

Table 3.5-3

Instrumentation Operating Conditions for Engineered Safety Features

No.	Functional Unit	1 No. of Channels	2 No. of Channels to Trip	3 Min. Operable Channels	4 Min. Degree of Redun- dancy	5 Operator Action if Conditions of Column 3 Cannot be Met	6 Operator Action if Conditions of Column 4 Cannot be Met
1	Safety Injection						
a.	Manual	2	1	1	0	Cold shutdown	Same as Column 5
b.	High Containment Pressure (Hi Level)	3	2	2	1	Cold shutdown	(1)
c.	High Differential Pressure Between Steam Lines	3/steam line	2/steam line	2/steam line	1/steam line	Cold shutdown	(1)
d.	Pressurizer Low Pressure*	3	2	2	1	Cold shutdown	(1)
e.	High Steam Flow in 2/4 Steam Lines Coincident	2/line	1/2 in any 2 lines	1/line in each of 3 lines	2	Cold shutdown	(1)
	With Low T_{avg} or Low Steam Line Pressure	4 T_{avg} Signals	2	3	2		
		4 Pres- sure Signals	2	3	2		

* Permissible bypass if reactor coolant pressure less than 2000 psig.

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2.	Containment Spray						
a.	Manual	2	1	1	0	Cold shutdown	Same as Column 5
b.	High Containment Pressure (Hi-Hi Level)	2 sets of 3	2 of 3 in each set	2 per set	1/set	Cold shutdown	(1)
3.	Loss Of Power						
a.	480V Emergency Bus Undervoltage (Loss of Voltage)	2/bus	1/bus	1/bus	0	Cold shutdown	Same as Column 5
b.	480V Emergency Bus Undervoltage (De- graded Voltage)	2/bus	2/bus	1/bus	0	(3)	Same as Column 5
4.	Auxiliary Feedwater						
a.	Steam Gen. Water Level (Low-Low)						
	i. Start Motor- Driven Pumps	3/stm gen.	2 in any stm gen.	2 chan. in each stm gen.	1	Reduce RCS temperature such that $T < 350^{\circ}\text{F}$	(2)

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No.	Functional Unit	1	2	3	4	5	6
		No. of Channels	No. of Channels to Trip	Min. Operable Channels	Min. Degree of Redundancy	Operator Action if Conditions of Column 3 Cannot be Met	Operator Action if Conditions of Column 4 Cannot be Met
	ii Start Turbine-Driven Pump	3/stm gen.	2/3 in each of two stm gen.	2 chan. in each stm gen.	1	T < 350°F	(2)
b.	S.I. Start Motor-Driven Pumps	(All safety injection initiating functions and requirements)					
c.	Station Blackout Start Motor-Driven and Turbine-Driven Pumps	2	1	1	0	T < 350°F	Same as Column 5
d.	Trip of Main Feed-water Pumps Start Motor-Driven Pumps	2	1	1	0	Hot shutdown	Same as column 5
5.	Overpressure Protection System (OPS)	3	2	2	1	Refer to Specification 3.1.A.4	Same as Column 5
6.	Engineered Safety Features (SI) Logic	2	1	2#	1#	Be in Hot shutdown within the next 6 hours	Same as column 5

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- # An Engineered Safety Feature (SI) logic channel may be bypassed for maintenance for up to 24 hours or surveillance testing for up to eight hours provided the redundant logic channel is operable.
- (1) Restore all channels as required by column 1 to an OPERABLE status within 72 hours or place the inoperable channel in trip. Otherwise, proceed to cold shutdown.
 - (2) Restore all channels as required by column 1 to an OPERABLE status within 72 hours or place the inoperable channel in trip. Otherwise, reduce T_{avg} to less than 350°F.
 - (3)
 - a) If the 138kV source of offsite power and the 13.8kV source of offsite power are available:
 - 1) Both channels may be inoperable on one bus for a period not to exceed 72 hours;
 - 2) If one channel is inoperable after 72 hours, place the inoperable channel in trip;
 - 3) If both channels are inoperable after 72 hours, proceed to cold shutdown.
 - b) If the 138kV source of offsite power or the 13.8kV source of offsite power is not available:
 - 1) If one channel is inoperable, place the inoperable channel in trip;
 - 2) If both channels are inoperable, proceed to cold shutdown.

Table 4.1-1
Minimum Frequencies for Checks, Calibrations and
Tests of Instrument Channels

Channel Description	Check	Calibrate	Test	Remarks
1. Nuclear Power Range	S	D (1) M (3) ^{*1}	Q (2)	1) Heat balance calibration 2) Signal to delta T; bistable action (permissive, rod stop, trips) 3) Upper and lower chambers for axial offset.
2. Nuclear Intermediate Range	S (1)	N.A.	S/U (2) ^{*2}	1) Once/shift when in service 2) Bistable action (permissive, rod stop, trip)
3. Nuclear Source Range	S (1)	N.A.	S/U (2) ^{*2}	1) Once/shift when in service 2) Bistable action (alarm, trip)
4. Reactor Coolant Temperature	S	R#	Q (1)	1) Overtemperature - delta T Overpower - delta T
5. Reactor Coolant Flow	S	R#	Q	
6. Pressurizer Water Level	S	R#	Q	
7. Pressurizer Pressure (High & Low)	S	R#	Q	
8.a 6.9 kV Voltage	N.A.	R#	Q	
8.b 6.9 kV Frequency	N.A.	R#	Q (1) R# (2)	1) Underfrequency relay actuation only. 2) The full test including RCP breaker trip upon underfrequency relay actuation and reactor trip logic relay actuation upon tripping of the RCP breaker.
9. Analog Rod Position	S	R#	M	
10. Rod Position Bank Counters	S	N.A.	N.A.	With analog rod position
11. Steam Generator Level	S	R#	Q	
12. Charging Flow	N.A.	R#	N.A.	

Table 4.1-1

Minimum Frequencies for Checks, Calibrations and
Tests of Instrument Channels

	Channel Description	Check	Calibrate	Test	Remarks
28.	Control Rod Protection (for use with LOPAR fuel)	N.A.	R#	*4	
29.	Loss of Power				
	a. 480v Emergency Bus Undervoltage (Loss of Voltage)	N.A.	R#	R#	
	b. 480v Emergency Bus Undervoltage (Degraded Voltage)	S	R#	M	
	c. 480v Emergency Bus Undervoltage (Alarm)	N.A.	R#	M	
30.	Auxiliary Feedwater				
	a. Steam Generator Water Level (Low-Low)	S	R#	R#	
	b. Low-Low Level AFWS Automatic Actuation Logic	N.A.	N.A.	M	Test one logic channel per month on an alternating basis.
	c. Station Blackout (Undervoltage)	N.A.	R#	R#	
	d. Trip of Main Feedwater Pumps	N.A.	N.A.	R#	
31.	Reactor Coolant System Subcooling Margin Monitor	M	R#	N.A.	
32.	PORV Position Indicator (Limit Switch)	M	R#	R#	