

TABLE 3.1.1 PROTECTIVE INSTRUMENTATION REQUIREMENTS  
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Function	Trip Setting	Reactor Modes in which Function Must Be OPERABLE				Minimum Number of OPERABLE or OPERATING [tripped] Trip Systems	Minimum Number of Instrument Channels Per OPERABLE Trip System	Action Required*
		Shutdown	Refuel	Startup	Run			
<b>E. Containment Spray</b>								
Comply with Technical Specification 3.4								
<b>F. Primary Containment Isolation</b>								
1. High Drywell Pressure	≤ 3.5 psig	X(u)	X(u)	X(u)	X	2(k)	2(k)(oo)	Isolate containment or PLACE IN COLD SHUTDOWN CONDITION
2. Low-Low Reactor Water Level	≥ 7'2" above TOP of ACTIVE FUEL	X(u)	X(u)	X(u)	X	2	2(oo)	
<b>G. Automatic Depressurization</b>								
1. High Drywell Pressure	≤ 3.5 psig	X(v)	X(v)	X(v)	X	2(k)	2(k)	See note h
2. Low-Low-Low Reactor Water Level	≥ 4'8" above TOP of ACTIVE FUEL	X(v)	X(v)	X(v)	X	2	2	See note h
3. Core Spray Booster Pump d/p Permissive	> 21.2 psid	X(v)	X(v)	X(v)	X	Note i	Note i	See note i
<b>H. Isolation Condenser Isolation (See Note hh)</b>								
1. High Flow Steam Line	≤ 20 psig P	X(s)	X(s)	X	X	2	2(oo)	Isolate affected Isolation Condenser comply with Spec 3.8. See note dd
2. High Flow Condensate Line	≤ 27" P H <sub>2</sub> O	X(s)	X(s)	X	X	2	2(oo)	

The average of the scram insertion times for the three fastest control rods of all groups of four control rods in a two-by-two array shall be no greater than:

<u>Rod Length Inserted (%)</u>	<u>Insertion Time (Seconds)</u>
5	0.398
20	0.954
50	2.120
90	5.300

Any four rod group may contain a control rod which is valved out of service provided the above requirements and Specification 3.2.A are met. Time zero shall be taken as the de-energization of the pilot scram valve solenoids.

4. In service control rods which cannot be moved with control rod drive pressure shall be considered inoperable. If a partially or fully withdrawn control rod drive cannot be moved with drive or scram pressure, the reactor shall be brought to a shutdown condition within 48 hours unless investigation demonstrates that the cause of the failure is not due to a failed control rod drive mechanism collet housing. Inoperable control rods shall be valved out of service, in such positions that Specification 3.2.A is met. In no case shall the number of inoperable control rods valved out of service be greater than six during the power operation. If this specification is not met, the reactor shall be placed in the shutdown condition.
5. Control Rods shall not be withdrawn for approach to criticality unless at least two source range channels have an observed count rate equal to or greater than 3 counts per second.

C. Standby Liquid Control System

1. The standby liquid control system shall be operable at all times when the reactor is not shut down by the control rods such that Specification 3.2.A is met and except as provided in Specification 3.2.C.3.
2. The standby liquid control solution shall have a Boron-10 isotopic enrichment equal to or greater than 35 atom %, be maintained within the cross-hatched volume-concentration requirement area in Figure 3.2-1 and at a temperature not less than the temperature presented in Figure 3.2-2 at all times when the standby liquid control system is required to be operable.
3. (a) If one standby liquid control system pumping circuit becomes inoperable during the RUN mode and Specification 3.2.A is met, the reactor may remain in operation for a period not to exceed 7 days, provided the pump in the other circuit is verified daily to be operable, otherwise be in the Shutdown condition within 24 hours.

However, 200 milliseconds is conservatively assumed for this time interval in the transient analyses and this is also included in the allowable scram insertion times of Specification 3.2.B.3. The specified limits provide sufficient scram capability to accommodate failure to scram of any one operable rod. This failure is in addition to any inoperable rods that exist in the core, provided that those inoperable rods met the core reactivity Specification 3.2.A.

Control rods (6) which cannot be moved with control rod drive pressure are clearly indicative of an abnormal operating condition on the affected rods and are, therefore, considered to be inoperable. Inoperable rods are valved out of service to fix their position in the core and assure predictable behavior. If the rod is fully inserted and then valved out of service, it is in a safe position of maximum contribution to shutdown reactivity. If it is valved out of service in a non-fully inserted position, that position is required to be consistent with the shutdown reactivity limitation stated in Specification 3.2.A, which assures the core can be shutdown at all times with control rods. Before a rod is valved out of service in a non-fully inserted position, an analysis is performed to insure Specification 3.2.A is met.

The number of inoperable control rods permitted to be valved out of service could be many more than six allowed by the specification, particularly late in the operating cycle; however, the occurrence of more than six could be indicative of a generic problem and the reactor will be shut down. Operable rods that have been taken out of service at the fully inserted position to perform HCU maintenance are not to be counted as inoperable control rods. Also, if damage within the control rod drive mechanism and in particular, cracks in drive internal housings, cannot be ruled out, then a generic problem affecting a number of drives cannot be ruled out. Circumferential cracks resulting from stress assisted intergranular corrosion have occurred in the collet housing of drives at several BWRs. This type of cracking could occur in a number of drives and if the cracks propagated until severance of the collet housing occurred, scram could be prevented in the affected rods. Limiting the period of operation with a potentially severed collet housing and requiring increased surveillance after detecting one stuck rod will assure that the reactor will not be operated with a large number of rods with failed collet housings. Placing the reactor in the shutdown condition inserts the control rods and accomplishes the objective of the specifications on control rod operability. This operation is normally expected to be accomplished within eight hours.

The source range monitor (SRM) system (7) performs no automatic safety function. It does provide the operator with a visual indication of neutron level which is needed for knowledgeable and efficient reactor startup at low neutron levels. The results of the reactivity accidents are functions of the neutron flux. The requirement of at least 3 cps assures that any transient begins at or above the initial value of  $10^{-8}$  of rated power used in the analyses of transients from cold conditions. One operable SRM channel would be adequate to monitor the approach to critical using homogeneous patterns of scattered control rods.