

3.7 INSTRUMENTATION SYSTEMS

Operational Safety Instrumentation

Applicability

Applies to reactor and safety features instrumentation systems.

Objectives

To ensure the automatic initiation of the Reactor Protection System and the Engineered Safety Features in the event that a principal process variable limit is exceeded, and to define the limiting conditions for operation of the plant instrumentation and safety circuits necessary to ensure reactor and plant safety.

Specification

- A. The Reactor Protection System instrumentation channels and interlocks shall be OPERABLE as specified in Table 3.7-1.
- B. The Engineered Safeguards Actions and Isolation Function Instrumentation channels and interlocks shall be OPERABLE as specified in Tables 3.7-2 and 3.7-3, respectively.
- C. The Engineered Safety Features initiation instrumentation setting limits shall be as stated in Table 3.7-4.
- D. The explosive gas monitoring instrumentation channel shown in Table 3.7-5(a) shall be OPERABLE with its alarm setpoint set to ensure that the limits of Specification 3.11.A.1 are not exceeded.
 1. With an explosive gas monitoring instrumentation channel alarm setpoint less conservative than required by the above specification, declare the channel inoperable and take the action shown in Table 3.7-5(a).

2. With less than the minimum number of explosive gas monitoring instrumentation channels OPERABLE, take the action shown in Table 3.7-5(a). Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, prepare and submit a Special Report to the Commission (Region II) to explain why the inoperability was not corrected in a timely manner.
- E. The accident monitoring instrumentation listed in Table 3.7-6 shall be OPERABLE in accordance with the following:
1. With the number of OPERABLE accident monitoring instrumentation channels less than the Total Number of Channels shown in Table 3.7-6, items 1 through 9, either restore the inoperable channel(s) to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours.
 2. With the number of OPERABLE accident monitoring instrumentation channels less than the Minimum OPERABLE Channels requirement of Table 3.7-6, items 1 through 9, either restore the inoperable channel(s) to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN within the next 12 hours.
- F. The containment hydrogen analyzers and associated support equipment shall be OPERABLE in accordance with the following:
1. Two independent containment hydrogen analyzers shall be OPERABLE during REACTOR CRITICAL or POWER OPERATION.
 - a. With one hydrogen analyzer inoperable, restore the inoperable analyzer to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 6 hours.

Clarification of Operator Actions

The Operator Actions associated with Functional Units 10 and 16 on Table 3.7-1 require the unit to be reduced in power to less than the P-7 setpoint (10%) if the required conditions cannot be satisfied for either the P-8 or P-7 permissible bypass conditions. The requirement to reduce power below P-7 for a P-8 permissible bypass condition is necessary to ensure consistency with the out of service and shutdown action times assumed in the WCAP-10271 and WCAP-14333P risk analyses by eliminating the potential for a scenario that would allow sequential entry into the Operator Actions (i.e., initial entry into the Operator Action with a reduction in power to below P-8, followed by a second entry into the Operator Action with a reduction in power to below P-7). This scenario would permit sequential allowed outage time periods that may result in an additional 72 hours that was not assumed in the risk analysis to place a channel in trip or to place the unit in a condition where the protective function was not necessary.

References

- (1) UFSAR - Section 7.5
- (2) UFSAR - Section 14.5
- (3) UFSAR - Section 14.3.2

TABLE 3.7-1
 REACTOR TRIP
 INSTRUMENT OPERATING CONDITIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Action</u>
1. Manual	2	2	1		1
2. Nuclear Flux Power Range	4	3	2	Low trip setting at P-10	2
3. Nuclear Flux Intermediate Range	2	2	1	P-10	3
4. Nuclear Flux Source Range				P-6	
a. Below P-6 - Note A	2	2	1		4
b. Shutdown - Note B	2	1	0		5
5. Overtemperature ΔT	3	2	2		6
6. Overpower ΔT	3	2	2		6
7. Low Pressurizer Pressure	3	2	2	P-7	7
8. Hi Pressurizer Pressure	3	2	2		6

Note A - With the reactor trip breakers closed and the control rod drive system capable of rod withdrawal.

Note B - With the reactor trip breakers open.

TABLE 3.7-1
REACTOR TRIP
INSTRUMENT OPERATING CONDITIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Action</u>
9. Pressurizer-Hi Water Level	3	2	2	P-7	7
10. Low Flow	3/loop	2/loop in each operating loop	2/loop in any operating loop	P-8	7
			2/loop in any 2 operating loops	P-7	7
11. Turbine Trip					
a. Stop valve closure	4	1	4	P-7	7
b. Low fluid oil pressure	3	2	2	P-7	7
12. Lo-Lo Steam Generator Water Level	3/loop	2/loop in each operating loop	2/loop in any operating loops		6
13. Underfrequency 4KV Bus	3-1/bus	2	2	P-7	7
14. Undervoltage 4KV Bus	3-1/bus	2	2	P-7	7
15. Safety Injection (SI) Input From ESF	2	2	1		11
16. Reactor Coolant Pump Breaker Position	1/breaker	1/breaker per operating loop	1 2	P-8 P-7	9 9

Amendment Nos. 228 and 228

TABLE 3.7-1
REACTOR TRIP
INSTRUMENT OPERATING CONDITIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Action</u>
17. Low steam generator water level with steam/feedwater flow mismatch	2/loop-level and 2/loop-flow mismatch	1/loop-level and 2/loop-flow mismatch or 2/loop-level and 1/loop-flow mismatch	1/loop-level coincident with 1/loop-flow mismatch in same loop		6
18. a. Reactor Trip Breakers	2	2	1		8
b. Reactor Trip Bypass Breakers - Note C	2	1	1		
19. Automatic Trip Logic	2	2	1		11
20. Reactor Trip System Interlocks - Note D					
a. Intermediate range neutron flux, P-6	2	2	1		13
b. Low power reactor trips block, P-7					
Power range neutron flux, P-10 and Turbine impulse pressure	4	3	2		13
Turbine impulse pressure	2	2	1		13
c. Power range neutron flux, P-8	4	3	2		13
d. Power range neutron flux, P-10	4	3	2		13
e. Turbine impulse pressure	2	2	1		13

Note C - With the Reactor Trip Breaker open for surveillance testing in accordance with Specification Table 4.1-1 (Item 30)

Note D - Reactor Trip System Interlocks are described in Table 4.1-A

Amendment Nos. 228 and 228

TABLE 3.7-1 (Continued)

TABLE NOTATION

ACTION STATEMENTS

ACTION 1. With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN and open the reactor trip breakers within the next 6 hours.

ACTION 2. With the number of OPERABLE channels equal to the Minimum OPERABLE Channels requirement, REACTOR CRITICAL and POWER OPERATION may proceed provided the following conditions are satisfied:

1. The inoperable channel is placed in the tripped condition within 72 hours.
2. The Minimum OPERABLE Channels requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of the redundant channel(s) per Specification 4.1.
3. Either, THERMAL POWER is restricted to $\leq 75\%$ of RATED POWER and the Power Range, Neutron Flux trip setpoint is reduced to $\leq 85\%$ of RATED POWER within 78 hours; or, the QUADRANT POWER TILT is monitored at least once per 12 hours.

TABLE 3.7-1 (Continued)

4. The QUADRANT POWER TILT shall be determined to be within the limit when above 75 percent of RATED POWER with one Power Range Channel inoperable by using the moveable incore detectors to confirm that the normalized symmetric power distribution, obtained from 2 sets of 4 symmetric thimble locations or a full-core flux map, is consistent with the indicated QUADRANT POWER TILT at least once per 12 hours.

With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels requirement, be in at least HOT SHUTDOWN within 6 hours

ACTION 3.

With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels requirement and with the THERMAL POWER level:

- a. Below the P-6 (Block of Source Range Reactor Trip) setpoint, restore the inoperable channel to OPERABLE status prior to increasing THERMAL POWER above the P-6 Setpoint.
- b. Above the P-6 (Block of Source Range Reactor Trip) setpoint, but below 10% of RATED POWER, decrease power below P-6 or, increase THERMAL POWER above 10% of RATED POWER within 24 hours.
- c. Above 10% of RATED POWER, POWER OPERATION may continue.

TABLE 3.7-1 (Continued)

ACTION 4. With the number of channels OPERABLE one less than required by the Minimum OPERABLE Channels requirement and with the THERMAL POWER level:

- a. Below P-6, (Block of Source Range Reactor Trip) setpoint, immediately suspend reactivity changes that are more positive than necessary to meet the required shutdown margin or refueling boron concentration limit and restore the inoperable channel to OPERABLE status within 48 hours or open the reactor trip breakers within the next hour. With two Source Range Channels inoperable, open the reactor trip breakers immediately. Two Source Range channels must be OPERABLE prior to increasing THERMAL POWER above the P-6 setpoint.
- b. Above P-6, operation may continue.

ACTION 5. With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels requirement, verify compliance with the Shutdown Margin requirements within 1 hour and at least once per 12 hours thereafter.

ACTION 6. With the number of OPERABLE channels less than the Total Number of Channels, REACTOR CRITICAL and POWER OPERATION may proceed provided the following conditions are satisfied:

1. The inoperable channel is placed in the tripped condition within 72 hours.
2. The Minimum OPERABLE Channels requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.1.

If the conditions are not satisfied in the time permitted, be in at least HOT SHUTDOWN within 6 hours.

TABLE 3.7-1 (Continued)

ACTION 7. With the number of OPERABLE channels less than the Total Number of Channels, REACTOR CRITICAL and POWER OPERATION may proceed provided the following conditions are satisfied:

1. The inoperable channel is placed in the tripped condition within 72 hours.
2. The Minimum OPERABLE Channels requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing per Specification 4.1.

If the conditions are not satisfied in the time permitted, reduce power to less than the P-7 setpoint within the next 6 hours.

ACTION 8.A. With the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, be in at least HOT SHUTDOWN within 6 hours. In conditions of operation other than REACTOR CRITICAL or POWER OPERATIONS, with the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the reactor trip breakers within the next hour. However, one channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.1 provided the other channel is OPERABLE, or one reactor trip breaker may be bypassed for up to 4 hours for concurrent surveillance testing of the Reactor trip breaker and automatic trip logic provided the other train is OPERABLE.

8.B. With one of the diverse trip features (undervoltage or shunt trip device) inoperable, restore it to OPERABLE status within 48 hours or declare the breaker inoperable and apply Action 8.A. The breaker shall not be bypassed while one of the diverse trip features is inoperable except for the time required for performing maintenance to restore the breaker to OPERABLE status.

TABLE 3.7-1 (Continued)

- ACTION 9. With one channel inoperable, restore the inoperable channel to OPERABLE status within 72 hours or reduce THERMAL POWER to below the P-7 (Block of Low Reactor Coolant Pump Flow and Reactor Coolant Pump Breaker Position) setpoint within the next 6 hours.
- ACTION 10. Deleted
- ACTION 11. With the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within 6 hours. In conditions of operation other than REACTOR CRITICAL or POWER OPERATIONS, with the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 48 hours or open the reactor trip breakers within the next hour. However, one channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.1 provided the other channel is OPERABLE.
- ACTION 12. Deleted
- ACTION 13. With the number of OPERABLE channels less than the Minimum OPERABLE Channels requirement, within 1 hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or be in at least HOT SHUTDOWN within the next 6 hours.

TABLE 3.7-2 (Continued)
ENGINEERED SAFEGUARDS ACTION
INSTRUMENT OPERATING CONDITIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Actions</u>
2. CONTAINMENT SPRAY					
a. Manual	1 set	1 set	1 set ♦		15
b. High containment pressure (Hi-Hi)	4	3	3		17
c. Automatic actuation logic	2	2	1		14
3. AUXILIARY FEEDWATER					
a. Steam generator water level low-low					
1) Start motor driven pumps	3/steam generator	2/steam generator	2/steam generator any 1 generator		20
2) Starts turbine driven pump	3/steam generator	2/steam generator	2/steam generator any 2 generators		20
b. RCP undervoltage starts turbine driven pump	3	2	2		20
c. Safety injection - start motor driven pumps	See #1 above (all SI initiating functions and requirements)				
d. Station blackout - start motor driven pumps	1/bus 2 transfer buses/unit	1/bus 2 transfer buses/unit	2		24

♦ Must actuate 2 switches simultaneously

TABLE 3.7-2 (Continued)
ENGINEERED SAFEGUARDS ACTION
INSTRUMENT OPERATING CONDITIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Actions</u>
3. AUXILIARY FEEDWATER (continued)					
e. Trip of main feedwater pumps - start motor driven pumps	2/MFW pump	1/MFW pump	2-1 each MFW pump		24
f. Automatic actuation logic	2	2	1		22
4. LOSS OF POWER					
a. 4.16 kv emergency bus undervoltage (loss of voltage)	3/bus	2/bus	2/bus		26
b. 4.16 kv emergency bus undervoltage (degraded voltage)	3/bus	2/bus	2/bus		26
5. NON-ESSENTIAL SERVICE WATER ISOLATION					
a. Low intake canal level - Note A	4	3	3		20
b. Automatic actuation logic	2	2	1		14
6. ENGINEERED SAFEGAURDS ACTUATION INTERLOCKS - Note B					
a. Pressurizer pressure, P-11	3	2	2		23
b. Low-low T _{avg} , P-12	3	2	2		23
c. Reactor trip, P-4	2	2	1		24
7. RECIRCULATION MODE TRANSFER					
a. RWST Level - Low	4	3	2		25
b. Automatic Actuation Logic and Actuation Relays	2	2	1		14

Note A - When the temporary Service Water supply jumper to the CCHXs is in service in accordance with the footnote to TS 3.14.A.2.b, two low intake canal level probes will be permitted to be in the tripped condition. In this condition, two operable channels are required with one channel to trip. If one of the two operable channels becomes inoperable, the operating Unit must be in HOT SHUTDOWN within the following 6 hours and in COLD SHUTDOWN within the following 30 hours.

Note B - Engineered Safeguards Actuation Interlocks are described in Table 4.1-A

Amendment Nos. 228 and 228

TABLE 3.7-3
INSTRUMENT OPERATING CONDITIONS FOR ISOLATION FUNCTIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Actions</u>
1. CONTAINMENT ISOLATION					
a. Phase 1					
1) Safety Injection (SI)	See Item #1, Table 3.7-2 (all SI initiating functions and requirements)				
2) Automatic initiation logic	2	2	1		14
3) Manual	2	2	1		21
b. Phase 2					
1) High containment pressure	4	3	3		17
2) Automatic actuation logic	2	2	1		14
3) Manual	2	2	1		21
c. Phase 3					
1) High containment pressure (Hi-Hi setpoint)	4	3	3		17
2) Automatic actuation logic	2	2	1		14
3) Manual	1 set	1 set	1 set ♦		15
2. STEAMLIN ISOLATION					
See Item #1.e Table 3.7-2 for operability requirements					
a. High steam flow in 2/3 lines coincident with 2/3 low T_{avg} or 2/3 low steam pressures					
♦ Must actuate 2 switches simultaneously					

Amendment Nos. 228 and 228

TABLE 3.7-3 (Continued)
INSTRUMENT OPERATING CONDITIONS FOR ISOLATION FUNCTIONS

<u>Functional Unit</u>	<u>Total Number Of Channels</u>	<u>Minimum OPERABLE Channels</u>	<u>Channels To Trip</u>	<u>Permissible Bypass Conditions</u>	<u>Operator Actions</u>
STEAMLINE ISOLATION (continued)					
b. High containment pressure (Hi-Hi setpoint)	4	3	3		17
c. Manual	1/steamline	1/steamline	1/steamline		21
d. Automatic actuation logic	2	2	1		22
3. TURBINE TRIP AND FEEDWATER ISOLATION				When all MFRV, SG FWIV & associated bypass valves are closed & deactivated or isolated by manual valves.	
a. Steam generator water-level high-high	3/steam generator	2/steam generator	2/in any one steam generator		20
b. Automatic actuation logic and actuation relay	2	2	1		22
c. Safety injection	See Item #1 Table 3.7-2 (all SI initiating functions and requirements)				

Amendment Nos. 228 and 228

TABLES 3.7-2 AND 3.7-3

TABLE NOTATIONS

- ACTION 14. With the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the next 30 hours. One channel may be bypassed for up to 8 hours for surveillance testing per Specification 4.1, provided the other channel is OPERABLE.
- ACTION 15. With the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 30 hours.
- ACTION 16. Deleted
- ACTION 17. With the number of OPERABLE channels one less than the Total Number of Channels, REACTOR CRITICAL and POWER OPERATION may proceed provided the inoperable channel is placed in the tripped condition within 72 hours and the Minimum OPERABLE Channels requirement is met. One additional channel may be bypassed for up to 12 hours for surveillance testing per Specification 4.1.
- ACTION 18. Deleted
- ACTION 19. Deleted
- ACTION 20. With the number of OPERABLE channels less than the Total Number of Channels, REACTOR CRITICAL and/or POWER OPERATION may proceed provided the following conditions are satisfied:
- a. The inoperable channel is placed in the tripped condition within 72 hours.
 - b. The Minimum OPERABLE Channels requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.1.
- If the conditions are not satisfied in the time permitted, be in HOT SHUTDOWN within the next 6 hours and reduce RCS temperature & pressure to less than 350°F/450 psig, respectively in the following 12 hours.

TABLE NOTATIONS

- ACTION 21. With the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- ACTION 22. With the number of OPERABLE channels one less than the Minimum OPERABLE Channels requirement, restore the inoperable channel to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 6 hours and reduce pressure and temperature to less than 450 psig and 350° within the following 12 hours; however, one channel may be bypassed for up to 8 hours for surveillance testing per Specification 4.1 provided the other channel is OPERABLE.
- ACTION 23. With the number of OPERABLE channels less than the Minimum OPERABLE Channels requirement, within one hour determine by observation of the associated permissive annunciator window(s) that the interlock is in its required state for the existing plant condition, or be in at least HOT SHUTDOWN within the next 6 hours.
- ACTION 24. With the number of OPERABLE channels less than the Total Number of Channels, restore the inoperable channels to OPERABLE status within 48 hours or reduce pressure and temperature to less than 450 psig and 350°F within the next 12 hours.
- ACTION 25. With the number of OPERABLE channels one less than the Total Number of Channels, place the inoperable channel in the bypassed condition within 72 hours or be in at least HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. One additional channel may be bypassed for up to 12 hours for surveillance testing per Specification 4.1.
- ACTION 26. With the number of OPERABLE channels less than the Total Number of Channels, the associated Emergency Diesel Generator may be considered OPERABLE provided the following conditions are satisfied:
- a. The inoperable channel is placed in the tripped conditions within 72 hours.
 - b. The Minimum OPERABLE Channels requirement is met; however, the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels per Specification 4.1.

If the conditions are not satisfied, declare the associated EDG inoperable.

H. If the RWST Water Chemistry exceeds 0.15 PPM for Cl^- and/or F^- , flushing of sensitized stainless steel piping as required by 4.1.E will be performed once the RWST Water Chemistry has been brought within specification limit of less than 0.15 PPM chlorides and/or fluorides. Samples will be taken periodically until the sample indicates the Cl^- and/or F^- and levels are below 0.15 PPM.

BASIS

Check

Failures such as blown instrument fuses, defective indicators, and faulted amplifiers which result in "upscale" or "downscale" indication can be easily recognized by simple observation of the functioning of an instrument or system. Furthermore, such failures are, in many cases, revealed by alarm or annunciator action, and a periodic check supplements this type of built-in surveillance.

Calibration

Calibration shall be performed to ensure the presentation and acquisition of accurate information.

The nuclear flux (power level) channels shall be calibrated daily against a heat balance standard to account for errors induced by changing rod patterns and core physics parameters.

Other channels are subject only to the "drift" errors induced within the instrumentation itself and, consequently, can tolerate longer intervals between calibration. Process systems instrumentation errors resulting from drift within the individual instruments are normally negligible.

During the interval between periodic channel tests and daily check of each channel, a comparison between redundant channels will reveal any abnormal condition resulting from a calibration shift, due to instrument drift of a single channel.

During the periodic channel test, if it is deemed necessary, the channel may be tuned to compensate for the calibration shift. However, it is not expected that this will be required at any fixed or frequent interval.

Thus, minimum calibration frequencies of once-per-day for the nuclear flux (power level) channels, and once per 18 months for the process system channels are considered acceptable.

The OPERABILITY of the Reactor Trip System and ESFAS instrumentation systems and interlocks ensures that 1) the associated ESF action and/or reactor trip will be initiated when the parameter monitored by each channel or combination thereof exceeds its setpoint, 2) the specified coincidence logic and sufficient redundancy are maintained to permit a channel to be out of service for testing or maintenance consistent with maintaining an appropriate level of reliability of the RTS and ESFAS instrumentation, and 3) sufficient system functional capability is available from diverse parameters.

The surveillance requirements specified for these systems ensure that the overall system functional capability is maintained comparable to the original design standards. The periodic surveillance tests performed at the minimum frequencies are sufficient to demonstrate this capability. Specific surveillance intervals and surveillance and maintenance outage times have been determined in accordance with WCAP-10271, EVALUATION OF SURVEILLANCE FREQUENCIES AND OUT OF SERVICE TIMES FOR THE REACTOR TRIP INSTRUMENTATION SYSTEM, and supplements to that report, WCAP-10271 Supplement 2, EVALUATION OF SURVEILLANCE FREQUENCIES AND OUT OF SERVICE TIMES FOR THE ENGINEERED SAFETY FEATURES ACTUATION SYSTEM, and supplements to that report, and WCAP-14333P, PROBABILISTIC RISK ANALYSIS OF THE RPS AND ESF TEST TIMES AND COMPLETION TIMES, as approved by the NRC and documented in SERs dated February 21, 1985, February 22, 1989, the SSER dated April 30, 1990 for WCAP-10271 and July 15, 1998 for WCAP-14333P. For those functional units not included in the generic Westinghouse probabilistic risk analyses discussed above, a plant-specific risk assessment was performed. This risk assessment demonstrates that the effect on core damage frequency and incremental change in core damage probability is negligible for the relaxations associated with the additional functional units.

Surveillance testing of instrument channels is routinely performed with the channel in the tripped condition. Only those instrument channels with hardware permanently installed that permits bypassing without lifting a lead or installing a jumper are routinely tested in the bypass condition. However, an inoperable channel may be bypassed by lifting a lead or installing a jumper to permit surveillance testing of another instrument channel of the same functional unit.

TABLE 4.1-1
MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

<u>Channel Description</u>	<u>Check</u>	<u>Calibrate</u>	<u>Test</u>	<u>Remarks</u>
1. Nuclear Power Range	S	D(1,5) Q(3,5) R(4)	Q(2)	1) Against a heat balance standard, above 15% RATED POWER 2) Signal at ΔT ; bistable action (permissive, rod stop, trip) 3) Upper and lower chambers for symmetric offset by means of the movable incore detector system 4) Neutron detectors may be excluded from CHANNEL CALIBRATION 5) The provisions of Specification 4.0.4 are not applicable
2. Nuclear Intermediate Range (below P-10 setpoint)	*S	R(2,3)	P(1)	1) Log level; bistable action (permissive, rod stop, trip) 2) Neutron detectors may be excluded from CHANNEL CALIBRATION 3) The provisions of Specification 4.0.4 are not applicable
3. Nuclear Source Range (below P-6 setpoint)	*S	R(2,3)	P(1)	1) Bistable action (alarm, trip) 2) Neutron detectors may be excluded from CHANNEL CALIBRATION 3) The provisions of Specification 4.0.4 are not applicable
4. Reactor Coolant Temperature	*S	R	Q(1) Q(2)	1) Overtemperature ΔT 2) Overpower ΔT
5. Reactor Coolant Flow	S	R	Q	
6. Pressurizer Water Level	S	R	Q	
7. Pressurizer Pressure (High & Low)	S	R	Q	
8. 4 KV Voltage and Frequency	N.A.	R	Q(1)	1) Setpoint verification not required
9. Analog Rod Position	*S(1,2) (4)	R	M(3)	1) With step counters 2) Each six inches of rod motion when data logger is out of service 3) Rod bottom bistable action 4) N.A. when reactor is in HOT, INTERMEDIATE OR COLD SHUTDOWN

Amendment Nos. 228 and 228

TABLE 4.1-1(Continued)
MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

<u>Channel Description</u>	<u>Check</u>	<u>Calibrate</u>	<u>Test</u>	<u>Remarks</u>
10. Rod Position Bank Counters	S(1,2) Q(3)	N.A.	N.A.	1) Each six inches of rod motion when data logger is out of service 2) With analog rod position 3) For the control banks, the benchboard indicators shall be checked against the output of the bank overlap unit.
11. Steam Generator Level	S	R	Q	
12. Deleted				
13. Deleted				
14. Deleted				
15. Recirculation Mode Transfer				
a. Refueling Water Storage Tank Level-Low	S	R	Q	
b. Automatic Actuation Logic and Actuation Relays	N.A.	N.A.	M	
16. Deleted				
17. Reactor Containment Pressure-CLS	*D	R	Q(1)	1) Isolation valve signal and spray signal
18. Deleted				
19. Deleted				
20. Deleted				
21. Deleted				
22. Steam Line Pressure	S	R	Q	

Amendment Nos. 228 and 228

TABLE 4.1-1(Continued)
MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

<u>Channel Description</u>	<u>Check</u>	<u>Calibrate</u>	<u>Test</u>	<u>Remarks</u>
23. Turbine First Stage Pressure	S	R	Q	
24. Deleted				
25. Deleted				
26. Logic Channel Testing	N.A.	N.A.	M(1)(2)	1) Reactor protection, safety injection and the consequence limiting safeguards system logic are tested monthly per this line item. 2) The master and slave relays are not included in the monthly logic channel test of the safety injection system.
27. Deleted				
28. Turbine Trip				Setpoint verification is not applicable
A. Stop valve closure	N.A.	N.A.	P	
B. Low fluid oil pressure	N.A.	N.A.	P	
29. Deleted				
30. Reactor Trip Breaker	N.A.	N.A.	M	The test shall independently verify operability of the undervoltage and shunt trip attachments
31. Deleted				

Amendment Nos. 228 and 228

TABLE 4.1-1(Continued)
MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

<u>Channel Description</u>	<u>Check</u>	<u>Calibrate</u>	<u>Test</u>	<u>Remarks</u>
32. Auxiliary Feedwater				
a. Steam Generator Water Level Low-Low	S	R	Q(1)	1) The auto start of the turbine driven pump is not included in the monthly test, but is tested within 31 days prior to each startup.
b. RCP Undervoltage	S	R	R(1)(2)	1) The actuation logic and relays are tested within 31 days prior to each startup. 2) Setpoint verification not required.
c. S.I.	(All Safety Injection surveillance requirements)			
d. Station Blackout	N.A.	R	N.A.	
e. Main Feedwater Pump Trip	N.A.	N.A.	R	
33. Loss of Power				
a. 4.16 KV Emergency Bus Undervoltage (Loss of Voltage)	N.A.	R	Q(1)	1) Setpoint verification not required.
b. 4.16 KV Emergency Bus Undervoltage (Degraded Voltage)	N.A.	R	Q(1)	1) Setpoint verification not required.
34. Deleted				
35. Manual Reactor Trip	N.A.	N.A.	R	The test shall independently verify the operability of the undervoltage and shunt trip attachments for the manual reactor trip function. The test shall also verify the operability of the bypass breaker trip circuit.
36. Reactor Trip Bypass Breaker	N.A.	N.A.	M(1), R(2)	1) Remote manual undervoltage trip immediately after placing the bypass breaker into service, but prior to commencing reactor trip system testing or required maintenance. 2) Automatic undervoltage trip.
37. Safety Injection Input to RPS	N.A.	N.A.	R	
38. Reactor Coolant Pump Breaker Position Trip	N.A.	N.A.	R	

Amendment Nos. 228 and 228

TABLE 4.1-1(Continued)
MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

<u>Channel Description</u>	<u>Check</u>	<u>Calibrate</u>	<u>Test</u>	<u>Remarks</u>
39. Steam/Feedwater Flow and Low S/G Water Level	S	R	Q(1)	1) The provisions of Specification 4.0.4 are not applicable
40. Intake Canal Low (See Footnote 1)	D	R	M(1), Q(2)	1) Logic Test 2) Channel Electronics Test
41. Turbine Trip and Feedwater Isolation				
a. Steam generator water level high	S	R	Q	
b. Automatic actuation logic and actuation relay	N.A.	R	M(1)	1) Automatic actuation logic only, actuation relays tested each refueling
42. Reactor Trip System Interlocks				
a. Intermediate range neutron flux, P-6	N.A.	R(1)	R(2)	1) Neutron detectors may be excluded from the calibration 2) The provisions of Specification 4.0.4 are not applicable.
b. Low reactor trips block, P-7	N.A.	R(1)	R(2)	
c. Power range neutron flux, P-8	N.A.	R(1)	R(2)	
d. Power range neutron flux, P-10	N.A.	R(1)	R(2)	
e. Turbine impulse pressure	N.A.	R	R	

Footnote 1:

Check Consists of verifying for an indicated intake canal level greater than 23'-6" that all four low level sensor channel alarms are not in an alarm state.

Calibration Consists of uncovering the level sensor and measuring the time response and voltage signals for the immersed and dry conditions. It also verifies the proper action of instrument channel from sensor to electronics to channel output relays and annunciator. Only the two available sensors on the shutdown unit would be tested.

Tests
 1) The logic test verifies the three out of four logic development for each train by using the channel test switches for that train.
 2) Channel electronics test verifies that electronics module responds properly to a superimposed differential millivolt signal which is equivalent to the sensor detecting a "dry" condition.

TABLE 4.1-1(Continued)
MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

<u>Channel Description</u>	<u>Check</u>	<u>Calibrate</u>	<u>Test</u>	<u>Remarks</u>
43. Engineered Safeguards Actuation Interlocks				
a. Reactor trip, P-4	N.A.	N.A.	R	
b. Pressurizer pressure, P-11	N.A.	R	R	
c. Low, low T _{avg} , P-12	N.A.	R	R	

S - Each Shift

M - 31 days

D - Daily

P - Prior to each startup if not done within the previous 31 days

N.A. - Not Applicable

R - Once per 18 months

Q - Every 92 days

* See Specification 4.1.D