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TSB1 - TECHNICAL SPECIFICATION BASES UNIT 1 MANUAL

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A001

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SSES MANUAL

Manual Name: TSB1

Manual Title: TECHNICAL SPECIFICATION BASES UNIT 1 MANUAL

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B 3.3 INSTRUMENTATION

B 3.3.6.1 Primary Containment Isolation Instrumentation

BASES

BACKGROUND The primary containment isolation instrumentation automatically initiates closure of appropriate primary containment isolation valves (PCIVs). The function of the PCIVs, in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents (DBAs). Primary containment isolation within the time limits specified for those isolation valves designed to close automatically ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a DBA.

The isolation instrumentation includes the sensors, relays, and instruments that are necessary to cause initiation of primary containment and reactor coolant pressure boundary (RCPB) isolation. When the setpoint is reached, the sensor actuates, which then outputs an isolation signal to the isolation logic. Functional diversity is provided by monitoring a wide range of independent parameters. The input parameters to the isolation logics are (a) reactor vessel water level, (b) area ambient and emergency cooler temperatures, (c) main steam line (MSL) flow measurement, (d) Standby Liquid Control (SLC) System initiation, (e) condenser vacuum, (f) main steam line pressure, (g) high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) steam line Δ pressure, (h) SGTS Exhaust radiation, (i) HPCI and RCIC steam line pressure, (j) HPCI and RCIC turbine exhaust diaphragm pressure, (k) reactor water cleanup (RWCU) differential flow and high flow, (l) reactor steam dome pressure, and (m) drywell pressure. Redundant sensor input signals from each parameter are provided for initiation of isolation. The only exception is SLC System initiation. In addition, manual isolation of the logics is provided.

Primary containment isolation instrumentation has inputs to the trip logic of the isolation functions listed below.

(continued)

BASES

BACKGROUND
(continued)

1. Main Steam Line Isolation

Most MSL Isolation Functions receive inputs from four channels. The outputs from these channels are combined in a one-out-of-two taken twice logic to initiate isolation of all main steam isolation valves (MSIVs). The outputs from the same channels are arranged into two two-out-of-two logic trip systems to isolate all MSL drain valves. The MSL drain line has two isolation valves with one two-out-of-two logic system associated with each valve.

The exceptions to this arrangement are the Main Steam Line Flow—High Function. The Main Steam Line Flow—High Function uses 16 flow channels, four for each steam line. One channel from each steam line inputs to one of the four trip strings. Two trip strings make up each trip system and both trip systems must trip to cause an MSL isolation. Each trip string has four inputs (one per MSL), any one of which will trip the trip string. The trip strings are arranged in a one-out-of-two taken twice logic. This is effectively a one-out-of-eight taken twice logic arrangement to initiate isolation of the MSIVs. Similarly, the 16 flow channels are connected into two two-out-of-two logic trip systems (effectively, two one-out-of-four twice logic), with each trip system isolating one of the two MSL drain valves.

2. Primary Containment Isolation

Most Primary Containment Isolation Functions receive inputs from four channels. The outputs from these channels are arranged into two two-out-of-two logic trip systems. One trip system initiates isolation of all inboard primary containment isolation valves, while the other trip system initiates isolation of all outboard primary containment isolation valves. Each logic closes one of the two valves on each penetration, so that operation of either logic isolates the penetration.

The exceptions to this arrangement are as follows. Hydrogen and Oxygen Analyzers which isolate Division I Analyzer on a Division I isolation signal, and Division II Analyzer on a Division II isolation signal. This is to ensure monitoring capability is not lost. Chilled Water to recirculation pumps and Liquid Radwaste Collection System isolation valves

(continued)

BASES

BACKGROUND 2. Primary Containment Isolation (continued)

where both inboard and outboard valves will isolate on either division providing the isolation signal. Traversing incore probe ball valves and the instrument gas to the drywell to suppression chamber vacuum breakers only have one isolation valve and receives a signal from only one division.

3., 4. High Pressure Coolant Injection System Isolation and Reactor Core Isolation Cooling System Isolation

Most Functions that isolate HPCI and RCIC receive input from two channels, with each channel in one trip system using a one-out-of-one logic. Each of the two trip systems in each isolation group is connected to one of the two valves on each associated penetration.

The exceptions are the HPCI and RCIC Turbine Exhaust Diaphragm Pressure—High and Steam Supply Line Pressure—Low Functions. These Functions receive inputs from four turbine exhaust diaphragm pressure and four steam supply pressure channels for each system. The outputs from the turbine exhaust diaphragm pressure and steam supply pressure channels are each connected to two two-out-of-two trip systems. Each trip system isolates one valve per associated penetration.

5. Reactor Water Cleanup System Isolation

The Reactor Vessel Water Level—Low Low, Level 2 Isolation Function receives input from four reactor vessel water level channels. The outputs from the reactor vessel water level channels are connected into two two-out-of-two trip systems. The Differential Flow—High, Flow—High, and SLC System Initiation Functions receive input from two channels, with each channel in one trip system using a one-out-of-one logic. The temperature isolations are divided into three Functions. These Functions are Pump Area, Penetration Area, and Heat Exchanger Area. Each area is monitored by two temperature monitors, one for each trip system. These are configured so that any one input will trip the associated trip system. Each of the two trip systems is connected to one of the two valves on each RWCU penetration.

(continued)

BASES

BACKGROUND
(continued)

6. Shutdown Cooling System Isolation

The Reactor Vessel Water Level—Low, Level 3 Function receives input from four reactor vessel water level channels. The outputs from the reactor vessel water level channels are connected to two two-out-of-two trip systems. The Reactor Vessel Pressure—High Function receives input from two channels, with each channel in one trip system using a one-out-of-one logic. Each of the two trip systems is connected to one of the two valves on each shutdown cooling penetration.

7. Traversing Incore Probe System Isolation

The Reactor Vessel Water Level—Low, Level 3 Isolation Function receives input from two reactor vessel water level channels. The Drywell Pressure-High Isolation Function receives input from two drywell pressure channels. The outputs from the reactor vessel water level channels and drywell pressure channels are connected into one two-out-of-two logic trip system.

When either Isolation Function actuates, the TIP drive mechanisms will withdraw the TIPs, if inserted, and close the inboard TIP System isolation ball valves when the proximity probe senses the TIPs are withdrawn into the shield. The TIP System isolation ball valves are only open when the TIP System is in use. The outboard TIP System isolation valves are manual shear valves.

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The isolation signals generated by the primary containment isolation instrumentation are implicitly assumed in the safety analyses of References 1 and 2 to initiate closure of valves to limit offsite doses. Refer to LCO 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," Applicable Safety Analyses Bases for more detail of the safety analyses.

Primary containment isolation instrumentation satisfies Criterion 3 of the NRC Policy Statement. (Ref. 8) Certain instrumentation Functions are retained for other reasons and are described below in the individual Functions discussion.

(continued)

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(continued)

The OPERABILITY of the primary containment instrumentation is dependent on the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.6.1-1. Each Function must have a required number of OPERABLE channels, with their setpoints within the specified Allowable Values, where appropriate. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions. Each channel must also respond within its assumed response time, where appropriate.

Allowable Values are specified for each Primary Containment Isolation Function specified in the Table. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoints do not exceed the Allowable Value between CHANNEL

CALIBRATIONS. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. Trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter reaches the setpoint, the associated device changes state. The analytic limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytic limits, corrected for calibration, process, and some of the instrument errors. The trip setpoints are then determined accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in MODES 1, 2, and 3 consistent with the Applicability for LCO 3.6.1.1, "Primary Containment." Functions that have different Applicabilities are discussed below in the individual Functions discussion.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

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(continued)

The penetrations which are isolated by the below listed functions can be determined by referring to the PCIV Table found in the Bases of LCO 3.6.1.3, "Primary Containment Isolation Valves."

Main Steam Line Isolation

1.a. Reactor Vessel Water Level—Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, isolation of the MSIVs and other interfaces with the reactor vessel occurs to prevent offsite dose limits from being exceeded. The Reactor Vessel Water Level—Low Low Low, Level 1 Function is one of the many Functions assumed to be OPERABLE and capable of providing isolation signals. The Reactor Vessel Water Level—Low Low Low, Level 1 Function associated with isolation is assumed in the analysis of the recirculation line break (Ref. 1). The isolation of the MSLs on Level 1 supports actions to ensure that offsite dose limits are not exceeded for a DBA.

Reactor vessel water level signals are initiated from four level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level—Low Low Low, Level 1 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Reactor Vessel Water Level—Low Low Low, Level 1 Allowable Value is chosen to be the same as the ECCS Level 1 Allowable Value (LCO 3.3.5.1) to ensure that the MSLs isolate on a potential loss of coolant accident (LOCA) to prevent offsite doses from exceeding 10 CFR 100 limits.

(continued)

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(continued)

1.b. Main Steam Line Pressure—Low

Low MSL pressure indicates that there may be a problem with the turbine pressure regulation, which could result in a low reactor vessel water level condition and the RPV cooling down more than 100°F/hr if the pressure loss is allowed to continue. The Main Steam Line Pressure—Low Function is directly assumed in the analysis of the pressure regulator failure (Ref. 2). For this event, the closure of the MSIVs ensures that the RPV temperature change limit (100°F/hr) is not reached. In addition, this Function supports actions to ensure that Safety Limit 2.1.1.1 is not exceeded. (This Function closes the MSIVs prior to pressure decreasing below 785 psig, which results in a scram due to MSIV closure, thus reducing reactor power to < 25% RTP.)

The MSL low pressure signals are initiated from four instruments that are connected to the MSL header. The instruments are arranged such that, even though physically separated from each other, each instrument is able to detect low MSL pressure. Four channels of Main Steam Line Pressure—Low Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Main Steam Line Pressure—Low trip will only occur after a 500 milli-second time delay to prevent any spurious isolations.

The Allowable Value was selected to be high enough to prevent excessive RPV depressurization. The Main Steam Line Pressure—Low Function is only required to be OPERABLE in MODE 1 since this is when the assumed transient can occur (Ref. 2).

1.c. Main Steam Line Flow—High

Main Steam Line Flow—High is provided to detect a break of the MSL and to initiate closure of the MSIVs. If the steam were allowed to continue flowing out of the break, the reactor would depressurize and the core could uncover. If the RPV water level decreases too far, fuel damage could occur. Therefore, the isolation is initiated on high flow to prevent or minimize core damage. The Main Steam Line Flow—High Function is

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1.c. Main Steam Line Flow—High (continued)

directly assumed in the analysis of the main steam line break (MSLB) (Ref. 1). The isolation action, along with the scram function of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46 and offsite doses do not exceed the 10 CFR 100 limits.

The MSL flow signals are initiated from 16 instruments that are connected to the four MSLs. The instruments are arranged such that, even though physically separated from each other, all four connected to one MSL would be able to detect the high flow. Four channels of Main Steam Line Flow—High Function for each unisolated MSL (two channels per trip system) are available and are required to be OPERABLE so that no single instrument failure will preclude detecting a break in any individual MSL.

1.d. Condenser Vacuum—Low

The Allowable Value is chosen to ensure that offsite dose limits are not exceeded due to the break.

The Condenser Vacuum—Low Function is provided to prevent overpressurization of the main condenser in the event of a loss of the main condenser vacuum. Since the integrity of the condenser is an assumption in offsite dose calculations, the Condenser Vacuum—Low Function is assumed to be OPERABLE and capable of initiating closure of the MSIVs. The closure of the MSIVs is initiated to prevent the addition of steam that would lead to additional condenser pressurization and possible rupture of the diaphragm installed to protect the turbine exhaust hood, thereby preventing a potential radiation leakage path following an accident.

Condenser vacuum pressure signals are derived from four pressure instruments that sense the pressure in the condenser. Four channels of Condenser Vacuum-Low Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

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1.d. Condenser Vacuum—Low (continued)

The Allowable Value is chosen to prevent damage to the condenser due to pressurization, thereby ensuring its integrity for offsite dose analysis. As noted (footnote (a) to Table 3.3.6.1-1), the channels are not required to be OPERABLE in MODES 2 and 3 when all main turbine stop valves (TSVs) are closed, since the potential for condenser overpressurization is minimized. Switches are provided to manually bypass the channels when all TSVs are closed.

1.e. Reactor Building Main Steam Tunnel Temperature—High

Reactor Building Main Steam Tunnel temperature is provided to detect a leak in the RCPB and provides diversity to the high flow instrumentation. The isolation occurs when a very small leak has occurred. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. However, credit for these instruments is not taken in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks, such as MSLBs.

Area temperature signals are initiated from thermocouples located in the area being monitored. Four channels of Reactor Building Main Steam Tunnel Temperature—High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The reactor building main steam tunnel temperature trip will only occur after a one second time delay.

The temperature monitoring Allowable Value is chosen to detect a leak equivalent to approximately 25 gpm of water.

1.f. Manual Initiation

The Manual Initiation push button channels introduce signals into the MSL isolation logic that are redundant to the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for the overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis.

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1.f. Manual Initiation (continued)

There are four push buttons for the logic, two manual initiation push button per trip system. There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the push buttons.

Two channels of Manual Initiation Function are available and are required to be OPERABLE in MODES 1, 2, and 3, since these are the MODES in which the MSL isolation automatic Functions are required to be OPERABLE.

Primary Containment Isolation

2.a. Reactor Vessel Water Level - Low, Level 3

Low RPV water level indicates that the capability to cool the fuel may be threatened. The valves whose penetrations communicate with the primary containment are isolated to limit the release of fission products. The isolation of the primary containment on Level 3 supports actions to ensure that offsite dose limits of 10 CFR 100 are not exceeded. The Reactor Vessel Water Level—Low, Level 3 Function associated with isolation is implicitly assumed in the FSAR analysis as these leakage paths are assumed to be isolated post LOCA.

Reactor Vessel Water Level—Low, Level 3 signals are initiated from level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level—Low, Level 3 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Reactor Vessel Water Level—Low, Level 3 Allowable Value was chosen to be the same as the RPS Level 3 scram Allowable Value (LCO 3.3.1.1), since isolation of these valves is not critical to orderly plant shutdown.

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2.b. Reactor Vessel Water Level—Low Low, Level 2

Low RPV water level indicates that the capability to cool the fuel may be threatened. The valves whose penetrations communicate with the primary containment are isolated to limit the release of fission products. The isolation of the primary containment on Level 2 supports actions to ensure that offsite dose limits of 10 CFR 100 are not exceeded. The Reactor Vessel Water Level—Low Low, Level 2 Function associated with isolation is implicitly assumed in the FSAR analysis as these leakage paths are assumed to be isolated post LOCA.

Reactor Vessel Water Level—Low Low, Level 2 signals are initiated from level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level—Low Low, Level 2 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Reactor Vessel Water Level—Low Low, Level 2 Allowable Value was chosen to be the same as the ECCS Level 2 Allowable Value (LCO 3.3.5.1), since this may be indicative of a LOCA.

2.c. Reactor Vessel Water Level—Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The valves whose penetrations communicate with the primary containment are isolated to limit the release of fission products. The isolation of the primary containment on Level 1 supports actions to ensure the offsite dose limits of 10 CFR 100 are not exceeded. The Reactor Vessel Water Level - Low Low Low, Level 1 Function associated with isolation is implicitly assumed in the FSAR analysis as these leakage paths are assumed to be isolated post LOCA.

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2.c. Reactor Vessel Water Level—Low Low Low, Level 1 (continued)

Reactor vessel water level signals are initiated from four level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level—Low Low Low, Level 1 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Reactor Vessel Water Level—Low Low Low, Level 1 Allowable Value is chosen to be the same as the ECCS Level 1 Allowable Value (LCO 3.3.5.1) to ensure that the associated penetrations isolate on a potential loss of coolant accident (LOCA) to prevent offsite doses from exceeding 10 CFR 100 limits.

2.d. Drywell Pressure—High

High drywell pressure can indicate a break in the RCPB inside the primary containment. The isolation of some of the primary containment isolation valves on high drywell pressure supports actions to ensure that offsite dose limits of 10 CFR 100 are not exceeded. The Drywell Pressure—High Function, associated with isolation of the primary containment, is implicitly assumed in the FSAR accident analysis as these leakage paths are assumed to be isolated post LOCA.

High drywell pressure signals are initiated from pressure instruments that sense the pressure in the drywell. Four channels of Drywell Pressure—High per Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Value was selected to be the same as the ECCS Drywell Pressure—High Allowable Value (LCO 3.3.5.1), since this may be indicative of a LOCA inside primary containment.

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2.e. SGTS Exhaust Radiation—High

High SGTS Exhaust radiation indicates possible gross failure of the fuel cladding. Therefore, when SGTS Exhaust Radiation High is detected, an isolation is initiated to limit the release of fission products. However, this Function is not assumed in any accident or transient analysis in the FSAR because other leakage paths (e.g., MSIVs) are more limiting.

The SGTS Exhaust radiation signals are initiated from radiation detectors that are located in the SGTS Exhaust. Two channels of SGTS Exhaust Radiation—High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Value is low enough to promptly detect gross failures in the fuel cladding.

2.f. Manual Initiation

The Manual Initiation push button channels introduce signals into the primary containment isolation logic that are redundant to the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis.

There are two push buttons for the logic, one manual initiation push button per trip system. There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the push buttons.

Two channels of the Manual Initiation Function are available and are required to be OPERABLE in MODES 1, 2, and 3, since these are the MODES in which the Primary Containment Isolation automatic Functions are required to be OPERABLE.

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High Pressure Coolant Injection and Reactor Core Isolation
Cooling Systems Isolation

3.a., 4.a. HPCI and RCIC Steam Line Δ Pressure—High

Steam Line Δ Pressure High Functions are provided to detect a break of the RCIC or HPCI steam lines and initiate closure of the steam line isolation valves of the appropriate system. If the steam is allowed to continue flowing out of the break, the reactor will depressurize and the core can uncover. Therefore, the isolations are initiated on high flow to prevent or minimize core damage. The isolation action, along with the scram function of the RPS, ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. Specific credit for these Functions is not assumed in any FSAR accident analyses since the bounding analysis is performed for large breaks such as recirculation and MSL breaks. However, these instruments prevent the RCIC or HPCI steam line breaks from becoming bounding.

The HPCI and RCIC Steam Line Δ Pressure — High signals are initiated from instruments (two for HPCI and two for RCIC) that are connected to the system steam lines. Two channels of both HPCI and RCIC Steam Line Δ pressure—High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The steam line Δ Pressure - High will only occur after a 3 second time delay to prevent any spurious isolations.

The Allowable Values are chosen to be low enough to ensure that the trip occurs to prevent fuel damage and maintains the MSLB event as the bounding event, and high enough to be above the maximum transient steam flow during system startup.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY
(continued)

3.b., 4.b. HPCI and RCIC Steam Supply Line Δ Pressure—Low

Low MSL pressure indicates that the pressure of the steam in the HPCI or RCIC turbine may be too low to continue operation of the associated system's turbine. These isolations are for equipment protection and are not assumed in any transient or accident analysis in the FSAR. However, they also provide a diverse signal to indicate a possible system break. These instruments are included in Technical Specifications (TS) because of the potential for risk due to possible failure of the instruments preventing HPCI and RCIC initiations (Ref. 3).

The HPCI and RCIC Steam Supply Line Pressure—Low signals are initiated from instruments (four for HPCI and four for RCIC) that are connected to the system steam line. Four channels of both HPCI and RCIC Steam Supply Line Pressure—Low Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Values are selected to be high enough to prevent damage to the system's turbine.

3.c., 4.c. HPCI and RCIC Turbine Exhaust Diaphragm Pressure—High

High turbine exhaust diaphragm pressure indicates that a release of steam into the associated compartment is possible. That is, one of two exhaust diaphragms has ruptured. These isolations are to prevent steam from entering the associated compartment and are not assumed in any transient or accident analysis in the FSAR. These instruments are included in the TS because of the potential for risk due to possible failure of the instruments preventing HPCI and RCIC initiations (Ref. 3).

The HPCI and RCIC Turbine Exhaust Diaphragm Pressure-High signals are initiated from instruments (four for HPCI and four for RCIC) that are connected to the area between the rupture diaphragms on each system's turbine exhaust line. Four channels of both HPCI and RCIC Turbine Exhaust Diaphragm Pressure-High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY

3.c., 4.c. HPCI and RCIC Turbine Exhaust Diaphragm Pressure—High
(continued)

The Allowable Values is low enough to identify a high turbine exhaust pressure condition resulting from a diaphragm rupture, or a leak in the diaphragm adjacent to the exhaust line and high enough to prevent inadvertent system isolation.

3.d., 4.d. Drywell Pressure—High

High drywell pressure can indicate a break in the RCPB. The HPCI and RCIC isolation of the turbine exhaust vacuum breaker line is provided to prevent communication with the wetwell when high drywell pressure exists. A potential leakage path exists via the turbine exhaust. The isolation is delayed until the system becomes unavailable for injection (i.e., low steam supply line pressure). The isolation of the HPCI and RCIC turbine exhaust vacuum breaker line by Drywell Pressure—High is indirectly assumed in the FSAR accident analysis because the turbine exhaust vacuum breaker line leakage path is not assumed to contribute to offsite doses and is provided for long term containment isolation.

High drywell pressure signals are initiated from pressure instruments that sense the pressure in the drywell. Four channels of both HPCI and RCIC Drywell Pressure—High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Value was selected to be the same as the ECCS Drywell Pressure—High Allowable Value (LCO 3.3.5.1), since this is indicative of a LOCA inside primary containment.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY
(continued)

3.e., 3.f., 3.g., 4.e., 4.f., 4.g., HPCI and RCIC Area and Emergency
Cooler Temperature—High

HPCI and RCIC Area and Emergency Cooler temperatures are provided to detect a leak from the associated system steam piping. The isolation occurs when a small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks such as recirculation or MSL breaks.

Area and Emergency Cooler Temperature-High signals are initiated from thermocouples that are appropriately located to protect the system that is being monitored. Two Instruments monitor each area. Two channels for each HPCI and RCIC Area and Emergency Cooler Temperature-High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The HPCI and RCIC Pipe Routing area temperature trips will only occur after a 15 minute time delay to prevent any spurious temperature isolations due to short temperature increases and allows operators sufficient time to determine which system is leaking. The other ambient temperature trips will only occur after a one second time delay to prevent any spurious temperature isolations.

The Allowable Values are set low enough to detect a leak equivalent to 25 gpm, and high enough to avoid trips at expected operating temperature.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY
(continued)

3.h., 4.h. Manual Initiation

The Manual Initiation push button channels introduce signals into the HPCI and RCIC systems' isolation logics that are redundant to the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for these Functions. They are retained for overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis

There is one manual initiation push button for each of the HPCI and RCIC systems. One isolation pushbutton per system will introduce an isolation to one of the two trip systems. There is no Allowable Value for these Functions, since the channels are mechanically actuated based solely on the position of the push buttons.

Two channels of both HPCI and RCIC Manual Initiation Functions are available and are required to be OPERABLE in MODES 1, 2, and 3 since these are the MODES in which the HPCI and RCIC systems' Isolation automatic Functions are required to be OPERABLE.

Reactor Water Cleanup System Isolation

5.a. RWCU Differential Flow—High

The high differential flow signal is provided to detect a break in the RWCU System. This will detect leaks in the RWCU System when area temperature would not provide detection (i.e., a cold leg break). Should the reactor coolant continue to flow out of the break, offsite dose limits may be exceeded. Therefore, isolation of the RWCU System is initiated when high differential flow is sensed to prevent exceeding offsite doses. A 45 second time delay is provided to prevent spurious trips during most RWCU operational transients. This Function is not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks such as MSLBs.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY

5.a. RWCU Differential Flow—High (continued)

The high differential flow signals are initiated from instruments that are connected to the inlet (from the recirculation suction) and outlets (to condenser and feedwater) of the RWCU System. Two channels of Differential Flow—High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Differential Flow—High Allowable Value ensures that a break of the RWCU piping is detected.

5.b, 5.c, 5.d RWCU Area Temperatures—High

RWCU area temperatures are provided to detect a leak from the RWCU System. The isolation occurs even when small leaks have occurred and is diverse to the high differential flow instrumentation for the hot portions of the RWCU System. If the small leak continues without isolation, offsite dose limits may be reached. Credit for these instruments is not taken in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks such as recirculation or MSL breaks.

Area temperature signals are initiated from temperature elements that are located in the area that is being monitored. Six thermocouples provide input to the Area Temperature—High Function (two per area). Six channels are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The area temperature trip will only occur after a one second time to prevent any spurious temperature isolations.

The Area Temperature—High Allowable Values are set low enough to detect a leak equivalent to 25 gpm.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY
(continued)

5.e. SLC System Initiation

The isolation of the RWCU System is required when the SLC System has been initiated to prevent dilution and removal of the boron solution by the RWCU System (Ref. 4). SLC System initiation signals are initiated from the two SLC pump start signals.

There is no Allowable Value associated with this Function since the channels are mechanically actuated based solely on the position of the SLC System initiation switch.

Two channels (one from each pump) of the SLC System Initiation Function are available and are required to be OPERABLE only in MODES 1 and 2, since these are the only MODES where the reactor can be critical, with the exception of Special Operations LCO 3.10.8, and these MODES are consistent with the Applicability for the SLC System (LCO 3.1.7).

As noted (footnote (b) to Table 3.3.6.1-1), this Function is only required to close the outboard RWCU isolation valve trip systems.

5.f. Reactor Vessel Water Level—Low Low, Level 2

Low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, isolation of some interfaces with the reactor vessel occurs to isolate the potential sources of a break. The isolation of the RWCU System on Level 2 supports actions to ensure that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. The Reactor Vessel Water Level—Low Low, Level 2 Function associated with RWCU isolation is not directly assumed in the FSAR safety analyses because the RWCU System line break is bounded by breaks of larger systems (recirculation and MSL breaks are more limiting).

Reactor Vessel Water Level—Low Low, Level 2 signals are initiated from four level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY

5.f. Reactor Vessel Water Level—Low Low, Level 2 (continued)

Reactor Vessel Water Level—Low Low, Level 2 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Reactor Vessel Water Level—Low Low, Level 2 Allowable Value was chosen to be the same as the ECCS Reactor Vessel Water Level—Low Low, Level 2 Allowable Value (LCO 3.3.5.1), since the capability to cool the fuel may be threatened.

5.g. RWCU Flow - High

RWCU Flow—High Function is provided to detect a break of the RWCU System. Should the reactor coolant continue to flow out of the break, offsite dose limits may be exceeded. Therefore, isolation is initiated on high flow to prevent or minimize core damage. The isolation action, along with the scram function of the RPS, ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46. Specific credit for this Function is not assumed in any FSAR accident analyses since the bounding analysis is performed for large breaks such as recirculation and MSL breaks.

The RWCU Flow—High signals are initiated from two instruments. Two channels of RWCU Flow—High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The RWCU flow trip will only occur after a 5 second time delay to prevent spurious trips.

The Allowable Value is chosen to be low enough to ensure that the trip occurs to prevent fuel damage and maintains the MSLB event as the bounding event.

5.h. Manual Initiation

The Manual Initiation push button channels introduce signals into the RWCU System isolation logic that are redundant to

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY

5.h. Manual Initiation (continued)

the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis.

There are two push buttons for the logic, one manual initiation push button per trip system. There is no Allowable Value for this Function, since the channels are mechanically actuated based solely on the position of the push buttons.

Two channels of the Manual Initiation Function are available and are required to be OPERABLE in MODES 1, 2, and 3 since these are the MODES in which the RWCU System Isolation automatic Functions are required to be OPERABLE.

Shutdown Cooling System Isolation

6.a. Reactor Steam Dome Pressure—High

The Reactor Steam Dome Pressure—High Function is provided to isolate the shutdown cooling portion of the Residual Heat Removal (RHR) System. This interlock is provided only for equipment protection to prevent an intersystem LOCA scenario, and credit for the interlock is not assumed in the accident or transient analysis in the FSAR.

The Reactor Steam Dome Pressure—High signals are initiated from two instruments. Two channels of Reactor Steam Dome Pressure—High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. The Function is only required to be OPERABLE in MODES 1, 2, and 3, since these are the only MODES in which the reactor can be pressurized with the exception of Special Operations LCO 3.10.1; thus, equipment protection is needed. The Allowable Value was chosen to be low enough to protect the system equipment from overpressurization.

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BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY

(continued)

6.b. Reactor Vessel Water Level—Low, Level 3

Low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, isolation of some reactor vessel interfaces occurs to

begin isolating the potential sources of a break. The Reactor Vessel Water Level—Low, Level 3 Function associated with RHR Shutdown Cooling System isolation is not directly assumed in safety analyses because a break of the RHR Shutdown Cooling System is bounded by breaks of the recirculation and MSL.

The RHR Shutdown Cooling System isolation on Level 3 supports actions to ensure that the RPV water level does not drop below the top of the active fuel during a vessel draindown event caused by a leak (e.g., pipe break or inadvertent valve opening) in the RHR Shutdown Cooling System.

Reactor Vessel Water Level—Low, Level 3 signals are initiated from four level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels (two channels per trip system) of the Reactor Vessel Water Level—Low, Level 3 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. As noted (footnote (c) to Table 3.3.6.1-1), only two channels of the Reactor Vessel Water Level—Low, Level 3 Function are required to be OPERABLE in MODES 4 and 5 (and must input into the same trip system), provided the RHR Shutdown Cooling System integrity is maintained. System integrity is maintained provided the piping is intact and no maintenance is being performed that has the potential for draining the reactor vessel through the system.

The Reactor Vessel Water Level—Low, Level 3 Allowable Value was chosen to be the same as the RPS Reactor Vessel Water Level—Low, Level 3 Allowable Value (LCO 3.3.1.1), since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level—Low, Level 3 Function is only required to be OPERABLE in MODES 3, 4, and 5 to prevent this potential flow path from lowering the reactor vessel level to the top of the fuel.

(continued)

BASES

APPLICABLE
SAFETY
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LCO, and
APPLICABILITY

6.b. Reactor Vessel Water Level—Low, Level 3 (continued)

In MODES 1 and 2, another isolation (i.e., Reactor Steam Dome Pressure—High) and administrative controls ensure that this flow path remains isolated to prevent unexpected loss of inventory via this flow path.

6.c Manual Initiation

The Manual Initiation push button channels introduce signals to RHR Shutdown Cooling System isolation logic that is redundant to the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis.

There are two push buttons for the logic, one manual initiation push button per trip system. There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the push buttons.

Two channels of the Manual Initiation Function are available and are required to be OPERABLE in MODES 3, 4, and 5, since these are the MODES in which the RHR Shutdown Cooling System Isolation automatic Function are required to be OPERABLE.

Traversing Incore Probe System Isolation

7.a Reactor Vessel Water Level - Low, Level 3

Low RPV water level indicates that the capability to cool the fuel may be threatened. The valves whose penetrations communicate with the primary containment are isolated to limit the release of fission products. The isolation of the primary containment on Level 3 supports actions to ensure that offsite dose limits of 10 CFR 100 are not exceeded. The Reactor Vessel Water Level - Low, Level 3 Function associated with isolation is implicitly assumed in the FSAR analysis as these leakage paths are assumed to be isolated post LOCA.

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES,
LCO, and
APPLICABILITY

7.a Reactor Vessel Water Level - Low, Level 3 (continued)

Reactor Vessel Water Level - Low, Level 3 signals are initiated from level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Two channels of Reactor Vessel Water Level - Low, Level 3 Function are available and are required to be OPERABLE to ensure that no single instrument failure can initiate an inadvertent isolation actuation. The isolation function is ensured by the manual shear valve in each penetration.

The Reactor Vessel Water Level - Low, Level 3 Allowable Value was chosen to be the same as the RPS Level 3 scram Allowable Value (LCO 3.3.1.1), since isolation of these valves is not critical to orderly plant shutdown.

7.b. Drywell Pressure - High

High drywell pressure can indicate a break in the RCPB inside the primary containment. The isolation of some of the primary containment isolation valves on high drywell pressure supports actions to ensure that offsite does limits of 10 CFR 100 are not exceeded. The Drywell Pressure - High Function, associated with isolation of the primary containment, is implicitly assumed in the FSAR accident analysis as these leakage paths are assumed to be isolated post LOCA.

High drywell pressure signals are initiated from pressure transmitters that sense the pressure in the drywell. Two channels of Drywell Pressure - High per Function are available and are required to be OPERABLE to ensure that no single instrument failure can initiate an inadvertent actuation. The isolation function is ensured by the manual shear valve in each penetration.

The Allowable Value was selected to be the same as the ECCS Drywell Pressure - High Allowable Value (LCO 3.3.5.1), since this may be indicative of a LOCA inside primary containment.

(continued)

BASES

ACTIONS

The ACTIONS are modified by two Notes. Note 1 allows penetration flow path(s) to be unisolated intermittently under administrative controls. These controls consist of stationing a dedicated operator at the controls of the valve, who is in continuous communication with the control room. In this way, the penetration can be rapidly isolated when a need for primary containment isolation is indicated. Note 2 has been provided to modify the ACTIONS related to primary containment isolation instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable primary containment isolation instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable primary containment isolation instrumentation channel.

A.1

Because of the diversity of sensors available to provide isolation signals and the redundancy of the isolation design, an allowable out of service time of 12 hours for Functions 2.a, 2.d, 6.b, 7.a, and 7.b and 24 hours for Functions other than Functions 2.a, 2.d, 6.b, 7.a, and 7.b has been shown to be acceptable (Refs. 5 and 6) to permit restoration of any inoperable channel to OPERABLE status. This out of service time is only acceptable provided the associated Function is still maintaining isolation capability (refer to Required Action B.1 Bases). If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the channel must be placed in the tripped condition per Required Action A.1. Placing the inoperable channel in trip would conservatively compensate for the inoperability, restore capability to accommodate a single failure, and allow operation to continue with no further restrictions. Alternately, if it is not desired to place the channel in trip (e.g., as in the case where placing the inoperable channel in trip would result in an isolation), Condition C must be entered and its Required Action taken.

(continued)

BASES

ACTIONS
(continued)

B.1 and B.2

Required Action B.1 is intended to ensure that appropriate actions are taken if multiple, inoperable, untripped channels within the same Function result in redundant automatic isolation capability being lost for the associated penetration flow path(s). The MSL Isolation Functions are considered to be maintaining isolation capability when sufficient channels are OPERABLE or in trip, such that both trip systems will generate a trip signal from the given Function on a valid signal. The other isolation functions are considered to be maintaining isolation capability when sufficient channels are OPERABLE or in trip, such that one trip system will generate a trip signal from the given Function on a valid signal. This ensures that one of the two PCIVs in the associated penetration flow path can receive an isolation signal from the given Function. For Functions 1.a, 1.b, 1.d, and 1.e, this would require both trip systems to have one channel OPERABLE or in trip. For Function 1.c, this would require both trip systems to have one channel, associated with each MSL, OPERABLE or in trip. Therefore, this would require both trip systems to have one channel per location OPERABLE or in trip. For Functions 2.a, 2.b, 2.c, 2.d, 3.b, 3.c, 3.d, 4.b, 4.c, 4.d, 5.f, and 6.b, this would require one trip system to have two channels, each OPERABLE or in trip. For Functions 2.e, 3.a, 3.e, 3.f, 3.g, 4.a, 4.e, 4.f, 4.g, 5.a, 5.b, 5.c, 5.d, 5.e, 5.g, and 6.a, this would require one trip system to have one channel OPERABLE or in trip. The Condition does not include the Manual Initiation Functions (Functions 1.f, 2.f, 3.h, 4.h, 5.h, and 6.c), since they are not assumed in any accident or transient analysis. Thus, a total loss of manual initiation capability for 24 hours (as allowed by Required Action A.1) is allowed.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 1 hour Completion Time is acceptable because it minimizes risk while allowing time for restoration or tripping of channels.

(continued)

BASES

ACTIONS
(continued)

C.1

Required Action C.1 directs entry into the appropriate Condition referenced in Table 3.3.6.1-1. The applicable Condition specified in Table 3.3.6.1-1 is Function and MODE or other specified condition dependent and may change as the Required Action of a previous Condition is completed. Each time an inoperable channel has not met any Required Action of Condition A or B and the associated Completion Time has expired, Condition C will be entered for that channel and provides for transfer to the appropriate subsequent Condition.

D.1, D.2.1, and D.2.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the plant must be placed in a MODE or other specified condition in which the LCO does not apply. This is done by placing the plant in at least MODE 3 within 12 hours and in MODE 4 within 36 hours (Required Actions D.2.1 and D.2.2). Alternately, the associated MSLs may be isolated (Required Action D.1), and, if allowed (i.e., plant safety analysis allows operation with an MSL isolated), operation with that MSL isolated may continue. Isolating the affected MSL accomplishes the safety function of the inoperable channel. The Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

E.1

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the plant must be placed in a MODE or other specified condition in which the LCO does not apply. This is done by placing the plant in at least MODE 2 within 6 hours.

The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS
(continued)

F.1

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, plant operations may continue if the affected penetration flow path(s) is isolated. Isolating the affected penetration flow path(s) accomplishes the safety function of the inoperable channels.

If it is not desired to isolate the affected penetration flow path(s) (e.g., as in the case where isolating the penetration flow path(s) could result in a reactor scram), Condition H must be entered and its Required Actions taken.

The 1 hour Completion Time is acceptable because it minimizes risk while allowing sufficient time for plant operations personnel to isolate the affected penetration flow path(s).

G.1

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, plant operations may continue if the affected penetration flow path(s) is isolated. Isolating the affected penetration flow path(s) accomplishes the safety function of the inoperable channels. The 24 hour Completion Time is acceptable due to the fact that these Functions are either not assumed in any accident or transient analysis in the FSAR (Manual Initiation) or, in the case of the TIP System isolation, the TIP System penetration is a small bore (0.280 inch), its isolation in a design basis event (with loss of offsite power) would be via the manually operated shear valves, and the ability to manually isolate by either the normal isolation valve or the shear valve is unaffected by the inoperable instrumentation. It should be noted, however, that the TIP System is powered from an auxiliary instrumentation bus which has an uninterruptible power supply and hence, the TIP drive mechanisms and ball valve control will still function in the event of a loss of offsite power. Alternately, if it is not desired to isolate the affected penetration flow path(s) (e.g., as in the case where isolating the penetration flow path(s) could result in a reactor scram), Condition H must be entered and its Required Actions taken.

(continued)

BASES

ACTIONS
(continued)

H.1 and H.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, or any Required Action of Condition F or G is not met and the associated Completion Time has expired, the plant must be placed in a MODE or other specified condition in which the LCO does not apply. This is done by placing the plant in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

I.1 and I.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated SLC subsystem(s) is declared inoperable or the RWCU System is isolated. Since this Function is required to ensure that the SLC System performs its intended function, sufficient remedial measures are provided by declaring the associated SLC subsystems inoperable or isolating the RWCU System.

The 1 hour Completion Time is acceptable because it minimizes risk while allowing sufficient time for personnel to isolate the RWCU System.

J.1 and J.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated penetration flow path should be closed. However, if the shutdown cooling function is needed to provide core cooling, these Required Actions allow the penetration flow path to remain unisolated provided action is immediately initiated to restore the channel to OPERABLE status or to isolate the RHR Shutdown Cooling System (i.e., provide alternate decay heat removal capabilities so the penetration flow path can be isolated). Actions must continue until the channel is restored to OPERABLE status or the RHR Shutdown Cooling System is isolated.

(continued)

BASES

SURVEILLANCE REQUIREMENTS As noted at the beginning of the SRs, the SRs for each Primary Containment Isolation instrumentation Function are found in the SRs column of Table 3.3.6.1-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required

Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Refs. 5 and 6) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the PCIVs will isolate the penetration flow path(s) when necessary.

SR 3.3.6.1.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria which are determined by the plant staff based on an investigation of a combination of the channel instrument uncertainties, may be used to support this parameter comparison and include indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit, and does not necessarily indicate the channel is Inoperable.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal checks of channels during normal operational use of the displays associated with the channels required by the LCO.

(continued)

BASES

SURVEILLANCE
REQUIREMENTS
(continued)

SR 3.3.6.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function.

The 92 day Frequency of SR 3.3.6.1.2 is based on the reliability analysis described in References 5 and 6.

This SR is modified by two Notes. Note 1 provides a general exception to the definition of CHANNEL FUNCTIONAL TEST. This exception is necessary because the design of instrumentation does not facilitate functional testing of all required contacts of the relays which input into the combinational logic. (Reference 11) Performance of such a test could result in a plant transient or place the plant in an undo risk situation. Therefore, for this SR, the CHANNEL FUNCTIONAL TEST verifies acceptable response by verifying the change of state of the relay which inputs into the combinational logic. The required contacts not tested during the CHANNEL FUNCTIONAL TEST are tested under the LOGIC SYSTEM FUNCTIONAL TEST, SR 3.3.6.1.5. This is acceptable because operating experience shows that the contacts not tested during the CHANNEL FUNCTIONAL TEST normally pass the LOGIC SYSTEM FUNCTIONAL TEST, and the testing methodology minimizes the risk of unplanned transients.

Note 2 provides a second specific exception to the definition of CHANNEL FUNCTIONAL TEST. For Functions 2.e, 3.a, and 4.a, certain channel relays are not included in the performance of the CHANNEL FUNCTIONAL TEST. These exceptions are necessary because the circuit design does not facilitate functional testing of the entire channel through to the coil of the relay which enters the combinational logic. (Reference 11) Specifically, testing of all required relays would require rendering the affected system (i.e., HPCI or RCIC) inoperable, or require lifting of leads and inserting test equipment which could lead to unplanned transients. Therefore, for these circuits, the CHANNEL FUNCTIONAL TEST verifies acceptable response by verifying the actuation of circuit devices up to the point where further testing could result in an unplanned transient. (References 10 and 12) The required relays not tested during the CHANNEL FUNCTIONAL TEST are tested under the LOGIC SYSTEM FUNCTIONAL TEST, SR 3.3.6.1.5. This exception

(continued)

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.3.6.1.2 (continued)

is acceptable because operating experience shows that the devices not tested during the CHANNEL FUNCTIONAL TEST normally pass the LOGIC SYSTEM FUNCTIONAL TEST, and the testing methodology minimizes the risk of unplanned transients.

SR 3.3.6.1.3 and SR 3.3.6.1.4

A CHANNEL CALIBRATION verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency of SR 3.3.6.1.3 is based on the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.6.1.4 is based on the assumption of an 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

It should be noted that some of the primary containment High Drywell pressure instruments, although only required to be calibrated on a 24 month Frequency, are calibrated quarterly based on other TS requirements.

SR 3.3.6.1.5

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required isolation logic for a specific channel. The system functional testing performed on PCIVs in LCO 3.6.1.3 overlaps this Surveillance to provide complete testing of the assumed safety function. The 24 month Frequency is based on the need to perform portions of this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.

(continued)

BASES

SURVEILLANCE
REQUIREMENTS
(continued)

SR 3.3.6.1.6

This SR ensures that the individual channel response times are less than or equal to the maximum values assumed in the accident analysis. Testing is performed only on channels where the guidance given in Reference 9 could not be met, which identified that degradation of response time can usually be detected by other surveillance tests.

As stated in Note 1, the response time of the sensors for Functions 1.b, is excluded from ISOLATION SYSTEM RESPONSE TIME testing. Because the vendor does not provide a design instrument response time, a penalty value to account for the sensor response time is included in determining total channel response time. The penalty value is based on the historical performance of the sensor. (Reference 13) This allowance is supported by Reference 9 which determined that significant degradation of the sensor channel response time can be detected during performance of other Technical Specification SRs and that the sensor response time is a small part of the overall ISOLATION RESPONSE TIME testing.

Function 1.a and 1.c channel sensors and logic components are excluded from response time testing in accordance with the provisions of References 14 and 15.

As stated in Note 2, response time testing of isolating relays is not required for Function 5.a. This allowance is supported by Reference 9. These relays isolate their respective isolation valve after a nominal 45 second time delay in the circuitry. No penalty value is included in the response time calculation of this function. This is due to the historical response time testing results of relays of the same manufacturer and model number being less than 100 milliseconds, which is well within the expected accuracy of the 45 second time delay relay.

ISOLATION SYSTEM RESPONSE TIME acceptance criteria are included in Reference 7. This test may be performed in one measurement, or in overlapping segments, with verification that all components are tested.

ISOLATION SYSTEM RESPONSE TIME tests are conducted on an 24 month STAGGERED TEST BASIS. The 24 month Frequency is consistent with the typical industry refueling cycle and is based upon plant operating experience that shows that random failures of instrumentation

(continued)

BASES

SURVEILLANCE REQUIREMENTS SR 3.3.6.1.6 (continued)

components causing serious response time degradation, but not channel failure, are infrequent occurrences.

REFERENCES

1. FSAR, Section 6.3.
2. FSAR, Chapter 15.
3. NEDO-31466, "Technical Specification Screening Criteria Application and Risk Assessment," November 1987.
4. FSAR, Section 4.2.3.4.3.
5. NEDC-31677P-A, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation," July 1990.
6. NEDC-30851P-A Supplement 2, "Technical Specifications Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation," March 1989.
7. FSAR, Table 7.3-29.
8. Final Policy Statement on Technical Specifications Improvements, July 22, 1993 (58 FR 39132).
9. NEDO-32291-A "System Analyses for Elimination of Selected Response Time Testing Requirements," October 1995.
10. PPL Letter to NRC, PLA-2618, Response to NRC INSPECTION REPORTS 50-387/85-28 AND 50-388/85-23, dated April 22, 1986.
11. NRC Inspection and Enforcement Manual, Part 9900: Technical Guidance, Standard Technical Specification Section 1.0 Definitions, Issue date 12/08/86.
12. Susquehanna Steam Electric Station NRC REGION I COMBINED INSPECTION 50-387/90-20; 50-388/90-20, File R41-2, dated March 5, 1986.
13. NRC Safety Evaluation Report related to Amendment No. 171 for License No. NPF-14 and Amendment No. 144 for License No. NPF-22.
14. NEDO 32291-A, Supplement 1, "System Analyses for the Elimination of Selected Response Time Testing Requirements," October 1999.

(continued)

BASES

REFERENCES
(continued)

15. NEDO 32291, Supplement 1, Addendum 2, "System Analyses for the Elimination of Selected Response Time Testing Requirements," September 5, 2003.
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B 3.6 CONTAINMENT SYSTEMS

B 3.6.1.1 Primary Containment

BASES

BACKGROUND

The function of the primary containment is to isolate and contain fission products released from the Reactor Primary System following a Design Basis Loss of Coolant Accident and to confine the postulated release of radioactive material. The primary containment consists of a steel lined, reinforced concrete vessel, which surrounds the Reactor Primary System and provides an essentially leak tight barrier against an uncontrolled release of radioactive material to the environment.

The isolation devices for the penetrations in the primary containment boundary are a part of the containment leak tight barrier. To maintain this leak tight barrier:

- a. All penetrations required to be closed during accident conditions are either:
 1. capable of being closed by an OPERABLE automatic containment isolation system, or
 2. closed by manual valves, blind flanges, or de-activated automatic valves secured in their closed positions, except as provided in LCO 3.6.1.3, "Primary Containment Isolation Valves (PCIVs);"
- b. The primary containment air lock is OPERABLE, except as provided in LCO 3.6.1.2, "Primary Containment Air Lock;" and
- c. All equipment hatches are closed.

Several instruments connect to the primary containment atmosphere and are considered extensions of the primary containment. The leak rate tested instrument isolation valves identified in the Leakage Rate Test Program should be used as the primary containment boundary when the instruments are isolated and/or vented. Table B 3.6.1.1-1 contains the listing of the instruments and isolation valves.

(continued)

BASES

BACKGROUND
(continued)

The H₂O₂ Analyzer lines beyond the PCIVs, up to and including the components within the H₂O₂ Analyzer panels, are extensions of primary containment (i.e., closed system), and are required to be leak rate tested in accordance with the Leakage Rate Test Program. The H₂O₂ Analyzer closed system boundary is identified in the Leakage Rate Test Program, and consists of components, piping, tubing, fittings, and valves, which meet the design guidance of Reference 7. Within the H₂O₂ Analyzer panels, the boundary ends at the first normally closed valve. The closed system boundary between PASS and the H₂O₂ Analyzer system ends at the Seismic Category I boundary between the two systems. This boundary occurs at the process sampling solenoid operated isolation valves (SV-12361, SV-12365, SV-12366, SV-12368, and SV-12369). These solenoid operated isolation valves do not fully meet the guidance of Reference 7 for closed system boundary valves in that they are not powered from a Class 1E power source. Based upon a risk determination, operating these valves as closed system boundary valves is not risk significant. These normally closed valves are required to be leakage rate tested in accordance with the Leakage Rate Test Program, since they form part of the closed system boundary for the H₂O₂ Analyzers. These valves are "closed system boundary valves" and may be opened under administrative control, as delineated in Technical Requirements Manual (TRM) Bases 3.6.4. Opening of these valves to permit testing of PASS in Modes 1, 2, and 3 is permitted in accordance with TRO 3.6.4.

When the H₂O₂ Analyzer panels are isolated and/or vented, the panel isolation valves identified in the Leakage Rate Test Program should be used as the boundary of the extension of primary containment. Table B 3.6.1.1-2 contains a listing of the affected H₂O₂ Analyzer penetrations and panel isolation valves.

This Specification ensures that the performance of the primary containment, in the event of a Design Basis Accident (DBA), meets the assumptions used in the safety analyses of References 1 and 2. SR 3.6.1.1.1 leakage rate requirements are in conformance with 10 CFR 50, Appendix J, Option B and supporting documents (Ref. 3, 4 and 5), as modified by approved exemptions.

(continued)

BASES (continued)

APPLICABLE
SAFETY ANALYSES

The safety design basis for the primary containment is that it must withstand the pressures and temperatures of the limiting DBA without exceeding the design leakage rate.

The DBA that postulates the maximum release of radioactive material within primary containment is a LOCA. In the analysis of this accident, it is assumed that primary containment is OPERABLE such that release of fission products to the environment is controlled by the rate of primary containment leakage.

Analytical methods and assumptions involving the primary containment are presented in References 1 and 2. The safety analyses assume a nonmechanistic fission product release following a DBA, which forms the basis for determination of offsite doses. The fission product release is, in turn, based on an assumed leakage rate from the primary containment. OPERABILITY of the primary containment ensures that the leakage rate assumed in the safety analyses is not exceeded.

The maximum allowable leakage rate for the primary containment (L_a) is 1.0% by weight of the containment air per 24 hours at the design basis LOCA maximum peak containment pressure (P_a) of 45 psig.

Primary containment satisfies Criterion 3 of the NRC Policy Statement. (Ref. 6)

LCO

Primary containment OPERABILITY is maintained by limiting leakage to $\leq 1.0 L_a$, except prior to each startup after performing a required Primary Containment Leakage Rate Testing Program leakage test. At this time, applicable leakage limits must be met. Compliance with this LCO will ensure a primary containment configuration, including equipment hatches, that is structurally sound and that will limit leakage to those leakage rates assumed in the safety analyses.

Individual leakage rates specified for the primary containment air lock are addressed in LCO 3.6.1.2.

Leakage requirements for MSIVs and Secondary containment bypass are addressed in LCO 3.6.1.3.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, a DBA could cause a release of radioactive material to primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, primary containment is not required to be OPERABLE in MODES 4 and 5 to prevent leakage of radioactive material from primary containment.

ACTIONS

A.1

In the event primary containment is inoperable, primary containment must be restored to OPERABLE status within 1 hour. The 1 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining primary containment OPERABILITY during MODES 1, 2, and 3. This time period also ensures that the probability of an accident (requiring primary containment OPERABILITY) occurring during periods where primary containment is inoperable is minimal.

B.1 and B.2

If primary containment cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.1.1

Maintaining the primary containment OPERABLE requires compliance with the visual examinations and leakage rate test requirements of the Primary Containment Leakage Rate Testing Program. The primary containment concrete visual examinations may be performed during either power operation, e.g., performed concurrently with other primary containment inspection-related activities, or during a maintenance or refueling outage. The visual examinations of the steel liner plate inside primary containment are performed during maintenance or refueling outages since this is the only time the liner plate is fully accessible.

(continued)

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.1.1 (continued)

Failure to meet air lock leakage testing (SR 3.6.1.2.1) or resilient seal primary containment purge valve leakage testing (SR 3.6.1.3.6) does not necessarily result in a failure of this SR. The impact of the failure to meet these SRs must be evaluated against the Type A, B, and C acceptance criteria of the Primary Containment Leakage Rate Testing Program. As left leakage prior to each startup after performing a required leakage test is required to be $< 0.6 L_a$ for combined Type B and C leakage, and $\leq 0.75 L_a$ for overall Type A leakage. At all other times between required leakage rate tests, the acceptance criteria is based on an overall Type A leakage limit of $\leq 1.0 L_a$. At $\leq 1.0 L_a$ the offsite dose consequences are bounded by the assumptions of the safety analysis. The Frequency is required by the Primary Containment Leakage Rate Testing Program.

SR Frequencies are as required by the Primary Containment Leakage Rate Testing Program. These periodic testing requirements verify that the primary containment leakage rate does not exceed the leakage rate assumed in the safety analysis.

As noted in table B 3.6.1.3-1, an exemption to Appendix J is provided that isolation barriers which remain water filled or a water seal remains in the line post-LOCA are tested with water and the leakage is not included in the Type B and C $0.60 L_a$ total.

SR 3.6.1.1.2

Maintaining the pressure suppression function of primary containment requires limiting the leakage from the drywell to the suppression chamber. Thus, if an event were to occur that pressurized the drywell, the steam would be directed through the downcomers into the suppression pool. This SR measures drywell to suppression chamber leakage to ensure that the leakage paths that would bypass the suppression pool are within allowable limits. The allowable limit is 10% of the acceptable SSES A/\sqrt{k} design valve. For SSES, the A/\sqrt{k} design value is $.0535 \text{ ft}^2$.

Satisfactory performance of this SR can be achieved by establishing a known differential pressure between the drywell and the suppression chamber and determining the leakage. The leakage test is performed when the 10 CFR 50, Appendix J, Type A test is performed in accordance with the Primary Containment Leakage Rate Testing Program. This testing Frequency was developed considering this test is performed in conjunction with the Integrated Leak rate test

(continued)

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.1.2 (continued)

and also in view of the fact that component failures that might have affected this test are identified by other primary containment SRs. Two consecutive test failures, however, would indicate unexpected primary containment degradation; in this event, as the Note indicates, increasing the Frequency to once every 24 months is required until the situation is remedied as evidenced by passing two consecutive tests.

SR 3.6.1.1.3

Maintaining the pressure suppression function of primary containment requires limiting the leakage from the drywell to the suppression chamber. Thus, if an event were to occur that pressurized the drywell, the steam would be directed through downcomers into the suppression pool. This SR measures suppression chamber-to-drywell vacuum breaker leakage to ensure the leakage paths that would bypass the suppression pool are within allowable limits. The total allowable leakage limit is 30% of the SR 3.6.1.1.2 limit. The allowable leakage per set is 12% of the SR 3.6.1.1.2 limit.

The leakage is determined by establishing a 4.3 psi differential pressure across the drywell-to-suppression chamber vacuum breakers and verifying the leakage. The leakage test is performed every 24 months. The 24 month Frequency was developed considering the surveillance must be performed during a unit outage. A Note is provided which allows this Surveillance not to be performed when SR 3.6.1.1.2 is performed. This is acceptable because SR 3.6.1.1.2 ensures the OPERABILITY of the pressure suppression function including the suppression chamber-to-drywell vacuum breakers.

REFERENCES

1. FSAR, Section 6.2.
2. FSAR, Section 15.
3. 10 CFR 50, Appendix J, Option B.
4. Nuclear Energy Institute, 94-01

(continued)

BASES

REFERENCES

(continued)

5. ANSI/ANS 56.8-1994
 6. Final Policy Statement on Technical Specifications Improvements July 22, 1993 (58 FR 39132)
 7. Standard Review Plan 6.2.4, Rev. 1, September 1975
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**TABLE B 3.6.1.1-1
 INSTRUMENT ISOLATION VALVES**

(Page 1 of 2)

PENETRATION NUMBER	INSTRUMENT	INSTRUMENT ISOLATION VALVE
X-3B	PSH-C72-1N002A	IC-PSH-1N002A
	PSH L C72-1N004	IC-PSHL-1N004
	PS-E11-1N010A	IC-PS-1N010A
	PS-E11-1N011A	IC-PS-1N011A
	PSH-C72-1N002B	IC-PSH-1N002B
	PS-E11-1N010C	IC-PS-1N010C
	PS-E11-1N011C	IC-PS-1N011C
	PSH-15120C	IC-PSH-15120C
X-32A	PSH-C72-1N002D	IC-PSH-1N002D
	PS-E11-1N010B	IC-PS-1N010B
	PS-E11-1N011B	IC-PS-1N011B
	PSH-C72-1N002C	IC-PSH-1N002C
	PS-E11-1N010D	IC-PS-1N010D
	PS-E11-1N011D	IC-PS-1N011D
	PSH-15120D	IC-PSH-15120D
X-39A	FT-15120A	IC-FT-15120A HIGH and IC-FT-15120A LOW
X-39B	FT-15120B	IC-FT-15120B HIGH and IC-FT-15120B LOW
X-90A	PT-15709A	IC-PT-15709A
	PT-15710A	IC-PT-15710A
	PT-15728A	IC-PT-15728A
X-90D	PT-15709B	IC-PT-15709B
	PT-15710B	IC-PT-15710B
	PT-15728B	IC-PT-15728B

**TABLE B 3.6.1.1-1
 INSTRUMENT ISOLATION VALVES**

(Page 2 of 2)

X-204A/205A	FT-15121A	IC-FT-15121A HIGH and IC-FT-15121A LOW
X-204B/205B	FT-15121B	IC-FT-15121B HIGH and IC-FT-15121B LOW
X-219A	LT-15775A	IC-LT-15775A REF and IC-LT-15775A VAR
	LSH-E41-1N015A	155027 and 155031
	LSH-E41-1N015B	155029 and 155033
X-223A	PT-15702	IC-PT-15702
X-232A	LT-15776A	IC-LT-15776A REF and IC-LT-15776A VAR
	PT-15729A	IC-PT-15729A
	LI-15776A2	IC-LT-15776A2 REF and IC-LT-15776A2 VAR
X234A	LT-15775B	IC-LT-15775B REF and IC-LT-15775B VAR
X-235A	LT-15776B	IC-LT-15776B REF and IC-LT-15776B VAR
	PT-15729B	IC-PT-15729B

TABLE B 3.6.1.1-2

H₂O₂ ANALYZER PANEL ISOLATION VALVES

PENETRATION NUMBER	PANEL ISOLATION VALVE ^(a)
X-60A, X-88B, X-221A, X-238A	157138
	157139
	157140
	157141
	157142
X-80C, X-233, X-238B	157149
	157150
	157151
	157152
	157153

(a) Only those valves listed in this table with current leak rate test results, as identified in the Leakage Rate Test Program, may be used as isolation valves.

B 3.3 INSTRUMENTATION

B 3.3.3.1 Post Accident Monitoring (PAM) Instrumentation

BASES

BACKGROUND The primary purpose of the PAM instrumentation is to display plant variables that provide information required by the control room operators during accident situations. This information provides the necessary support for the operator to take the manual actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for Design Basis Events. The instruments that monitor these variables are designated as Type A, Category I, and non-Type A, Category I, in accordance with Regulatory Guide 1.97 (Ref. 1).

The OPERABILITY of the accident monitoring instrumentation ensures that there is sufficient information available on selected plant parameters to monitor and assess plant status and behavior following an accident. This capability is consistent with the recommendations of Reference 1.

**APPLICABLE
SAFETY
ANALYSES**

The PAM instrumentation LCO ensures the OPERABILITY of Regulatory Guide 1.97, Type A variables so that the control room operating staff can:

- Perform the diagnosis specified in the Emergency Operating Procedures (EOPs). These variables are restricted to preplanned actions for the primary success path of Design Basis Accidents (DBAs), (e.g., loss of coolant accident (LOCA)), and
- Take the specified, preplanned, manually controlled actions for which no automatic control is provided, which are required for safety systems to accomplish their safety function.

The PAM instrumentation LCO also ensures OPERABILITY of Category I, non-Type A, variables so that the control room operating staff can:

- Determine whether systems important to safety are performing their intended functions;

(continued)

BASES

APPLICABLE
SAFETY
ANALYSES
(continued)

- Determine the potential for causing a gross breach of the barriers to radioactivity release;
- Determine whether a gross breach of a barrier has occurred; and
- Initiate action necessary to protect the public and for an estimate of the magnitude of any impending threat.

The plant specific Regulatory Guide 1.97 Analysis (Ref. 2 and 3) documents the process that identified Type A and Category I, non-Type A, variables.

Accident monitoring instrumentation that satisfies the definition of Type A in Regulatory Guide 1.97 meets Criterion 3 of the NRC Policy Statement. (Ref. 4) Category I, non-Type A, instrumentation is retained in Technical Specifications (TS) because they are intended to assist operators in minimizing the consequences of accidents. Therefore, these Category I variables are important for reducing public risk.

LCO

LCO 3.3.3.1 requires two OPERABLE channels for all but one Function to ensure that no single failure prevents the operators from being presented with the information necessary to determine the status of the plant and to bring the plant to, and maintain it in, a safe condition following that accident.

Furthermore, provision of two channels allows a CHANNEL CHECK during the post accident phase to confirm the validity of displayed information.

The exception to the two channel requirement is primary containment isolation valve (PCIV) position. In this case, the important information is the status of the primary containment penetrations. The LCO requires one position indicator for each active PCIV. This is sufficient to redundantly verify the isolation status of each isolable penetration either via indicated status of the active valve and prior knowledge of passive valve or via system boundary

(continued)

BASES

LCO
(continued)

status. If a normally active PCIV is known to be closed and deactivated, position indication is not needed to determine status. Therefore, the position indication for valves in this state is not required to be OPERABLE.

The following list is a discussion of the specified instrument Functions listed in Table 3.3.3.1-1 in the accompanying LCO. Table B 3.3.3.1-1 provides a listing of the instruments that are used to meet the operability requirements for the specific functions.

1. Reactor Steam Dome Pressure

Reactor steam dome pressure is a Type A, Category 1, variable provided to support monitoring of Reactor Coolant System (RCS) integrity and to verify operation of the Emergency Core Cooling Systems (ECCS). Two independent pressure channels, consisting of three wide range control room indicators and one wide range control room recorder per channel with a range of 0 psig to 1500 psig, monitor pressure. The wide range recorders are the primary method of indication available for use by the operators during an accident, therefore, the PAM Specification deals specifically with this portion of the instrument channel.

2. Reactor Vessel Water Level

Reactor vessel water level is a Type A, Category 1, variable provided to support monitoring of core cooling and to verify operation of the ECCS. A combination of three different level instrument ranges, with two independent channels each, monitor Reactor Vessel Water Level. The extended range instrumentation measures from -150 inches to 180 inches and outputs to three control room level indicators per channel. The wide range instrumentation measures from -150 inches to 60 inches and outputs to one control room recorder and three control room indicators per channel. The fuel zone range instrumentation measures from -310 inches to -110 inches and outputs to a control room recorder (one channel) and a control room indicator (one channel). These three ranges of instruments combine to provide level indication from the bottom of the Core to above the main steam line. The wide range level recorders, the fuel zone level indicator and level recorder, and one inner ring extended range level indicator per channel are the primary method of indication available for use by the operator during an accident, therefore the PAM

(continued)

BASES

LCO

2. Reactor Vessel Water Level (continued)

Specification deals specifically with this portion of the instrument channel.

3. Suppression Chamber Water Level

Suppression chamber water level is a Type A, Category 1, variable provided to detect a breach in the reactor coolant pressure boundary (RCPB). This variable is also used to verify and provide long term surveillance of ECCS function. A combination of two different level instrument ranges, with two independent channels each, monitor Suppression chamber water level. The wide range instrumentation measures from the ECCS suction lines to approximately the top of the chamber and outputs to one control room recorder per channel. The wide range recorders are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel.

4. Primary Containment Pressure

Primary Containment pressure is a Type A, Category 1, variable provided to detect a breach of the RCPB and to verify ECCS functions that operate to maintain RCS integrity. A combination of two different pressure instrument ranges, with two independent channels each, monitor primary containment pressure. The LOCA range measures from -15 psig to 65 psig and outputs to one control room recorder per channel. The accident range measures from 0 psig to 250 psig and outputs to one control room recorder per channel (same recorders as the LOCA range). The recorders (both ranges) are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel.

5. Primary Containment High Radiation

Primary containment area radiation (high range) is provided to monitor the potential of significant radiation releases

(continued)

BASES

LCO

5. Primary Containment High Radiation (continued)

and to provide release assessment for use by operators in determining the need to invoke site emergency plans. Two independent channels, which output to one control room recorder per channel with a range of 10^0 to 1×10^8 R/hr, monitor radiation. The PAM Specification deals specifically with this portion of the instrument channel.

6. Primary Containment Isolation Valve (PCIV) Position

PCIV position is provided for verification of containment integrity. In the case of PCIV position, the important information is the isolation status of the containment penetration. The LCO requires a channel of valve position indication in the control room to be OPERABLE for an active PCIV in a containment penetration flow path, i.e., two total channels of PCIV position indication for a penetration flow path with two active valves. For containment penetrations with only one active PCIV having control room indication, Note (b) requires a single channel of valve position indication to be OPERABLE. This is sufficient to redundantly verify the isolation status of each isolable penetration via indicated status of the active valve, as applicable, and prior knowledge of passive valve or system boundary status. If a penetration flow path is isolated, position indication for the PCIV(s) in the associated penetration flow path is not needed to determine status. Therefore, the position indication for valves in an isolated penetration flow path is not required to be OPERABLE. These valves which require position indication are specified in Table B 3.6.1.3-1. Furthermore, the loss of position indication does not necessarily result in the PCIV being inoperable.

The PCIV position PAM instrumentation consists of position switches unique to PCIVs, associated wiring and control room indicating lamps (not necessarily unique to a PCIV) for active PCIVs (check valves and manual valves are not required to have position indication). Therefore, the PAM Specification deals specifically with these instrument channels.

(continued)

BASES

LCO
(continued)

7. Neutron Flux

Wide range neutron flux is a Category I variable provided to verify reactor shutdown. The Neutron Monitoring System Average Power Range Monitors (APRM) provides reliable neutron flux measurement from 0% to 125% of full power. The APRM consists of four channels each with their own chassis powered with redundant power supplies. The APRM sends signals to the analog isolator module which in turn sends individual APRM signals to the recorders used for post accident monitoring. The PAM function for neutron flux is satisfied by having any 2 channels of APRM provided for post accident monitoring. The PAM Specification deals specifically with this portion of the instrument channel.

The Neutron Monitoring System (NMS) was evaluated against the criteria established in General Electric NEDO-31558A to ensure its acceptability for post-accident monitoring. NEDO-31558A provides alternate criteria for the NMS to meet the post-accident monitoring guidance of Regulatory Guide 1.97. Based on the evaluation, the NMS was found to meet the criteria established in NEDO-31558A. The APRM sub-function of the NMS is used to provide the Neutron Flux monitoring identified in TS 3.3.3.1 (Ref. 5 and 6).

8. Not Used

(continued)

BASES

LCO
(continued)

9. Drywell Atmosphere Temperature

Drywell atmosphere temperature is a Category I variable provided to verify RCS and containment integrity and to verify the effectiveness of ECCS actions taken to prevent containment breach. Two independent temperature channels, consisting of two control room recorders per channel with a range of 40 to 440 degrees F, monitor temperature. The PAM Specification deals specifically with the inner ring temperature recorder portion of the instrument channel.

10. Suppression Chamber Water Temperature

Suppression Chamber water temperature is a Type A, Category 1, variable provided to detect a condition that could potentially lead to containment breach and to verify the effectiveness of ECCS actions taken to prevent containment breach. The suppression chamber water temperature instrumentation allows operators to detect trends in suppression chamber water temperature in sufficient time to take action to prevent steam quenching vibrations in the suppression pool. Two channels are required to be OPERABLE. Each channel consists of eight sensors of which a minimum of four sensors (one sensor in each quadrant) must be OPERABLE to consider a channel OPERABLE. The outputs for the temperature sensors are displayed on two independent indicators in the control room and recorded on the monitoring units located in the control room on a back panel. The temperature indicators are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1 and 2. These variables are related to the diagnosis and preplanned actions required to mitigate DBAs. The applicable DBAs are assumed to occur in MODES 1 and 2. In MODES 3, 4, and 5, plant conditions are such that the likelihood of an event that would require PAM instrumentation is extremely low; therefore, PAM instrumentation is not required to be OPERABLE in these MODES.

(continued)

BASES (continued)

ACTIONS

A note has been provided to modify the ACTIONS related to PAM instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable PAM instrumentation channels provide appropriate compensatory measures for separate Functions. As such, a Note has been provided that allows separate Condition entry for each inoperable PAM Function.

A.1

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channels, the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

B.1

If a channel has not been restored to OPERABLE status in 30 days, this Required Action specifies initiation of action in accordance with Specification 5.6.7, which requires a written report to be submitted to the NRC. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions.

(continued)

BASES

ACTIONS

B.1 (continued)

This action is appropriate in lieu of a shutdown requirement because alternative actions are identified before the written report is submitted to the NRC, and given the likelihood of plant conditions that would require information provided by this instrumentation.

C.1

When one or more Functions have two required channels that are inoperable (i.e., two channels inoperable in the same Function), one channel in the Function should be restored to OPERABLE status within 7 days. The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrument operation and the availability of alternate means to obtain the required information. Continuous operation with two required channels inoperable in a Function is not acceptable because the alternate indications may not fully meet all performance qualification requirements applied to the PAM instrumentation. Therefore, requiring restoration of one inoperable channel of the Function limits the risk that the PAM Function will be in a degraded condition should an accident occur.

D.1

This Required Action directs entry into the appropriate Condition referenced in Table 3.3.3.1-1. The applicable Condition referenced in the Table is Function dependent. Each time an inoperable channel has not met any Required Action of Condition C, as applicable, and the associated Completion Time has expired, Condition D is entered for that channel and provides for transfer to the appropriate subsequent Condition.

E.1

For the majority of Functions in Table 3.3.3.1-1, if any Required Action and associated Completion Time of Condition C are not met, the plant must be brought to a MODE in which the LCO not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions

(continued)

BASES

ACTIONS

E.1 (continued)

from full power conditions in an orderly manner and without challenging plant systems.

F.1

Since alternate means of monitoring primary containment area radiation have been developed and tested, the Required Action is not to shut down the plant, but rather to follow the directions of Specification 5.6.7. These alternate means will be temporarily installed if the normal PAM channel cannot be restored to OPERABLE status within the allotted time. The report provided to the NRC should discuss the alternate means used, describe the degree to which the alternate means are equivalent to the installed PAM channels, justify the areas in which they are not equivalent, and provide a schedule for restoring the normal PAM channels.

SURVEILLANCE
REQUIREMENTS

The following SRs apply to each PAM instrumentation Function in Table 3.3.3.1-1.

SR 3.3.3.1.1

Performance of the CHANNEL CHECK once every 31 days ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel against a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria which are determined by the plant staff based on an investigation of a combination of the channel instrument uncertainties, may be used to support this

(continued)

BASES

SURVEILLANCE REQUIREMENTS SR 3.3.3.1.1 (continued)

parameter comparison and include indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit and does not necessarily indicate the channel is Inoperable.

The Frequency of 31 days is based upon plant operating experience, with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 31 day interval is rare. The CHANNEL CHECK supplements less formal checks of channels during normal operational use of those displays associated with the required channels of this LCO.

SR 3.3.3.1.2 and SR 3.3.3.1.3

A CHANNEL CALIBRATION is performed every 24 months except for the PCIV Position Function. The PCIV Position Function is adequately demonstrated by the Remote Position Indication performed in accordance with 5.5.6, "Inservice Testing Program". CHANNEL CALIBRATION verifies that the channel responds to measured parameter with the necessary range and accuracy, and does not include alarms.

The CHANNEL CALIBRATION for the Containment High Radiation instruments shall consist of an electronic calibration of the channel, not including the detector, for range decades above 10 R/hr and a one point calibration check of the detector below 10 R/hr with an installed or portable gamma source.

The Frequency is based on operating experience and for the 24 month Frequency consistency with the industry refueling cycles.

(continued)

BASES

- REFERENCES
1. Regulatory Guide 1.97 Rev. 2, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," February 6, 1985
 2. Nuclear Regulatory Commission Letter A. Schwencer to N. Curtis, Emergency Response Capability, Conformance to R.G. 1.97, Rev. 2, dated February 6, 1985.
 3. PP&L Letter (PLA-2222), N. Curtis to A. Schwencer, dated May 31, 1984.
 4. Final Policy Statement on Technical Specifications Improvements, July 22, 1993 (58 FR 32193)
 5. NEDO-31558A, BWROG Topical Report, Position on NRC Reg. Guide 1.97, Revision 3 Requirements for Post Accident Neutron Monitoring System (NMS).
 6. Nuclear Regulatory Commission Letter from C. Poslusny to R.G. Byram dated July 3, 1996.
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TABLE B 3.3.3.1-1

Post Accident Instruments
(Page 1 of 3)

Instrument/Variable	Element	Transmitter	Recorder	Indicator
1. Reactor Steam Dome Pressure	N/A	PT-14201A	UR-14201A (red)*	PI-14202A PI-14202A1 PI-14204A
	N/A	PT-14201B	UR-14201B (red)*	PI-14202B (left side) PI-14202B1 (left side) PI-14204B (left side)
2. Reactor Vessel Water Level	N/A	LT-14201A (Wide Range)	UR-14201A (blue)*	LI-14201A (left side) LI-14201A1 (left side) LI-14203A (left side)
	N/A	LT-14201B (Wide Range)	UR-14201B (blue)*	LI-14201B (left side) LI-14201B1 (left side) LI-14203B (left side)
	N/A	LT-14203A (Extended Range)	N/A	LI-14201A (right side) ⁽¹⁾ LI-14201A1 (right side) LI-14203A (right side)
	N/A	LT-14203B (Extended Range)	N/A	LI-14201B (right side) ⁽¹⁾ LI-14201B1 (right side) LI-14203B (right side)
	N/A	LT-14202A (Fuel Zone Range)	UR-14201A (brown)*	N/A
	N/A	LT-14202B (Fuel Zone Range)	UR-14201B (brown)*	N/A
3. Suppression Chamber Water Level	N/A	LT-15776A (Wide Range)	UR-15776A (red)*	N/A
	N/A	LT-15776B (Wide Range)	UR-15776B (red)*	N/A
	N/A	LT-15775A (Narrow Range)	UR-15776A (blue)	LI-15775A
	N/A	LT-15775B (Narrow Range)	UR-15776B (blue)	LI-15775B

TS-Prop/3.3/SA33031A.B1B

TABLE B 3.3.3.1-1

Post Accident Instruments
(Page 2 of 3)

Instrument/Variable	Element	Transmitter	Recorder	Indicator
4. Primary Containment Pressure	N/A	PT-15709A (0 to 250 psig)	UR-15701A (Dark Blue)*	N/A
	N/A	PT-15709B (0 to 250 psig)	UR-15701B (Dark Blue)*	N/A
	N/A	PT-15710A (-15 to 65 psig)	UR-15701A (Red)*	N/A
	N/A	PT-15710B (-15 to 65 psig)	UR-15701B (Red)*	N/A
5. Primary Containment High Radiation	RE-15720A	RITS-15720A	UR-15776A (Green)*	N/A
	RE-15720B	RITS-15720B	UR-15776B (Green)*	N/A
6. PCIV Position	See Technical Specification Bases Table B 3.6.1.3-1 for PCIV that require position indication to be OPERABLE			
7. Neutron Flux	N/A	APRM-1	NR-C51-1R603A (red pen)*	N/A
	N/A	APRM-2	NR-C51-1R603B (red pen)*	N/A
	N/A	APRM-3	NR-C51-1R603C (red pen)*	N/A
	N/A	APRM-4	NR-C51-1R603D (red pen)*	N/A
8. Containment Oxygen and Hydrogen Analyzer	AE-15745A (Hydrogen)	AIT-15745A	UR-15701A (Blue Violet)* UR-15701A (Violet)*	N/A
	AE-15745B (Hydrogen)	AIT-15745B	UR-15701B (Blue Violet)* UR-15701B (Violet)*	N/A
	AE-15746A (Oxygen)	AIT-15746A	UR-15701A (Orange)*	N/A
	AE-15746B (Oxygen)	AIT-15746B	UR-15701B (Orange)*	N/A

TABLE B 3.3.3.1-1

Post Accident Instruments
(Page 3 of 3)

Instrument/Variable	Element	Transmitter	Recorder	Indicator
9. Drywell Atmosphere Temperature	TE-15790A	TT-15790A	UR-15701A (Brown)* TR-15790A (point # 1)	N/A
	TE-15790B	TT-15790B	UR-15701B (Brown)* TR-15790B (point # 1)	N/A
10. Suppression Chamber Water Temperature	TE-15753	TX-15751	N/A	TIAH-15751* TI-15751
	TE-15755			
	TE-15757			
	TE-15759			
	TE-15763			
	TE-15765			
	TE-15767			
TE-15769				
	TE-15752	TX-15752	N/A	TIAH-15752* TI-15752
	TE-15754			
	TE-15758			
	TE-15760			
	TE-15762			
	TE-15766			
	TE-15768			
TE-15770				

* Indicates that the instrument (and associated components in the instrument channel) is considered as instrument channel surveillance acceptance criteria.

(1) In the case of the inner ring indicators for extended range level, it is recommended that LI-14201A and LI-14201B be used as acceptance criteria, however LI-14201A1, LI-14201B1, LI-14203A, or LI-14203B may be used in their place provided that surveillance requirements are satisfied. Only one set of these instruments needs to be OPERABLE.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.1.3 Primary Containment Isolation Valves (PCIVs)

BASES

BACKGROUND

The function of the PCIVs, in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents (DBAs) to within limits. Primary containment isolation within the time limits specified for those isolation valves designed to close automatically ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a DBA.

The OPERABILITY requirements for PCIVs help ensure that an adequate primary containment boundary is maintained during and after an accident by minimizing potential paths to the environment. Therefore, the OPERABILITY requirements provide assurance that primary containment function assumed in the safety analyses will be maintained. For PCIVs, the primary containment isolation function is that the valve must be able to close (automatically or manually) and/or remain closed, and maintain leakage within that assumed in the DBA LOCA Dose Analysis. These isolation devices are either passive or active (automatic). Manual valves, de-activated automatic valves secured in their closed position (including check valves with flow through the valve secured), blind flanges, and closed systems are considered passive devices. The OPERABILITY requirements for closed systems are discussed in Technical Requirements Manual (TRM) Bases 3.6.4. Check valves, or other automatic valves designed to close without operator action following an accident, are considered active devices. Two barriers in series are provided for each penetration so that no single credible failure or malfunction of an active component can result in a loss of isolation or leakage that exceeds limits assumed in the safety analyses. One of these barriers may be a closed system.

For each division of H₂O₂ Analyzers, the lines, up to and including the first normally closed valves within the H₂O₂ Analyzer panels, are extensions of primary containment (i.e., closed system), and are required to be leak rate tested in

(continued)

BASES

BACKGROUND
(continued)

accordance with the Leakage Rate Test Program. The H₂O₂ Analyzer closed system boundary is identified in the Leakage Rate Test Program. The closed system boundary consists of those components, piping, tubing, fittings, and valves, which meet the guidance of Reference 6. The closed system provides a secondary barrier in the event of a single failure of the PCIVs, as described below. The closed system boundary between PASS and the H₂O₂ Analyzer system ends at the process sampling solenoid operated isolation valves between the systems (SV-12361, SV-12365, SV-12366, SV-12368, and SV-12369). These solenoid operated isolation valves do not fully meet the guidance of Reference 6 for closed system boundary valves in that they are not powered from a Class 1E power source. However, based upon a risk determination, operating these valves as closed system boundary valves is not risk significant. These valves also form the end of the Seismic Category I boundary between the systems. These process sampling solenoid operated isolation valves are normally closed and are required to be leak rate tested in accordance with the Leakage Rate Test Program as part of the closed system for the H₂O₂ Analyzer system. These valves are "closed system boundary valves" and may be opened under administrative control, as delineated in Technical Requirements Manual (TRM) Bases 3.6.4. Opening of these valves to permit testing of PASS in Modes 1, 2, and 3 is permitted in accordance with TRO 3.6.4.

Each H₂O₂ Analyzer Sampling line penetrating primary containment has two PCIVs, located just outside primary containment. While two PCIVs are provided on each line, a single active failure of a relay in the control circuitry for these valves, could result in both valves failing to close or failing to remain closed. Furthermore, a single failure (a hot short in the common raceway to all the valves) could simultaneously affect all of the PCIVs within a H₂O₂ Analyzer division. Therefore, the containment isolation barriers for these penetrations consist of two PCIVs and a closed system. For situations where one or both PCIVs are inoperable, the ACTIONS to be taken are similar to the ACTIONS for a single PCIV backed by a closed system.

(continued)

BASES

BACKGROUND
(continued)

The drywell vent and purge lines are 24 inches in diameter; the suppression chamber vent and purge lines are 18 inches in diameter. The containment purge valves are normally maintained closed in MODES 1, 2, and 3 to ensure the primary containment boundary is maintained. The outboard isolation valves have 2 inch bypass lines around them for use during normal reactor operation.

The RHR Shutdown Cooling return line containment penetrations {X-13A(B)} are provided with a normally closed gate valve {HV-151F015A(B)} and a normally open globe valve {HV-151F017A(B)} outside containment and a testable check valve {HV-151F050A(B)} with a normally closed parallel air operated globe valve {HV-151F122A(B)} inside containment. The gate valve is manually opened and automatically isolates upon a containment isolation signal from the Nuclear Steam Supply Shutoff System or RPV low level 3 when the RHR System is operated in the Shutdown Cooling Mode only. The LPCI subsystem is an operational mode of the RHR System and uses the same injection lines to the RPV as the Shutdown Cooling Mode.

The design of these containment penetrations is unique in that some valves are containment isolation valves while others perform the function of pressure isolation valves. In order to meet the 10 CFR 50 Appendix J leakage testing requirements, the HV-151F015A(B) and the closed system outside containment are the only barriers tested in accordance with the Leakage Rate Test Program. Since these containment penetrations {X-13A and X-13B} include a containment isolation valve outside containment that is tested in accordance with 10 CFR 50 Appendix J requirements and a closed system outside containment that meets the requirements of USNRC Standard Review Plan 6.2.4 (September 1975), paragraph II.3.e, the containment isolation provisions for these penetrations provide an acceptable alternative to the explicit requirements of 10 CFR 50, Appendix A, GDC 55.

Containment penetrations X-13A(B) are also high/low pressure system interfaces. In order to meet the requirements to have two (2) isolation valves between the high pressure and low pressure systems, the HV-151F050A(B), HV-151F122A(B), and HV-151F015A(B) valves are used to meet this requirement and are tested in accordance with the pressure test program.

(continued)

BASES (continued)

APPLICABLE
SAFETY ANALYSES

The PCIVs LCO was derived from the assumptions related to minimizing the loss of reactor coolant inventory, and establishing the primary containment boundary during major accidents. As part of the primary containment boundary, PCIV OPERABILITY supports leak tightness of primary containment. Therefore, the safety analysis of any event requiring isolation of primary containment is applicable to this LCO.

The DBAs that result in a release of radioactive material within primary containment are a LOCA and a main steam line break (MSLB). In the analysis for each of these accidents, it is assumed that PCIVs are either closed or close within the required isolation times following event initiation. This ensures that potential paths to the environment through PCIVs (including primary containment purge valves) are minimized. Of the events analyzed in Reference 1, the MSLB is the most limiting event due to radiological consequences. The closure time of the main steam isolation valves (MSIVs) is a significant variable from a radiological standpoint. The MSIVs are required to close within 3 to 5 seconds since the 5 second closure time is assumed in the analysis. The safety analyses assume that the purge valves were closed at event initiation. Likewise, it is assumed that the primary containment is isolated such that release of fission products to the environment is controlled.

The DBA analysis assumes that within the required isolation time leakage is terminated, except for the maximum allowable leakage rate, L_a .

The single failure criterion required to be imposed in the conduct of unit safety analyses was considered in the original design of the primary containment purge valves. Two valves in series on each purge line provide assurance that both the supply and exhaust lines could be isolated even if a single failure occurred.

The primary containment purge valves may be unable to close in the environment following a LOCA. Therefore, each of the purge valves is required to remain closed during MODES 1, 2, and 3 except as permitted under Note 2 of SR 3.6.1.3.1. In this case, the single failure criterion remains applicable to the primary containment purge valve

(continued)

BASES

APPLICABLE
SAFETY ANALYSES
(continued)

due to failure in the control circuit associated with each valve. The primary containment purge valve design precludes a single failure from compromising the primary containment boundary as long as the system is operated in accordance with this LCO.

Both H₂O₂ Analyzer PCIVs may not be able to close given a single failure in the control circuitry of the valves. The single failure is caused by a "hot short" in the cables/raceway to the PCIVs that causes both PCIVs for a given penetration to remain open or to open when required to be closed. This failure is required to be considered in accordance with IEEE-279 as discussed in FSAR Section 7.3.2a. However, the single failure criterion for containment isolation of the H₂O₂ Analyzer penetrations is satisfied by virtue of the combination of the associated PCIVs and the closed system formed by the H₂O₂ Analyzer piping system as discussed in the BACKGROUND section above.

The closed system boundary between PASS and the H₂O₂ Analyzer system ends at the process sampling solenoid operated isolation valves between the systems (SV-12361, SV-12365, SV-12366, SV-12368, and SV-12369). The closed system is not fully qualified to the guidance of Reference 6 in that the closed system boundary valves between the H₂O₂ system and PASS are not powered from a Class 1E power source. However, based upon a risk determination, the use of these valves is considered to have no risk significance. This exemption to the requirement of Reference 6 for the closed system boundary is documented in License Amendment No. 195.

PCIVs satisfy Criterion 3 of the NRC Policy Statement. (Ref. 2)

LCO

PCIVs form a part of the primary containment boundary. The PCIV safety function is related to minimizing the loss of reactor coolant inventory and establishing the primary containment boundary during a DBA.

The power operated, automatic isolation valves are required to have isolation times within limits and actuate on an automatic isolation signal. The valves covered by this LCO are listed in Table B 3.6.1.3-1.

(continued)

BASES

LCO
(continued)

The normally closed PCIVs are considered OPERABLE when manual valves are closed or open in accordance with appropriate administrative controls, automatic valves are in their closed position, blind flanges are in place, and closed systems are intact. These passive isolation valves and devices are those listed in Table B 3.6.1.3-1.

Purge valves with resilient seals, secondary containment bypass valves, MSIVs, and hydrostatically tested valves must meet additional leakage rate requirements. Other PCIV leakage rates are addressed by LCO 3.6.1.1, "Primary Containment," as Type B or C testing.

This LCO provides assurance that the PCIVs will perform their designed safety functions to minimize the loss of reactor coolant inventory and establish the primary containment boundary during accidents.

APPLICABILITY

In MODES 1, 2, and 3, a DBA could cause a release of radioactive material to primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, most PCIVs are not required to be

BASES

APPLICABILITY
(continued)

OPERABLE and the primary containment purge valves are not required to be closed in MODES 4 and 5. Certain valves, however, are required to be OPERABLE to prevent inadvertent reactor vessel draindown. These valves are those whose associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation." (This does not include the valves that isolate the associated instrumentation.)

ACTIONS

The ACTIONS are modified by a Note allowing penetration flow path(s) to be unisolated intermittently under administrative controls. These controls consist of stationing a dedicated operator at the controls of the valve, who is in continuous communication with the control room. In this way, the penetration can be rapidly isolated when a need for primary containment isolation is indicated.

A second Note has been added to provide clarification that, for the purpose of this LCO, separate Condition entry is allowed for each penetration flow path. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable PCIV. Complying with the Required Actions may allow for continued operation, and subsequent inoperable PCIVs are governed by subsequent Condition entry and application of associated Required Actions.

The ACTIONS are modified by Notes 3 and 4. Note 3 ensures that appropriate remedial actions are taken, if necessary, if the affected system(s) are rendered inoperable by an inoperable PCIV (e.g., an Emergency Core Cooling System subsystem is inoperable due to a failed open test return valve). Note 4 ensures appropriate remedial actions are taken when the primary containment leakage limits are exceeded. Pursuant to LCO 3.0.6, these actions are not required even when the associated LCO is not met. Therefore, Notes 3 and 4 are added to require the proper actions be taken.

A.1 and A.2

With one or more penetration flow paths with one PCIV inoperable except for purge valve leakage not within limit,

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

the affected penetration flow paths must be isolated. The method of isolation must include the use of at least one isolation barrier that cannot be adversely affected by a single active failure. Isolation barriers that meet this criterion are a closed and de-activated automatic valve, a closed manual valve, a blind flange, and a check valve with flow through the valve secured. For a penetration isolated in accordance with Required Action A.1, the device used to isolate the penetration should be the closest available valve to the primary containment. The Required Action must be completed within the 4 hour Completion Time (8 hours for main steam lines). The Completion Time of 4 hours is reasonable considering the time required to isolate the penetration and the relative importance of supporting primary containment OPERABILITY during MODES 1, 2, and 3. For main steam lines, an 8 hour Completion Time is allowed. The Completion Time of 8 hours for the main steam lines allows a period of time to restore the MSIVs to OPERABLE status given the fact that MSIV closure will result in isolation of the main steam line(s) and a potential for plant shutdown.

For affected penetrations that have been isolated in accordance with Required Action A.1, the affected penetration flow path(s) must be verified to be isolated on a periodic basis. This is necessary to ensure that primary containment penetrations required to be isolated following an accident, and no longer capable of being automatically isolated, will be in the isolation position should an event occur. This Required Action does not require any testing or device manipulation. Rather, it involves verification that those devices outside containment and capable of potentially being mispositioned are in the correct position. The Completion Time of "once per 31 days for isolation devices outside primary containment" is appropriate because the devices are operated under administrative controls and the probability of their misalignment is low. For the devices inside primary containment, the time period specified "prior to entering MODE 2 or 3 from MODE 4, if primary containment was de-inerted while in MODE 4, if not performed within the previous 92 days" is based on engineering judgment and is considered reasonable in view of the inaccessibility of the devices and other administrative controls ensuring that device misalignment is an unlikely possibility.

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

Condition A is modified by a Note indicating that this Condition is only applicable to those penetration flow paths with two PCIVs except for the H₂O₂ Analyzer penetrations. For penetration flow paths with one PCIV, Condition C provides the appropriate Required Actions. For the H₂O₂ Analyzer Penetrations, Condition D provides the appropriate Required Actions.

Required Action A.2 is modified by a Note that applies to isolation devices located in high radiation areas, and allows them to be verified by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted. Therefore, the probability of misalignment of these devices, once they have been verified to be in the proper position, is low.

B.1

With one or more penetration flow paths with two PCIVs inoperable except for purge valve leakage not within limit, either the inoperable PCIVs must be restored to OPERABLE status or the affected penetration flow path must be isolated within 1 hour. The method of isolation must include the use of at least one isolation barrier that cannot be adversely affected by a single active failure. Isolation barriers that meet this criterion are a closed and de-activated automatic valve, a closed manual valve, and a blind flange. The 1 hour Completion Time is consistent with the ACTIONS of LCO 3.6.1.1.

Condition B is modified by a Note indicating this Condition is only applicable to penetration flow paths with two PCIVs except for the H₂O₂ Analyzer penetrations. For penetration flow paths with one PCIV, Condition C provides the appropriate Required Actions. For the H₂O₂ Analyzer Penetrations, Condition D provides the appropriate Required Actions.

C.1 and C.2

With one or more penetration flow paths with one PCIV inoperable, the inoperable valve must be restored to OPERABLE status or the affected penetration flow path

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

must be isolated. The method of isolation must include the use of at least one isolation barrier that cannot be adversely affected by a single active failure. Isolation barriers that meet this criterion are a closed and de-activated automatic valve, a closed manual valve, and a blind flange. A check valve may not be used to isolate the affected penetration. Required Action C.1 must be completed within the 72 hour Completion Time. The Completion Time of 72 hours is reasonable considering the relative stability of the closed system (hence, reliability) to act as a penetration isolation boundary and the relative importance of supporting primary containment OPERABILITY during MODES 1, 2, and 3. The closed system must meet the requirements of Reference 6. For conditions where the PCIV and the closed system are inoperable, the Required Actions of TRO 3.6.4, Condition B apply. For the Excess Flow Check Valves (EFCV), the Completion Time of 12 hours is reasonable considering the instrument and the small pipe diameter of penetration (hence, reliability) to act as a penetration isolation boundary and the small pipe diameter of the affected penetrations. In the event the affected penetration flow path is isolated in accordance with Required Action C.1, the affected penetration must be verified to be isolated on a periodic basis. This is necessary to ensure that primary containment penetrations required to be isolated following an accident are isolated. The Completion Time of once per 31 days for verifying each affected penetration is isolated is appropriate because the valves are operated under administrative controls and the probability of their misalignment is low.

Condition C is modified by a Note indicating that this Condition is only applicable to penetration flow paths with only one PCIV. For penetration flow paths with two PCIVs and the H₂O₂ Analyzer Penetration. Conditions A, B and D provide the appropriate Required Actions.

Required Action C.2 is modified by a Note that applies to valves and blind flanges located in high radiation areas and allows them to be verified by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted. Therefore, the probability of misalignment of these valves, once they have been verified to be in the proper position, is low.

(continued)

BASES

ACTIONS
(continued)

D.1 and D.2

With one or more H₂O₂ Analyzer penetrations with one or both PCIVs inoperable, the inoperable valve(s) must be restored to OPERABLE status or the affected penetration flow path must be isolated. The method of isolation must include the use of at least one isolation barrier that cannot be adversely affected by a single active failure. Isolation barriers that meet this criterion are a closed and de-activated automatic valve, a closed manual valve, and a blind flange. A check valve may not be used to isolate the affected penetration. Required Action D.1 must be completed within the 72 hour Completion Time. The Completion Time of 72 hours is reasonable considering the unique design of the H₂O₂ Analyzer penetrations. The containment isolation barriers for these penetrations consist of two PCIVs and a closed system. In addition, the Completion Time of 72 hours is reasonable considering the relative stability of the closed system (hence, reliability) to act as a penetration isolation boundary and the relative importance of supporting primary containment OPERABILITY during MODES 1, 2, and 3. In the event the affected penetration flow path is isolated in accordance with Required Action D.1, the affected penetration must be verified to be isolated on a periodic basis. This is necessary to ensure that primary containment penetrations required to be isolated following an accident are isolated. The Completion Time of once per 31 days for verifying each affected penetration is isolated is appropriate because the valves are operated under administrative controls and the probability of their misalignment is low.

When an H₂O₂ Analyzer penetration PCIV is to be closed and deactivated in accordance with Condition D, this must be accomplished by pulling the fuse for the power supply, and either determining the power cables at the solenoid valve, or jumpering of the power side of the solenoid to ground.

The OPERABILITY requirements for the closed system are discussed in Technical Requirements Manual (TRM) Bases 3.6.4. In the event that either one or both of the PCIVs and the closed system are inoperable, the Required Actions of TRO 3.6.4, Condition B apply.

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

Condition D is modified by a Note indicating that this Condition is only applicable to the H₂O₂ Analyzer penetrations.

E.1

With the secondary containment bypass leakage rate not within limit, the assumptions of the safety analysis may not be met. Therefore, the leakage must be restored to within limit within 4 hours. Restoration can be accomplished by isolating the penetration that caused the limit to be exceeded by use of one closed and de-activated automatic valve, closed manual valve, or blind flange. When a penetration is isolated, the leakage rate for the isolated penetration is assumed to be the actual pathway leakage through the isolation device. If two isolation devices are used to isolate the penetration, the leakage rate is assumed to be the lesser actual pathway leakage of the two devices. The 4 hour Completion Time is reasonable considering the time required to restore the leakage by isolating the penetration and the relative importance of secondary containment bypass leakage to the overall containment function.

F.1

In the event one or more containment purge valves are not within the purge valve leakage limits, purge valve leakage must be restored to within limits. The 24 hour Completion Time is reasonable, considering that one containment purge valve remains closed, except as controlled by SR 3.6.1.3.1 so that a gross breach of containment does not exist.

G.1 and G.2

If any Required Action and associated Completion Time cannot be met in MODE 1, 2, or 3, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS
(continued)

H.1 and H.2

If any Required Action and associated Completion Time cannot be met, the unit must be placed in a condition in which the LCO does not apply. If applicable, action must be immediately initiated to suspend operations with a potential for draining the reactor vessel (OPDRVs) to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until OPDRVs are suspended or valve(s) are restored to OPERABLE status. If suspending an OPDRV would result in closing the residual heat removal (RHR) shutdown cooling isolation valves, an alternative Required Action is provided to immediately initiate action to restore the valve(s) to OPERABLE status. This allows RHR to remain in service while actions are being taken to restore the valve.

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.3.1

This SR ensures that the primary containment purge valves are closed as required or, if open, open for an allowable reason. If a purge valve is open in violation of this SR, the valve is considered inoperable. If the inoperable valve is not otherwise known to have excessive leakage when closed, it is not considered to have leakage outside of limits. The SR is also modified by Note 1, stating that primary containment purge valves are only required to be closed in MODES 1, 2, and 3. If a LOCA inside primary containment occurs in these MODES, the purge valves may not be capable of closing before the pressure pulse affects systems downstream of the purge valves, or the release of radioactive material will exceed limits prior to the purge valves closing. At other times when the purge valves are required to be capable of closing (e.g., during handling of irradiated fuel), pressurization concerns are not present and the purge valves are allowed to be open. The SR is modified by Note 2 stating that the SR is not required to be met when the purge valves are open for the stated reasons. The Note states that these valves may be opened for inerting, de-inerting, pressure control, ALARA or air quality considerations for personnel entry, or Surveillances that require the valves to be open. The vent and purge valves are capable of closing in the environment following a LOCA. Therefore, these valves are allowed to be open for

(continued)

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.3.1 (continued)

limited periods of time. The 31 day Frequency is consistent with other PCIV requirements discussed in SR 3.6.1.3.2.

SR 3.6.1.3.2

This SR verifies that each primary containment isolation manual valve and blind flange that is located outside primary containment and not locked, sealed, or otherwise secured and is required to be closed during accident conditions is closed. The SR helps to ensure that post accident leakage of radioactive fluids or gases outside the primary containment boundary is within design limits.

This SR does not require any testing or valve manipulation. Rather, it involves verification that those PCIVs outside primary containment, and capable of being mispositioned, are in the correct position. Since verification of valve position for PCIVs outside primary containment is relatively easy, the 31 day Frequency was chosen to provide added assurance that the PCIVs are in the correct positions.

Two Notes have been added to this SR. The first Note allows valves and blind flanges located in high radiation areas to be verified by use of administrative controls. Allowing verification by administrative controls is considered acceptable since access to these areas is typically restricted during MODES 1, 2, and 3 for ALARA reasons. Therefore, the probability of misalignment of these PCIVs, once they have been verified to be in the proper position, is low. A second Note has been included to clarify that PCIVs that are open under administrative controls are not required to meet the SR during the time that the PCIVs are open. This SR does not apply to valves that are locked, sealed, or otherwise secured in the closed position, since these were verified to be in the correct position upon locking, sealing, or securing.

SR 3.6.1.3.3

This SR verifies that each primary containment manual isolation valve and blind flange that is located inside primary containment and not locked, sealed, or otherwise

(continued)

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.3.3 (continued)

secured and is required to be closed during accident conditions is closed. The SR helps to ensure that post accident leakage of radioactive fluids or gases outside the primary containment boundary is within design limits. For PCIVs inside primary containment, the Frequency defined as "prior to entering MODE 2 or 3 from MODE 4 if primary containment was de-inerted while in MODE 4, if not performed within the previous 92 days" is appropriate since these PCIVs are operated under administrative controls and the probability of their misalignment is low. This SR does not apply to valves that are locked, sealed, or otherwise secured in the closed position, since these were verified to be in the correct position upon locking, sealing, or securing. Two Notes have been added to this SR. The first Note allows valves and blind flanges located in high radiation areas to be verified by use of administrative controls. Allowing verification by administrative controls is considered acceptable since the primary containment is inerted and access to these areas is typically restricted during MODES 1, 2, and 3 for ALARA reasons. Therefore, the probability of misalignment of these PCIVs, once they have been verified to be in their proper position, is low. A second Note has been included to clarify that PCIVs that are open under administrative controls are not required to meet the SR during the time that the PCIVs are open.

SR 3.6.1.3.4

The traversing incore probe (TIP) shear isolation valves are actuated by explosive charges. Surveillance of explosive charge continuity provides assurance that TIP valves will actuate when required. Other administrative controls, such as those that limit the shelf life of the explosive charges, must be followed. The 31 day Frequency is based on operating experience that has demonstrated the reliability of the explosive charge continuity.

SR 3.6.1.3.5

Verifying the isolation time of each power operated and each automatic PCIV is within limits is required to demonstrate OPERABILITY. MSIVs may be excluded from this SR since MSIV

(continued)

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.3.5 (continued)

full closure isolation time is demonstrated by SR 3.6.1.3.7. The isolation time test ensures that the valve will isolate in a time period less than or equal to that assumed in the Final Safety Analyses Report. The isolation time and Frequency of this SR are in accordance with the requirements of the Inservice Testing Program.

SR 3.6.1.3.6

For primary containment purge valves with resilient seals, the Appendix J Leakage Rate Test Interval of 24 months is sufficient. The acceptance criteria for these valves is defined in the Primary Containment Leakage Rate Testing Program, 5.5.12.

The SR is modified by a Note stating that the primary containment purge valves are only required to meet leakage rate testing requirements in MODES 1, 2, and 3. If a LOCA inside primary containment occurs in these MODES, purge valve leakage must be minimized to ensure offsite radiological release is within limits. At other times when the purge valves are required to be capable of closing (e.g., during handling of irradiated fuel), pressurization concerns are not present and the purge valves are not required to meet any specific leakage criteria.

SR 3.6.1.3.7

Verifying that the isolation time of each MSIV is within the specified limits is required to demonstrate OPERABILITY. The isolation time test ensures that the MSIV will isolate in a time period that does not exceed the times assumed in the DBA analyses. This ensures that the calculated radiological consequences of these events remain within 10 CFR 100 limits. The Frequency of this SR is in accordance with the requirements of the Inservice Testing Program.

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BASES

SURVEILLANCE
REQUIREMENTS
(continued)

SR 3.6.1.3.8

Automatic PCIVs close on a primary containment isolation signal to prevent leakage of radioactive material from primary containment following a DBA. This SR ensures that each automatic PCIV will actuate to its isolation position on a primary containment isolation signal. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.6.1.5 overlaps this SR to provide complete testing of the safety function. The 24 month Frequency was developed considering it is prudent that some of these Surveillances be performed only during a unit outage since isolation of penetrations could eliminate cooling water flow and disrupt the normal operation of some critical components. Operating experience has shown that these components usually pass this Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.1.3.9

This SR requires a demonstration that a representative sample of reactor instrumentation line excess flow check valves (EFCV) are OPERABLE by verifying that the valve actuates to check flow on a simulated instrument line break. As defined in FSAR Section 6.2.4.3.5 (Reference 4), the conditions under which an EFCV will isolate, simulated instrument line break, are at flow rates which develop a differential pressure of between 3 psid and 10 psid. This SR provides assurance that the instrumentation line EFCVs will perform its design function to check flow. No specific valve leakage limits are specified because no specific leakage limits are defined in the FSAR. The 24 month Frequency is based on the need to perform some of these Surveillances under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The representative sample consists of an approximate equal number of EFCVs such that each EFCV is tested at least once every 10 years (nominal). The nominal 10 year interval is based on other performance-based testing programs, such as Inservice Testing (snubbers) and Option B to 10 CFR 50, Appendix J. In addition, the EFCVs in the sample are representative of the various plant configurations, models, sizes and operating environments. This ensures that any potential common problems with a specific type or application of EFCV is detected at the earliest possible time. EFCV failures will be evaluated to determine if additional testing in that test interval is warranted to ensure overall reliability and that failures to isolate are very infrequent. Therefore, testing of a representative sample was concluded to be acceptable from a reliability standpoint (Reference 7).

(continued)

BASES

SURVEILLANCE
REQUIREMENTS
(continued)

SR 3.6.1.3.10

The TIP shear isolation valves are actuated by explosive charges. An in place functional test is not possible with this design. The explosive squib is removed and tested to provide assurance that the valves will actuate when required. The replacement charge for the explosive squib shall be from the same manufactured batch as the one fired or from another batch that has been certified by having one of the batch successfully fired. The Frequency of 24 months on a STAGGERED TEST BASIS is considered adequate given the administrative controls on replacement charges and the frequent checks of circuit continuity (SR 3.6.1.3.4).

SR 3.6.1.3.11

This SR ensures that the leakage rate of secondary containment bypass leakage paths is less than the specified leakage rate. This provides assurance that the assumptions in the radiological evaluations of Reference 4 are met. The secondary containment leakage pathways and Frequency are defined by the Primary Containment Leakage Rate Testing Program. This SR simply imposes additional acceptance criteria. A note is added to this SR which states that these valves are only required to meet this leakage limit in MODES 1, 2, and 3. In the other MODES, the Reactor Coolant System is not pressurized and specific primary containment leakage limits are not required.

SR 3.6.1.3.12

The analyses in References 1 and 4 are based on the specified leakage rate. Leakage through each MSIV must be ≤ 100 scfh for any one MSIV or ≤ 300 scfh for total leakage through the MSIVs combined with the Main Steam Line Drain Isolation Valve, HPCI Steam Supply Isolation Valve and the RCIC Steam Supply Isolation Valve. The MSIVs can be tested at either $\geq P_t$ (22.5 psig) or P_a (45 psig). Main Steam Line Drain Isolation, HPCI and RCIC Steam Supply Line Isolation Valves, are tested at P_a (45 psig). A note is added to this SR which states that these valves are only required to meet this leakage limit in MODES 1, 2, and 3. In the other conditions, the Reactor Coolant System is not pressurized and specific primary containment leakage limits are not required. The Frequency is required by the Primary Containment Leakage Rate Testing Program. If leakage from the MSIVs requires internal work on any MSIV, the leakage will be reduced for the affected MSIV to ≤ 11.5 scfh.

(continued)

BASES

SURVEILLANCE
REQUIREMENTS
(continued)

SR 3.6.1.3.13

Surveillance of hydrostatically tested lines provides assurance that the calculation assumptions of Reference 2 are met. The acceptance criteria for the combined leakage of all hydrostatically tested lines is 3.3 gpm when tested at 1.1 P_a, (49.5 psig). The combined leakage rates must be demonstrated in accordance with the leakage rate test Frequency required by the Primary Containment Leakage Testing Program.

As noted in Table B 3.6.1.3-1, PCIVs associated with this SR are not Type C tested. Containment bypass leakage is prevented since the line terminates below the minimum water level in the Suppression Chamber. These valves are tested in accordance with the IST Program. Therefore, these valves leakage is not included as containment leakage.

This SR has been modified by a Note that states that these valves are only required to meet the combined leakage rate in MODES 1, 2, and 3, since this is when the Reactor Coolant System is pressurized and primary containment is required. In some instances, the valves are required to be capable of automatically closing during MODES other than MODES 1, 2, and 3. However, specific leakage limits are not applicable in these other MODES or conditions.

REFERENCES

1. FSAR, Chapter 15.
 2. Final Policy Statement on Technical Specifications Improvements, July 22, 1993 (58 FR 39132).
 3. 10 CFR 50, Appendix J, Option B.
 4. FSAR, Section 6.2.
 5. NEDO-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.
 6. Standard Review Plan 6.2.4, Rev. 1, September 1975
 7. NEDO-32977-A, "Excess Flow Check Valve Testing Relaxation," June 2000.
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**Table B 3.6.1.3-1
 Primary Containment Isolation Valve
 (Page 1 of 11)**

Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Containment Atmospheric Control	1-57-193 (d)	ILRT	Manual	N/A
	1-57-194 (d)	ILRT	Manual	N/A
	HV-15703	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15704	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15705	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15711	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15713	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15714	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15721	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15722	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15723	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15724	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15725	Containment Purge	Automatic Valve	2.b, 2.d, 2.e (15)
	HV-15766 (a)	Suppression Pool Cleanup	Automatic Valve	2.b, 2.d (30)
	HV-15768 (a)	Suppression Pool Cleanup	Automatic Valve	2.b, 2.d (30)
	SV-157100 A	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157100 B	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157101 A	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157101 B	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157102 A	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157102 B	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157103 A	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157103 B	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157104	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157105	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157106	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-157107	Containment Radiation Detection Syst	Automatic Valve	2.b, 2.d
	SV-15734 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15734 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15736 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
SV-15736 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d	
	SV-15737	Nitrogen Makeup	Automatic Valve	2.b, 2.d, 2.e

Table B 3.6.1.3-1
Primary Containment Isolation Valve
(Page 2 of 11)

Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Containment Atmospheric	SV-15738	Nitrogen Makeup	Automatic Valve	2.b, 2.d, 2.e
	SV-15740 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
Control (continued)	SV-15740 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15742 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15742 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15750 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15750 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15752 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15752 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15767	Nitrogen Makeup	Automatic Valve	2.b, 2.d, 2.e
	SV-15774 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15774 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15776 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15776 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15780 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15780 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15782 A (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15782 B (e)	Containment Atmosphere Sample	Automatic Valve	2.b, 2.d
	SV-15789	Nitrogen Makeup	Automatic Valve	2.b, 2.d, 2.e
	Containment Instrument Gas	1-26-072 (d)	Containment Instrument Gas	Manual Check
1-26-074 (d)		Containment Instrument Gas	Manual Check	N/A
1-26-152 (d)		Containment Instrument Gas	Manual Check	N/A
1-26-154 (d)		Containment Instrument Gas	Manual Check	N/A
1-26-164 (d)		Containment Instrument Gas	Manual Check	N/A
HV-12603		Containment Instrument Gas	Automatic Valve	2.c, 2.d (20)
SV-12605		Containment Instrument Gas	Automatic Valve	2.c, 2.d
SV-12651		Containment Instrument Gas	Automatic Valve	2.c, 2.d
SV-12654 A		Containment Instrument Gas	Power Operated	N/A
SV-12654 B		Containment Instrument Gas	Power Operated	N/A
SV-12661		Containment Instrument Gas	Automatic Valve	2.b, 2.d
SV-12671		Containment Instrument Gas	Automatic Valve	2.b, 2.d
Core Spray	HV-152F001 A (b)(c)	CS Suction Valve	Power Operated	N/A
	HV-152F001 B (b)(c)	CS Suction Valve	Power Operated	N/A
	HV-152F005 A	CS Injection	Power Operated	N/A
	HV-152F005 B	CS Injection Valve	Power Operated	N/A
	HV-152F006 A	CS Injection Valve	Air Operated Check Valve	N/A
	HV-152F006 B	CS Injection Valve	Air Operated Check Valve	N/A
	HV-152F015 A (b)(c)	CS Test Valve	Automatic Valve	2.c, 2.d (80)
	HV-152F015 B (b)(c)	CS Test Valve	Automatic Valve	2.c, 2.d (80)

Table B 3.6.1.3-1 (continued)
Primary Containment Isolation Valve
 (Page 3 of 11)

Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Core Spray (continued)	HV-152F031 A (b)(c)	CS Minimum Recirculation Flow	Power Operated	N/A
	HV-152F031 B (b)(c)	CS Minimum Recirculation Flow	Power Operated	N/A
	HV-152F037 A	CS Injection	Power Operated (Air)	N/A
	HV-152F037 B	CS Injection	Power Operated (Air)	N/A
	XV-152F018 A	Core Spray	Excess Flow Check Valve	N/A
	XV-152F018 B	Core Spray	Excess Flow Check Valve	N/A
HPCI	1-55-038 (d)	HPCI Injection Valve	Manual	N/A
	155F046 (b)(c)(d)	HPCI Minimum Flow Check Valve	Manual Check	N/A
	155F049 (a)(d)	HPCI Turbine Exhaust Valve	Manual Check	N/A
	HV-155F002	HPCI Steam Supply Valve	Automatic Valve	3.a, 3.b, 3.c, 3.e, 3.f, 3.g (50)
	HV-155F003	HPCI Steam Supply Valve	Automatic Valve	3.a, 3.b, 3.c, 3.e, 3.f, 3.g (50)
	HV-155F006	HPCI Injection Valve	Power Operated	N/A
	HV-155F012 (b)(c)	HPCI Minimum Flow Valve	Power Operated	N/A
	HV-155F042 (b)(c)	HPCI Suction Valve	Automatic Valve	3.a, 3.b, 3.c, 3.e, 3.f, 3.g (90)
	HV-155F066 (a)	HPCI Turbine Exhaust Valve	Power Operated	N/A
	HV-155F075	HPCI Vacuum Breaker Isolation Valve	Automatic Valve	3.b, 3.d (15)
	HV-155F079	HPCI Vacuum Breaker Isolation Valve	Automatic Valve	3.b, 3.d (15)
	HV-155F100	HPCI Steam Supply Valve	Automatic Valve	3.a, 3.b, 3.c, 3.e, 3.f, 3.g (6)
	XV-155F024 A	HPCI Valve	Excess Flow Check Valve	N/A
	XV-155F024 B	HPCI Valve	Excess Flow Check Valve	N/A
	XV-155F024 C	HPCI Valve	Excess Flow Check Valve	N/A
XV-155F024 D	HPCI Valve	Excess Flow Check Valve	N/A	
Liquid Radwaste Collection	HV-16108 A1	Liquid Radwaste Isolation Valve	Automatic Valve	2.b, 2.d (15)
	HV-16108 A2	Liquid Radwaste Isolation Valve	Automatic Valve	2.b, 2.d (15)
	HV-16116 A1	Liquid Radwaste Isolation Valve	Automatic Valve	2.b, 2.d (15)
	HV-16116 A2	Liquid Radwaste Isolation Valve	Automatic Valve	2.b, 2.d (15)
Demin Water	1-41-017 (d)	Demineralized Water	Manual	N/A
	1-41-018 (d)	Demineralized Water	Manual	N/A
Nuclear Boiler	141F010 A (d)	Feedwater Isolation Valve	Manual Check	N/A
	141F010 B (d)	Feedwater Isolation Valve	Manual Check	N/A

Table B 3.6.1.3-1 (continued)
Primary Containment Isolation Valve
(Page 4 of 11)

Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal . LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Nuclear Boiler (continued)	141F039 A (d)	Feedwater Isolation Valve	Manual Check	N/A
	141F039 B (d)	Feedwater Isolation Valve	Manual Check	N/A
	141818 A (d)	Feedwater Isolation Valve	Manual Check	N/A
	141818 B (d)	Feedwater Isolation Valve	Manual Check	N/A
	HV-141F016	MSL Drain Isolation Valve	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (10)
	HV-141F019	MSL Drain Isolation Valve	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (15)
	HV-141F022 A	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F022 B	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F022 C	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F022 D	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F028 A	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F028 B	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F028 C	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F028 D	MSIV	Automatic Valve	1.a, 1.b, 1.c, 1.d, 1.e (5)
	HV-141F032 A	Feedwater Isolation Valve	Power Operated Check	N/A
	HV-141F032 B	Feedwater Isolation Valve	Power Operated Check	N/A
	XV-141F009	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F070 A	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F070 B	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F070 C	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F070 D	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F071 A	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F071 B	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F071 C	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F071 D	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A

Table B 3.6.1.3-1 (continued)
Primary Containment Isolation Valve
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Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Nuclear Boiler (continued)	XV-141F072 A	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F072 B	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F072 C	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F072 D	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F073 A	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F073 B	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F073 C	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
	XV-141F073 D	Nuclear Boiler EFCV	Excess Flow Check Valve	N/A
Nuclear Boiler Vessel Instrumentation	XV-14201	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-14202	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F041	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F043 A	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F043 B	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F045 A	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F045 B	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F047 A	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F047 B	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F051 A	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F051 B	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F051 C	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F051 D	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F053 A	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F053 B	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A

Table B 3.6.1.3-1 (continued)
Primary Containment Isolation Valve
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Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Nuclear Boiler Vessel Instrumentation (continued)	XV-142F053 C	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F053 D	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F055	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F057	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 A	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 B	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 C	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 D	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 E	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 F	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 G	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 H	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 L	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 M	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 N	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 P	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 R	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 S	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 T	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
	XV-142F059 U	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A
XV-142F061	Nuclear Boiler Vessel Instrument	Excess Flow Check Valve	N/A	
RBCCW	HV-11313	RBCCW	Automatic Valve	2.c, 2.d (30)
	HV-11314	RBCCW	Automatic Valve	2.c, 2.d (30)
	HV-11345	RBCCW	Automatic Valve	2.c, 2.d (30)
	HV-11346	RBCCW	Automatic Valve	2.c, 2.d (30)

Table B 3.6.1.3-1 (continued)
 Primary Containment Isolation Valve
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Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
RCIC	1-49-020 (d)	RCIC INJECTION	Manual	N/A
	149F021 (b)(c)(d)	RCIC Minimum Recirculation Flow	Manual Check	N/A
	149F028 (a)(d)	RCIC Vacuum Pump Discharge	Manual Check	N/A
	149F040 (a)(d)	RCIC Turbine Exhaust	Manual Check	N/A
	FV-149F019 (b)(c)	RCIC Minimum Recirculation Flow	Power Operated	N/A
	HV-149F007	RCIC Steam Supply	Automatic Valve	4.a, 4.b, 4.c, 4.e, 4.f, 4.g (20)
	HV-149F008	RCIC Steam Supply	Automatic Valve	4.a, 4.b, 4.c, 4.e, 4.f, 4.g (20)
	HV-149F013	RCIC Injection	Power Operated	N/A
	HV-149F031 (b)(c)	RCIC Suction	Power Operated	N/A
	HV-149F059 (a)	RCIC Turbine Exhaust	Power Operated	N/A
	HV-149F060 (a)	RCIC Vacuum Pump Discharge	Power Operated	N/A
	HV-149F062	RCIC Vacuum Breaker	Automatic Valve	4.b, 4.d (10)
	HV-149F084	RCIC Vacuum Breaker	Automatic Valve	4.b, 4.d (10)
	HV-149F088	RCIC Steam Supply	Automatic Valve	4.a, 4.b, 4.c, 4.e, 4.f, 4.g (12)
	XV-149F044 A	RCIC	Excess Flow Check Valve	N/A
	XV-149F044 B	RCIC	Excess Flow Check Valve	N/A
	XV-149F044 C	RCIC	Excess Flow Check Valve	N/A
XV-149F044 D	RCIC	Excess Flow Check Valve	N/A	
RB Chilled Water System	HV-18781 A1	RB Chilled Water	Automatic Valve	2.c, 2.d (40)
	HV-18781 A2	RB Chilled Water	Automatic Valve	2.c, 2.d (40)
	HV-18781 B1	RB Chilled Water	Automatic Valve	2.c, 2.d (40)
	HV-18781 B2	RB Chilled Water	Automatic Valve	2.c, 2.d (40)
	HV-18782 A1	RB Chilled Water	Automatic Valve	2.c, 2.d (12)
	HV-18782 A2	RB Chilled Water	Automatic Valve	2.c, 2.d (12)
	HV-18782 B1	RB Chilled Water	Automatic Valve	2.c, 2.d (12)
	HV-18782 B2	RB Chilled Water	Automatic Valve	2.c, 2.d (12)
	HV-18791 A1	RB Chilled Water	Automatic Valve	2.b, 2.d (15)
	HV-18791 A2	RB Chilled Water	Automatic Valve	2.b, 2.d (15)
	HV-18791 B1	RB Chilled Water	Automatic Valve	2.b, 2.d (15)
	HV-18791 B2	RB Chilled Water	Automatic Valve	2.b, 2.d (15)
	HV-18792 A1	RB Chilled Water	Automatic Valve	2.b, 2.d (8)
	HV-18792 A2	RB Chilled Water	Automatic Valve	2.b, 2.d (8)
	HV-18792 B1	RB Chilled Water	Automatic Valve	2.b, 2.d (8)
HV-18792 B2	RB Chilled Water	Automatic Valve	2.b, 2.d (8)	
Reactor Recirculation	143F013 A (d)	Recirculation Pump Seal Water	Manual Check	N/A
	143F013 B (d)	Recirculation Pump Seal Water	Manual Check	N/A

Table B 3.6.1.3-1 (continued)
 Primary Containment Isolation Valve
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Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Reactor Recirculation (continued)	XV-143F003 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F003 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F004 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F004 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F009 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F009 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F009 C	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F009 D	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F010 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F010 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F010 C	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F010 D	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F011 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F011 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F011 C	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F011 D	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F012 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F012 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F012 C	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F012 D	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F017 A	Recirculation Pump Seal Water	Excess Flow Check Valve	N/A
	XV-143F017 B	Recirculation Pump Seal Water	Excess Flow Check Valve	N/A
	XV-143F040 A	Reactor Recirculation	Excess Flow Check Valve	N/A

Table B 3.6.1.3-1 (continued)
Primary Containment Isolation Valve
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Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Reactor Recirculation (continued)	XV-143F040 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F040 C	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F040 D	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F057 A	Reactor Recirculation	Excess Flow Check Valve	N/A
	XV-143F057 B	Reactor Recirculation	Excess Flow Check Valve	N/A
	HV-143F019	Reactor Coolant Sample	Automatic Valve	2.b (9)
	HV-143F020	Reactor Coolant Sample	Automatic Valve	2.b (2)
Residual Heat Removal	HV-151F004 A (b)(c)	RHR - Suppression Pool Suction	Power Operated	N/A
	HV-151F004 B (b)(c)	RHR - Suppression Pool Suction	Power Operated	N/A
	HV-151F004 C (b)(c)	RHR - Suppression Pool Suction	Power Operated	N/A
	HV-151F004 D (b)(c)	RHR - Suppression Pool Suction	Power Operated	N/A
	HV-151F007 A (b)(c)	RHR-Minimum Recirculation Flow	Power Operated	N/A
	HV-151F007 B (b)(c)	RHR-Minimum Recirculation Flow	Power Operated	N/A
	HV-151F008	RHR - Shutdown Cooling Suction	Automatic Valve	6.a, 6.b, 6.c (52)
	HV-151F009	RHR - Shutdown Cooling Suction	Automatic Valve	6.a, 6.b, 6.c (52)
	HV-151F011 A (b)(d)	RHR-Suppression Pool Cooling/Spray	Manual	N/A
	HV-151F011 B (b)(d)	RHR-Suppression Pool Cooling/Spray	Manual	N/A
	HV-151F015 A (f)	RHR - Shutdown Cooling Return/LPCI Injection	Power Operated	N/A
	HV-151F015 B (f)	RHR - Shutdown Cooling Return/LPCI Injection	Power Operated	N/A
	HV-151F016 A (b)	RHR - Drywell Spray	Automatic Valve	2.c, 2.d (90)
	HV-151F016 B (b)	RHR - Drywell Spray	Automatic Valve	2.c, 2.d (90)
	HV-151F022	RHR - Reactor Vessel Head Spray	Automatic Valve	2.d, 6.a, 6.b, 6.c (30)
	HV-151F023	RHR - Reactor Vessel Head Spray	Automatic Valve	2.d, 6.a, 6.b, 6.c (20)
	HV-151F028 A (b)	RHR - Suppression Pool Cooling/Spray	Automatic Valve	2.c, 2.d (90)
	HV-151F028 B (b)	RHR - Suppression Pool Cooling/Spray	Automatic Valve	2.c, 2.d (90)
	HV-151F050 A (g)	RHR - Shutdown Cooling Return/LPCI Injection Valve	Air Operated Check Valve	N/A
	HV-151F050 B (g)	RHR - Shutdown Cooling Return/LPCI Injection Valve	Air Operated Check Valve	N/A
	HV-151F103 A (b)	RHR Heat Exchanger Vent	Power Operated	N/A
HV-151F103 B (b)	RHR Heat Exchanger Vent	Power Operated	N/A	

Table B 3.6.1.3-1 (continued)
Primary Containment Isolation Valve
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Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
Residual Heat Removal (continued)	HV-151F122 A (g)	RHR - Shutdown Cooling Return/LPCI Injection Valve	Power Operated (Air)	N/A
	HV-151F122 B (g)	RHR - Shutdown Cooling Return/LPCI Injection Valve	Power Operated (Air)	N/A
	PSV-15106 A (b)(d)	RHR - Relief Valve Discharge	Relief Valve	N/A
	PSV-15106 B (b)(d)	RHR - Relief Valve Discharge	Relief Valve	N/A
	PSV-151F126 (d)	RHR - Shutdown Cooling Suction	Relief Valve	N/A
	XV-15109 A	RHR	Excess Flow Check Valve	N/A
	XV-15109 B	RHR	Excess Flow Check Valve	N/A
	XV-15109 C	RHR	Excess Flow Check Valve	N/A
	XV-15109 D	RHR	Excess Flow Check Valve	N/A
RWCU	HV-144F001 (a)	RWCU Suction	Automatic Valve	5.a, 5.b, 5.c, 5.d, 5.f, 5.g (30)
	HV-144F004 (a)	RWCU Suction	Automatic Valve	5.a, 5.b, 5.c, 5.d, 5.e, 5.f, 5.g (30)
	XV-14411 A	RWCU	Excess Flow Check Valve	N/A
	XV-14411 B	RWCU	Excess Flow Check Valve	N/A
	XV-14411 C	RWCU	Excess Flow Check Valve	N/A
	XV-14411 D	RWCU	Excess Flow Check Valve	N/A
	XV-144F046	RWCU	Excess Flow Check Valve	N/A
	HV-14182 A	RWCU Return Isolation Valve	Power Operated	N/A
	HV-14182 B	RWCU Return Isolation Valve	Power Operated	N/A
SLCS	148F007 (a)(d)	SLCS	Manual Check	N/A
	HV-148F006 (a)	SLCS	Power Operated Check Valve	N/A
TIP System	C51-J004 A (Shear Valve)	TIP Shear Valves	Squib Valves	N/A
	C51-J004 B (Shear Valve)	TIP Shear Valves	Squib Valves	N/A
	C51-J004 C (Shear Valve)	TIP Shear Valves	Squib Valves	N/A
	C51-J004 D (Shear Valve)	TIP Shear Valves	Squib Valves	N/A
	C51-J004 E (Shear Valve)	TIP Shear Valves	Squib Valves	N/A

**Table B 3.6.1.3-1
 Primary Containment Isolation Valve
 (Page 11 of 11)**

Plant System	Valve Number	Valve Description	Type of Valve	Isolation Signal LCO 3.3.6.1 Function No. (Maximum Isolation Time (Seconds))
TIP System (continued)	C51-J004 A (Ball Valve)	TIP Ball Valves	Automatic Valve	7.a, 7.b (5)
	C51-J004 B (Ball Valve)	TIP Ball Valves	Automatic Valve	7.a, 7.b (5)
	C51-J004 C (Ball Valve)	TIP Ball Valves	Automatic Valve	7.a, 7.b (5)
	C51-J004 D (Ball Valve)	TIP Ball Valves	Automatic Valve	7.a, 7.b (5)
	C51-J004 E (Ball Valve)	TIP Ball Valves	Automatic Valve	7.a, 7.b (5)

- (a) Isolation barrier remains water filled or a water seal remains in the line post-LOCA, isolation valve is tested with water. Isolation valve leakage is not included in 0.60 L_a total Type B and C tests.
- (b) Redundant isolation boundary for this valve is provided by the closed system whose integrity is verified by the Leakage Rate Test Program. This footnote does not apply to valve 155F046 (HPCI) when the associated PCIV, HV155F012 is closed and deactivated. Similarly, this footnote does not apply to valve 149F021 (RCIC) when it's associated PCIV, FV149F019 is closed and deactivated.
- (c) Containment Isolation Valves are not Type C tested. Containment bypass leakage is prevented since the line terminates below the minimum water level in the Suppression Chamber. Refer to the IST Program.
- (d) LCO 3.3.3.1, "PAM Instrumentation," Table 3.3.3.1-1, Function 6, does not apply since these are relief valves, check valves, manual valves or deactivated and closed.
- (e) The containment isolation barriers for the penetration associated with this valve consists of two PCIVs and a closed system. The closed system provides a redundant isolation boundary for both PCIVs, and its integrity is required to be verified by the Leakage Rate Test Program.
- (f) Redundant isolation boundary for this valve is provided by the closed system whose integrity is verified by the Leakage Rate Test Program.
- (g) These valves are not required to be 10 CFR 50, Appendix J tested since the HV-151F015A(B) valves and a closed system form the 10 CFR 50, Appendix J boundary. These valves form a high/low pressure interface and are pressure tested in accordance with the pressure test program.