSTRUMENTATION

3.3.2 Engineered Safety Feature Actuation System (ESFAS) Instrumentation

LCO 3.3.2 The ESFAS instrumentation for each Function in Table 3.3.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.2-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels or trains inoperable.	A.1 Enter the Condition referenced in Table 3.3.2-1 for the channel(s) or train(s).	Immediately
B. One channel or train inoperable.	B.1 Restore channel or train to OPERABLE status.	48 hours
	<u>OR</u>	
	B.2.1 Be in MODE 3.	54 hours
	<u>AND</u>	
	B.2.2 Be in MODE 5.	84 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. One train inoperable.</p>	<p>C.1 -----NOTE----- One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE. ----- Restore train to OPERABLE status.  <u>OR</u> C.2.1 Be in MODE 3.  <u>AND</u> C.2.2 Be in MODE 5.</p>	<p>6 hours   12 hours  42 hours</p>
<p>D. One channel inoperable.</p>	<p>D.1 -----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. ----- Place channel in trip.  <u>OR</u> D.2.1 Be in MODE 3.  <u>AND</u> D.2.2 Be in MODE 4.</p>	<p>6 hours  12 hours  18 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>E. One Containment Pressure channel inoperable.</p>	<p>E.1 -----NOTE----- One additional channel may be bypassed for up to 4 hours for surveillance testing. ----- Place channel in bypass.  <u>OR</u> E.2.1 Be in MODE 3.  <u>AND</u> E.2.2 Be in MODE 4.</p>	<p>6 hours   12 hours   18 hours</p>
<p>F. One channel or train inoperable.</p>	<p>F.1 Restore channel or train to OPERABLE status.  <u>OR</u> F.2.1 Be in MODE 3.  <u>AND</u> F.2.2 Be in MODE 4.</p>	<p>48 hours   54 hours   60 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>G. One train inoperable.</p>	<p>G.1 -----NOTE-----            One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE.            -----            Restore train to OPERABLE status.</p> <p><u>OR</u></p> <p>G.2.1 Be in MODE 3.</p> <p><u>AND</u></p> <p>G.2.2 Be in MODE 4.</p>	<p>6 hours</p> <p>12 hours</p> <p>18 hours</p>
<p>H. One train inoperable.</p>	<p>H.1 -----NOTE-----            One train may be bypassed for up to 4 hours for surveillance testing provided the other train is OPERABLE.            -----            Restore train to OPERABLE status.</p> <p><u>OR</u></p> <p>H.2 Be in MODE 3.</p>	<p>6 hours</p> <p>12 hours</p>

(continued)



ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>I. One channel inoperable.</p>	<p>I.1 -----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. ----- Place channel in trip.  <u>OR</u> I.2 Be in MODE 3.</p>	<p>6 hours          12 hours</p>
<p>J. One Main Feedwater Pumps trip channel inoperable.</p>	<p>J.1 Restore channel to OPERABLE status.  <u>OR</u> J.2 Be in MODE 3.</p>	<p>48 hours          54 hours</p>
<p>K. One channel inoperable.</p>	<p>K.1 -----NOTE----- One additional channel may be bypassed for up to 4 hours for surveillance testing. ----- Place channel in bypass.  <u>OR</u></p>	<p>6 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
K. (continued)	K.2.1 Be in MODE 3.  <u>AND</u>  K.2.2 Be in MODE 5.	12 hours    42 hours
L. One or more channels inoperable.	L.1 Verify interlock is in required state for existing unit condition.  <u>OR</u>  L.2.1 Be in MODE 3.  <u>AND</u>  L.2.2 Be in MODE 4.	1 hour    7 hours    13 hours

3

SURVEILLANCE REQUIREMENTS

-----NOTE-----  
Refer to Table 3.3.2-1 to determine which SRs apply for each ESFAS Function.  
-----

SURVEILLANCE	FREQUENCY
SR 3.3.2.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.2.2 Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.2.3 -----NOTE----- The continuity check may be excluded. ----- Perform ACTUATION LOGIC TEST.	18 months
SR 3.3.2.4 Perform MASTER RELAY TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.2.5 Perform COT.	92 days
SR 3.3.2.6 Perform SLAVE RELAY TEST.	18 months
SR 3.3.2.7 -----NOTE----- Verification of relay setpoints not required. ----- Perform TADOT.	92 days

(continued)

ACTIONS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.2.8</p> <p>-----NOTE----- Verification of setpoint not required for manual initiation functions. -----</p> <p>Perform TADOT.</p>	<p>18 months</p>
<p>SR 3.3.2.9</p> <p>-----NOTE----- This Surveillance shall include verification that the time constants are adjusted to the prescribed values. -----</p> <p>Perform CHANNEL CALIBRATION.</p>	<p>18 months</p>
<p>SR 3.3.2.10</p> <p>-----NOTE----- Not required to be performed for the turbine driven AFW pump until 24 hours after SG pressure is <math>\geq 1000</math> psig. -----</p> <p>Verify ESFAS RESPONSE TIMES are within limit.</p>	<p>18 months on a STAGGERED TEST BASIS</p>
<p>SR 3.3.2.11</p> <p>-----NOTE----- Verification of setpoint not required. -----</p> <p>Perform TADOT.</p>	<p>Once per reactor trip breaker cycle</p>

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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	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 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure - High 1	1,2,3	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	$\leq 0.274 \text{ kg/cm}^2$ (3.9 psig)	$\leq 0.218 \text{ kg/cm}^2$ (3.1 psig)
d. Pressurizer Pressure - Low	1,2,3 <sup>(a)</sup>	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	$\geq 128.94 \text{ kg/cm}^2$ (1834 psig)	$\geq 129.72 \text{ kg/cm}^2$ (1845 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 3.3.2.4 SR 3.3.2.6	NA	NA
c. Containment Pressure High - 3	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	$\leq 1.33 \text{ kg/cm}^2$ (18.9 psig)	$\leq 1.27 \text{ kg/cm}^2$ (18.1 psig)
3. Containment Isolation						
a. Phase A Isolation						

(continued)

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

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

Table 3.3.2-1 (page 2 of 5)  
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
3. Containment Isolation (continued)						
(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 3.3.2.4 SR 3.3.2.6	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 3.3.2.4 SR 3.3.2.6	NA	NA
(3)Containment Pressure						
High - 3	1,2,3	4	E	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 1.33 kg/cm <sup>2</sup> (18.9 psig)	≤ 1.27 kg/cm <sup>2</sup> (18.1 psig)
4. Steam Line Isolation						
a. Manual Initiation	1,2 <sup>(c)</sup> ,3 <sup>(c)</sup>	2	F	SR 3.3.2.8	NA	NA
b. Automatic Actuation Logic and Actuation Relays	1,2 <sup>(c)</sup> ,3 <sup>(c)</sup>	2 trains	G	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA

(continued)

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

Table 3.3.2-1 (page 3 of 5)  
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
4. Steam Line Isolation (continued)						
c. Containment Pressure High - 2	1,2 <sup>(c)</sup> ,3 <sup>(c)</sup>	3	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 0.977 kg/cm <sup>2</sup> (13.9 psig)	≤ 0.921 kg/cm <sup>2</sup> (13.1 psig)
d. Steam Line Pressure						
(1)Low	1,2 <sup>(c)</sup> ,3 <sup>(a)(c)</sup>	3 per steam Line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 39.58 kg/cm <sup>2</sup> (563 psig) <sup>(b)</sup>	≥ 41.13 kg/cm <sup>2</sup> (585 psig) <sup>(b)</sup>
(2)Negative Rate - High	3 <sup>(d)(c)</sup>	3 per steam Line	D	SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 7.84 kg/cm <sup>2</sup> (111.5 psi/sec) <sup>(e)</sup>	≤ 7.03 kg/cm <sup>2</sup> (100 psi/sec) <sup>(e)</sup>
5. Turbine Trip and Feedwater Isolation						
a. Automatic Actuation Logic and Actuation Relays	1,2 <sup>(d)</sup>	2 trains	H	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. SG Water Level - High High (P-14)	1,2 <sup>(d)</sup>	3 per SG	I	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 79.8%	≤ 78.0%
c. Steam Line Pressure - Low	1, 2 <sup>(c)</sup>	3 per steam Line	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 39.58 kg/cm <sup>2</sup> (563 psi) <sup>(b)</sup>	≥ 41.13 kg/cm <sup>2</sup> (585 psi) <sup>(b)</sup>

(continued)

- (a) Above the P-11 (Pressurizer Pressure) interlock.
- (b) Time constants used in the lead/lag controller are  $t_1 \geq 50$  seconds and  $t_2 \leq 5$  seconds.
- (c) Except when all MSIVs are closed and de-activated.
- (d) Below the P-11 (Pressurizer Pressure) interlock.
- (e) Time constant utilized in the rate/lag controller is ≤ 50 seconds.
- (f) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

Table 3.3.2-1 (page 4 of 5)  
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
5. Turbine Trip and Feedwater Isolation (continued)						
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
6. Auxiliary Feedwater						
a. Automatic Actuation Logic and Actuation Relays (Solid State Protection System)	1,2,3	2 trains	G	SR 3.3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA	NA
b. Automatic Actuation Logic and Actuation Relays (Balance of Plant ESFAS)	1,2,3	2 trains	G	SR 3.3.2.3	NA	NA
c. SG Water Level - Low Low	1,2,3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 15.3 %	≥ 17 %
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
e. Loss of Offsite Power :  4.16 KV Bus Undervoltage and EDG Breaker Closure	1,2,3	4 per bus	F	SR 3.3.2.7 SR 3.3.2.9 SR 3.3.2.10	≥ 3640 V and ≤ 3710 V	≥ 3675 V
f. Trip of all Main Feedwater Pumps and Startup Feedwater Pump	1,2	4	J	SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.10	NA	NA

(continued)



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

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
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 3.3.2.4 SR 3.3.2.6	NA	NA
b. Refueling Water Storage Tank (RWST) Level - Low Low	1,2,3,4	4	K	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ 34.40 M (112' - 10 $\frac{3}{8}$ " ) Ele v	≥ 34.78 M (114' - 1 $\frac{3}{8}$ " ) E lev
Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
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	1,2,3	3	L	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9	≤ 137.87 kg/cm <sup>2</sup> (1961 psig) and ≥ 136.33 kg/cm <sup>2</sup> (1939 psig)	≤ 137.10 kg/cm <sup>2</sup> (1950 psig)

3.3 INSTRUMENTATION

3.3.3 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3 The PAM instrumentation for each Function in Table 3.3.3-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTE-----

1. LCO 3.0.4 is not applicable.
  2. Separate Condition entry is allowed for each Function.
- 

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one of two required channels inoperable.	A.1 Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action in accordance with Specification 16.6.9.3	Immediately
C. One or more Functions with one of one or two of two required channels inoperable.	C.1 Restore one channel to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
(deleted)	(deleted)	(deleted)
D. Required Action and associated Completion Time of Condition C not met.	D.1 Enter the Condition referenced in Table 3.3.3-1 for the channel.	Immediately
E. As required by Required Action D.1 and referenced in Table 3.3.3-1.	E.1 Be in MODE 3.  <u>AND</u>  E.2 Be in MODE 4.	6 hours    12 hours
F. As required by Required Action D.1 and referenced in Table 3.3.3-1.	F.1 Initiate action in accordance with Specification 16.6.9.3	Immediately

3

SURVEILLANCE REQUIREMENTS

-----NOTE-----

SR 3.3.3.1 and SR 3.3.3.2 apply to each PAM instrumentation Function in Table 3.3.3-1.

SURVEILLANCE	FREQUENCY
SR 3.3.3.1 Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days
SR 3.3.3.2 -----NOTE----- Neutron detectors are excluded from CHANNEL CALIBRATION. ----- Perform CHANNEL CALIBRATION.	18 months

Table 3.3.3-1 (page 1 of 1)  
Post Accident Monitoring Instrumentation

FUNCTION	REQUIRED CHANNELS	CONDITION REFERENCED FROM REQUIRED ACTION D.1
1. Power Range Neutron Flux	2	E
2. Source Range Neutron Flux	2	E
3. Reactor Coolant System (RCS) Hot Leg Temperature (wide range)	1 per loop	E
4. RCS Cold Leg Temperature (wide range)	1 per loop	E
5. RCS Pressure (Wide Range)	2	E
6. Reactor Vessel Water Level	2	F
7. Containment Sump Water Level	2	E
8. Containment Pressure (Wide Range)	2	E
9. Containment Isolation Valve Position	2 per penetration flow path <sup>(a)(b)</sup>	E
10. Containment Area Radiation (High Range)	2	F
11. Pressurizer Level	2	E
12. Steam Generator Water Level (Wide Range)	1 per steam generator	E
13. Condensate Storage Tank Level	2	E
14. Core Exit Temperature - Quadrant [1]	2 <sup>(c)</sup>	E
15. Core Exit Temperature - Quadrant [2]	2 <sup>(c)</sup>	E
16. Core Exit Temperature - Quadrant [3]	2 <sup>(c)</sup>	E
17. Core Exit Temperature - Quadrant [4]	2 <sup>(c)</sup>	E
18. Auxiliary Feedwater Flow	2 (1/Loop)	E
19. Steam Line Pressure	2 per steam generator	E
20. Steam Generator Water Level (Narrow Range)	2 per steam generator	E
21. Refueling Water Storage Tank Water Level	2	E
22. Boric Acid Tank Level	2	F
23. Pressurizer PORV Position Indicator	1/valve	F

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

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

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

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

-----NOTES-----

1. LCO 3.0.4 is not applicable.
  2. 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

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.4.1 Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days
SR 3.3.4.2 Verify each required control circuit and transfer switch is capable of performing the intended function.	18 months
SR 3.3.4.3 -----NOTE----- Neutron detectors are excluded from CHANNEL CALIBRATION. ----- Perform CHANNEL CALIBRATION for each required instrumentation channel.	18 months
SR 3.3.4.4 Perform TADOT of the reactor trip breaker open/closed indication.	18 months

Table 3.3.4-1 (page 1 of 1)  
Remote Shutdown System Instrumentation and Controls

FUNCTION/INSTRUMENT OR CONTROL PARAMETER	REQUIRED NUMBER OF FUNCTIONS
1. Reactivity Control	
a. Source Range Neutron Flux	1
b. Reactor Trip Breaker Position	1 per trip breaker
2. Reactor Coolant System (RCS) Pressure Control	
a. Pressurizer Pressure or RCS Wide Range Pressure	1
b. Pressurizer Power Operated Relief Valve (PORV) Control	1
3. Decay Heat Removal via Steam Generators (SGs)	
a. RCS Hot Leg Temperature (wide range)	1 per loop
b. RCS Cold Leg Temperature (wide range)	1 per loop
c. AFW Controls Condensate Storage Tank Level	1
d. SG Pressure	1 per SG
e. SG Level (wide Range)	1 per SG
f. AFW Flow	1per SG
4. RCS Inventory Control	
a. Pressurizer Level	1
b. Charging Pump Controls	1
c. Boric Acid Tank Level	1



3.3 INSTRUMENTATION

3.3.5 Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation

LCO 3.3.5 The LOP instrumentation for each Function in Table 3.3.5-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Function 1 with one channel per train inoperable.	A.1 -----NOTE----- The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. ----- Place channel in trip.	6 hours
B. Function 1 with two or more channels per train inoperable.	B.1 Restore all but one channel per train to OPERABLE status.	1 hour
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Enter applicable Condition(s) and Required Action(s) for the associated DG made inoperable by LOP DG start instrumentation.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>D. -----NOTE----- Only applicable to Function 2 -----  One Alarm Function channel inoperable on one bus.</p>	<p>D.1 Verify voltage on associated bus is <math>\geq 3675</math> volts.</p>	<p>Once per 4 hours</p>
<p>E. Required Action and associated Completion Time of Condition D not met.</p>	<p>E.1 Restore bus voltage to <math>\geq 3675</math> volts.</p>	<p>1 hour</p>
<p>F. Required Action and associated Completion Time of Condition E not met.</p>	<p>F.1 Be in MODE 3.  <u>AND</u>  F.2 Be in MODE 5.</p>	<p>6 hours    36 hours</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.3.5.1 -----NOTE----- 1. TADOT shall exclude actuation of the final trip actuation relay for LOP Function 1.  2. Setpoint verification not required. -----  Perform TADOT.</p>	<p>92 days</p>

(continued)

SURVEILLANCE REQUIREMENTS(continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.3.5.2 -----NOTE-----            CHANNEL CALIBRATION shall exclude actuation            of the final trip actuation relay for Function 1            -----            Perform CHANNEL CALIBRATION.</p>	<p>18 months</p>
<p>SR 3.3.5.3 -----NOTE-----            Response time testing shall include actuation of the            final trip actuation relay.            -----            Verify ESF RESPONSE TIME within limit.</p>	<p>18 months on a            STAGGERED            TEST BASIS</p>

Table 3.3.5-1 (page 1 of 1)  
Loss of Power Diesel Generator Start Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRAIN	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT
1. Class 1E 4.16 kV Bus undervoltage	1,2,3,4, (a)	4	SR 3.3.5.1 SR 3.3.5.2 SR 3.3.5.3	$\geq 3640$ V and $\leq 3710$ V	$\geq 3675$ V
2. Class 1E 4.16 kV Bus undervoltage Alarm	1,2,3,4	1	SR 3.3.5.1 SR 3.3.5.2	$\geq 3535$ V	$\geq 3570$ V

(a) When associated DG is required to be OPERABLE by LCO 3.8.2, "AC Sources - Shutdown."

3.3 INSTRUMENTATION

3.3.6 Containment Purge and Exhaust Isolation Instrumentation

LCO 3.3.6 The Containment Purge and Exhaust Isolation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,  
 During CORE ALTERATIONS,  
 During movement of irradiated fuel assemblies within  
 containment.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One radiation monitoring channel inoperable.	A.1 Restore the affected channel to OPERABLE status.	4 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>B. -----NOTE----- Only applicable in MODE 1, 2, 3, or 4. -----</p> <p>One or more Functions with one or more manual or automatic actuation trains inoperable.</p> <p><u>OR</u></p> <p>Two radiation monitoring channels inoperable.</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time of Condition A not met.</p>	<p>B.1 Enter applicable Conditions and Required Actions of LCO 3.6.3, "Containment Isolation Valves," for containment purge and exhaust isolation valves made inoperable by isolation instrumentation.</p>	<p>Immediately</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. -----NOTE-----  Only applicable during CORE ALTERATIONS or movement of irradiated fuel assemblies within containment.  -----</p> <p>One or more Functions with one or more manual or automatic actuation trains inoperable.</p> <p><u>OR</u></p> <p>Two radiation monitoring channels inoperable.</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time for Condition A not met.</p>	<p>C.1 Place and maintain containment purge and exhaust valves in closed position.</p> <p><u>OR</u></p> <p>C.2 Enter applicable Conditions and Required Actions of LCO 3.9.4, "Containment Penetrations," for containment purge and exhaust isolation valves made inoperable by isolation instrumentation.</p>	<p>Immediately</p>   <p>Immediately</p>

SURVEILLANCE REQUIREMENTS

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

SURVEILLANCE	FREQUENCY
SR 3.3.6.1    Perform CHANNEL CHECK.	12 hours
SR 3.3.6.2    Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.6.3    Perform MASTER RELAY TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.6.4    Perform COT.	92 days
SR 3.3.6.5    Perform SLAVE RELAY TEST.	18 months
SR 3.3.6.6    -----NOTE----- Verification of setpoint is not required. -----  Perform TADOT.	18 months
SR 3.3.6.7    Perform CHANNEL CALIBRATION.	18 months



Table 3.3.6-1 (page 1 of 1)  
Containment Purge and Exhaust Isolation Instrumentation

FUNCTION	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	TRIP SETPOINT
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 Radiation			
a. Gaseous (RT-119)	1	SR 3.3.6.1 SR 3.3.6.4 SR 3.3.6.7	$\leq 8.1 \times 10^{-4} \mu\text{ci/cc}$
b. Refueling Machine Area Radiation (RT-220)	1	SR 3.3.6.1 SR 3.3.6.4 SR 3.3.6.7	$\leq 1 \text{ R/hr}$
4. Containment Isolation - Phase A	Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 3.a., for all initiation functions and requirements.		

### 3.3 INSTRUMENTATION

#### 3.3.7 Control Room Emergency Ventilation System (CREVS) Actuation Instrumentation

LCO 3.3.7 The CREVS actuation instrumentation for each Function in Table 3.3.7-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, During movement of irradiated fuel assemblies, During CORE ALTERATIONS.

#### ACTIONS

-----NOTE-----

Separate Condition entry is allowed for each Function.

-----

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one channel or train inoperable.	A.1 Place one CREVS train in emergency operation mode.	7 days
B. One or more Functions with two channels or two trains inoperable.	B.1.1 Place one CREVS train in emergency operation mode.	Immediately
	<u>AND</u>	
	B.1.2 Enter applicable Conditions and Required Actions for one CREVS train made inoperable by inoperable CREVS actuation instrumentation.	Immediately
	<u>OR</u>	
	B.2 Place both trains in emergency operation mode.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time for Condition A or B not met in MODE 1, 2, 3, or 4.	C.1 Be in MODE 3.	6 hours
	<u>AND</u> C.2 Be in MODE 5.	36 hours
D. Required Action and associated Completion Time for Condition A or B not met during movement of irradiated fuel assemblies or during CORE ALTERATIONS.	D.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u> D.2 Suspend movement of irradiated fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

-----NOTE-----

Refer to Table 3.3.7-1 to determine which SRs apply for each CREVS Actuation Function.

-----

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform COT.	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.3.7.3    Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.7.4    Perform MASTER RELAY TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.7.5    Perform SLAVE RELAY TEST.	18 months
SR 3.3.7.6    -----NOTE----- Verification of setpoint is not required. -----  Perform TADOT.	18 months
SR 3.3.7.7    Perform CHANNEL CALIBRATION.	18 months

Table 3.3.7-1 (page 1 of 1)  
CREVS Actuation Instrumentation

FUNCTION	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	TRIP SETPOINT
1. Manual Initiation	2 trains	SR 3.3.7.6	NA
2. Automatic Actuation Logic and Actuation Relays	2 trains	SR 3.3.7.3 SR 3.3.7.4 SR 3.3.7.5	NA
3. Control Room Radiation			
Control Room Air Intakes (GK-RT-128, 228)	2	SR 3.3.7.1 SR 3.3.7.2 SR 3.3.7.7	$\leq 9.4 \times 10^{-6}$ $\mu\text{ci/cc}$
4. Safety Injection	Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.		

3.3 INSTRUMENTATION

3.3.8 Fuel Building Emergency Ventilation System (FBEVS) Actuation Instrumentation

LCO 3.3.8 The FBEVS actuation instrumentation for each Function in Table 3.3.8-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.8-1.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one channel or train inoperable.	A.1 Place one FBEVS train in operation.	7 days
B. One or more Functions with two channels or two trains inoperable.	B.1.1 Place one FBEVS train in operation.  <u>AND</u>	Immediately
	B.1.2 Enter applicable Conditions and Required Actions of LCO 3.7.13, "Fuel Building Emergency Ventilation System (FBEVS)," for one train made inoperable by inoperable actuation instrumentation.  <u>OR</u>	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Place both trains in emergency operation mode.	Immediately
C. Required Action and associated Completion Time for Condition A or B not met during movement of irradiated fuel assemblies in the fuel building.	C.1 Suspend movement of irradiated fuel assemblies in the fuel building.	Immediately
D. Required Action and associated Completion Time for Condition A or B not met in MODE 1, 2, 3, or 4.	D.1 Be in MODE 3.  <u>AND</u> D.2 Be in MODE 5.	6 hours  36 hours

SURVEILLANCE REQUIREMENTS

-----NOTE-----  
Refer to Table 3.3.8-1 to determine which SRs apply for each FBEVS Actuation Function.  
-----

SURVEILLANCE	FREQUENCY
SR 3.3.8.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.8.2 Perform COT.	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.3.8.3 Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.8.4 -----NOTE----- Verification of setpoint is not required. ----- Perform TADOT.	18 months
SR 3.3.8.5 Perform CHANNEL CALIBRATION.	18 months



Table 3.3.8-1 (page 1 of 1)  
FBEVS Actuation Instrumentation

FUNCTION	APPLICABLE			
	MODES OR SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	TRIP SETPOINT
1. Manual Initiation	1,2,3,4	2	SR 3.3.8.4	NA
	(a)	2	SR 3.3.8.4	NA
2. Automatic Actuation Logic and Actuation Relays	1,2,3,4,(a)	2 trains	SR 3.3.8.3	NA
3. Fuel Building Radiation				
a. Gaseous (RT-213)	1,2,3,4,(a)	1	SR 3.3.8.1 SR 3.3.8.2 SR 3.3.8.5	$\leq 1.4 \times 10^{-4}$ $\mu\text{ci} / \text{cc}$
b. Area Radiation (RT- 113)	1,2,3,4,(a)	1	SR 3.3.8.1 SR 3.3.8.2 SR 3.3.8.5	$\leq 100\text{mR/hr}$

(a) During movement of irradiated fuel assemblies in the fuel building.