ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-318
MARKED PAGES

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II. MARKED PAGES

See attached.

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SAFETY LIMIT	LIMITING SAFETY SYSTEM SETTING

1.1.B. Power Transient

To ensure that the Safety Limits established in Specification 1.1.A are not exceeded, each required scram shall be initiated by its expected scram signal. The Safety Limit shall be assumed to be exceeded when scram is accomplished by means other than the expected scram signal.

2.1.B. Power Transient Trip Settings

1.	Scram and isolation (PCIS groups 2,3,6) reactor low water level	≥ 538 in. above vessel zero
2.	Scram--turbine stop valve closure	≤ 10 percent valve closure
3.	Scram--turbine control valve fast closure or turbine trip	≥ 550 psig
4.	(Deleted)	
5.	Scram--main steam line isolation	≤ 10 percent valve closure
6.	Main steam isolation valve closure --nuclear system low pressure	≥ 825 psig

C. Reactor Vessel Water Level

Whenever there is irradiated fuel in the reactor vessel, the water level shall be greater than or equal to ~~378~~ 372.5 inches above vessel zero.

C. Water Level Trip Settings

1.	Core spray and LPCI actuation--reactor low water level	≥ ~~378~~ 398 in. above vessel zero
2.	HPCI and RCIC actuation--reactor low water level	≥ 470 in. above vessel zero
3.	Main steam isolation valve closure--reactor low water level	≥ ~~378~~ 398 in. above vessel zero

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1.1 BASES (Cont'd)

The safety limit has been established at ~~378~~ 372.5 inches above vessel zero to provide a point which can be monitored and also provide adequate margin to assure sufficient cooling. ~~This point is the lower reactor low water level trip.~~

REFERENCE

1. General Electric BWR Thermal Analysis Basis (GETAB) Data, Correlation and Design Application, NEDO 10958 and NEDE 10938.

Insert

2. General Electric Document No. EAS-65-0687, Setpoint Determination for Browns Ferry Nuclear Plant, Revision 2.

TABLE 3.2.A
PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Minimum No. Instrument Channels Operable Per Trip Sys(1)(11)	Function	Trip Level Setting	Action (1)	Remarks
2	Instrument Channel - Reactor Low Water Level(6)	≥ 538" above vessel zero	A or (B and E)	1. Below trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation (Groups 2, 3, and 6) c. Initiates SGTS
1	Instrument Channel - Reactor High Pressure (PS-68-93 and 94)	100 ± 15 psig	D	1. Above trip setting isolates the shutdown cooling suction valves of the RHR system.
2	Instrument Channel - Reactor Low Water Level (LIS-3-56A-D, SW #1)	≥ ~~378~~ 398" above vessel zero	A	1. Below trip setting initiates Main Steam Line Isolation
2	Instrument Channel - High Drywell Pressure (6) (PS-64-56A-D)	≤ 2.5 psig	A or (B and E)	1. Above trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation c. Initiates SGTS

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TABLE 3.2.B
INSTRUMENTATION THAT INITATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Reactor Low Water Level	≥ 470" above vessel zero	A	1. Below trip setting initiates HPCI.
2	Instrument Channel - Reactor Low Water Level	≥ 470" above vessel zero.	A	1. Multiplier relays initiate RCIC.
2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D, SW #1)	≥ ~~378~~ 398" above vessel zero.	A	1. Below trip setting initiates CSS. Multiplier relays initiate LPCI. 2. Multiplier relay from CSS initiates accident signal (15).
2(16)	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D, SW #2)	≥ ~~378~~ 398" above vessel zero.	A	1. Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.
1(16)	Instrument Channel - Reactor Low Water Level Permissive (LIS-3-184 & 185, SW #1)	≥ 544" above vessel zero.	A	1. Below trip setting permissive for initiating signals on ADS.
1	Instrument Channel - Reactor Low Water Level (LITS-3-52 and 62, SW #1)	≥ 312 5/16" above vessel zero. (2/3 core height)	A	1. Below trip setting prevents inadvertent operation of containment spray during accident condition.

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Unit 1

3.2/4.2-14

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NOTES FOR TABLE 3.2.B (Cont'd)

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10. Only one trip system for each cooler fan.

11. In only two of the four 4160-V shutdown boards. See note 13.

12. In only one of the four 4160-V shutdown boards. See note 13.

13. An emergency 4160-V shutdown board is considered a trip system.

14. RHRSW pump would be inoperable. Refer to Section 4.5.C for the requirements of a RHRSW pump being inoperable.

15. The accident signal is the satisfactory completion of a one-out-of-two taken twice logic of the drywell high pressure plus low reactor pressure or the vessel low water level ($\geq$ ~~378~~ 398" above vessel zero) originating in the core spray system trip system.

16. The ADS circuitry is capable of accomplishing its protective action with one OPERABLE trip system. Therefore, one trip system may be taken out of service for functional testing and calibration for a period not to exceed eight hours.

17. Two RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 hours, an orderly power reduction shall be initiated and reactor power shall be less than 30 percent within four hours.

18. Not required to be OPERABLE in the COLD SHUTDOWN CONDITION.

In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operator's ability to control, or terminates operator errors before they result in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the core cooling systems, control rod block and standby gas treatment systems. The objectives of the Specifications are (i) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, and (ii) to prescribe the trip settings required to assure adequate performance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

Some of the settings on the instrumentation that initiate or control core and containment cooling have tolerances explicitly stated where the high and low values are both critical and may have a substantial effect on safety. The setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are chosen at a level away from the normal operating range to prevent inadvertent actuation of the safety system involved and exposure to abnormal situations.

Actuation of primary containment valves is initiated by protective instrumentation shown in Table 3.2.A which senses the conditions for which isolation is required. Such instrumentation must be available whenever primary containment integrity is required.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement.

The low water level instrumentation set to trip at 538 inches above vessel zero closes isolation valves in the RHR System, Drywell and Suppression Chamber exhausts and drains and Reactor Water Cleanup Lines (Groups 2 and 3 isolation valves). The low reactor water level instrumentation that is set to trip when reactor water level is 470 inches above vessel zero (Table 3.2.B) trips the recirculation pumps and initiates the RCIC and HPCI systems. The RCIC and HPCI system initiation opens the turbine steam supply valve which in turn initiates closure of the respective drain valves (Group 7).

The low water level instrumentation set to trip at ≥ 398 ~~378~~ inches above vessel zero (Table 3.2.B) closes the Main Steam Isolation Valves, the Main Steam Line Drain Valves, and the Reactor Water Sample Valves (Group 1). These trip settings are adequate to prevent core uncovery in the case of a break in the largest line assuming the maximum closing time.

≥ 398

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The low reactor water level instrumentation that is set to trip when reactor water level is 378 inches above vessel zero (Table 3.2.B) initiates the LPCI, Core Spray Pumps, contributes to ADS initiation, and starts the diesel generators. These trip setting levels were chosen to be high enough to prevent spurious actuation but low enough to initiate CSCS operation so that postaccident cooling can be accomplished and the guidelines of 10 CFR 100 will not be violated. For large breaks up to the complete circumferential break of a 28-inch recirculation line and with the trip setting given above, CSCS initiation is initiated in time to meet the above criteria.

The high drywell pressure instrumentation is a diverse signal to the water level instrumentation and, in addition to initiating CSCS, it causes isolation of Groups 2 and 8 isolation valves. For the breaks discussed above, this instrumentation will initiate CSCS operation at about the same time as the low water level instrumentation; thus, the results given above are applicable here also.

Venturis are provided in the main steam lines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steam line break accident. The primary function of the instrumentation is to detect a break in the main steam line. For the worst case accident, main steam line break outside the drywell, a trip setting of 140 percent of rated steam flow in conjunction with the flow limiters and main steam line valve closure limits the mass inventory loss such that fuel is not uncovered, fuel cladding temperatures remain below 1000°F, and release of radioactivity to the environs is well below 10 CFR 100 guidelines. Reference Section 14.6.5 FSAR.

Temperature monitoring instrumentation is provided in the main steam line tunnel to detect leaks in these areas. Trips are provided on this instrumentation and when exceeded, cause closure of isolation valves. The setting of 200°F for the main steam line tunnel detector is low enough to detect leaks of the order of 15 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation. In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200°F. The temperature increases can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to bypass the temperature trip for four hours to avoid an unnecessary plant transient and allow performance of the secondary containment leak rate test or make repairs necessary to regain normal ventilation.

High radiation monitors in the main steam line tunnel have been provided to detect gross fuel failure as in the control rod drop accident. With the established nominal setting of three times normal background and main

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A PRIMARY CONTAINMENT	4.7.A PRIMARY CONTAINMENT
3. Pressure Suppression Chamber - Reactor Building Vacuum Breakers	3. Pressure Suppression Chamber-Reactor Building Vacuum Breakers
a. Except as specified in 3.7.A.3.b below, two pressure suppression chamber-reactor building vacuum breakers shall be OPERABLE at all times when primary containment integrity is required. The setpoint of the differential pressure instrumentation which actuates the pressure suppression chamber-reactor building vacuum breakers shall be ~~0.5 psid.~~ per Table 3.7.A.	a. The pressure suppression chamber-reactor building vacuum breakers shall be exercised in accordance with Specification 1.0.MM, and the associated instrumentation including setpoint shall be functionally tested for proper operation ~~each three months.~~ per Table 4.7.A.
b. From and after the date that one of the pressure suppression chamber-reactor building vacuum breakers is made or found to be INOPERABLE for any reason, reactor operation is permissible only during the succeeding seven days, provided that the repair procedure does not violate primary containment integrity.	b. A visual examination and determination that the force required to open each vacuum breaker (check valve) does not exceed 0.5 psid will be made each refueling outage.
4. Drywell-Pressure Suppression Chamber Vacuum Breakers	4. Drywell-Pressure Suppression Chamber Vacuum Breakers
a. When primary containment is required, all drywell-suppression chamber vacuum breakers shall be OPERABLE and positioned in the fully closed position (except during testing) except as specified in 3.7.A.4.b and 3.7.A.4.c., below.	a. Each drywell-suppression chamber vacuum breaker shall be tested in accordance with Specification 1.0.MM.
b. One drywell-suppression chamber vacuum breaker may be nonfully closed so long as it is determined to be not more than 3° open as indicated by the position lights.	b. When it is determined that two vacuum breakers are INOPERABLE for opening at a time when operability is required, all other vacuum breaker valves shall be exercised immediately and every 15 days thereafter until the INOPERABLE valve has been returned to normal service.

TABLE 3.7.A

INSTRUMENTATION FOR CONTAINMENT SYSTEMS

Minimum No. Operable Per Trip System	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	0.5 psid	(1)	Actuates the pressure suppression chamber-reactor building vacuum breakers.

Footnote:

(1) - Repair in 24 hours. If the function is not OPERABLE in 24 hours, declare the system or component inoperable.

TABLE 4.7.A

CONTAINMENT SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	Once/month (1)	Once/18 months (2)	None.

Footnotes:

(1) - Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify OPERABILITY of the trip and alarm functions.

(2) - Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the level setting.

Demonstration of the automatic initiation capability and OPERABILITY of filter cooling is necessary to assure system performance capability. If one standby gas treatment system is inoperable, the other systems must be tested daily. This substantiates the availability of the OPERABLE systems and thus reactor operation and refueling operation can continue for a limited period of time.

3.7.D/4.7.D Primary Containment Isolation Valves

The Browns Ferry Containment Leak Rate Program and Procedures contains the list of all the Primary Containment Isolation Valves for which the Technical Specification requirements apply. The procedures are subject to the change control provisions for plant procedures in the administrative controls section of the Technical Specifications. The opening of locked or sealed closed containment isolation valves on an intermittent basis under administrative control includes the following considerations: (1) stationing an operator, who is in constant communication with the control room, at the valve controls, (2) instructing this operator to close these valves in an accident situation, and (3) assuring that environmental conditions will not preclude access to close the valves and that this action will prevent the release of radioactivity outside the containment.

Double isolation valves are provided on lines penetrating the primary containment and open to the free space of the containment. Closure of one of the valves in each line would be sufficient to maintain the integrity of the pressure suppression system. Automatic initiation is required to minimize the potential leakage paths from the containment in the event of a LOCA.

Group 1 - Process lines are isolated by reactor vessel low water level ~~(378")~~ (≥ 398") in order to allow for removal of decay heat subsequent to a scram, yet isolate in time for proper operation of the core standby cooling systems. The valves in Group 1, except the reactor water sample line valves, are also closed when process instrumentation detects excessive main steam line flow, high radiation, low pressure, or main steam space high temperature. The reactor water sample line valves isolate only on reactor low water level at ~~378"~~ ≥ 398" or main steam line high radiation.

Group 2 - Isolation valves are closed by reactor vessel low water level (538") or high drywell pressure. The Group 2 isolation signal also "isolates" the reactor building and starts the standby gas treatment system. It is not desirable to actuate the Group 2 isolation signal by a transient or spurious signal.

Group 3 - Process lines are normally in use, and it is therefore not desirable to cause spurious isolation due to high drywell pressure resulting from nonsafety related causes. To protect the reactor from a possible pipe break

Table 3.2.L
Anticipated Transient Without Scram (ATWS) - RPT
Recirculation Pump Test (RPT) Surveillance Instrumentation

Minimum No. Channels Operable per Trip Sys (1)	Function	Trip Setting	Allowable Value	Action	Remarks
2	ATWS/RPT Logic Reactor Dome Pressure High (PIS-3-204A-D)	1118 psig	≤ 1146.5 psig	(2)	Two out of two of the high reactor dome pressure channels or the low reactor vessel level channels in either trip system trips both reactor recirculation pumps.
2	Reactor Vessel Level Low (LS-3-58A1-D1)	483" above vessel zero	≥ 471.52" above vessel zero		

(1) One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required surveillance provided the other channels in that trip system are OPERABLE.

(2) Two trip systems exist, either of which will trip both recirculation pumps. Perform Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

TABLE 4.2.B

SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration		Instrument Check
Instrument Channel Reactor Low Water Level (LIS-3-58A-D, LS-3-58A-D)	(1) (27)	Once/18 Months	(28)	Once/day
Instrument Channel Reactor Low Water Level (LIS-3-184 & 185)	(1) (27)	Once/18 Months	(28)	Once/day
Instrument Channel Reactor Low Water Level (LIS-3-52 & 62A)	(1) (27)	Once/18 Months	(28)	Once/day
Instrument Channel Drywell High Pressure (PIS-64-58E-H)	(1) (27)	Once/18 Months	(28)	none
Instrument Channel Drywell High Pressure (PIS-64-58A-D)	(1) (27)	Once/18 Months	(28)	none
Instrument Channel Drywell High Pressure (PIS-64-57A-D)	(1) (27)	Once/18 Months	(28)	none
Instrument Channel Reactor Low Pressure (PIS-3-74A&B, PS-3-74A&B) (PIS-68-95, PS-68-95) (PIS-68-96, PS-68-96)	(1) (27)	Once/6 Months	(28)	none

TABLE 4.2.B (Continued)

SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - RHR Pump Discharge Pressure	(1)	Once/3 months	none
Instrument Channel - Core Spray Pump Discharge Pressure	(1)	Once/3 months	none
Core Spray Sparger to RPV d/p	(1)	Once/3 months	Once/day
Trip System Bus Power Monitor	Once/operating Cycle	N/A	none
Instrument Channel - Condensate Header Low Level (LS-73-56A, B)	(1)	Once/3 months	none
Instrument Channel - Suppression Chamber High Level	(1)	Once/3 months	none
Instrument Channel - Reactor High Water Level (LIS-3-208A-D)	(1) (27)	~~Once/3 months~~ Once/18 Months (28)	Once/day
Instrument Channel - RCIC Turbine Steam Line High Flow	(1) (27)	~~Once/3 months~~ Once/18 Months (28)	none
Instrument Channel - RCIC Steam Supply Low Pressure	Once/31 days	Once/18 months	none
Instrument Channel - RCIC Turbine Exhaust Diaphragm High Pressure	Once/31 days	Once/18 months	none
HPCI Steam Line Space Torus Area High Temperature	(1)	Once/3 months	none
HPCI Steam Line Space HPCI Pump Room Area High Temperature	(1)	Once/3 months	none

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TABLE 4.2.B (Continued)

SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - HPCI Turbine Steam Line High Flow	(1) (27)	~~Once/3 months~~ Once/18 Months (28)	none
Instrument Channel - HPCI Steam Supply Low Pressure	Once/31 days	Once/18 months	none
Instrument Channel - HPCI Turbine Exhaust Diaphragm High Pressure	Once/31 days	Once/18 months	none
Core Spray System Logic	Once/18 months	(6)	N/A
RCIC System (Initiating) Logic	Once/18 months	N/A	N/A
RCIC System (Isolation) Logic	Once/18 months	(6)	N/A
HPCI System (Initiating) Logic	Once/18 months	(6)	N/A
HPCI System (Isolation) Logic	Once/18 months	(6)	N/A
ADS Logic	Once/18 months	(6)	N/A
LPCI (Initiating) Logic	Once/18 months	(6)	N/A
LPCI (Containment Spray) Logic	Once/18 months	(6)	N/A
Core Spray System Auto Initiation Inhibit (Core Spray Auto Initiation)	Once/18 months (7)	N/A	N/A
LPCI Auto Initiation Inhibit (LPCI Auto Initiation)	Once/18 months (7)	N/A	N/A

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TABLE 4.2.F

MINIMUM TEST AND CALIBRATION FREQUENCY FOR SURVEILLANCE INSTRUMENTATION

Instrument Channel	Calibration Frequency	Instrument Check
1) Reactor Water Level (LI-3-58A&B)	~~Once/6 months~~ Once/18 months	Each Shift
2) Reactor Pressure (PI-3-74A&B)	Once/6 months	Each Shift
3) Drywell Pressure (PT-64-67B) and XR-64-50	Once/6 months	Each Shift
4) Drywell Temperature (TI-64-52AB) and XR-64-50	Once/6 months	Each Shift
5) Suppression Chamber Air Temperature (XR-64-52)	Once/6 months	Each Shift
8) Control Rod Position	N/A	Each Shift
9) Neutron Monitoring	(2)	Each Shift
10) Drywell Pressure (PS-64-67B)	Once/6 months	N/A
11) Drywell Pressure (PIS-64-58A)	~~Once/6 months~~ Once/18 months	N/A
12) Drywell Temperature (TS-64-52A)	Once/6 months	N/A
13) Timer (IS-64-67A)	Once/6 months	N/A
14) CAD Tank Level	Once/6 months	Once/day
15) Containment Atmosphere Monitors	Once/6 months	Once/day

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LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A Primary Containment	4.7.A Primary Containment
3. Pressure Suppression Chamber - Reactor Building Vacuum Breakers	3. Pressure Suppression Chamber-Reactor Building Vacuum Breakers
a. Except as specified in 3.7.A.3.b below, two pressure suppression chamber-reactor building vacuum breakers shall be OPERABLE at all times when primary containment integrity is required. The setpoint of the differential pressure instrumentation which actuates the pressure suppression chamber-reactor building vacuum breakers shall be ~~0.5 psid.~~ per Table 3.7.A.	a. The pressure suppression chamber-reactor building vacuum breakers shall be exercised in accordance with Specification 1.0.MM, and the associated instrumentation including setpoint shall be functionally tested for proper operation ~~each three months~~. per Table 4.7.A.
b. From and after the date that one of the pressure suppression chamber-reactor building vacuum breakers is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days, provided that the repair procedure does not violate primary containment integrity.	b. A visual examination and determination that the force required to open each vacuum breaker (check valve) does not exceed 0.5 psid will be made each refueling outage.
4. Drywell-Pressure Suppression Chamber Vacuum Breakers	4. Drywell-Pressure Suppression Chamber Vacuum Breakers
a. When primary containment is required, all drywell-suppression chamber vacuum breakers shall be OPERABLE and positioned in the fully closed position (except during testing) except as specified in 3.7.A.4.b and 3.7.A.4.c., below.	a. Each drywell-suppression chamber vacuum breaker shall be tested in accordance with Specification 1.0.MM.
b. One drywell-suppression chamber vacuum breaker may be nonfully closed so long as it is determined to be not more than 3° open as indicated by the position lights.	b. When it is determined that two vacuum breakers are inoperable for opening at a time when operability is required, all other vacuum breaker valves shall be exercised immediately and every 15 days thereafter until the inoperable valve has been returned to normal service.

TABLE 3.7.A

INSTRUMENTATION FOR CONTAINMENT SYSTEMS

Minimum No. Operable Per Trip System	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	0.5 psid	(1)	Actuates the pressure suppression chamber reactor building vacuum breakers.

Footnote:

(1) - Repair in 24 hours. If the function is not OPERABLE in 24 hours, declare the system or component inoperable.

TABLE 4.7.A

CONTAINMENT SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	Once/month (1)	Once/18 months (2)	None.

Footnotes:

(1) - Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify OPERABILITY of the trip and alarm functions.

(2) - Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the level setting.

SAFETY LIMIT	LIMITING SAFETY SYSTEM SETTING
1.1.B. Power Transient To ensure that the Safety Limits established in Specification 1.1.A are not exceeded, each required scram shall be initiated by its expected scram signal. The Safety Limit shall be assumed to be exceeded when scram is accomplished by means other than the expected scram signal.	2.1.B. Power Transient Trip Settings 1. Scram and isolation (PCIS groups 2,3,6) reactor low water level — ≥ 538 in. above vessel zero 2. Scram—turbine stop valve closure — ≤ 10 percent valve closure 3. Scram—turbine control valve fast closure or turbine trip — ≥ 550 psig 4. (Deleted) 5. Scram—main steam line isolation — ≤ 10 percent valve closure 6. Main steam isolation valve closure—nuclear system low pressure — ≥ 825 psig
C. Reactor Vessel Water Level Whenever there is irradiated fuel in the reactor vessel, the water level shall be greater than or equal to ~~378~~ 372.5 inches above vessel zero.	C. Water Level Trip Settings 1. Core spray and LPCI actuation—reactor low water level — ≥ ~~378~~ 398 in. above vessel zero 2. HPCI and RCIC actuation—reactor low water level — ≥ 470 in. above vessel zero 3. Main steam isolation valve closure—reactor low water level — ≥ ~~378~~ 398 in. above vessel zero

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The safety limit has been established at ~~378~~ 372.5 inches above vessel zero to provide a point which can be monitored and also provide adequate margin to assure sufficient cooling. ~~This point is the lower reactor low water level trip.~~

REFERENCE

1. General Electric BWR Thermal Analysis Basis (GETAB) Data, Correlation and Design Application, NEDO 10958 and NEDE 10938.

Insert

2. General Electric Document No. EAS-65-0687, Setpoint Determination for Browns Ferry Nuclear Plant, Revision 2.

TABLE 3.1.A
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENTS

Min. No. of Operable Instr. Channels Per Trip System (1)(23)	Trip Function	Trip Level Setting	Modes in Which Function Must Be Operable: Shut-down	Refuel (7)	Startup/ Hot Standby	Run	Action (1)
1	Mode Switch in Shutdown		X	X	X	X	1.A
1	Manual Scram		X	X	X	X	1.A
	IRM (16)						
3	High Flux	≤120/125 Indicated on scale	X(22)	X(22)	X	(5)	1.A
3	Inoperative			X	X	(5)	1.A
	APRM (16)(24)(25)						
2	High Flux (Fixed Trip)	≤ 120%				X	1.A or 1.B
2	High Flux (Flow Biased)	See Spec. 2.1.A.1				X	1.A or 1.B
2	High Flux	≤ 15% rated power		X(21)	X(17)	(15)	1.A
2	Inoperative	(13)		X(21)	X(17)	X	1.A
2	Downscale	≥ 3 Indicated on Scale		(11)	(11)	X(12)	1.A or 1.B
2	High Reactor Pressure (PIS-3-22AA, BB, C, D)	≤ 1055 psig		X(10)	X	X	1.A
2	High Drywell Pressure (14) (PIS-64-56 A-D)	≤ 2.5 psig		X(8)	X(8)	X	1.A
2	Reactor Low Water Level (14) (LIS-3-203A-D)	≥ 538" above vessel zero		X	X	X	1.A

TABLE 3.1.A
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENTS

Min. No. of Operable Instr. Channels Per Trip System (1)(23)	Trip Function	Trip Level Setting	Modes In Which Function Must Be Operable: Shut-down	Refuel (7)	Startup/ Hot Standby	Run	Action (1)
2	High Water Level in West Scram Discharge Tank (LS-85-45A-D)	≤ 50 Gallons	X(2)	X(2)	X	X	1.A
2	High Water Level in East Scram Discharge Tank (LS-85-45E-H)	≤ 50 Gallons	X(2)	X(2)	X	X	1.A
4	Main Steam Line Isolation Valve Closure	≤10% Valve Closure				X(6)	1.A or 1.C
2	Turbine Control Valve Fast Closure or Turbine Trip	≥550 psig				X(4)	1.A or 1.D
4	Turbine Stop Valve Closure	≤10% Valve Closure				X(4)	1.A or 1.D
2	Turbine First Stage Pressure Permissive	not ≥154 psig		X(18)	X(18)	X(18)	1.A or 1.D (19)
2	Main Steam Line High Radiation (14)	3 X Normal Full Power Background (20)		X(9)	X(9)	X(9)	1.A or 1.C

(PIS-1-81A+B, PIS-1-91A+B)

Amendment No. 105
Corrected 8/24/87

JUL 17 1987

TABLE 4.1.A
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION FUNCTIONAL TESTS
MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTR. AND CONTROL CIRCUITS

	Group (2)	Functional Test	Minimum Frequency(3)
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
High Flux	C	Trip Channel and Alarm (4)	Once Per Week During Refueling and Before Each Startup
Inoperative	C	Trip Channel and Alarm (4)	Once Per Week During Refueling and Before Each Startup
APRM			
High Flux (15% Scram)	C	Trip Output Relays (4)	Before Each Startup and Weekly When Required to be Operable
High Flux (Flow Biased)	B	Trip Output Relays (4)	Once/Week
High Flux (Fixed Trip)	B	Trip Output Relays (4)	Once/Week
Inoperative	B	Trip Output Relays (4)	Once/Week
Downscale	B	Trip Output Relays (4)	Once/Week
Flow Bias	B	(6)	(6)
High Reactor Pressure (PIS-3-22AA, BB, C, D)	~~A~~ B	Trip Channel and Alarm (7)	Once/Month ~~(1)~~
High Drywell Pressure (PIS-64-56 A-D)	~~A~~ B	Trip Channel and Alarm (7)	Once/Month ~~(1)~~
Reactor Low Water Level (LIS-3-203 A-D)	~~A~~ B	Trip Channel and Alarm (7)	Once/Month ~~(1)~~

TABLE 4.1.A (Continued)

	Group (2)	Functional Test	Minimum Frequency(3)
High Water Level in Scram Discharge Tank Float Switches (LS-85-45C-F)	A	Trip Channel and Alarm	Once/Month
Electronic Level Switches (LS-85-45A, B, G, H)	B	Trip Channel and Alarm (7)	Once/Month
Main Steam Line High Radiation	B	Trip Channel and Alarm (4)	Once/3 Months (8)
Main Steam Line Isolation Valve Closure	A	Trip Channel and Alarm	Once/3 Months (8)
Turbine Control Valve Fast Closure or turbine trip	A	Trip Channel and Alarm	Once/Month (1)
Turbine First Stage Pressure Permissive	~~B~~	Trip Channel and Alarm (7)	Every three months
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Once/Month (1)

3.1/4.1-8

(PIS-1-81A and B, PIS-1-91A and B)

TABLE 4.1.B
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT CALIBRATION
MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration	Minimum Frequency(2)
IRM High Flux	C	Comparison to APRM on Controlled Startups (6)	Note (4)
APRM High Flux Output Signal	B	Heat Balance	Once Every 7 Days
Flow Bias Signal	B	Calibrate Flow Bias Signal (7)	Once/Operating Cycle
LPRM Signal	B	TIP System Traverse (8)	Every 1000 Effective Full Power Hours
High Reactor Pressure (PIS-3-22 AA, BB, C, D)	~~A~~ B	Standard Pressure Source	~~Every 3 Months~~ Once / 6 Months (9)
High Drywell Pressure (PIS-64-56 A-D)	~~A~~ B	Standard Pressure Source	~~Every 3 Months~~ Once / 18 Months (9)
Reactor Low Water Level (LIS-3-203 A-D)	~~A~~ B	Pressure Standard	~~Every 3 Months~~ Once / 18 Months (9)
High Water Level in Scram Discharge Volume Float Switches (LS-85-45C-F)	A	Calibrated Water Column (5)	Note (5)
Electronic Lvl Switches (LS-85-45-A, B, G, H)	B	Calibrated Water Column	Once/Operating Cycle (9)
Main Steam Line Isolation Valve Closure	A	Note (5)	Note (5)
Main Steam Line High Radiation	B	Standard Current Source (3)	Every 3 Months
Turbine First Stage Pressure Permissive	~~A~~ B	Standard Pressure Source	~~Every 6 Months~~ Once / 18 Months (9)
Turbine Control Valve Fast Closure or Turbine Trip	A	Standard Pressure Source	Once/Operating Cycle
Turbine Stop Valve Closure	A	Note (5)	Note (5)

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(PIS-1-81 A+B, PIS-1-91 A+B)

3.1/4.1-10

3.1 BASES

The reactor protection system automatically initiates a reactor scram to:

1. Preserve the integrity of the fuel cladding.

2. Preserve the integrity of the reactor coolant system.

3. Minimize the energy which must be absorbed following a loss of coolant accident, and prevents criticality.

This specification provides the limiting conditions for operation necessary to preserve the ability of the system to tolerate single failures and still perform its intended function even during periods when instrument channels may be out of service because of maintenance. When necessary, one channel may be made INOPERABLE for brief intervals to conduct required functional tests and calibrations.

The reactor protection system is made up of two independent trip systems (refer to Section 7.2, FSAR). There are usually four channels provided to monitor each critical parameter, with two channels in each trip system. The outputs of the channels in a trip system are combined in a logic such that either channel trip will trip that trip system. The simultaneous tripping of both trip systems will produce a reactor scram.

This system meets the intent of IEEE-279 for Nuclear Power Plant Protection Systems. The system has a reliability greater than that of a 2-out-of-3 system and somewhat less than that of a 1-out-of-2 system.

With the exception of the Average Power Range Monitor (APRM) channels, the Intermediate Range Monitor (IRM) channels, the Main Steam Isolation Valve closure and the Turbine Stop Valve closure, each trip system logic has one instrument channel. When the minimum condition for operation on the number of OPERABLE instrument channels per untripped protection trip system is met or if it cannot be met and the effected protection trip system is placed in a tripped condition, the effectiveness of the protection system is preserved; i.e., the system can tolerate a single failure and still perform its intended function of scramming the reactor. Three APRM instrument channels are provided for each protection trip system.

Insert

The reactor protection trip system is supplied, via a separate bus, by its own high inertia, ac motor-generator set. Alternate power is available to either Reactor Protection System bus from an electrical bus that can receive standby electrical power. The RPS monitoring system provides an isolation between nonclass 1E power supply and the class 1E RPS bus. This will ensure that failure of a nonclass 1E reactor protection power supply will not cause adverse interaction to the class 1E Reactor Protection System.

TABLE 3.2.A
PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Minimum No. Instrument Channels Operable Per Trip Sys(1)(11)	Function	Trip Level Setting	Action (1)	Remarks
2	Instrument Channel - Reactor Low Water Level(6) (LIS-3-203 A-D)	≥ 538" above vessel zero	A or (B and E)	1. Below trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation ~~(Groups 2, 3, and 6)~~ c. Initiates SGTS
1	Instrument Channel - Reactor High Pressure (PS-68-93 and 94)	100 ± 15 psig	D	1. Above trip setting isolates the shutdown cooling suction valves of the RHR system.
2	Instrument Channel - Reactor Low Water Level (LIS-3-56A-D) ~~SW #1~~	≥ ~~378"~~ 398" above vessel zero	A	1. Below trip setting initiates Main Steam Line Isolation
2	Instrument Channel - High Drywell Pressure (6) (~~PS-64-56A-D~~) PIS	≤ 2.5 psig	A or (B and E)	1. Above trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation c. Initiates SGTS

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TABLE 3.2.A (Continued)
PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Minimum No. Instrument Channels Operable Per Trip Sys(1)(11)	Function	Trip Level Setting	Action (1)	Remarks
2	Instrument Channel - High Radiation Main Steam Line Tunnel (6)	3 times normal rated full power background (13)	B	1. Above trip setting initiates Main Steam Line Isolation
2	Instrument Channel - Low Pressure Main Steam Line (PIS-1-72, 76, 82, 86)	≥ 825 psig (4)	B	1. Below trip setting initiates Main Steam Line Isolation
2(3)	Instrument Channel - High Flow Main Steam Line (PdIS-1-13A-D, 25A-D, 36A-D, 50A-D)	≤ 140% of rated steam flow	B	1. Above trip setting initiates Main Steam Line Isolation
2(12)	Instrument Channel - Main Steam Line Tunnel High Temperature	≤ 200°F	B	1. Above trip setting initiates Main Steam Line Isolation.
2(14)	Instrument Channel - Reactor Water Cleanup System Floor Drain High Temperature	160 - 180°F	C	1. Above trip setting initiates Isolation of Reactor Water Cleanup Line from Reactor and Reactor Water Return Line.
2	Instrument Channel - Reactor Water Cleanup System Space High Temperature	160 - 180°F	C	1. Same as above
1(15)	Instrument Channel - Reactor Building Ventilation High Radiation - Reactor Zone	≤ 100 mr/hr or downscale	G	1. 1 upscale channel or 2 downscale channels will a. Initiate SGTS b. Isolate reactor zone and refueling floor. c. Close atmosphere control system.

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TABLE 3.2.B
INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero.	A	1. Below trip setting initiates HPCI.
2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero. 398"	A	1. Multiplier relays initiate RCIC.
2	Instrument Channel - Reactor Low Water Level ~~(LIS-3-58A-D, SW#1)~~ (LS-3-58A-D)	≥ ~~358~~ above vessel zero.	A	1. Below trip setting initiates CSS. Multiplier relays initiate LPCI. 2. Multiplier relay from CSS initiates accident signal (15).
2(16)	Instrument Channel - Reactor Low Water Level ~~(LIS-3-58A-D, SW#2)~~ (LS-3-58A-D)	398" ≥ ~~378~~" above vessel zero.	A	1. Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.
1(16)	Instrument Channel - Reactor Low Water Level Permissive (LIS-3-184, ~~85~~ 185) ~~SW#2~~	≥ 544" above vessel zero.	A	1. Below trip setting permissive for initiating signals on ADS.
1	Instrument Channel - Reactor Low Water Level ~~(LIS-3-52 and 62, SW#1)~~ (LIS-3-52 and LIS-3-62A)	≥ 312 5/16" above vessel zero. (2/3 core height)	A	1. Below trip setting prevents inadvertent operation of containment spray during accident condition.

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TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2(18)	Instrument Channel - Drywell High Pressure (PS-64-58 E-H) I	1≤ p≤2.5 psig	A	1. Below trip setting prevents inadvertent operation of containment spray during accident conditions.
2(18)	Instrument Channel - Drywell High Pressure (PS-64-58 A-D) ~~SW#2~~ I	≤ 2.5 psig	A	1. Above trip setting in conjunction with low reactor pressure initiates CSS. Multiplier relays initiate HPCI. 2. Multiplier relay from CSS initiates accident signal. (15)
2(18)	Instrument Channel - Drywell High Pressure (PS-64-58A-D) ~~SW#1~~ I	≤ 2.5 psig	A	1. Above trip setting in conjunction with low reactor pressure initiates LPCI.
2(16)(18)	Instrument Channel - Drywell High Pressure (PS-64-57A-D) I	≤ 2.5 psig	A	1. Above trip setting, in conjunction with low reactor water level, drywell high pressure, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Reactor Low Pressure ~~(PS-3-74 A & B, SW #2)~~ ~~(PS-68-95, SW #2)~~ ~~(PS-68-96, SW #2)~~	450 psig ± 15 (PIS-3-74 A & B) (PIS-68-95, 96)	A	1. Below trip setting permissive for opening CSS and LPCI admission valves.
2	Instrument Channel - Reactor Low Pressure ~~(PS-3-74 A & B, SW #1)~~ ~~(PS-68-95, SW #1)~~ ~~(PS-68-96, SW #1)~~	230 psig ± 15 (PS-3-74 A & B) (PS-68-95, 96)	A	1. Recirculation discharge valve actuation.
1	Instrument Channel - Reactor Low Pressure (PS-68-93 & 94, SW #1)	100 psig ± 15	A	1. Below trip setting in conjunction with containment isolation signal and both suction valves open will close RHR (LPCI) admission valves.
2	Core Spray Auto Sequencing Timers (5)	6≤ t ≤8 sec.	B	1. With diesel power 2. One per motor
2	LPCI Auto Sequencing Timers (5)	0≤ t ≤1 sec.	B	1. With diesel power 2. One per motor
1	RHRSW A3, B1, C3, and D1 Timers	13≤ t ≤15 sec.	A	1. With diesel power 2. One per pump
2	Core Spray and LPCI Auto Sequencing Timers (6)	0≤ t ≤1 sec. 6≤ t ≤8 sec. 12≤ t ≤16 sec. 18≤ t ≤ 24 sec.	B	1. With normal power 2. One per CSS motor 3. Two per RHR motor
1	RHRSW A3, B1, C3, and D1 Timers	27≤ t ≤ 29 sec.	A	1. With normal power 2. One per pump

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
1	HPCI Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
1	RCIC Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
1(2)	Instrument Channel - Condensate Header Low Level (LS-73-56A & B)	≥ Elev. 551'	A	1. Below trip setting will open HPCI suction valves to the suppression chamber.
2(2)	Instrument Channel - Suppression Chamber High Level	≤ 7" above instrument zero	A	1. Above trip setting will open HPCI suction valves to the suppression chamber.
2(2)	Instrument Channel - Reactor High Water Level	≤ 583" above vessel zero	A	1. Above trip setting trips RCIC turbine.
1	Instrument Channel - RCIC Turbine Steam Line High Flow (PDIS-71-1A and 1B)	≤ 450" H_2O (7)	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.
4(4)	Instrument Channel - RCIC Steam Line Space High Temperature	≤200°F.	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.
3(2)	Instrument Channel - RCIC Steam Supply Pressure - Low (PS 71-1A-D)	≥50 psig	A	1. Below trip setting isolates RCIC system and trips RCIC turbine.
3(2)	Instrument Channel - RCIC Turbine Exhaust Diaphragm Pressure - High (PS 71-11A-D)	≤ 20 psig	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.

(LIS-3-208A and LIS-3-208C)

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3.2/4.2-18

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(LIS-3-208B and LIS-3-208D)

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2(2)	Instrument Channel - Reactor High Water Level	≤583" above vessel zero.	A	1. Above trip setting trips HPCI turbine.
1	Instrument Channel - HPCI Turbine Steam Line High Flow (PDIS-73-1A and 1B)	≤90 psi (7)	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
4(4)	Instrument Channel - HPCI Steam Line Space High Temperature	≤200°F.	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
3(2)	Instrument Channel - HPCI Steam Supply Pressure - Low (PS 73-1A-D)	≥100 psig	A	1. Below trip setting isolates HPCI system and trips HPCI turbine.
3(2)	Instrument Channel - HPCI Turbine Exhaust Diaphragm (PS 73-20A-D)	≤20 psig	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
1	Core Spray System Logic	N/A	B	1. Includes testing auto initiation inhibit to Core Spray Systems in other units.
1	RCIC System (Initiating) Logic	N/A	B	1. Includes Group 7 valves. 2. Group 7: The valves in Group 7 are automatically actuated by only the following condition: 1. The respective turbine steam supply valve not fully closed.
1	RCIC System (Isolation) Logic	N/A	B	1. Includes Group 5 valves. 2. Group 5: The valves in Group 5 are actuated by any of the following conditions: a. RCIC Steamline Space High Temperature b. RCIC Steamline High Flow c. RCIC Steamline Low Pressure d. RCIC Turbine Exhaust Diaphragm High Pressure
1 (16)	ADS Logic	N/A	A	

NOTES FOR TABLE 3.2.B (Continued)

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10. Only one trip system for each cooler fan.

11. In only two of the four 4160-V shutdown boards. See note 13.

12. In only one of the four 4160-V shutdown boards. See note 13.

13. An emergency 4160-V shutdown board is considered a trip system.

14. RHRSW pump would be inoperable. Refer to Section 4.5.C for the requirements of a RHRSW pump being inoperable.

15. The accident signal is the satisfactory completion of a one-out-of-two taken twice logic of the drywell high pressure plus low reactor pressure or the vessel low water level (≥ ~~378~~ 398" above vessel zero) originating in the core spray system trip system.

16. The ADS circuitry is capable of accomplishing its protective action with one OPERABLE trip system. Therefore, one trip system may be taken out of service for functional testing and calibration for a period not to exceed eight hours.

17. Two RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 hours, an orderly power reduction shall be initiated and reactor power shall be less than 30 percent within four hours.

18. Not required to be OPERABLE in the COLD SHUTDOWN CONDITION.

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TABLE 3.2.F

Surveillance Instrumentation

Minimum # of Operable Instrument Channels	Instrument #	Instrument	Type Indication and Range	Notes
2	LI-3-58A LI-3-58B ~~LI-3-45 A~~ ~~LI-3-46 B~~	Reactor Water Level	Indicator - 155" to +60"	(1) (2) (3)
2	PI-3-74A PI-3-74B ~~PI-3-54~~ ~~PI-3-61~~	Reactor Pressure	Indicator 0-~~1500~~ 1200 psig	(1) (2) (3)
2	XR-64-50 PI-64-67	Drywell Pressure	Recorder -15 to +65 psig Indicator -15 to +65 psig	(1) (2) (3)
2	TI-64-52 XR-64-50	Drywell Temperature	Recorder, Indicator 0-400°F	(1) (2) (3)
1	XR-64-52	Suppression Chamber Air Temperature	Recorder 0-400°F	(1) (2) (3)
1	N/A	Control Rod Position	6V Indicating Lights	
1	N/A	Neutron Monitoring	SRM, IRM, LPRM 0 to 100% power	(1) (2) (3) (4)
1	PS-64-67	Drywell Pressure	Alarm at 35 psig	
1	XR-64-50 and PS-64-58 B and IS-64-67	Drywell Temperature and Pressure and Timer	Alarm if temp. > 281°F and pressure >2.5 psig after 30 minute delay	(1) (2) (3) (4)
1	LI-84-2A	CAD Tank "A" Level	Indicator 0 to 100%	(1)
1	LI-84-13A	CAD Tank "B" Level	Indicator 0 to 100%	(1)

Table 3.2.L
Anticipated Transient Without Scram (ATWS) - RPT
Recirculation Pump Test (RPT) Surveillance Instrumentation

Minimum No. Channels operable per Trip Sys (1)	Function	Trip Setting	Allowable Value	Action	Remarks
	ATWS/RPT Logic			(2)	Two out of two of the high reactor dome pressure channels or the low reactor vessel level channels in either trip system tripsboth reactor recirculation pumps.
2	Reactor Dome Pressure High (PIS-3-204A-D)	1118 psig	≤ 1146.5 psig		
2	Reactor Vessel Level Low (LS-3-58 AI-DI)	483" above vessel zero	≥ 471.52" above vessel zero		

(1) One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required surveillance provided the other channels in that trip system are OPERABLE.

(2) Two trip systems exist, either of which will trip both recirculation pumps. Perform Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

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TABLE 4.2.A
SURVEILLANCE REQUIREMENTS FOR PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Function	Functional Test	Calibration Frequency	Instrument Check
Instrument Channel - Reactor Low Water Level (LIS-3-203A-D) ~~SW 2-3~~	(1) (28)	~~(5)~~ once/18 Months (29)	once/day
Instrument Channel - Reactor High Pressure	(1)	once/3 months	None
Instrument Channel - Reactor Low Water Level (LIS-3-56A-D) ~~SW #1~~	(1) (28)	~~once/3 month~~ Once/18 months (29)	once/day
Instrument Channel - High Drywell Pressure (PS-64-56A-D)	(1) (28)	~~(5)~~ once/18 Months (29)	N/A
Instrument Channel - High Radiation Main Steam Line Tunnel	once/3 months (27)	(5)	once/day
Instrument Channel - Low Pressure Main Steam Line (PdIS-1-72, 76, 82, 86)	~~once/3 months~~ (28) (27)	~~once/3 months~~ Once/18 Months (29)	None
Instrument Channel - High Flow Main Steam Line (PdIS-1-13A-D, 25A-D, 36A-D, 50A-D)	~~once/3 months~~ (28) (27)	~~once/3 months~~ once/18 Months (29)	once/day

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TABLE 4.2.B
SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - Reactor Lo Water Level (LIS-3-58A-D, LS-3-58A-D)	(1) (28)	~~once/3 months~~ once/18 Months (29)	once/day
Instrument Channel - Reactor Low Water Level (LIS-3-184 & 185)	(1) (28)	~~once/3 months~~ once/18 Months (29)	once/day
Instrument Channel - Reactor Low Water Level ~~(LIS-3-52 & 62)~~ (LIS-3-52 & 62A)	(1) (28)	~~once/3 months~~ once/18 Months (29)	once/day
Instrument Channel - Drywell High Pressure (PS-64-58E-H) I	(1) (28)	~~once/3 months~~ once/18 Months (29)	none
Instrument Channel - Drywell High Pressure (PS-64-58A-D) I	(1) (28)	~~once/3 months~~ once/18 Months (29)	none
Instrument Channel - Drywell High Pressure (PS-64-57A-D) I	(1) (28)	~~once/3 months~~ once/18 Months (29)	none
Instrument Channel - Reactor Low Pressure ~~(PS-3-74A & B)~~ ~~(PS-68-95)~~ ~~(PS-68-96)~~ (PIS-3-74A&B, PS-3-74A&B) (PIS-68-95, PS-68-95) (PIS-68-96, PS-68-96)	(1) (28)	~~once/3 months~~ once/6 Months (29)	none

TABLE 4.2.B (Cont'd)
SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - RHR Pump Discharge Pressure	(1)	once/3 months	none
Instrument Channel - Core Spray Pump Discharge Pressure	(1)	once/3 months	none
Core Spray Sparger to RPV d/p	(1)	once/3 months	once/day
Trip System Bus Power Monitor	once/operating Cycle	N/A	none
Instrument Channel - Condensate Header Level (LS-73-56A, B)	(1)	once/3 months	none
Instrument Channel - Suppression Chamber High Level	(1)	once/3 months	none
Instrument Channel - Reactor High Water Level (LIS-3-208A-D)	(1) (28)	~~once/3 months~~ once/18 Months (29)	once/day
Instrument Channel - RCIC Turbine Steam Line High Flow	(1) (28)	~~once/3 months~~ once/18 Months (29)	none
Instrument Channel - RCIC Steam Line Space High Temperature	(1)	once/3 months	none
Instrument Channel - RCIC Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - RCIC Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day

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TABLE 4.2.B (Cont'd)
SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - HPCI Turbine Steam Line High Flow	(1) (28)	~~once/3 months~~ once/18 Months (29)	none
Instrument Channel - HPCI Steam Line Space High Temperature	(1)	once/3 months	none
Instrument Channel - HPCI Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - HPCI Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day
Core Spray System Logic	once/18 months	(6)	N/A
RCIC System (Initiating) Logic	once/18 months	N/A	N/A
RCIC System (Isolation) Logic	once/18 months	(6)	N/A
HPCI System (Initiating) Logic	once/18 months	(6)	N/A
HPCI System (Isolation) Logic	once/18 months	(6)	N/A
ADS Logic	once/18 months	(6)	N/A
LPCI (Initiating) Logic	once/18 months	(6)	N/A
LPCI (Containment Spray) Logic	once/18 months	(6)	N/A

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TABLE 4.2.F
MINIMUM TEST AND CALIBRATION FREQUENCY FOR SURVEILLANCE INSTRUMENTATION

Instrument Channel	Calibration Frequency	Instrument Check
1) Reactor Water Level (LI-3-58A+B)	~~Once/6 months~~ Once/18 Months	Each Shift
2) Reactor Pressure (PI-3-74A+B)	Once/6 months	Each Shift
3) Drywell Pressure	Once/6 months	Each Shift
4) Drywell Temperature	Once/6 months	Each Shift
5) Suppression Chamber Air Temperature	Once/6 months	Each Shift
8) Control Rod Position	N/A	Each Shift
9) Neutron Monitoring	(2)	Each Shift
10) Drywell Pressure (PS-64-67)	Once/6 months	N/A
11) Drywell Pressure ~~(PS-64-58B)~~ (PIS-64-58A)	~~Once/6 months~~ Once/18 Months	N/A
12) Drywell Temperature (TR-64-52)	Once/6 months	N/A
13) Timer (IS-64-67)	Once/6 months	N/A
14) CAD Tank Level	Once/6 months	Once/day
15) Containment Atmosphere Monitors	Once/6 months	Once/day

3.2/4.2-53

In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operator's ability to control, or terminates operator errors before they result in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the core cooling systems, control rod block and standby gas treatment systems. The objectives of the Specifications are (i) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, and (ii) to prescribe the trip settings required to assure adequate performance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

Some of the settings on the instrumentation that initiate or control core and containment cooling have tolerances explicitly stated where the high and low values are both critical and may have a substantial effect on safety. The setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are chosen at a level away from the normal operating range to prevent inadvertent actuation of the safety system involved and exposure to abnormal situations.

Actuation of primary containment valves is initiated by protective instrumentation shown in Table 3.2.A which senses the conditions for which isolation is required. Such instrumentation must be available whenever primary containment integrity is required.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement.

The low water level instrumentation set to trip at 538 inches above vessel zero closes isolation valves in the RHR System, Drywell and Suppression Chamber exhausts and drains and Reactor Water Cleanup Lines (Groups 2 and 3 isolation valves). The low reactor water level instrumentation that is set to trip when reactor water level is 470 inches above vessel zero (Table 3.2.B) trips the recirculation pumps and initiates the RCIC and HPCI systems. The RCIC and HPCI system initiation opens the turbine steam supply valve which in turn initiates closure of the respective drain valves (Group 7).

The low water level instrumentation set to trip at ≥ 398 ~~378~~ inches above vessel zero (Table 3.2.B) closes the Main Steam Isolation Valves, the Main Steam Line Drain Valves, and the Reactor Water Sample Valves (Group 1). These trip settings are adequate to prevent core uncovery in the case of a break in the largest line assuming the maximum closing time.

The low reactor water level instrumentation that is set to trip when reactor water level is ~~378~~ inches above vessel zero (Table 3.2.B) initiates the LPCI, Core Spray Pumps, contributes to ADS initiation, and starts the diesel generators. These trip setting levels were chosen to be high enough to prevent spurious actuation but low enough to initiate CSCS operation so that postaccident cooling can be accomplished and the guidelines of 10 CFR 100 will not be violated. For large breaks up to the complete circumferential break of a 28-inch recirculation line and with the trip setting given above, CSCS initiation is initiated in time to meet the above criteria.

The high drywell pressure instrumentation is a diverse signal to the water level instrumentation and, in addition to initiating CSCS, it causes isolation of Groups 2 and 8 isolation valves. For the breaks discussed above, this instrumentation will initiate CSCS operation at about the same time as the low water level instrumentation; thus, the results given above are applicable here also.

Venturis are provided in the main steam lines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steam line break accident. The primary function of the instrumentation is to detect a break in the main steam line. For the worst case accident, main steam line break outside the drywell, a trip setting of 140 percent of rated steam flow in conjunction with the flow limiters and main steam line valve closure limits the mass inventory loss such that fuel is not uncovered, fuel cladding temperatures remain below 1000°F, and release of radioactivity to the environs is well below 10 CFR 100 guidelines. Reference Section 14.6.5 FSAR.

Temperature monitoring instrumentation is provided in the main steam line tunnel to detect leaks in these areas. Trips are provided on this instrumentation and when exceeded, cause closure of isolation valves. The setting of 200°F for the main steam line tunnel detector is low enough to detect leaks of the order of 15 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation. In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200°F. The temperature increases can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to bypass the temperature trip for four hours to avoid an unnecessary plant transient and allow performance of the secondary containment leak rate test or make repairs necessary to regain normal ventilation.

High radiation monitors in the main steam line tunnel have been provided to detect gross fuel failure as in the control rod drop accident. With the established nominal setting of three times normal background and main

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LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A PRIMARY CONTAINMENT	4.7.A PRIMARY CONTAINMENT
3. Pressure Suppression Chamber - Reactor Building Vacuum Breakers	3. Pressure Suppression Chamber-Reactor Building Vacuum Breakers.
a. Except as specified in 3.7.A.3.b below, two pressure suppression chamber-reactor building vacuum breakers shall be OPERABLE at all times when primary containment integrity is required. The setpoint of the differential pressure instrumentation which actuates the pressure suppression chamber-reactor building vacuum breakers shall be ~~0.5 psid~~ per Table 3.7.A.	a. The pressure suppression chamber-reactor building vacuum breakers shall be exercised in accordance with Specification 1.0.MM, and the associated instrumentation including setpoint shall be functionally tested for proper operation ~~each three months~~ per Table 4.7.A.
b. From and after the date that one of the pressure suppression chamber-reactor building vacuum breakers is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days, provided that the repair procedure does not violate primary containment integrity.	b. A visual examination and determination that the force required to open each vacuum breaker (check valve) does not exceed 0.5 psid will be made each refueling outage.
4. Drywell-Pressure Suppression Chamber Vacuum Breakers	4. Drywell-Pressure Suppression Chamber Vacuum Breakers
a. When primary containment is required, all drywell-suppression chamber vacuum breakers shall be OPERABLE and positioned in the fully closed position (except during testing) except as specified in 3.7.A.4.b and 3.7.A.4.c below.	a. Each drywell-suppression chamber vacuum breaker shall be tested in accordance with Specification 1.0.MM.
b. One drywell-suppression chamber vacuum breaker may be nonfully closed so long as it is determined to be not more than 3° open as indicated by the position lights.	b. When it is determined that two vacuum breakers are inoperable for opening at a time when operability is required, all other vacuum breaker valves shall be exercised immediately and every 15 days thereafter until the inoperable valve has been returned to normal service.

TABLE 3.7.A

INSTRUMENTATION FOR CONTAINMENT SYSTEMS

Minimum No. Operable Per Trip System	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	0.5 psid	(1)	Actuates the pressure suppression chamber-reactor building vacuum breakers.

Footnote:

(1) - Repair in 24 hours. If the function is not OPERABLE in 24 hours, declare the system or component inoperable.

TABLE 4.7.A

CONTAINMENT SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	Once/month (1)	Once/18 months (2)	None.

Footnotes:

(1) - Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify OPERABILITY of the trip and alarm functions.

(2) - Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the level setting.

3.7/4.7 BASES (Cont'd)

Demonstration of the automatic initiation capability and OPERABILITY of filter cooling is necessary to assure system performance capability. If one standby gas treatment system is inoperable, the other systems must be tested daily. This substantiates the availability of the OPERABLE systems and thus reactor operation and refueling operation can continue for a limited period of time.

3.7.D/4.7.D Primary Containment Isolation Valves

The Browns Ferry Containment Leak Rate Program and Procedures contains the list of all the Primary Containment Isolation Valves for which the Technical Specification requirements apply. The procedures are subject to the change control provisions for plant procedures in the administrative controls section of the Technical Specifications. The opening of locked or sealed closed containment isolation valves on an intermittent basis under administrative control includes the following considerations: (1) stationing an operator, who is in constant communication with the control room, at the valve controls, (2) instructing this operator to close these valves in an accident situation, and (3) assuring that environmental conditions will not preclude access to close the valves and that this action will prevent the release of radioactivity outside the containment.

Double isolation valves are provided on lines penetrating the primary containment and open to the free space of the containment. Closure of one of the valves in each line would be sufficient to maintain the integrity of the pressure suppression system. Automatic initiation is required to minimize the potential leakage paths from the containment in the event of a LOCA.

Group 1 - Process lines are isolated by reactor vessel low water level ~~(378")~~ (≥ 398") in order to allow for removal of decay heat subsequent to a scram, yet isolate in time for proper operation of the core standby cooling systems. The valves in Group 1, except the reactor water sample line valves, are also closed when process instrumentation detects excessive main steam line flow, high radiation, low pressure, or main steam space high temperature. The reactor water sample line valves isolate only on reactor low water level at ~~378"~~ ≥ 398" or main steam line high radiation.

Group 2 - Isolation valves are closed by reactor vessel low water level (538") or high drywell pressure. The Group 2 isolation signal also "isolates" the reactor building and starts the standby gas treatment system. It is not desirable to actuate the Group 2 isolation signal by a transient or spurious signal.

Group 3 - Process lines are normally in use, and it is therefore not desirable to cause spurious isolation due to high drywell pressure resulting from nonsafety related causes. To protect the reactor from a possible pipe break

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-318
REVISED PAGES

I. AFFECTED PAGE LIST

Unit 1	Unit 2	Unit 3
1.1/2.1-5	3.2/4.2-39a	1.1/2.1-5
1.1/2.1-10	3.2/4.2-44	1.1/2.1-10
3.2/4.2-7	3.2/4.2-46	3.1/4.1-2
3.2/4.2-14	3.2/4.2-47	3.1/4.1-3
3.2/4.2-24	3.2/4.2-54	3.1/4.1-7
3.2/4.2-65	3.7/4.7-10	3.1/4.1-8
3.2/4.2-66	3.7/4.7-24a	3.1/4.1-10
3.7/4.7-10	3.7/4.7-24b	3.1/4.1-13
3.7/4.7-24a		3.2/4.2-7
3.7/4.7-24b		3.2/4.2-8
3.7/4.7-34		3.2/4.2-14
		3.2/4.2-15
		3.2/4.2-16
		3.2/4.2-18
		3.2/4.2-19
		3.2/4.2-23
		3.2/4.2-30
		3.2/4.2-38a
		3.2/4.2-39
		3.2/4.2-43
		3.2/4.2-45
		3.2/4.2-46
		3.2/4.2-53
		3.2/4.2-64
		3.2/4.2-65
		3.7/4.7-10
		3.7/4.7-23b
		3.7/4.7-23c
		3.7/4.7-33

II. REVISED PAGES

See attached.

SAFETY LIMIT	LIMITING SAFETY SYSTEM SETTING
1.1.B. Power Transient To ensure that the SAFETY LIMITS established in Specification 1.1.A are not exceeded, each required scram shall be initiated by its expected scram signal. The SAFETY LIMIT shall be assumed to be exceeded when scram is accomplished by means other than the expected scram signal.	2.1.B. Power Transient Trip Settings 1. Scram and isolation (PCIS groups 2,3,6) reactor low water level — ≥ 538 in. above vessel zero 2. Scram--turbine stop valve closure — ≤ 10 percent valve closure 3. Scram--turbine control valve fast closure or turbine trip — ≥ 550 psig 4. (Deleted) 5. Scram--main steam line isolation — ≤ 10 percent valve closure 6. Main steam isolation valve closure --nuclear system low pressure — ≥ 825 psig
C. Reactor Vessel Water Level Whenever there is irradiated fuel in the reactor vessel, the water level shall be greater than or equal to 372.5 inches above vessel zero.	C. Water Level Trip Settings 1. Core spray and LPCI actuation--reactor low water level — ≥ 398 in. above vessel zero 2. HPCI and RCIC actuation--reactor low water level — ≥ 470 in. above vessel zero 3. Main steam isolation valve closure--reactor low water level — ≥ 398 in. above vessel zero

1.1 BASES (Cont'd)

The safety limit has been established at 372.5 inches above vessel zero to provide a point which can be monitored and also provide adequate margin to assure sufficient cooling.

REFERENCE

1. General Electric BWR Thermal Analysis Basis (GETAB) Data, Correlation and Design Application, NEDO 10958 and NEDE 10938.

2. General Electric Document No. EAS-65-0687, Setpoint Determination for Browns Ferry Nuclear Plant, Revision 2.

TABLE 3.2.A
PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Minimum No. Instrument Channels Operable Per Trip Sys(1)(11)	Function	Trip Level Setting	Action (1)	Remarks
2	Instrument Channel - Reactor Low Water Level(6)	≥ 538" above vessel zero	A or (B and E)	1. Below trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation (Groups 2, 3, and 6) c. Initiates SGTS
1	Instrument Channel - Reactor High Pressure (PS-68-93 and 94)	100 ± 15 psig	D	1. Above trip setting isolates the shutdown cooling suction valves of the RHR system.
2	Instrument Channel - Reactor Low Water Level (LIS-3-56A-D, SW #1)	≥ 398" above vessel zero	A	1. Below trip setting initiates Main Steam Line Isolation
2	Instrument Channel - High Drywell Pressure (6) (PS-64-56A-D)	≤ 2.5 psig	A or (B and E)	1. Above trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation c. Initiates SGTS

TABLE 3.2.B
INSTRUMENTATION THAT INITATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Reactor Low Water Level	≥ 470" above vessel zero	A	1. Below trip setting initiates HPCI.
2	Instrument Channel - Reactor Low Water Level	≥ 470" above vessel zero.	A	1. Multiplier relays initiate RCIC.
2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D, SW #1)	≥ 398" above vessel zero.	A	1. Below trip setting initiates CSS. Multiplier relays initiate LPCI. 2. Multiplier relay from CSS initiates accident signal (15).
2(16)	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D, SW #2)	≥ 398" above vessel zero.	A	1. Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.
1(16)	Instrument Channel - Reactor Low Water Level Permissive (LIS-3-184 & 185, SW #1)	≥ 544" above vessel zero.	A	1. Below trip setting permissive for initiating signals on ADS.
1	Instrument Channel - Reactor Low Water Level (LITS-3-52 and 62, SW #1)	≥ 312 5/16" above vessel zero. (2/3 core height)	A	1. Below trip setting prevents inadvertent operation of containment spray during accident condition.

NOTES FOR TABLE 3.2.B (Cont'd)

10. Only one trip system for each cooler fan.

11. In only two of the four 4160-V shutdown boards. See note 13.

12. In only one of the four 4160-V shutdown boards. See note 13.

13. An emergency 4160-V shutdown board is considered a trip system.

14. RHRSW pump would be inoperable. Refer to Section 4.5.C for the requirements of a RHRSW pump being inoperable.

15. The accident signal is the satisfactory completion of a one-out-of-two taken twice logic of the drywell high pressure plus low reactor pressure or the vessel low water level ($\geq$ 398" above vessel zero) originating in the core spray system trip system.

16. The ADS circuitry is capable of accomplishing its protective action with one OPERABLE trip system. Therefore, one trip system may be taken out of service for functional testing and calibration for a period not to exceed eight hours.

17. Two RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 hours, an orderly power reduction shall be initiated and reactor power shall be less than 30 percent within four hours.

18. Not required to be OPERABLE in the COLD SHUTDOWN CONDITION.

3.2 BASES

In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operator's ability to control, or terminates operator errors before they result in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the core cooling systems, control rod block and standby gas treatment systems. The objectives of the Specifications are (i) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, and (ii) to prescribe the trip settings required to assure adequate performance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

Some of the settings on the instrumentation that initiate or control core and containment cooling have tolerances explicitly stated where the high and low values are both critical and may have a substantial effect on safety. The setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are chosen at a level away from the normal operating range to prevent inadvertent actuation of the safety system involved and exposure to abnormal situations.

Actuation of primary containment valves is initiated by protective instrumentation shown in Table 3.2.A which senses the conditions for which isolation is required. Such instrumentation must be available whenever PRIMARY CONTAINMENT INTEGRITY is required.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement.

The low water level instrumentation set to trip at 538 inches above vessel zero closes isolation valves in the RHR System, Drywell and Suppression Chamber exhausts and drains and Reactor Water Cleanup Lines (Groups 2 and 3 isolation valves). The low reactor water level instrumentation that is set to trip when reactor water level is 470 inches above vessel zero (Table 3.2.B) trips the recirculation pumps and initiates the RCIC and HPCI systems. The RCIC and HPCI system initiation opens the turbine steam supply valve which in turn initiates closure of the respective drain valves (Group 7).

The low water level instrumentation set to trip at $\geq$ 398 inches above vessel zero (Table 3.2.B) closes the Main Steam Isolation Valves, the Main Steam Line Drain Valves, and the Reactor Water Sample Valves (Group 1). These trip settings are adequate to prevent core uncovery in the case of a break in the largest line assuming the maximum closing time.

The low reactor water level instrumentation that is set to trip when reactor water level is $\geq$ 398 inches above vessel zero (Table 3.2.B) initiates the LPCI, Core Spray Pumps, contributes to ADS initiation, and starts the diesel generators. These trip setting levels were chosen to be high enough to prevent spurious actuation but low enough to initiate CSCS operation so that postaccident cooling can be accomplished and the guidelines of 10 CFR 100 will not be violated. For large breaks up to the complete circumferential break of a 28-inch recirculation line and with the trip setting given above, CSCS initiation is initiated in time to meet the above criteria.

The high drywell pressure instrumentation is a diverse signal to the water level instrumentation and, in addition to initiating CSCS, it causes isolation of Groups 2 and 8 isolation valves. For the breaks discussed above, this instrumentation will initiate CSCS operation at about the same time as the low water level instrumentation; thus, the results given above are applicable here also.

Venturis are provided in the main steam lines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steam line break accident. The primary function of the instrumentation is to detect a break in the main steam line. For the worst case accident, main steam line break outside the drywell, a trip setting of 140 percent of rated steam flow in conjunction with the flow limiters and main steam line valve closure limits the mass inventory loss such that fuel is not uncovered, fuel cladding temperatures remain below 1000°F, and release of radioactivity to the environs is well below 10 CFR 100 guidelines. Reference Section 14.6.5 FSAR.

Temperature monitoring instrumentation is provided in the main steam line tunnel to detect leaks in these areas. Trips are provided on this instrumentation and when exceeded, cause closure of isolation valves. The setting of 200°F for the main steam line tunnel detector is low enough to detect leaks of the order of 15 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation. In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200°F. The temperature increases can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to bypass the temperature trip for four hours to avoid an unnecessary plant transient and allow performance of the secondary containment leak rate test or make repairs necessary to regain normal ventilation.

High radiation monitors in the main steam line tunnel have been provided to detect gross fuel failure as in the control rod drop accident. With the established nominal setting of three times normal background and main

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A PRIMARY CONTAINMENT	4.7.A PRIMARY CONTAINMENT
3. Pressure Suppression Chamber - Reactor Building Vacuum Breakers	3. Pressure Suppression Chamber-Reactor Building Vacuum Breakers
a. Except as specified in 3.7.A.3.b below, two pressure suppression chamber-reactor building vacuum breakers shall be OPERABLE at all times when PRIMARY CONTAINMENT INTEGRITY is required. The setpoint of the differential pressure instrumentation which actuates the pressure suppression chamber-reactor building vacuum breakers shall be per Table 3.7.A.	a. The pressure suppression chamber-reactor building vacuum breakers shall be exercised in accordance with Specification 1.0.MM, and the associated instrumentation including setpoint shall be functionally tested for proper operation per Table 4.7.A.
b. From and after the date that one of the pressure suppression chamber-reactor building vacuum breakers is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days, provided that the repair procedure does not violate PRIMARY CONTAINMENT INTEGRITY.	b. A visual examination and determination that the force required to open each vacuum breaker (check valve) does not exceed 0.5 psid will be made each refueling outage.
4. Drywell-Pressure Suppression Chamber Vacuum Breakers	4. Drywell-Pressure Suppression Chamber Vacuum Breakers
a. When primary containment is required, all drywell-suppression chamber vacuum breakers shall be OPERABLE and positioned in the fully closed position (except during testing) except as specified in 3.7.A.4.b and 3.7.A.4.c., below.	a. Each drywell-suppression chamber vacuum breaker shall be tested in accordance with Specification 1.0.MM.
b. One drywell-suppression chamber vacuum breaker may be nonfully closed so long as it is determined to be not more than 3° open as indicated by the position lights.	b. When it is determined that two vacuum breakers are inoperable for opening at a time when OPERABILITY is required, all other vacuum breaker valves shall be exercised immediately and every 15 days thereafter until the inoperable valve has been returned to normal service.

TABLE 3.7.A

INSTRUMENTATION FOR CONTAINMENT SYSTEMS

Minimum No. Operable Per Trip System	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	0.5 psid	(1)	Actuates the pressure suppression chamber-reactor building vacuum breakers.

Footnote:

(1) - Repair in 24 hours. If the function is not OPERABLE in 24 hours, declare the system or component inoperable.

TABLE 4.7.A

CONTAINMENT SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel-Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	Once/month(1)	Once/18 months(2)	None

Footnotes:

(1) - Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify OPERABILITY of the trip and alarm functions.

(2) - Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the level settings.

Demonstration of the automatic initiation capability and OPERABILITY of filter cooling is necessary to assure system performance capability. If one standby gas treatment system is inoperable, the other systems must be tested daily. This substantiates the availability of the OPERABLE systems and thus reactor operation and refueling operation can continue for a limited period of time.

3.7.D/4.7.D Primary Containment Isolation Valves

The Browns Ferry Containment Leak Rate Program and Procedures contains the list of all the Primary Containment Isolation Valves for which the Technical Specification requirements apply. The procedures are subject to the change control provisions for plant procedures in the administrative controls section of the Technical Specifications. The opening of locked or sealed closed containment isolation valves on an intermittent basis under administrative control includes the following considerations: (1) stationing an operator, who is in constant communication with the control room, at the valve controls, (2) instructing this operator to close these valves in an accident situation, and (3) assuring that environmental conditions will not preclude access to close the valves and that this action will prevent the release of radioactivity outside the containment.

Double isolation valves are provided on lines penetrating the primary containment and open to the free space of the containment. Closure of one of the valves in each line would be sufficient to maintain the integrity of the pressure suppression system. Automatic initiation is required to minimize the potential leakage paths from the containment in the event of a LOCA.

Group 1 - Process lines are isolated by reactor vessel low water level ($\geq$398") in order to allow for removal of decay heat subsequent to a scram, yet isolate in time for proper operation of the core standby cooling systems. The valves in Group 1, except the reactor water sample line valves, are also closed when process instrumentation detects excessive main steam line flow, high radiation, low pressure, or main steam space high temperature. The reactor water sample line valves isolate only on reactor low water level at $\geq$398" or main steam line high radiation.

Group 2 - Isolation valves are closed by reactor vessel low water level (538") or high drywell pressure. The Group 2 isolation signal also "isolates" the reactor building and starts the standby gas treatment system. It is not desirable to actuate the Group 2 isolation signal by a transient or spurious signal.

Group 3 - Process lines are normally in use, and it is therefore not desirable to cause spurious isolation due to high drywell pressure resulting from nonsafety related causes. To protect the reactor from a possible pipe break

Table 3.2.L
Anticipated Transient Without Scram (ATWS) -
Recirculation Pump Test (RPT) Surveillance Instrumentation

Minimum No. Channels Operable per Trip Sys (1)	Function	Trip Setting	Allowable Value	Action	Remarks
2	ATWS/RPT Logic Reactor Dome Pressure High (PIS-3-204A-D)	1118 psig	$\leq$ 1146.5 psig	(2)	Two out of two of the high reactor dome pressure channels or the low reactor vessel level channels in either trip system trips both reactor recirculation pumps.
2	Reactor Vessel Level Low (LS-3-58 A1-D1)	483" above vessel zero	$\geq$ 471.52" above vessel zero		

(1) One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required surveillance provided the other channels in that trip system are OPERABLE.

(2) Two trip systems exist, either of which will trip both recirculation pumps. Perform Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

TABLE 4.2.B

SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel Reactor Low Water Level (LIS-3-58A-D, LS-3-58A-D)	(1) (27)	Once/18 Months (28)	Once/day
Instrument Channel Reactor Low Water Level (LIS-3-184 & 185)	(1) (27)	Once/18 Months (28)	Once/day
Instrument Channel Reactor Low Water Level (LIS-3-52 & 62A)	(1) (27)	Once/18 Months (28)	Once/day
Instrument Channel Drywell High Pressure (PIS-64-58E-H)	(1) (27)	Once/18 Months (28)	none
Instrument Channel Drywell High Pressure (PIS-64-58A-D)	(1) (27)	Once/18 Months (28)	none
Instrument Channel Drywell High Pressure (PIS-64-57A-D)	(1) (27)	Once/18 Months (28)	none
Instrument Channel Reactor Low Pressure (PIS-3-74A&B, PS-3-74A&B) (PIS-68-95, PS-68-95) (PIS-68-96, PS-68-96)	(1) (27)	Once/6 Months (28)	none

TABLE 4.2.B (Continued)

SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - RHR Pump Discharge Pressure	(1)	Once/3 months	none
Instrument Channel - Core Spray Pump Discharge Pressure	(1)	Once/3 months	none
Core Spray Sparger to RPV d/p	(1)	Once/3 months	Once/day
Trip System Bus Power Monitor	Once/operating Cycle	N/A	none
Instrument Channel - Condensate Header Low Level (LS-73-56A, B)	(1)	Once/3 months	none
Instrument Channel - Suppression Chamber High Level	(1)	Once/3 months	none
Instrument Channel - Reactor High Water Level (LIS-3-208A-D)	(1)(27)	Once/18 months (28)	Once/day
Instrument Channel - RCIC Turbine Steam Line High Flow	(1)(27)	Once/18 months (28)	none
Instrument Channel - RCIC Steam Supply Low Pressure	Once/31 days	Once/18 months	none
Instrument Channel - RCIC Turbine Exhaust Diaphragm High Pressure	Once/31 days	Once/18 months	none
HPCI Steam Line Space Torus Area High Temperature	(1)	Once/3 months	none
HPCI Steam Line Space HPCI Pump Room Area High Temperature	(1)	Once/3 months	none

TABLE 4.2.B (Continued)

SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - HPCI Turbine Steam Line High Flow	(1)(27)	Once/18 months (28)	none
Instrument Channel - HPCI Steam Supply Low Pressure	Once/31 days	Once/18 months	none
Instrument Channel - HPCI Turbine Exhaust Diaphragm High Pressure	Once/31 days	Once/18 months	none
Core Spray System Logic	Once/18 months	(6)	N/A
RCIC System (Initiating) Logic	Once/18 months	N/A	N/A
RCIC System (Isolation) Logic	Once/18 months	(6)	N/A
HPCI System (Initiating) Logic	Once/18 months	(6)	N/A
HPCI System (Isolation) Logic	Once/18 months	(6)	N/A
ADS Logic	Once/18 months	(6)	N/A
LPCI (Initiating) Logic	Once/18 months	(6)	N/A
LPCI (Containment Spray) Logic	Once/18 months	(6)	N/A
Core Spray System Auto Initiation Inhibit (Core Spray Auto Initiation)	Once/18 months (7)	N/A	N/A
LPCI Auto Initiation Inhibit (LPCI Auto Initiation)	Once/18 months (7)	N/A	N/A

TABLE 4.2.F

MINIMUM TEST AND CALIBRATION FREQUENCY FOR SURVEILLANCE INSTRUMENTATION

Instrument Channel	Calibration Frequency	Instrument Check
1) Reactor Water Level (LI-3-58A&B)	Once/18 months	Each Shift
2) Reactor Pressure (PI-3-74A&B)	Once/6 months	Each Shift
3) Drywell Pressure (PI-64-67B) and XR-64-50	Once/6 months	Each Shift
4) Drywell Temperature (TI-64-52AB) and XR-64-50	Once/6 months	Each Shift
5) Suppression Chamber Air Temperature (XR-64-52)	Once/6 months	Each Shift
8) Control Rod Position	N/A	Each Shift
9) Neutron Monitoring	(2)	Each Shift
10) Drywell Pressure (PS-64-67B)	Once/6 months	N/A
11) Drywell Pressure (PIS-64-58A)	Once/18 months	N/A
12) Drywell Temperature (TS-64-52A)	Once/6 months	N/A
13) Timer (IS-64-67A)	Once/6 months	N/A
14) CAD Tank Level	Once/6 months	Once/day
15) Containment Atmosphere Monitors	Once/6 months	Once/day

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A Primary Containment	4.7.A Primary Containment
3. Pressure Suppression Chamber - Reactor Building Vacuum Breakers	3. Pressure Suppression Chamber-Reactor Building Vacuum Breakers
a. Except as specified in 3.7.A.3.b below, two pressure suppression chamber-reactor building vacuum breakers shall be OPERABLE at all times when PRIMARY CONTAINMENT INTEGRITY is required. The setpoint of the differential pressure instrumentation which actuates the pressure suppression chamber-reactor building vacuum breakers shall be per Table 3.7.A.	a. The pressure suppression chamber-reactor building vacuum breakers shall be exercised in accordance with Specification 1.0.MM, and the associated instrumentation including setpoint shall be functionally tested for proper operation per Table 4.7.A.
b. From and after the date that one of the pressure suppression chamber-reactor building vacuum breakers is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days, provided that the repair procedure does not violate PRIMARY CONTAINMENT INTEGRITY.	b. A visual examination and determination that the force required to open each vacuum breaker (check valve) does not exceed 0.5 psid will be made each refueling outage.
4. Drywell-Pressure Suppression Chamber Vacuum Breakers	4. Drywell-Pressure Suppression Chamber Vacuum Breakers
a. When primary containment is required, all drywell-suppression chamber vacuum breakers shall be OPERABLE and positioned in the fully closed position (except during testing) except as specified in 3.7.A.4.b and 3.7.A.4.c., below.	a. Each drywell-suppression chamber vacuum breaker shall be tested in accordance with Specification 1.0.MM.
b. One drywell-suppression chamber vacuum breaker may be nonfully closed so long as it is determined to be not more than 3° open as indicated by the position lights.	b. When it is determined that two vacuum breakers are inoperable for opening at a time when OPERABILITY is required, all other vacuum breaker valves shall be exercised immediately and every 15 days thereafter until the inoperable valve has been returned to normal service.

TABLE 3.7.A

INSTRUMENTATION FOR CONTAINMENT SYSTEMS

Minimum No. Operable Per Trip System	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	0.5 psid	(1)	Actuates the pressure suppression chamber-reactor building vacuum breakers.

Footnote:

(1) - Repair in 24 hours. If the function is not OPERABLE in 24 hours, declare the system or component inoperable.

TABLE 4.7.A

CONTAINMENT SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel-Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	Once/month(1)	Once/18 months(2)	None

Footnotes:

(1) - Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify OPERABILITY of the trip and alarm functions.

(2) - Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the level settings.

SAFETY LIMIT	LIMITING SAFETY SYSTEM SETTING
1.1.B. Power Transient	2.1.B. Power Transient Trip Settings
To ensure that the SAFETY LIMITS established in Specification 1.1.A are not exceeded, each required scram shall be initiated by its expected scram signal. The Safety Limit shall be assumed to be exceeded when scram is accomplished by means other than the expected scram signal.	1. Scram and isolation (PCIS groups 2,3,6) reactor low water level ≥ 538 in. above vessel zero 2. Scram--turbine stop valve closure ≤ 10 percent valve closure 3. Scram--turbine control valve fast closure or turbine trip ≥ 550 psig 4. (Deleted) 5. Scram--main steam line isolation ≤ 10 percent valve closure 6. Main steam isolation valve closure --nuclear system low pressure ≥ 825 psig
C. Reactor Vessel Water Level	C. Water Level Trip Settings
Whenever there is irradiated fuel in the reactor vessel, the water level shall be greater than or equal to 372.5 inches above vessel zero.	1. Core spray and LPCI actuation-- reactor low water level ≥ 398 in. above vessel zero 2. HPCI and RCIC actuation-- reactor low water level ≥ 470 in. above vessel zero 3. Main steam isolation valve closure-- reactor low water level ≥ 398 in. above vessel zero

1.1 BASES (Cont'd)

The safety limit has been established at 372.5 inches above vessel zero to provide a point which can be monitored and also provide adequate margin to assure sufficient cooling.

REFERENCE

1. General Electric BWR Thermal Analysis Basis (GETAB) Data, Correlation and Design Application, NEDO 10958 and NEDE 10938.

2. General Electric Do ment No. EAS-65-0687, Setpoint Determination for Browns Ferry Nuclear Plant, Revision 2.

TABLE 3.1.A
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENTS

Min. No. of Operable Instr. Channels Per Trip System (1)(23)	Trip Function	Trip Level Setting	Modes in Which Function Must Be Operable: Shut-down	Refuel (7)	Startup/ Hot Standby	Run	Action (1)
1	Mode Switch in Shutdown		X	X	X	X	1.A
1	Manual Scram		X	X	X	X	1.A
	IRM (16)						
3	High Flux	≤120/125 Indicated on scale	X(22)	X(22)	X	(5)	1.A
3	Inoperative			X	X	(5)	1.A
	APRM (16)(24)(25)						
2	High Flux (Fixed Trip)	≤ 120%				X	1.A or 1.B
2	High Flux (Flow Biased)	See Spec. 2.1.A.1				X	1.A or 1.B
2	High Flux	≤ 15% rated power		X(21)	X(17)	(15)	1.A
2	Inoperative	(13)		X(21)	X(17)	X	1.A
2	Downscale	≥ 3 Indicated on Scale		(11)	(11)	X(12)	1.A or 1.B
2	High Reactor Pressure (PIS-3-22AA,BB,C,D)	≤ 1055 psig		X(10)	X	X	1.A
2	High Drywell Pressure (14) (PIS-64-56A-D)	≤ 2.5 psig		X(8)	X(8)	X	1.A
2	Reactor Low Water Level (14) (LIS-3-203A-D)	≥ 538" above vessel zero		X	X	X	1.A

TABLE 3.1.A
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION REQUIREMENTS

Min. No. of Operable Instr. Channels Per Trip System (1)(23)	Trip Function	Trip Level Setting	Modes in Which Function Must Be Operable				Action (1)
			Shut-down	Refuel (7)	Startup/ Hot Standby	Run	
2	High Water Level in West Scram Discharge Tank (LS-85-45A-D)	≤ 50 Gallons	X(2)	X(2)	X	X	1.A
2	High Water Level in East Scram Discharge Tank (LS-85-45E-H)	≤ 50 Gallons	X(2)	X(2)	X	X	1.A
4	Main Steam Line Isolation Valve Closure	≤10% Valve Closure				X(6)	1.A or 1.C
2	Turbine Control Valve Fast Closure or Turbine Trip	≥550 psig				X(4)	1.A or 1.D
4	Turbine Stop Valve Closure	≤10% Valve Closure				X(4)	1.A or 1.D
2	Turbine First Stage Pressure Permissive (PIS-1-81A&B) (PIS-1-91A&B)	not ≥154 psig		X(18)	X(18)	X(18)	1.A or 1.D (19)
2	Main Steam Line High Radiation (14)	3 X Normal Full Power Background (20)		X(9)	X(9)	X(9)	1.A or 1.C

TABLE 4.1.A
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENTATION FUNCTIONAL TESTS
MINIMUM FUNCTIONAL TEST FREQUENCIES FOR SAFETY INSTR. AND CONTROL CIRCUITS

	Group (2)	Functional Test	Minimum Frequency(3)
Mode Switch in Shutdown	A	Place Mode Switch in Shutdown	Each Refueling Outage
Manual Scram	A	Trip Channel and Alarm	Every 3 Months
IRM			
High Flux	C	Trip Channel and Alarm (4)	Once Per Week During Refueling and Before Each Startup
Inoperative	C	Trip Channel and Alarm (4)	Once Per Week During Refueling and Before Each Startup
APRM			
High Flux (15% Scram)	C	Trip Output Relays (4)	Before Each Startup and Weekly When Required to be Operable
High Flux (Flow Biased)	B	Trip Output Relays (4)	Once/Week
High Flux (Fixed Trip)	B	Trip Output Relays (4)	Once/Week
Inoperative	B	Trip Output Relays (4)	Once/Week
Downscale	B	Trip Output Relays (4)	Once/Week
Flow Bias	B	(6)	(6)
High Reactor Pressure (PIS-3-22AA,BB,C,D)	B	Trip Channel and Alarm (7)	Once/Month
High Drywell Pressure (PIS-64-56A-D)	B	Trip Channel and Alarm (7)	Once/Month
Reactor Low Water Level (LIS-3-203A-D)	B	Trip Channel and Alarm (7)	Once/Month

TABLE 4.1.A (Continued)

	Group (2)	Functional Test	Minimum Frequency(3)
High Water Level in Scram Discharge Tank Float Switches (LS-85-45C-F)	A	Trip Channel and Alarm	Once/Month
Electronic Level Switches (LS-85-45A, B, G, H)	B	Trip Channel and Alarm (7)	Once/Month
Main Steam Line High Radiation	B	Trip Channel and Alarm (4)	Once/3 Months (8)
Main Steam Line Isolation Valve Closure	A	Trip Channel and Alarm	Once/3 Months (8)
Turbine Control Valve Fast Closure or turbine trip	A	Trip Channel and Alarm	Once/Month (1)
Turbine First Stage Pressure Permissive (PIS-1-81A and B, PIS-1-91A and B)	B	Trip Channel and Alarm (7)	Every three months
Turbine Stop Valve Closure	A	Trip Channel and Alarm	Once/Month (1)

TABLE 4.1.B
REACTOR PROTECTION SYSTEM (SCRAM) INSTRUMENT CALIBRATION
MINIMUM CALIBRATION FREQUENCIES FOR REACTOR PROTECTION INSTRUMENT CHANNELS

Instrument Channel	Group (1)	Calibration	Minimum Frequency(2)
IRM High Flux	C	Comparison to APRM on Controlled Startups (6)	Note (4)
APRM High Flux Output Signal	B	Heat Balance	Once Every 7 Days
Flow Bias Signal	B	Calibrate Flow Bias Signal (7)	Once/Operating Cycle
LPRM Signal	B	TIP System Traverse (8)	Every 1000 Effective Full Power Hours
High Reactor Pressure (PIS-3-22AA,BB,C,D)	B	Standard Pressure Source	Once/6 Months(9)
High Drywell Pressure (PIS-64-56A-D)	B	Standard Pressure Source	Once/18 Months(9)
Reactor Low Water Level (LIS-3-203A-D)	B	Pressure Standard	Once/18 Months(9)
High Water Level in Scram Discharge Volume			
Float Switches (LS-85-45C-F)	A	Calibrated Water Column (5)	Note (5)
Electronic Lvl Switches (LS-85-45-A, B, G, H)	B	Calibrated Water Column	Once/Operating Cycle (9)
Main Steam Line Isolation Valve Closure	A	Note (5)	Note (5)
Main Steam Line High Radiation	B	Standard Current Source (3)	Every 3 Months
Turbine First Stage Pressure Permissive (PIS-1-81A&B, PIS-1-91A&B)	B	Standard Fressure Source	Once/18 Months(9)
Turbine Control Valve Fast Closure or Turbine Trip	A	Standard Pressure Source	Once/Operating Cycle
Turbine Stop Valve Closure	A	Note (5)	Note (5)

3.1 BASES

The Reactor Protection System automatically initiates a reactor scram to:

1. Preserve the integrity of the fuel cladding.

2. Preserve the integrity of the reactor coolant system.

3. Minimize the energy which must be absorbed following a loss of coolant accident, and prevents criticality.

This specification provides the LIMITING CONDITIONS FOR OPERATION necessary to preserve the ability of the system to tolerate single failures and still perform its intended function even during periods when instrument channels may be out of service because of maintenance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

The reactor protection trip system is supplied, via a separate bus, by its own high inertia, ac motor-generator set. Alternate power is available to either Reactor Protection System bus from an electrical bus that can receive standby electrical power. The RPS monitoring system provides an isolation between nonclass 1E power supply and the class 1E RPS bus. This will ensure that failure of a nonclass 1E reactor protection power supply will not cause adverse interaction to the class 1E Reactor Protection System.

The Reactor Protection System is made up of two independent trip systems (refer to Section 7.2, FSAR). There are usually four channels provided to monitor each critical parameter, with two channels in each trip system. The outputs of the channels in a trip system are combined in a logic such that either channel trip will trip that trip system. The simultaneous tripping of both trip systems will produce a reactor scram.

This system meets the intent of IEEE-279 for Nuclear Power Plant Protection Systems. The system has a reliability greater than that of a 2-out-of-3 system and somewhat less than that of a 1-out-of-2 system.

With the exception of the Average Power Range Monitor (APRM) channels, the Intermediate Range Monitor (IRM) channels, the Main Steam Isolation Valve closure and the Turbine Stop Valve closure, each trip system logic has one instrument channel. When the minimum condition for operation on the number of OPERABLE instrument channels per untripped protection trip system is met or if it cannot be met and the effected protection trip system is placed in a tripped condition, the effectiveness of the protection system is preserved; i.e., the system can tolerate a single failure and still perform its intended function of scramming the reactor. Three APRM instrument channels are provided for each protection trip system.

TABLE 3.2.A
PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Minimum No. Instrument Channels Operable Per Trip Sys(1)(11)	Function	Trip Level Setting	Action (1)	Remarks
2	Instrument Channel - Reactor Low Water Level(6) (LIS-3-203A-D)	≥ 538" above vessel zero	A or (B and E)	1. Below trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation c. Initiates SGTS
1	Instrument Channel - Reactor High Pressure (PS-68-93 and 94)	100 ± 15 psig	D	1. Above trip setting isolates the shutdown cooling suction valves of the RHR system.
2	Instrument Channel - Reactor Low Water Level (LIS-3-56A-D)	≥ 398" above vessel zero	A	1. Below trip setting initiates Main Steam Line Isolation
2	Instrument Channel - High Drywell Pressure (6) (PIS-64-56A-D)	≤ 2.5 psig	A or (B and E)	1. Above trip setting does the following: a. Initiates Reactor Building Isolation b. Initiates Primary Containment Isolation c. Initiates SGTS

TABLE 3.2.A (Continued)
PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Minimum No. Instrument Channels Operable Per Trip Sys(1)(11)	Function	Trip Level Setting	Action (1)	Remarks
2	Instrument Channel - High Radiation Main Steam Line Tunnel (6)	3 times normal rated full power background (13)	B	1. Above trip setting initiates Main Steam Line Isolation
2	Instrument Channel - Low Pressure Main Steam Line (PIS-1-72, 76, 82, 86)	≥ 825 psig (4)	B	1. Below trip setting initiates Main Steam Line Isolation
2(3)	Instrument Channel - High Flow Main Steam Line (PdIS-1-13A-D, 25A-D, 36A-D, 50A-D)	≤ 140% of rated steam flow	B	1. Above trip setting initiates Main Steam Line Isolation
2(12)	Instrument Channel - Main Steam Line Tunnel High Temperature	≤ 200°F	B	1. Above trip setting initiates Main Steam Line Isolation.
2(14)	Instrument Channel - Reactor Water Cleanup System Floor Drain High Temperature	160 - 180°F	C	1. Above trip setting initiates Isolation of Reactor Water Cleanup Line from Reactor and Reactor Water Return Line.
2	Instrument Channel - Reactor Water Cleanup System Space High Temperature	160 - 180°F	C	1. Same as above
1(15)	Instrument Channel - Reactor Building Ventilation High Radiation - Reactor Zone	≤ 100 mr/hr or downscale	G	1. 1 upscale channel or 2 downscale channels will a. Initiate SGTS b. Isolate reactor zone and refueling floor. c. Close atmosphere control system.

TABLE 3.2.B
INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero.	A	1. Below trip setting initiates HPCI.
2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero.	A	1. Multiplier relays initiate RCIC.
2	Instrument Channel - Reactor Low Water Level (LS-3-58A-D)	≥ 398" above vessel zero.	A	1. Below trip setting initiates CSS. Multiplier relays initiate LPCI. 2. Multiplier relay from CSS initiates accident signal (15).
2(16)	Instrument Channel - Reactor Low Water Level (LS-3-58A-D)	≥ 398" above vessel zero.	A	1. Below trip settings, in conjunction with drywell high pressure, low water level permissive, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.
1(16)	Instrument Channel - Reactor Low Water Level Permissive (LIS-3-184, 185)	≥ 544" above vessel zero.	A	1. Below trip setting permissive for initiating signals on ADS.
1	Instrument Channel - Reactor Low Water Level (LIS-3-52 and LIS-3-62A)	≥ 312 5/16" above vessel zero. (2/3 core height)	A	1. Below trip setting prevents inadvertent operation of containment spray during accident condition.

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2(18)	Instrument Channel - Drywell High Pressure (PIS-64-58 E-H)	1≤ p≤2.5 psig	A	1. Below trip setting prevents inadvertent operation of containment spray during accident conditions.
2(18)	Instrument Channel - Drywell High Pressure (PIS-64-58 A-D)	≤ 2.5 psig	A	1. Above trip setting in conjunction with low reactor pressure initiates CSS. Multiplier relays initiate HPCI. 2. Multiplier relay from CSS initiates accident signal. (15)
2(18)	Instrument Channel - Drywell High Pressure (PIS-64-58A-D)	≤ 2.5 psig	A	1. Above trip setting in conjunction with low reactor pressure initiates LPCI.
2(16)(18)	Instrument Channel - Drywell High Pressure (PIS-64-57A-D)	≤ 2.5 psig	A	1. Above trip setting, in conjunction with low reactor water level, drywell high pressure, 120 sec. delay timer and CSS or RHR pump running, initiates ADS.

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Reactor Low Pressure (PIS-3-74A & B) (PIS-68-95, 96)	450 psig ± 15	A	1. Below trip setting permissive for opening CSS and LPCI admission valves.
2	Instrument Channel - Reactor Low Pressure (PS-3-74A & B) (PS-68-95, 96)	230 psig ± 15	A	1. Recirculation discharge valve actuation.
1	Instrument Channel - Reactor Low Pressure (PS-68-93 & 94, SW #1)	100 psig ± 15	A	1. Below trip setting in conjunction with containment isolation signal and both suction valves open will close RHR (LPCI) admission valves.
2	Core Spray Auto Sequencing Timers (5)	6≤ t ≤8 sec.	B	1. With diesel power 2. One per motor
2	LPCI Auto Sequencing Timers (5)	0≤ t ≤1 sec.	B	1. With diesel power 2. One per motor
1	RHRSW A3, B1, C3, and D1 Timers	13≤ t ≤15 sec.	A	1. With diesel power 2. One per pump
2	Core Spray and LPCI Auto Sequencing Timers (6)	0≤ t ≤1 sec. 6≤ t ≤8 sec. 12≤ t ≤16 sec. 18≤ t ≤ 24 sec.	B	1. With normal power 2. One per CSS motor 3. Two per RHR motor
1	RHRSW A3, B1, C3, and D1 Timers	27≤ t ≤ 29 sec.	A	1. With normal power 2. One per pump

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
1	HPCI Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
1	RCIC Trip System bus power monitor	N/A	C	1. Monitors availability of power to logic systems.
1(2)	Instrument Channel - Condensate Header Low Level (LS-73-56A & B)	≥ Elev. 551'	A	1. Below trip setting will open HPCI suction valves to the suppression chamber.
2(2)	Instrument Channel - Suppression Chamber High Level	≤ 7" above instrument zero	A	1. Above trip setting will open HPCI suction valves to the suppression chamber.
2(2)	Instrument Channel - Reactor High Water Level (LIS-3-208A and LIS-3-208C)	≤ 583" above vessel zero	A	1. Above trip setting trips RCIC turbine.
1	Instrument Channel - RCIC Turbine Steam Line High Flow (PDIS-71-1A and 1B)	≤ 450" H_2O (7)	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.
4(4)	Instrument Channel - RCIC Steam Line Space High Temperature	≤200°F.	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.
3(2)	Instrument Channel - RCIC Steam Supply Pressure - Low (PS 71-1A-D)	≥50 psig	A	1. Below trip setting isolates RCIC system and trips RCIC turbine.
3(2)	Instrument Channel - RCIC Turbine Exhaust Diaphragm Pressure - High (PS 71-11A-D)	≤ 20 psig	A	1. Above trip setting isolates RCIC system and trips RCIC turbine.

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2(2)	Instrument Channel - Reactor High Water Level (LIS-3-208B and LIS-3-208D)	≤583" above vessel zero.	A	1. Above trip setting trips HPCI turbine.
1	Instrument Channel - HPCI Turbine Steam Line High Flow (PDIS-73-1A and 1B)	≤90 psi (7)	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
4(4)	Instrument Channel - HPCI Steam Line Space High Temperature	≤200°F.	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
3(2)	Instrument Channel - HPCI Steam Supply Pressure - Low (PS 73-1A-D)	≥100 psig	A	1. Below trip setting isolates HPCI system and trips HPCI turbine.
3(2)	Instrument Channel - HPCI Turbine Exhaust Diaphragm (PS 73-20A-D)	≤20 psig	A	1. Above trip setting isolates HPCI system and trips HPCI turbine.
1	Core Spray System Logic	N/A	B	1. Includes testing auto initiation inhibit to Core Spray Systems in other units.
1	RCIC System (Initiating) Logic	N/A	B	1. Includes Group 7 valves. 2. Group 7: The valves in Group 7 are automatically actuated by only the following condition: 1. The respective turbine steam supply valve not fully closed.
1	RCIC System (Isolation) Logic	N/A	B	1. Includes Group 5 valves. 2. Group 5: The valves in Group 5 are actuated by any of the following conditions: a. RCIC Steamline Space High Temperature b. RCIC Steamline High Flow c. RCIC Steamline Low Pressure d. RCIC Turbine Exhaust Diaphragm High Pressure
1 (16)	ADS Logic	N/A	A	

NOTES FOR TABLE 3.2.B (Continued)

10. Only one trip system for each cooler fan.

11. In only two of the four 4160-V shutdown boards. See note 13.

12. In only one of the four 4160-V shutdown boards. See note 13.

13. An emergency 4160-V shutdown board is considered a trip system.

14. RHRSW pump would be inoperable. Refer to Section 4.5.C for the requirements of a RHRSW pump being inoperable.

15. The accident signal is the satisfactory completion of a one-out-of-two taken twice logic of the drywell high pressure plus low reactor pressure or the vessel low water level ($\geq$ 398" above vessel zero) originating in the core spray system trip system.

16. The ADS circuitry is capable of accomplishing its protective action with one OPERABLE trip system. Therefore, one trip system may be taken out of service for functional testing and calibration for a period not to exceed eight hours.

17. Two RPT systems exist, either of which will trip both recirculation pumps. The systems will be individually functionally tested monthly. If the test period for one RPT system exceeds two consecutive hours, the system will be declared inoperable. If both RPT systems are inoperable or if one RPT system is inoperable for more than 72 hours, an orderly power reduction shall be initiated and reactor power shall be less than 30 percent within four hours.

18. Not required to be OPERABLE in the COLD SHUTDOWN CONDITION.

TABLE 3.2.F

Surveillance Instrumentation

Minimum # of Operable Instrument Channels	Instrument #	Instrument	Type Indication and Range	Notes
2	LI-3-58A LI-3-58B	Reactor Water Level	Indicator - 155" to +60"	(1) (2) (3)
2	PI-3-74A PI-3-74B	Reactor Pressure	Indicator 0-1200 psig	(1) (2) (3)
2	XR-64-50 PI-64-67	Drywell Pressure	Recorder -15 to +65 psig Indicator -15 to +65 psig	(1) (2) (3)
2	TI-64-52 XR-64-50	Drywell Temperature	Recorder, Indicator 0-400°F	(1) (2) (3)
1	XR-64-52	Suppression Chamber Air Temperature	Recorder 0-400°F	(1) (2) (3)
1	N/A	Control Rod Position	6V Indicating Lights	
1	N/A	Neutron Monitoring	SRM, IRM, LPRM 0 to 100% power	(1) (2) (3) (4)
1	PS-64-67	Drywell Pressure	Alarm at 35 psig	
1	XR-64-50 and PS-64-58 B and IS-64-67	Drywell Temperature and Pressure and Timer	Alarm if temp. > 281°F and pressure >2.5 psig after 30 minute delay	(1) (2) (3) (4)
1	LI-84-2A	CAD Tank "A" Level	Indicator 0 to 100%	(1)
1	LI-84-13A	CAD Tank "B" Level	Indicator 0 to 100%	(1)

Table 3.2.L
Anticipated Transient Without Scram (ATWS) -
Recirculation Pump Test (RPT) Surveillance Instrumentation

Minimum No. Channels operable per Trip Sys (1)	Function	Trip Setting	Allowable Value	Action	Remarks
2	ATWS/RPT Logic Reactor Dome Pressure High (PIS-3-204A-D)	1118 psig	≤ 1146.5 psig	(2)	Two out of two of the high reactor dome pressure channels or the low reactor vessel level channels in either trip system trips both reactor recirculation pumps.
2	Reactor Vessel Level Low (LS-3-58 A1-D1)	483" above vessel zero	≥ 471.52" above vessel zero		

(1) One channel in only one trip system may be placed in an inoperable status for up to 6 hours for required surveillance provided the other channels in that trip system are OPERABLE.

(2) Two trip systems exist, either of which will trip both recirculation pumps. Perform Surveillance/maintenance/calibration on one channel in only one trip system at a time. If a channel is found to be inoperable or if the surveillance/maintenance/calibration period for one channel exceeds 6 consecutive hours, the trip system will be declared inoperable or the channel will be placed in a tripped condition. If in RUN mode and one trip system is inoperable for 72 hours or both trip systems are inoperable, the reactor shall be in at least the HOT STANDBY CONDITION within 6 hours.

TABLE 4.2.A
SURVEILLANCE REQUIREMENTS FOR PRIMARY CONTAINMENT AND REACTOR BUILDING ISOLATION INSTRUMENTATION

Function	Functional Test	Calibration Frequency	Instrument Check
Instrument Channel - Reactor Low Water Level (LIS-3-203A-D)	(1)(28)	once/18 months (29)	once/day
Instrument Channel - Reactor High Pressure	(1)	once/3 months	None
Instrument Channel - Reactor Low Water Level (LIS-3-56A-D)	(1)(28)	once/18 months (29)	once/day
Instrument Channel - High Drywell Pressure (PIS-64-56A-D)	(1)(28)	once/18 months (29)	N/A
Instrument Channel - High Radiation Main Steam Line Tunnel	once/3 months (27)	(5)	once/day
Instrument Channel - Low Pressure Main Steam Line (PIS-1-72, 76, 82, 86)	(28) (27)	once/18 months (29)	None
Instrument Channel - High Flow Main Steam Line (PdIS-1-13A-D, 25A-D, 36A-D, 50A-D)	(28) (27)	once/18 months (29)	once/day

TABLE 4.2.B
SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - Reactor Low Water Level (LS-3-58A-D, LIS-3-58A-D)	(1)(28)	once/18 months(29)	once/day
Instrument Channel - Reactor Low Water Level (LIS-3-184 & 185)	(1)(28)	once/18 months(29)	once/day
Instrument Channel - Reactor Low Water Level (LIS-3-52 & 62A)	(1)(28)	once/18 months(29)	once/day
Instrument Channel - Drywell High Pressure (PIS-64-58E-H)	(1)(28)	once/18 months(29)	none
Instrument Channel - Drywell High Pressure (PIS-64-58A-D)	(1)(28)	once/18 months(29)	none
Instrument Channel - Drywell High Pressure (PIS-64-57A-D)	(1)(28)	once/18 months(29)	none
Instrument Channel - Reactor Low Pressure (PIS-3-74A & B, PS-3-74A & B) (PIS-68-95, PS-68-95) (PIS-68-96, PS-68-96)	(1)(28)	once/6 months(29)	none

TABLE 4.2.B (Cont'd)
SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - RHR Pump Discharge Pressure	(1)	once/3 months	none
Instrument Channel - Core Spray Pump Discharge Pressure	(1)	once/3 months	none
Core Spray Sparger to RPV d/p	(1)	once/3 months	once/day
Trip System Bus Power Monitor	once/operating Cycle	N/A	none
Instrument Channel - Condensate Header Level (LS-73-56A, B)	(1)	once/3 months	none
Instrument Channel - Suppression Chamber High Level	(1)	once/3 months	none
Instrument Channel - Reactor High Water Level (LIS-3-208A-D)	(1)(28)	once/18 months(29)	once/day
Instrument Channel - RCIC Turbine Steam Line High Flow	(1)(28)	once/18 months(29)	none
Instrument Channel - RCIC Steam Line Space High Temperature	(1)	once/3 months	none
Instrument Channel - RCIC Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - RCIC Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day

TABLE 4.2.B (Cont'd)
SURVEILLANCE REQUIREMENTS FOR INSTRUMENTATION THAT INITIATE OR CONTROL THE CSCS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel - HPCI Turbine Steam Line High Flow	(1)(28)	once/18 months(29)	none
Instrument Channel - HPCI Steam Line Space High Temperature	(1)	once/3 months	none
Instrument Channel - HPCI Steam Supply Low Pressure	once/31 days	once/18 months	once/day
Instrument Channel - HPCI Turbine Exhaust Diaphragm High Pressure	once/31 days	once/18 months	once/day
Core Spray System Logic	once/18 months	(6)	N/A
RCIC System (Initiating) Logic	once/18 months	N/A	N/A
RCIC System (Isolation) Logic	once/18 months	(6)	N/A
HPCI System (Initiating) Logic	once/18 months	(6)	N/A
HPCI System (Isolation) Logic	once/18 months	(6)	N/A
ADS Logic	once/18 months	(6)	N/A
LPCI (Initiating) Logic	once/18 months	(6)	N/A
LPCI (Containment Spray) Logic	once/18 months	(6)	N/A

TABLE 4.2.F
MINIMUM TEST AND CALIBRATION FREQUENCY FOR SURVEILLANCE INSTRUMENTATION

Instrument Channel	Calibration Frequency	Instrument Check
1) Reactor Water Level (LI-3-58A & B)	Once/18 months	Each Shift
2) Reactor Pressure (PI-3-74A & B)	Once/6 months	Each Shift
3) Drywell Pressure	Once/6 months	Each Shift
4) Drywell Temperature	Once/6 months	Each Shift
5) Suppression Chamber Air Temperature	Once/6 months	Each Shift
8) Control Rod Position	N/A	Each Shift
9) Neutron Monitoring	(2)	Each Shift
10) Drywell Pressure (PS-64-67)	Once/6 months	N/A
11) Drywell Pressure (PIS-64-58A)	Once/18 months	N/A
12) Drywell Temperature (TR-64-52)	Once/6 months	N/A
13) Timer (IS-64-67)	Once/6 months	N/A
14) CAD Tank Level	Once/6 months	Once/day
15) Containment Atmosphere Monitors	Once/6 months	Once/day

3.2 BASES

In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operator's ability to control, or terminates operator errors before they result in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the core cooling systems, control rod block and standby gas treatment systems. The objectives of the Specifications are (i) to assure the effectiveness of the protective instrumentation when required by preserving its capability to tolerate a single failure of any component of such systems even during periods when portions of such systems are out of service for maintenance, and (ii) to prescribe the trip settings required to assure adequate performance. When necessary, one channel may be made inoperable for brief intervals to conduct required functional tests and calibrations.

Some of the settings on the instrumentation that initiate or control core and containment cooling have tolerances explicitly stated where the high and low values are both critical and may have a substantial effect on safety. The setpoints of other instrumentation, where only the high or low end of the setting has a direct bearing on safety, are chosen at a level away from the normal operating range to prevent inadvertent actuation of the safety system involved and exposure to abnormal situations.

Actuation of primary containment valves is initiated by protective instrumentation shown in Table 3.2.A which senses the conditions for which isolation is required. Such instrumentation must be available whenever PRIMARY CONTAINMENT INTEGRITY is required.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement.

The low water level instrumentation set to trip at 538 inches above vessel zero closes isolation valves in the RHR System, Drywell and Suppression Chamber exhausts and drains and Reactor Water Cleanup Lines (Groups 2 and 3 isolation valves). The low reactor water level instrumentation that is set to trip when reactor water level is 470 inches above vessel zero (Table 3.2.B) trips the recirculation pumps and initiates the RCIC and HPCI systems. The RCIC and HPCI system initiation opens the turbine steam supply valve which in turn initiates closure of the respective drain valves (Group 7).

The low water level instrumentation set to trip at $\geq$398 inches above vessel zero (Table 3.2.B) closes the Main Steam Isolation Valves, the Main Steam Line Drain Valves, and the Reactor Water Sample Valves (Group 1). These trip settings are adequate to prevent core uncovery in the case of a break in the largest line assuming the maximum closing time.

The low reactor water level instrumentation that is set to trip when reactor water level is ≥398 inches above vessel zero (Table 3.2.B) initiates the LPCI, Core Spray Pumps, contributes to ADS initiation, and starts the diesel generators. These trip setting levels were chosen to be high enough to prevent spurious actuation but low enough to initiate CSCS operation so that postaccident cooling can be accomplished and the guidelines of 10 CFR 100 will not be violated. For large breaks up to the complete circumferential break of a 28-inch recirculation line and with the trip setting given above, CSCS initiation is initiated in time to meet the above criteria.

The high drywell pressure instrumentation is a diverse signal to the water level instrumentation and, in addition to initiating CSCS, it causes isolation of Groups 2 and 8 isolation valves. For the breaks discussed above, this instrumentation will initiate CSCS operation at about the same time as the low water level instrumentation; thus, the results given above are applicable here also.

Venturis are provided in the main steam lines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steam line break accident. The primary function of the instrumentation is to detect a break in the main steam line. For the worst case accident, main steam line break outside the drywell, a trip setting of 140 percent of rated steam flow in conjunction with the flow limiters and main steam line valve closure limits the mass inventory loss such that fuel is not uncovered, fuel cladding temperatures remain below 1000°F, and release of radioactivity to the environs is well below 10 CFR 100 guidelines. Reference Section 14.6.5 FSAR.

Temperature monitoring instrumentation is provided in the main steam line tunnel to detect leaks in these areas. Trips are provided on this instrumentation and when exceeded, cause closure of isolation valves. The setting of 200°F for the main steam line tunnel detector is low enough to detect leaks of the order of 15 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, the high steam flow instrumentation is a backup to the temperature instrumentation. In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200°F. The temperature increases can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to bypass the temperature trip for four hours to avoid an unnecessary plant transient and allow performance of the secondary containment leak rate test or make repairs necessary to regain normal ventilation.

High radiation monitors in the main steam line tunnel have been provided to detect gross fuel failure as in the control rod drop accident. With the established nominal setting of three times normal background and main

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A PRIMARY CONTAINMENT	4.7.A PRIMARY CONTAINMENT
3. Pressure Suppression Chamber - Reactor Building Vacuum Breakers	3. Pressure Suppression Chamber-Reactor Building Vacuum Breakers
a. Except as specified in 3.7.A.3.b below, two pressure suppression chamber-reactor building vacuum breakers shall be OPERABLE at all times when PRIMARY CONTAINMENT INTEGRITY is required. The setpoint of the differential pressure instrumentation which actuates the pressure suppression chamber-reactor building vacuum breakers shall be per Table 3.7.A.	a. The pressure suppression chamber-reactor building vacuum breakers shall be exercised in accordance with Specification 1.0.MM, and the associated instrumentation including setpoint shall be functionally tested for proper operation per Table 4.7.A.
b. From and after the date that one of the pressure suppression chamber-reactor building vacuum breakers is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding seven days, provided that the repair procedure does not violate PRIMARY CONTAINMENT INTEGRITY.	b. A visual examination and determination that the force required to open each vacuum breaker (check valve) does not exceed 0.5 psid will be made each refueling outage.
4. Drywell-Pressure Suppression Chamber Vacuum Breakers	4. Drywell-Pressure Suppression Chamber Vacuum Breakers
a. When primary containment is required, all drywell-suppression chamber vacuum breakers shall be OPERABLE and positioned in the fully closed position (except during testing) except as specified in 3.7.A.4.b and 3.7.A.4.c below.	a. Each drywell-suppression chamber vacuum breaker shall be tested in accordance with Specification 1.0.MM.
b. One drywell-suppression chamber vacuum breaker may be nonfully closed so long as it is determined to be not more than 3° open as indicated by the position lights.	b. When it is determined that two vacuum breakers are inoperable for opening at a time when OPERABILITY is required, all other vacuum breaker valves shall be exercised immediately and every 15 days thereafter until the inoperable valve has been returned to normal service.

TABLE 3.7.A

INSTRUMENTATION FOR CONTAINMENT SYSTEMS

Minimum No. Operable Per Trip System	Function	Trip Level Setting	Action	Remarks
2	Instrument Channel - Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	0.5 psid	(1)	Actuates the pressure suppression chamber-reactor building vacuum breakers.

Footnote:

(1) - Repair in 24 hours. If the function is not OPERABLE in 24 hours, declare the system or component inoperable.

TABLE 4.7.A

CONTAINMENT SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Function	Functional Test	Calibration	Instrument Check
Instrument Channel-Pressure suppression chamber-reactor building vacuum breakers (PdIS-64-20, 21)	Once/month(1)	Once/18 months(2)	None

Footnotes:

(1) - Functional test consists of the injection of a simulated signal into the electronic trip circuitry in place of the sensor signal to verify OPERABILITY of the trip and alarm functions.

(2) - Calibration consists of the adjustment of the primary sensor and associated components so that they correspond within acceptable range and accuracy to known values of the parameter which the channel monitors, including adjustment of the electronic trip circuitry, so that its output relay changes state at or more conservatively than the analog equivalent of the level settings.

3.7/4.7 BASES (Cont'd)

Demonstration of the automatic initiation capability and OPERABILITY of filter cooling is necessary to assure system performance capability. If one standby gas treatment system is inoperable, the other systems must be tested daily. This substantiates the availability of the OPERABLE systems and thus reactor operation and refueling operation can continue for a limited period of time.

3.7.D/4.7.D Primary Containment Isolation Valves

The Browns Ferry Containment Leak Rate Program and Procedures contains the list of all the Primary Containment Isolation Valves for which the Technical Specification requirements apply. The procedures are subject to the change control provisions for plant procedures in the administrative controls section of the Technical Specifications. The opening of locked or sealed closed containment isolation valves on an intermittent basis under administrative control includes the following considerations: (1) stationing an operator, who is in constant communication with the control room, at the valve controls, (2) instructing this operator to close these valves in an accident situation, and (3) assuring that environmental conditions will not preclude access to close the valves and that this action will prevent the release of radioactivity outside the containment.

Double isolation valves are provided on lines penetrating the primary containment and open to the free space of the containment. Closure of one of the valves in each line would be sufficient to maintain the integrity of the pressure suppression system. Automatic initiation is required to minimize the potential leakage paths from the containment in the event of a LOCA.

Group 1 - Process lines are isolated by reactor vessel low water level ($\geq$398") in order to allow for removal of decay heat subsequent to a scram, yet isolate in time for proper operation of the core standby cooling systems. The valves in Group 1, except the reactor water sample line valves, are also closed when process instrumentation detects excessive main steam line flow, high radiation, low pressure, or main steam space high temperature. The reactor water sample line valves isolate only on reactor low water level at $\geq$398" or main steam line high radiation.

Group 2 - Isolation valves are closed by reactor vessel low water level (538") or high drywell pressure. The Group 2 isolation signal also "isolates" the reactor building and starts the standby gas treatment system. It is not desirable to actuate the Group 2 isolation signal by a transient or spurious signal.

Group 3 - Process lines are normally in use, and it is therefore not desirable to cause spurious isolation due to high drywell pressure resulting from nonsafety related causes. To protect the reactor from a possible pipe break