

Table 3.1.1 (Cont'd)

REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENT

Minimum No. of Operable Instrument Channels per Trip System (1)	Trip Function	Trip Level Setting	Modes in which Function Must be Operable			Number of Instrument Channels Provided by Design	Action (1)
			Refuel (7)	Startup	Run		
2	High Water Level in Scram Discharge Instrument Volume	<50 Gallons	X(2)	X	X	4 Instrument Channels	A
2	Turbine Condenser Low Vacuum	>23 in. Hg. Vacuum			X	4 Instrument Channels	A or C
2	Main Steam Line High Radiation	<3 X Normal Full X Power Background		X	X	4 Instrument Channels	A
4	Main Steam Line Isolation Valve Closure	<10% Valve Closure			X(6)	8 Instrument Channels	A
2	Turbine Control Valve Fast Closure	500<P<850 psig Control Oil Pres- sure Between Fast Closure Solenoid and Disc Dump Valve			X(4)	4 Instrument Channels	A or D
4	Turbine Stop Valve Closure	<10% Valve Closure			X(4)	8 Instrument Channels	A or D

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2	Turbine Condenser Low Vacuum	>23 in. Hg. Vacuum			X	4 Instrument Channels	A or C
2	Main Steam Line High Radiation	<3 X Normal Full X Power Background		X	X(14)	4 Instrument Channels	A
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2	Turbine Control Valve Fast Closure	500<P<850 psig Control Oil Pres- sure Between Fast Closure Solenoid and Disc Dump Valve			X(4)	4 Instrument Channels	A or D
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PBAPS

NOTES FOR TABLE 3.1.1

1. There shall be two operable or tripped trip systems for each function. If the minimum number of operable sensor channels for a trip system cannot be met, the affected trip system shall be placed in the safe (tripped) condition, or the appropriate actions listed below shall be taken.
 - A. Initiate insertion of operable rods and complete insertion of all operable rods within four hours.
 - B. Reduce power level to IRM range and place mode switch in the start up position within 8 hours.
 - C. Reduce turbine load and close main steam line isolation valves within 8 hours.
 - D. Reduce power to less than 30% rated.
2. Permissible to bypass, in refuel and shutdown positions of the reactor mode switch.
3. Deleted.
4. Bypassed when turbine first stage pressure is less than 220 psig or less than 30% of rated.
5. IRM's are bypassed when APRM's are onscale and the reactor mode switch is in the run position.
6. The design permits closure of any two lines without a scram being initiated.
7. When the reactor is subcritical and the reactor water temperature is less than 212 degrees F, only the following trip functions need to be operable:
 - A. Mode switch in shutdown
 - B. Manual scram
 - C. High flux IRM
 - D. Scram discharge instrument volume high level
8. Not required to be operable when primary containment integrity is not required.
9. Not required to be operable when the reactor pressure vessel head is not bolted to the vessel.

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TABLE 4.1.1 (Cont'd)

REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT FUNCTIONAL TESTS
 MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTRUMENT AND CONTROL CIRCUITS

	Group (2)	Functional Test	Minimum Frequency (3)
High Water Level in Scram Discharge Instrument Volume	A	Trip Channel and Alarm	Every 1 month.
Turbine Condenser Low Vacuum (6)	B2	Trip Channel and Alarm (4)	Every 1 month (1).
Main Steam Line High Radiation	B1	Trip Channel and Alarm (4)	Once/week.
Main Steam Line Isolation Valve Closure	A	Trip Channel and Alarm	Every 1 month (1).
Turbine Control Valve EHC Oil Pressure	A	Trip Channel and Alarm	Every 1 month.
Turbine First Stage Pressure Permissive	A	Trip Channel and Alarm	Every 3 months (1).
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Every 1 month (1).

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Main Steam Line Isolation Valve Closure	A	Trip Channel and Alarm	Every 1 month (1).
Turbine Control Valve EHC Oil Pressure	A	Trip Channel and Alarm	Every 1 month.
Turbine First Stage Pressure Permissive	A	Trip Channel and Alarm	Every 3 months (1).
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Every 1 month (1).

TABLE 4.1.2 (Cont'd.)

REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT CALIBRATION
MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration (4)	Minimum Frequency (2)
Turbine Control Valve Fast Closure Oil Pressure Trip	A	Standard Pressure Source	Once per operating cycle.
Turbine Stop Valve Closure	A	Note (5)	Note (5)

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Turbine Control Valve Fast Closure Oil Pressure Trip	A	Standard Pressure Source	Once per operating cycle.
Turbine Stop Valve Closure	A	Note (5)	Note (5)

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the amount of water which must be accommodated during a scram.

During normal operation the discharge volume is empty; however, should it fill with water, the water discharged to the piping from the reactor could not be accommodated which would result in slow scram times or partial control rod insertion. To preclude this occurrence, level switches have been provided in the instrument volume which alarm and scram the reactor when the volume of water reaches 50 gallons. As indicated above, there is sufficient volume in the piping to accommodate the scram without impairment of the scram times or amount of insertion of the control rods. This function shuts the reactor down while sufficient volume remains to accommodate the discharged water and precludes the situation in which a scram would be required but not be able to perform its function adequately.

A source range monitor (SRM) system is also provided to supply additional neutron level information during start-up but has no scram functions (reference paragraph 7.5.4 FSAR). Thus, the IRM and APRM are required in the "Refuel" and "Start/Hot Standby" modes. In the power range the APRM system provides required protection (reference paragraph 7.5.7 FSAR). Thus the IRM System is not required in the "Run" mode. The APRM's cover only the power range. The IRM's and APRM's provide adequate coverage in the start-up and intermediate range.

The high reactor pressure, high drywell pressure, reactor low water level and scram discharge volume high level scrams are required for Startup and Run modes of plant operation. They are, therefore, required to be operational for these modes of reactor operation.

The requirement to have the scram functions indicated in Table 3.1.1 operable in the Refuel mode assures that shifting to the Refuel mode during reactor power operation does not diminish the protection provided by the reactor protection system.

The turbine condenser low vacuum scram is only required during power operation and must be bypassed to start up the unit. The main condenser low vacuum trip is bypassed except in the run position of the mode switch.

Turbine stop valve closure occurs at 10% of valve closure. Below 220 psig turbine first stage pressure (30% of rated), the scram signal due to turbine stop valve closure is bypassed because the flux and pressure scrams are adequate to protect the reactor.

TABLE 3.2.A

INSTRUMENTATION THAT INITIATES PRIMARY CONTAINMENT ISOLATION

Minimum No. of Operable Instrument Channels per Trip System (1)	Instrument	Trip Level Setting	Number of Instrument Channels Provided By Design	Action. (2)
2	Main Steam Line Leak Detection High Temperature	\leq 200 Deg. F	4 Inst. Channels	B
1	Reactor Cleanup System High Flow	$<$ 300% of Rated Flow	2 Inst. Channels	C
1	Reactor Cleanup System High Temperature	\leq 200 Deg. F.	1 Inst. Channels	E
2	Reactor Pressure (Feedwater Flush System Interlock)	\leq 600 psig	4 Inst. Channels	F

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1	Reactor Cleanup System High Temperature	≤ 200 Deg. F.	1 Inst. Channels	E
2	Reactor Pressure (Feedwater Flush System Interlock)	≤ 600 psig	4 Inst. Channels	F

NOTES FOR TABLE 3.2.A

1. Whenever Primary Containment integrity is required by Section 3.7, there shall be two operable or tripped trip systems for each function.
2. If the first column cannot be met for one of the trip systems, that trip system shall be tripped or the appropriate action listed below shall be taken:
 - A. Initiate an orderly shutdown and have the reactor in Cold Shutdown Condition in 24 hours.
 - B. Initiate an orderly load reduction and have Main Steam Lines isolated within eight hours.
 - C. Isolate Reactor Water Cleanup System.
 - D. Isolate Shutdown Cooling.
 - E. Isolate Reactor Water Cleanup Filter Demineralizers unless the following provision is satisfied. The RWCU Filter Demineralizer may be used (the isolation overridden) to route the reactor water to the main condenser or waste surge tank, with the high temperature trip inoperable for up to 48 hours, provided the water inlet temperature is monitored once per hour and confirmed to be below 180 degree F.
 - F. Isolate Feedwater Flush System
3. Instrument setpoint corresponds to 177.7" above top of active fuel.
4. Instrument setpoint corresponds to 129.7" above top of active fuel.
5. Two required for each steam line.
6. These signals also start SBGTS and initiate secondary containment isolation.
7. Only required in Run Mode (interlocked with Mode Switch).
8. At a radiation level of 1.5 times the normal rated power background, an alarm will be tripped in the control room to alert the control room operators to an increase in the main steam line tunnel radiation level.

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5. Two required for each steam line.
6. These signals also start SBGTS and initiate secondary containment isolation.
7. Only required in Run Mode (interlocked with Mode Switch).
8. At a radiation level of 1.5 times the normal rated power background, an alarm will be tripped in the control room to alert the control room operators to an increase in the main steam line tunnel radiation level.

NOTES FOR TABLE 3.2.A (Continued)

9. In the event of a loss of ventilation in the main steam line tunnel area, the main steam line tunnel exhaust duct high temperature setpoint may be raised up to 250 degrees F for a period not to exceed 30 minutes to permit restoration of the ventilation flow. During the 30 minute period, an operator shall observe control room indications of the duct temperature so in the event of rapid increases (indicative of a steam line break) the operator shall promptly close the main steam line isolation valves.
10. Within 24 hours prior to the planned start of the hydrogen injection test with the reactor power at greater than 20% rated power, the normal full power radiation background level and associated trip setpoints may be changed based on a calculated value of the radiation level expected during the test. The background radiation level and associated trip setpoints may be adjusted during the test program based on either calculations or measurements of actual radiation levels resulting from hydrogen injection. The background radiation level shall be determined and associated trip setpoints shall be set within 24 hours of re-establishing normal radiation levels after completion of the test program, and within 12 hours of establishing reactor power levels below 20% rated power.

NOTES FOR TABLE 3.2.A (Continued)

9. In the event of a loss of ventilation in the main steam line tunnel area, the main steam line tunnel exhaust duct high temperature setpoint may be raised up to 250 degrees F for a period not to exceed 30 minutes to permit restoration of the ventilation flow. During the 30 minute period, an operator shall observe control room indications of the duct temperature so in the event of rapid increases (indicative of a steam line break) the operator shall promptly close the main steam line isolation valves.

TABLE 4.2.A

MINIMUM TEST AND CALIBRATION FREQUENCY FOR PCIS

Instrument Channel (5)	Instrument Functional Test	Calibration Frequency	Instrument Check
1) Reactor High Pressure (Shutdown Cooling Permissive)	(1)	Once/3 months	None
2) Reactor Low-Low Water Level (7)	(1)(3)	Once/operating cycle	Once/day
3) Main Steam High Temp.	(1)(3)	Once/operating cycle	Once/day
4) Main Steam High Flow (7)	(1)(3)	Once/operating cycle	Once/day
5) Main Steam Low Pressure	(1)	Once/3 months	None
6) Reactor Water Cleanup High Flow	(1)	Once/3 months	Once/day
7) Reactor Water Cleanup High Temp.	(1)	Once/3 months	None
8) Reactor Pressure (Feedwater Flush Permissive)	(1)(3)	Once/operating cycle	Once/day
100 1 Logic System Functional Test (4) (6)		Frequency	
1) Main Steam Line Isolation Vvs. Main Steam Line Drain Vvs. Reactor Water Sample Vvs.		Once/6 months	
2) RHR - Isolation Vv. Control Shutdown Cooling Vvs. Head Spray		Once/6 months	
3) Reactor Water Cleanup Isolation		Once/6 months	
4) Drywell Isolation Vvs. TIP Withdrawal Atmospheric Control Vvs. Sump Drain Valves		Once/6 months	
5) Standby Gas Treatment System Reactor Building Isolation		Once/6 months	

SIMPLIFIED SCHEMATIC-CONDENSER LOW VACUUM/
MSIV CLOSURE-BYPASS TYPICAL OF FOUR TRIP LOGIC.

