3/4.3.1 and 3/4.3.2 REACTOR PROTECTIVE AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEMS INSTRUMENTATION

Table 3.3-1, Functional Unit 13, Reactor Trip Breakers

The Reactor Trip Breakers Functional Unit in Table 3.3-1 refers to the reactor trip breaker channels. There are four reactor trip breaker channels. Two reactor trip breaker channels with a coincident trip logic of one-out-of-two taken twice (reactor trip breaker channels A or B, and C or D) are required to produce a trip. Each reactor trip breaker channel consists of two reactor trip breakers. For a reactor trip breaker channel to be considered OPERABLE, both of the reactor trip breakers of that reactor trip breaker channel must be capable of performing their safety function (disrupting the flow of power in its respective trip leg). The safety function is satisfied when the reactor trip breaker is capable of automatically opening, or otherwise opened or racked-out.

If a racked-in reactor trip breaker is not capable of automatically opening, the ACTION for an inoperable reactor trip breaker channel shall be entered. The ACTION shall not be exited unless the reactor trip breaker capability to automatically open is restored, or the reactor trip breaker is opened or racked-out.

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3/4.6.2.1 and 3/4.6.2.2 CONTAINMENT SPRAY SYSTEM and CONTAINMENT COOLING SYSTEM (con't)

The 18 month Surveillance Requirement verifies that each containment cooling fan actuates upon receipt of an actual or simulated SIAS actuation signal. The 18 month frequency is based on engineering judgment and has been shown to be acceptable through operating experience.

Verifying a cooling water flow rate of 1200 gpm to each cooling unit provides assurance that the design flow rate assumed in the safety analyses will be achieved. The safety analyses assumed a cooling water flow rate of 1100 gpm. The 1200 gpm requirement accounts for measurement instrument uncertainties and potential flow degradation. Also considered in selecting the 18 month frequency were the known reliability of the Cooling Water System, the two train redundancy, and the low probability of a significant degradation of flow occurring between surveillances. The flow measurement for the 18 month test shall be done in a configuration equivalent to the accident lineup to ensure that in an accident situation adequate flow will be provided to the containment fan coolers for them to perform their safety function.

Verifying that each valve actuates to the full open position provides further assurance that the valves will travel to their full open position on a Safety Injection Actuation Signal.

3/4.6.3 CONTAINMENT ISOLATION VALVES

The OPERABILITY of the containment isolation valves ensures that the containment atmosphere will be isolated from the outside environment in the event of a release of radioactive material to the containment atmosphere or pressurization of the containment and is consistent with the requirements of GDC 54 through GDC 57 of Appendix A to 10 CFR Part 50. 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 LOCA.

The opening of locked or sealed closed containment isolation valves on an intermittent basis under administrative control includes the following considerations: (1) stationing an operator, who is in constant communication with control room, at the valve controls, (2) instructing this operator to close these valves in an accident situation, and (3) assuring that environmental conditions will not preclude access to close the valves and that this action will prevent the release of radioactivity outside the containment.

"Containment Isolation Valves", previously Table 3.6-2, have been incorporated into the Technical Requirements Manual (TRM).

For penetrations with multiple flow paths, only the affected flow path(s) is required to be isolated when a containment isolation valve in that flow path is inoperable. The flow path may be isolated with the inoperable valve in accordance with the Action requirements, provided the leakage rate acceptance criteria, as applicable, is met and controls are in place to ensure the valve is closed. Also, the penetration is required to meet the requirements of GDC-54, and GDC-55 through GDC 57, as applicable, for all the unisolated flow paths.

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. Either recombiner unit is capable of controlling the expected hydrogen generation associated with (1) zirconium-water reactions, (2) radiolytic decomposition of water, and (3) corrosion of metals within containment. These hydrogen control systems are consistent with the recommendations of Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA," March 1971.

SURVEILLANCE REQUIREMENT SR 4.6.4.2.a requires performance of a system functional test for each hydrogen recombiner to ensure that the recombiners are operational and can attain and sustain the temperature necessary for hydrogen recombination. In particular, this SR requires verification that the minimum heater sheath temperature increases to ≥ 700°F in ≤ 90 minutes. After reaching 700°F, the power is increased to maximum for approximately 2 minutes and verified to be ≥ 60 kW.

SURVEILLANCE REQUIREMENT SR 4.6.4.2.b ensures that there are no physical problems that could affect recombiner operation. Since the recombiners are mechanically passive, they are not subject to mechanical failure. The only credible failures involve loss of power, blockage of the internal flow path, missile impact, etc. A visual inspection is sufficient to determine abnormal conditions that could cause such failures.

SURVEILLANCE REQUIREMENT SR 4.6.4.2.c requires performance of a resistance to ground test for each heater phase to ensure that there are no detectable grounds in any heater phase. This is accomplished by verifying that the resistance to ground for any heater phase is ≥ 10,000 ohms.

3/4.6.5 VACUUM RELIEF VALVES

The OPERABILITY of the primary containment to annulus vacuum relief valves with a setpoint of less than or equal + 0.3 psid ensures that the containment internal pressure differential does not become more negative than the containment design limit for internal pressure differential of 0.65 psi. This situation would occur, for the worst case, if all containment heat removal systems (containment spray, containment cooling, and other HVAC systems) were inadvertently started with only one vacuum relief valve OPERABLE.

3/4.6.6 SECONDARY CONTAINMENT

3/4.6.6.1 SHIELD BUILDING VENTILATION SYSTEM

The OPERABILITY of the shield building ventilation systems ensures that containment vessel leakage occurring during LOCA conditions into the annulus will be filtered through the HEPA filters and charcoal adsorber trains prior to discharge to the atmosphere. This requirement is necessary to meet the assumptions used in the safety analyses and limit the site boundary radiation doses to within the limits of 10 CFR Part 100 during LOCA conditions.

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM

The OPERABILITY of the emergency feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350°F from normal operating conditions in the event of a total loss-of-offsite power.

The two electric-driven emergency feedwater pumps combined are capable of delivering a total feedwater flow of 575 gpm at a pressure of 1102 psig to the entrance of the steam generator(s). The steam-driven emergency feedwater pump is capable of delivering a total feedwater flow of 575 gpm at a pressure of 1102 psig to the entrance of the steam generator(s). This capacity is sufficient to ensure that adequate feedwater flow is available to remove decay heat and reduce the Reactor Coolant System temperature to less than 350°F when the shutdown cooling system may be placed into operation.

The surveillance requirement to verify the minimum pump discharge pressure on recirculation flow ensures that the pump performance curve has not degraded below that used to show that the pumps meet the above flow requirements and is consistent with the requirements of ASME Section XI.

3/4.7.1.3 CONDENSATE STORAGE POOL

The OPERABILITY of the condensate storage pool (CSP) with the minimum water volume ensures that sufficient water is available (173,500 gallons) to cool the Reactor Coolant System to shutdown cooling entry conditions following any design basis accident. Additional makeup water is stored in the wet cooling tower (WCT) basins providing the capability to maintain HOT STANDBY conditions for at least an additional 2 hours prior to initiating shutdown cooling. The total makeup capacity also provides sufficient cooling for 24 hours until shutdown cooling is initiated in the event the ultimate heat sink sustains tornado damage concurrent with the tornado event. The CSP contained water volume limit (91% indicated in MODES 1, 2, and 3) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 170,000 gallons of water is available in the CSP for the emergency feedwater system and that 3,500 gallons of water is available in the CSP for use by the component cooling water makeup system. The CSP contained water volume limit (11% indicated in MODE 4) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 3,500 gallons of water is available in the CSP for the component cooling water makeup system. If natural circulation is required, the combined capacity (WCT and CSP) is sufficient to maintain the plant at HOT STANDBY for 4 hours, followed by a cooldown to shutdown cooling entry conditions assuming the availability of only onsite power or only offsite power, and the worst single failure (loss of a diesel generator or atmospheric dump valve). This requires approximately 275,000 gallons and complies with BTP RSB 5-1.

3/4.7.9 SEALED SOURCE CONTAMINATION

The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39(c) limits for plutonium. This limitation will ensure that leakage from byproduct, source, and special nuclear material sources will not exceed allowable intake values.

Sealed sources are classified into three groups according to their use, with Surveillance Requirements commensurate with the probability of damage to a source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism (i.e. sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shield mechanism.

3/4.7.10 This section deleted.

3/4.7.11 This section deleted.

3/4.7.12 ESSENTIAL SERVICES CHILLED WATER SYSTEM

The Essential Services Chilled Water (CHW) System provides a heat sink for the removal of process and operating heat from selected safety related air handling systems during normal operation and Design Basis Accidents (DBAs). These air handling systems cool spaces containing equipment required for safety related operations. The CHW System is a closed loop system consisting of three 100 percent capacity subsystems, each consisting of one chiller; one chilled water pump; one chilled water expansion tank; instrumentation and controls; and piping and valves. Two subsystems are required to be OPERABLE to provide redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single failure.

The design basis of the CHW System is to remove the post accident heat load from ESF spaces following a DBA coincident with a loss of offsite power. During a DBA, each train is required to provide chilled water to the air handling systems at the design temperature of ≤ 42°F and flow rate of ≥500 gpm.

During normal operations, the CHW System may be unloaded (low heat within the cooling space, typically found during the winter months) in which air handling unit cooling coil heat loads are at a minimum. Therefore, during normal operation, it is acceptable for the CHW system to operate in such a manner that ≤ 42°F and/or ≥ 500 gpm may not be directly met, yet CHW System Operability is maintained. During normal operation, when there is insufficient heat load, the following conditions may apply, but the CHW System is still OPERABLE.

(1) The chilled water operational flow control valves for Control Room Ventilation Unit AH-12 and Switchgear Ventilation Units AH-25 and AH-30, control the flow rate through the cooling coils based on discharge air temperature. If there is insufficient load, the flow control valves may be at a minimum, thus, reducing the total chilled water train flow rate to <500 gpm.

Revised by NRC Letter dated
March 17, 1999
TSCR 98-03

ESSENTIAL SERVICES CHILLED WATER SYSTEM (Continued)

2) The CHW System chillers are equipped with a Hot Gas Bypass Valve which opens when chilled water inlet temperature is reduced significantly. This indicates the available heat load on the operating chiller is reduced to a point it will begin to auto recycle if the valve is not opened. This valve diverts a portion of hot compressor discharge gas directly to the bottom of the evaporator instead of sending it to the condenser. This diversion artificially increases the evaporators refrigerant pressure and temperature which in turns increases the chilled water outlet temperature. The increased chilled water outlet temperature eventually increases the chilled water inlet temperature which then closes the Hot Gas Bypass Valve. This operation allows the chiller to stay running at minimum heat loads, down to approximately 10% rated capacity, but allows the chilled water outlet temperature to cycle. Due to this cycling, the peak chilled water outlet temperature may be >42°F. During DBA conditions, air handling unit cooling coil heat loads would be increased which results in the Hot Gas Bypass Valve going to the closed position.

3) If the Hot Gas Bypass Valve does not open (i.e., is not operational), as described in Item 2, the chiller will auto recycle based on either low chilled water inlet or outlet temperature. The chiller will automatically secure at a preset low temperature, then automatically restart when the chilled water temperature increases past the reset deadband of the switch. The reset deadbands for both switches allow the chilled water outlet temperature to be >42°F. As chiller loading is increased (as would occur during a DBA) the chiller will load sufficiently to reduce chilled water outlet temperature ≤42°F.

The 31 day Surveillance Requirement (SR) to verify the chilled water outlet temperature is ≤42°F at a flow rate of ≥500 gpm ensures the assumptions of the DBA are preserved. This SR will be performed with sufficient heat load to ensure the Hot Gas Bypass Valve is closed and the chiller is not auto recycling on low load. This may require shifting loads from one chilled train to one being tested. This requirement is reflective of an actual post DBA condition, and ensures the chiller will control the chilled water outlet temperature within limits when sufficient heat load is applied.