B 3.7 PLANT SYSTEMS

B 3.7.1 Standby Service Water (SSW) System and Ultimate Heat Sink (UHS)

BASES

BACKGROUND

The SSW System is designed to provide cooling water for the removal of heat from unit auxiliaries, such as Residual Heat Removal (RHR) System heat exchangers, standby diesel generators (DGs), and room coolers for Emergency Core Cooling System equipment required for a safe reactor shutdown following a Design Basis Accident (DBA) or transient. The SSW System also provides cooling to unit components, as required, during normal shutdown and reactor isolation modes. During a DBA, the equipment required for normal operation only is isolated from the SSW System, and cooling is directed only to safety related equipment.

The SSW System consists of two independent cooling water headers (subsystems A and B), and their associated pumps, piping, valves, and instrumentation. The two SSW pumps, or one SSW pump and the high pressure core spray service water pump, are sized to provide sufficient cooling capacity to support the required safety related systems during safe shutdown of the unit following a loss of coolant accident (LOCA). Subsystems A and B service equipment in SSW Divisions 1 and 2, respectively.

The UHS consists of two cooling towers with two required fan cells per tower, each with a concrete makeup water cooling tower basin. These two cooling tower basins are interconnected by a siphon line (to transfer water between them) and together constitute the UHS basin. The combined UHS basin volume is sized such that sufficient water inventory is available for all SSW System post LOCA cooling requirements for a 30 day period with no external makeup water source available (Regulatory Guide 1.27, Ref. 1). Normal makeup for each cooling tower basin is provided automatically by the Plant Service Water System.

Cooling water is pumped from the cooling tower basins by the two SSW pumps to the essential components through the two main supply headers (subsystems A and B). After removing heat from the components, the water is discharged to the cooling towers where the heat is rejected through direct contact with ambient air.

(continued)

BASES

BACKGROUND (continued)

Subsystems A and B supply cooling water to equipment required for a safe reactor shutdown. Additional information on the design and operation of the SSW System and UHS along with the specific equipment for which the SSW System supplies cooling water is provided in the UFSAR, Section 9.2.1 and the UFSAR, Table 9.2-3 (Refs. 2 and 3, respectively). The SSW System is designed to withstand a single active or passive failure, coincident with a loss of offsite power, without losing the capability to supply adequate cooling water to equipment required for safe reactor shutdown.

Following a DBA or transient, the SSW System will operate automatically without operator action. Manual initiation of supported systems (e.g., suppression pool cooling) is, however, performed for long term cooling operations.

APPLICABLE SAFETY ANALYSES

The volume of each water source incorporated in a UHS complex is sized so that sufficient water inventory is available for all SSW System post LOCA cooling requirements for a 30 day period with no additional makeup water source available (Ref. 1). The ability of the SSW System to support long term cooling of the reactor or containment is assumed in evaluations of the equipment required for safe reactor shutdown presented in the UFSAR, Sections 9.2.1, 6.2.1.1.3.3 and Chapter 15, (Refs. 2, 4, and 5, respectively). These analyses include the evaluation of the long term primary containment response after a design basis LOCA. The SSW System provides cooling water for the RHR suppression pool cooling mode to limit suppression pool temperature and primary containment pressure following a LOCA. This ensures that the primary containment can perform its intended function of limiting the release of radioactive materials to the environment following a LOCA. The SSW System also provides cooling to other components assumed to function during a LOCA (e.g., RHR and Low Pressure Core Spray systems). Also, the ability to provide onsite emergency AC power is dependent on the ability of the SSW System to cool the DGs.

The safety analyses for long term containment cooling were performed, as discussed in the UFSAR, Sections 6.2.1.1.3.3 and 6.2.2.3 (Refs. 4 and 6, respectively), for a LOCA, concurrent with a loss of offsite power, and minimum available DG power. The worst case single failure affecting

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

the performance of the SSW System is the failure of one of the two standby DGs, which would in turn affect one SSW subsystem. The SSW flow assumed in the analyses is 7900 gpm per pump to the heat exchanger (UFSAR, Table 6.2-2, Ref. 7). Reference 2 discusses SSW System performance during these conditions.

The SSW System, together with the UHS, satisfy Criterion 3 of the NRC Policy Statement.

LCO

The OPERABILITY of subsystem A (Division 1) and subsystem B (Division 2) of the SSW System is required to ensure the effective operation of the RHR System in removing heat from the reactor, and the effective operation of other safety related equipment during a DBA or transient. Requiring both subsystems to be OPERABLE ensures that either subsystem A or B will be available to provide adequate capability to meet cooling requirements of the equipment required for safe shutdown in the event of a single failure.

A subsystem is considered OPERABLE when:

a. The associated pump is OPERABLE; and

b. The associated piping, valves, instrumentation, and controls required to perform the safety related function are OPERABLE.

OPERABILITY of the UHS is based on a minimum basin water level at or above elevation 130 ft 3 in mean sea level (equivalent to an indicated level of ≥ 7 ft 3 in) and an OPERABLE siphon line between the cooling tower basins. Also, four cooling tower fans are required to be OPERABLE (2 per UHS cooling tower basin).

The isolation of the SSW System to components or systems may render those components or systems inoperable, but may not affect the OPERABILITY of the SSW System.

OPERABILITY of the High Pressure Core Spray (HPCS) Service Water System (SWS) is addressed by LCO 3.7.2, "HPCS SWS."

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the SSW System and the UHS are required to be OPERABLE to support OPERABILITY of the equipment serviced by the SSW System and UHS and required to be OPERABLE in these MODES.

In MODES 4 and 5, the OPERABILITY requirements of the SSW System and UHS are determined by the systems they support.

ACTIONS

A.1

If one cooling tower has one fan inoperable, action must be taken to restore the inoperable cooling tower fan to OPERABLE status within 7 days.

The 7 day Completion Time is reasonable, based on the low probability of an accident occurring during the 7 days that one cooling tower fan is inoperable, the number of available systems, and the time required to complete the Required Action.

B.1 and D.1

If one SSW subsystem is inoperable or if both fans in one cooling tower are inoperable (since this is equivalent to the loss of function of one SSW subsystem), it must be restored to OPERABLE status within 72 hours. With the unit in this condition, the remaining OPERABLE SSW subsystem is adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in the OPERABLE SSW subsystem could result in loss of SSW function. The 72 hour Completion Time was developed taking into account the redundant capabilities afforded by the OPERABLE subsystem and the low probability of a DBA occurring during this period.

The Required Action is modified by two Notes indicating that the applicable Conditions of LCO 3.8.1, "AC Sources—Operating," and LCO 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System—Hot Shutdown," be entered and the Required Actions taken if the inoperable SSW subsystem results in an inoperable DG or RHR shutdown cooling subsystem, respectively. This is in accordance with LCO 3.0.6 and ensures the proper actions are taken for these components.

(continued)

ACTIONS (continued)

C.1

A low water level in the UHS basin indicates that the required 30 day water supply for the post LOCA cooling requirements may not be available. However, changes in water level for such a large volume are slowly occurring events and the degradation when discovered is unlikely to have significantly degraded the basin capability. The 72 hour Completion Time was developed taking into account the remaining capability of the UHS basin, the low probability that this inoperability occurring during the assumed maximum heat load conditions, and the low probability of a DBA occurring during this period.

E.1

If any Required Action and associated Completion Time of Condition A, C, or D are not met the unit must be placed in a MODE in which overall plant risk is minimized. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours.

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 8) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action E.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

(continued)

ACTIONS (continued)

F.1 and F.2

If both SSW subsystems are inoperable, more than one of the UHS cooling towers have inoperable cooling tower fan(s), or the UHS basin is inoperable for reasons other than condition C, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed 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 unit conditions from full Clpower conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.1.1

This SR ensures adequate long term (30 days) cooling can be maintained. With the UHS water source below the minimum level, the UHS basin must be declared inoperable. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.1.2

Operating each cooling tower fan for ≥ 15 minutes ensures that all fans are OPERABLE and that all associated controls are functioning properly. It also ensures that fan or motor failure, or excessive vibration can be detected for corrective action. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.1.3

Verifying the correct alignment for each required manual, power operated, and automatic valve in each SSW subsystem flow path provides assurance that the proper flow paths will exist for SSW operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position and yet considered in the correct position, provided it can be automatically realigned to its accident position within the required time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.1.3 (continued)

This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

Isolation of the SSW System to components or systems does not necessarily affect the OPERABILITY of the SSW subsystem. As such, when all SSW pumps, valves, and piping are OPERABLE, but a branch connection off the main header is isolated, the SSW subsystem needs to be evaluated to determine if it is still OPERABLE.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.1.4

This SR verifies that the automatic isolation valves of the SSW System will automatically switch to the safety or emergency position to provide cooling water exclusively to the safety related equipment during an accident event. This is demonstrated by use of an actual or simulated initiation signal. This SR also verifies the automatic start capability of the SSW pump and cooling tower fans in each subsystem. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.5.1.6 overlaps this SR to provide complete testing of the safety function.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. Regulatory Guide 1.27, Revision 2, January 1976.
2. UFSAR, Section 9.2.1.
3. UFSAR, Table 9.2-3.
4. UFSAR, Section 6.2.1.1.3.3.
5. UFSAR, Chapter 15.
6. UFSAR, Section 6.2.2.3.
7. UFSAR, Table 6.2-2.
8. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

B 3.7 PLANT SYSTEMS

B 3.7.2 High Pressure Core Spray (HPCS) Service Water System (SWS)

BASES

BACKGROUND

The HPCS SWS is designed to provide cooling water for the removal of heat from components of the Division 3 HPCS System.

The HPCS SWS consists of one cooling water header (subsystem C of the Standby Service Water (SSW) System), and the associated pumps, piping, and valves. The Ultimate Heat Sink (UHS) is also considered part of the SSW System (LCO 3.7.1, "Standby Service Water (SSW) System and Ultimate Heat Sink (UHS)").

Cooling water is pumped from a UHS water source by the HPCS service water pump to the essential components through the HPCS service water supply header. After removing heat from the components, the water is discharged to the cooling tower, where the heat is rejected through direct contact with ambient air via natural draft.

The HPCS SWS specifically supplies cooling water to the Division 3 HPCS diesel generator jacket water coolers and HPCS pump room cooler. The HPCS SWS pump is sized such that it will provide adequate cooling water to the equipment required for safe shutdown. Following a Design Basis Accident or transient, the HPCS SWS will operate automatically and without operator action as described in the UFSAR, Section 9.2.1 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The ability of the HPCS SWS to provide adequate cooling to the HPCS System is an implicit assumption for safety analyses evaluated in the UFSAR, Chapters 6 and 15 (Refs. 2 and 3, respectively).

The HPCS SWS satisfies Criterion 3 of the NRC Policy Statement.

(continued)

BASES (continued)

LCO

The HPCS SWS is required to be OPERABLE to ensure that the HPCS System will operate as required. An OPERABLE HPCS SWS consists of an OPERABLE pump; and an OPERABLE flow path, capable of taking suction from the UHS basin and transferring the water to the appropriate unit equipment.

The OPERABILITY of the UHS is discussed in LCO 3.7.1. However, the OPERABILITY of the basin cooling tower fans does not affect the OPERABILITY of the HPCS SWS, due to the limited heat removal during its operation.

APPLICABILITY

In MODES 1, 2, and 3, the HPCS SWS is required to be OPERABLE to support OPERABILITY of the HPCS System since it is required to be OPERABLE in these MODES.

In MODES 4 and 5, the OPERABILITY requirements of the HPCS SWS and the UHS are determined by the HPCS System.

ACTIONS

A.1

When the HPCS SWS is inoperable, the capability of the HPCS System to perform its intended function cannot be ensured. Therefore, if the HPCS SWS is inoperable, the HPCS System must be declared inoperable immediately and the applicable Conditions of LCO 3.5.1, "ECCS - Operating," or LCO 3.5.2, "RPV Water Inventory Control," entered.

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1

Verifying the correct alignment for each required manual, power operated, and automatic valve in the HPCS service water flow path provides assurance that the proper flow paths will exist for HPCS service water operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in correct position prior to locking, sealing, or securing.

A valve is also allowed to be in the nonaccident position and yet considered in the correct position, provided it can be automatically realigned to its accident position within the required time. This SR does not require any testing or valve manipulation; rather, it involves verification that

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1 (continued)

those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

Isolation of the HPCS SWS to components or systems may render those components or systems inoperable, but may not affect the OPERABILITY of the HPCS SWS. As such, when all HPCS SWS pumps, valves, and piping are OPERABLE, but a branch connection off the main header is isolated, the HPCS SWS needs to be evaluated to determine if it is still OPERABLE.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.2.2

This SR verifies that the automatic isolation valves of the HPCS SWS will automatically switch to the safety or emergency position to provide cooling water exclusively to the safety related equipment during an accident event. This is demonstrated by use of an actual or simulated initiation signal. This SR also verifies the automatic start capability of the HPCS SWS pump. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.5.1.6 overlaps this SR to provide complete testing of the safety function.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Section 9.2.1.
2. UFSAR, Chapter 6.
3. UFSAR, Chapter 15.

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Fresh Air (CRFA) System

BASES

BACKGROUND

The CRFA System provides a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity, hazardous chemicals, or smoke.

The safety related function of the CRFA System used to control radiation exposure consists of redundant isolation valves in each inlet and exhaust flow path. The system also includes two independent and redundant high efficiency air filtration subsystems for treatment of recirculated air or outside supply air and a CRE boundary that limits the inleakage of unfiltered air. Each CFRA subsystem consists of a demister, an electric heater, a prefilter, a high efficiency particulate air (HEPA) filter, an activated charcoal adsorber section (optional), a second HEPA filter, a fan, and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. Demisters remove water droplets from the airstream. Prefilters and HEPA filters remove particulate matter, which may be radioactive. The charcoal adsorbers, if utilized, provide a holdup period for gaseous iodine, allowing time for decay.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected for normal operation, natural events, and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be maintained to ensure that the inleakage of unfiltered air into the CRE will not exceed the inleakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRE occupants. The CRE and its boundary are defined in the Control Room Envelope Habitability Program.

(continued)

BASES

BACKGROUND (continued)

With the implementation of the alternative source term (Reference 7), the filtration of elemental and organic iodine is no longer credited in the accident analyses and is not a safety-related function. Parts of the CRFA System are operated to maintain the CRE environment during normal operation. Upon receipt of the initiation signal(s) (indicative of conditions that could result in radiation exposure to CRE occupants), the CRFA System automatically switches to the isolation mode of operation to minimize infiltration of contaminated air into the CRE. A system of valves isolates the CRE. CRE air flow may be recirculated and processed through either of the two filter subsystems.

The CRFA System is designed to maintain the control room environment for a 30 day continuous occupancy after a DBA, per the requirements of GDC 19. CRFA System operation in maintaining the control room habitability is discussed in the UFSAR, Sections 6.5.1 and 9.4.1 (Refs. 1 and 2, respectively).

APPLICABLE SAFETY ANALYSES

The ability of the CRFA System to maintain the habitability of the CRE is an explicit assumption for the safety analyses presented in the UFSAR, Chapters 6 and 15 (Refs. 3 and 4, respectively).

The CRFA System is assumed to isolate the CRE in response to manual initiation following a loss of coolant accident. Analyses of these events have assumed the CRE would be isolated for at least three days. At that time, isolation was terminated and the CRE was again ventilated with filtered (i.e., HEPA) outside air. Safety analysis of the fuel handling accident has demonstrated that CRE isolation is not required for this accident. The radiological doses to CRE occupants as a result of the various DBAs are summarized in Reference 4. No single active or passive failure will cause the loss of outside or recirculated air from the CRE.

The CRFA System provides protection from smoke and hazardous chemicals to the CRE occupants. The analysis of hazardous chemical releases demonstrates that the toxicity limits are not exceeded in the CRE following a hazardous chemical release (Ref. 5). The evaluation of a smoke challenge

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

demonstrates that it will not result in the inability of the CRE occupants to control the reactor either from the control room or from the remote shutdown panels (Ref. 8).

The CRFA System satisfies Criterion 3 of the NRC Policy Statement.

LCO

Two redundant subsystems of the CRFA System are required to be OPERABLE to ensure that at least one is available, if a single active failure disables the other subsystem. Total CRFA system failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, could result in a failure to meet the dose requirements of GDC 19 in the event of a DBA.

Each CRFA subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter is not excessively restricting flow and is capable of performing its filtration functions; and

c. Demister, ductwork, valves, and dampers are OPERABLE, and air circulation can be maintained.

In order for the CRFA subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequence analyses for DBAs, and that CRE occupants are protected from hazardous chemicals and smoke.

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs, and access panels. For entry and exit through doors, the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated

(continued)

BASES

LCO (continued)

individual at the opening who is in continuous communication with the operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

APPLICABILITY

In MODES 1, 2, and 3, the CRFA System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining the CRFA System OPERABLE is not required in MODE 4 or 5.

ACTIONS

A.1

With one CRFA subsystem inoperable for reasons other than an inoperable CRE boundary, the inoperable CRFA subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CRFA subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in loss of CRFA System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

B.1, B.2, and B.3

If the unfiltered inleakage of potentially contaminated air past the CRE boundary and into the CRE can result in CRE occupant radiological dose greater than the calculated dose of the licensing basis analyses of DBA consequences (allowed to be up to 5 rem TEDE), or inadequate protection of CRE occupants from hazardous chemicals or smoke, the CRE boundary is inoperable. Actions must be taken to restore an OPERABLE CRE boundary within 90 days.

(continued)

BASES

ACTIONS

B.1, B.2, and B.3 (continued)

During the period that the CRE boundary is considered inoperable, action must be initiated to implement mitigating actions to lessen the effect on CRE occupants from the potential hazards of a radiological or chemical event or a challenge from smoke. Actions must be taken within 24 hours to verify that in the event of a DBA, the mitigating actions will ensure that CRE occupant radiological exposures will not exceed the calculated dose of the licensing basis analyses of DBA consequences, and that CRE occupants are protected from hazardous chemicals and smoke. These mitigating actions (i.e., actions that are taken to offset the consequences of the inoperable CRE boundary) should be preplanned for implementation upon entry into the condition, regardless of whether entry is intentional or unintentional. The 24 hour Completion Time is reasonable based on the low probability of a DBA occurring during this time period, and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possible repair, and test most problems with the CRE boundary.

C.1

In MODE 1, 2, or 3, if the inoperable CRFA subsystem or the CRE boundary cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes overall plant risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours.

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 5) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

(continued)

BASES

ACTIONS (continued)

C.1 (continued)

Required Action C.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

D.1

If both CRFA subsystems are inoperable in MODE 1, 2, or 3 for reasons other than an inoperable CRE, the CRFA System may not be capable of performing the intended function and the unit is in a condition outside of the accident analyses. Therefore, the plant must be brought to a MODE in which the overall plant risk is minimized. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours.

(continued)

ACTIONS (continued)

D.1 (continued)

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 5) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action E.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is 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 (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

This SR verifies that a subsystem in a standby mode starts from the control room on demand and continues to operate. Standby systems should be checked periodically to ensure that they start and function properly. Operation for ≥ 15 continuous minutes demonstrates OPERABILITY of the system. Periodic operation ensures that blockages fan or motor failure, or excessive vibration can be detected for corrective action. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.3.2

This SR verifies that the required CRFA testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The VFTP includes testing HEPA filter performance, and minimum system flow rate. Specific test frequencies and additional information are discussed in detail in the VFTP.

SR 3.7.3.3

This SR verifies that each CRFA subsystem starts and operates and that the isolation valves close in ≤ 4 seconds on an actual or simulated initiation signal. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.7.1.1 overlaps this SR to provide complete testing of the safety function. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.3.4

This SR verifies the OPERABILITY of the CRE boundary by testing for unfiltered air inleakage past the CRE boundary and into the CRE. The details of the testing are specified in the Control Room Envelope Habitability Program.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.3.4 (continued)

The CRE is considered habitable when the radiological dose to CRE occupants calculated in the licensing basis analyses of DBA consequences is no more than 5 rem TEDE and the CRE occupants are protected from hazardous chemicals and smoke. This SR verifies that the unfiltered air inleakage into the CRE is no greater than the flow rate assumed in the licensing basis analyses of DBA consequences. When unfiltered air inleakage is greater than the assumed flow rate, Condition B must be entered. Required Action B.3 allows time to restore the CRE boundary to OPERABLE status provided mitigating actions can ensure that the CRE remains within the licensing basis habitability limits for the occupants following an accident. Compensatory measures are discussed in Regulatory Guide 1.196, Section C.2.7.3, which endorses, with exceptions, NEI 99-03, Section 8.4 and Appendix F (Ref. 9). These compensatory measures may also be used as mitigating actions as required by Required Action B.2. Temporary analytical methods may also be used as compensatory measures to restore OPERABILITY (Ref. 10). Options for restoring the CRE boundary to OPERABLE status include changing the licensing basis DBA consequence analysis, repairing the CRE boundary, or a combination of these actions. Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRE boundary has been restored to OPERABLE status.

REFERENCES

1. FSAR, Section 6.5.1.

2. FSAR, Section 9.4.1.

3. FSAR, Chapter 6.

4. FSAR, Chapter 15.

5. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

6. Engineering Evaluation Request 95/6213, Engineering Evaluation Request Response Partial Response dated 12/18/95.

7. Amendment 145 to GGNS Operating License.

(continued)

BASES

REFERENCES (continued)

8. UFSAR, Section 9.5

9. NEI 99-03, Control Room Habitability Assessment, June 2001.

10. Letter from Eric J. Leeds (NRC) to James W. Davis (NEI) Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability." (ADAMS Accession No. ML04300694).

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B 3.7 PLANT SYSTEMS

B 3.7.4 Control Room Air Conditioning (AC) System

BASES

BACKGROUND

The Control Room AC System provides temperature control for the control room.

The Control Room AC System consists of two independent, redundant subsystems that provide cooling and heating of recirculated control room air. Each subsystem consists of heating coils, cooling coils, fans, chillers, compressors, ductwork, dampers, and instrumentation and controls to provide for control room temperature control.

The Control Room AC System is designed to provide a controlled environment under both normal and accident conditions. The Control Room AC System operation in maintaining the control room temperature is discussed in the UFSAR, Sections 6.4 and 9.4.1 (Refs. 1 and 2, respectively).

APPLICABLE SAFETY ANALYSES

The design basis of the Control Room AC System is to maintain the control room temperature for a 30 day continuous occupancy.

The Control Room AC System components are arranged in redundant safety related subsystems. During emergency operation, the Control Room AC System maintains a habitable environment and ensures the OPERABILITY of components in the control room. A single active failure of a component of the Control Room AC System, assuming a loss of offsite power, does not impair the ability of the system to perform its design function. Redundant detectors and controls are provided for control room temperature control. The Control Room AC System is designed in accordance with Seismic Category I requirements. The Control Room AC System is capable of removing sensible and latent heat loads from the control room, including consideration of equipment heat loads and personnel occupancy requirements to ensure equipment OPERABILITY.

The ability of the Control Room AC System to maintain the control room temperature during Modes 1, 2, and 3 is implicitly assumed in the analyses of the design basis

(continued)

BASES

APPLICABLE accidents (e.g., LOCA, main steam line break).

The Control Room AC System satisfies Criterion 3 of the NRC Policy Statement.

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BASES (continued)

LCO

Two independent and redundant subsystems of the Control Room AC System are required to be OPERABLE to ensure that at least one is available, assuming a single failure disables the other subsystem. Total system failure could result in the equipment operating temperature exceeding limits.

The Control Room AC System is considered OPERABLE when the individual components necessary to maintain the control room temperature are OPERABLE in both subsystems. These components include the cooling coils, fans, chillers, compressors, ductwork, dampers, and associated instrumentation and controls. The heating coils are not required for Control Room AC System OPERABILITY.

APPLICABILITY

In MODE 1, 2, or 3, the Control Room AC System must be OPERABLE to ensure that the control room temperature will not exceed equipment OPERABILITY limits.

In MODES 4 and 5, the probability and consequences of a Design Basis Accident are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining the Control Room AC System OPERABLE is not required in MODE 4 or 5.

ACTIONS

A.1

With one control room AC subsystem inoperable, the inoperable control room AC subsystem must be restored to OPERABLE status within 30 days. With the unit in this condition, the remaining OPERABLE control room AC subsystem is adequate to perform the control room air conditioning function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in loss of the control room air conditioning function. The 30 day Completion Time is based on the low probability of an event occurring requiring control room isolation, the consideration that the remaining subsystem can provide the required protection, and the availability of alternate cooling methods.

(continued)

BASES

ACTIONS

B.1 and B.2

If both control room AC subsystems are inoperable, the Control Room AC System may not be capable of performing its intended function. Therefore, the control room area temperature is required to be monitored to ensure that temperature is being maintained low enough that equipment in the control room is not adversely affected. With the control room temperature being maintained within the temperature limit, 7 days is allowed to restore a control room AC subsystem to OPERABLE status. This Completion Time is reasonable considering that the control room temperature is being maintained within limits, the low probability of an event occurring requiring control room isolation, and the availability of alternate cooling methods.

C.1

In MODE 1, 2, or 3, if the control room area temperature cannot be maintained less than or equal to 90°F or if the inoperable control room AC subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE that minimizes overall plant risk. To achieve this status the unit must be placed in at least MODE 3 within 12 hours.

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 3) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action B.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

(continued)

BASES

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(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.4.1

This SR verifies that the heat removal capability of the system is sufficient to remove the control room heat load assumed in the safety analysis. The SR consists of a combination of testing and calculation. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. FSAR, Section 6.4.
2. FSAR, Section 9.4.1.
3. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

B 3.7 PLANT SYSTEMS

B 3.7.5 Main Condenser Offgas

BASES

BACKGROUND

During unit operation, steam from the low pressure turbine is exhausted directly into the condenser. Air and noncondensible gases are collected in the condenser, then exhausted through the steam jet air ejectors (SJAEs) to the Main Condenser Offgas System. The offgas from the main condenser normally includes radioactive gases.

The Main Condenser Offgas System has been incorporated into the unit design to reduce the gaseous radwaste emission. This system uses a catalytic recombiner to recombine radiolytically dissociated hydrogen and oxygen. The gaseous mixture is cooled by the offgas condenser; the water and condensibles are stripped out by the offgas condenser and moisture separator. The radioactivity of the remaining gaseous mixture (i.e., the offgas recombiner effluent) is monitored downstream of the moisture separator prior to entering the holdup line.

APPLICABLE SAFETY ANALYSES

The main condenser offgas gross gamma activity rate is an initial condition of the Main Condenser Offgas System failure event as discussed in the UFSAR, Section 15.7.1 (Ref. 1). The analysis assumes a gross failure in the Main Condenser Offgas System that results in the rupture of the Main Condenser Offgas System pressure boundary. The gross gamma activity rate is controlled to ensure that during the event, the calculated offsite doses will be well within the limits (NUREG-0800, Ref. 2) of 10 CFR 100 (Ref. 3), or the NRC staff approved licensing basis.

The main condenser offgas limits satisfy Criterion 2 of the NRC Policy Statement.

LCO

To ensure compliance with the assumptions of the Main Condenser Offgas System failure event (Ref. 1), the fission product release rate should be consistent with a noble gas release to the reactor coolant of 100 μCi/MWt-second after decay of 30 minutes. The LCO is conservatively established based on 100 μCi/MWt-second and the original GGNS licensed power level of 3833 MWt.

(continued)

BASES (continued)

APPLICABILITY

The LCO is applicable when steam is being exhausted to the main condenser and the resulting noncondensibles are being processed via the Main Condenser Offgas System. This occurs during MODE 1, and during MODES 2 and 3 with any main steam line not isolated and the SJAE in operation. In MODES 4 and 5, steam is not being exhausted to the main condenser and the requirements are not applicable.

ACTIONS

A.1

If the offgas radioactivity rate limit is exceeded, 72 hours is allowed to restore the gross gamma activity rate to within the limit. The 72 hour Completion Time is reasonable, based on engineering judgment considering the time required to complete the Required Action, the large margins associated with permissible dose and exposure limits, and the low probability of a Main Condenser Offgas System rupture occurring.

B.1, and B.2

If the gross gamma activity rate is not restored to within the limits within the associated Completion Time, the SJAE must be isolated. This isolates the Main Condenser Offgas System from the source of the radioactive steam. The 12 hour Completion Time is reasonable, based on operating experience, to perform the actions from full power conditions in an orderly manner and without challenging unit systems.

An alternative to Required Action B.1 is to place the unit in a MODE in which overall plant risk is minimized. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours.

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 4) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action B.2 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing

(continued)

BASES

ACTIONS

B.1, and B.2 (continued)

inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.5.1 and 3.7.5.2

SR 3.7.5.2, requires an isotopic analysis of an offgas sample to ensure that the required limits are satisfied. The noble gases to be sampled include Xe-133, Xe-135, Xe-138, Kr-85, Kr-87, and Kr-88. If the measured rate of radioactivity increases significantly (by ≥ 50% after correcting for expected increases due to changes in THERMAL POWER), an isotopic analysis is also performed within 4 hours after the increase is noted as required by SR 3.7.5.1, to ensure that the increase is not indicative of a sustained increase in the radioactivity rate. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.5.2 is modified by a Note indicating that the SR is not required to be performed until 31 days after any SJAE is in operation. Only in this condition can radioactive fission gases be in the Main Condenser Offgas System at significant rates.

REFERENCES

1. FSAR, Section 15.7.1.

2. NUREG-0800.

3. 10 CFR 100.

4. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

B 3.7 PLANT SYSTEMS

B 3.7.6 Fuel Pool Water Level

BASES

BACKGROUND

The minimum water level in the spent fuel storage pool and upper containment fuel storage pool meets the assumptions of iodine decontamination factors following a fuel handling accident.

A general description of the spent fuel storage pool and upper containment fuel storage pool design is found in the UFSAR, Section 9.1.2 (Ref. 1). The assumptions of the fuel handling accident are found in the UFSAR, Section 15.7.4 (Ref. 2).

APPLICABLE SAFETY ANALYSES

The water level above the irradiated fuel assemblies is an explicit assumption of the fuel handling accident. A fuel handling accident is evaluated to ensure that the radiological consequences remain within the guidelines in NUREG-0800, Section 15.0.1 (Ref. 4) and 10 CFR 50.67, (Ref. 5). A fuel handling accident could release a fraction of the fission product inventory by breaching the fuel rod cladding as discussed in Appendix B to Regulatory Guide 1.183 (Ref. 6).

The fuel handling accident is evaluated for the dropping of an irradiated fuel assembly onto stored fuel bundles. The consequences of a fuel handling accident inside the auxiliary building and inside containment are documented in Reference 2. The water levels in the spent fuel storage pool and upper containment fuel storage pool provide for absorption of water soluble fission product gases and transport delays of soluble and insoluble gases that must pass through the water before being released to the secondary containment atmosphere. This absorption and transport delay reduces the potential radioactivity of the release during a fuel handling accident.

The fuel pool water level satisfies Criterion 2 of the NRC Policy Statement.

(continued)

BASES (continued)

LCO	The specified water level preserves the assumption of the fuel handling accident analysis (Ref. 2. As such, it is the minimum required for fuel movement within the spent fuel storage pool and upper containment fuel storage pool.
APPLICABILITY	This LCO applies whenever movement of irradiated fuel assemblies occurs in the associated fuel storage racks since the potential for a release of fission products exists.
ACTIONS	A.1 Required Action A.1 is modified by a Note indicating that LCO 3.0.3 does not apply. If moving irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, inability to suspend movement of irradiated fuel assemblies is not a sufficient reason to require a reactor shutdown. When the initial conditions for an accident cannot be met, steps should be taken to preclude the accident from occurring. With either fuel pool level less than required, the movement of irradiated fuel assemblies in the associated storage pool is suspended immediately. Suspension of this activity shall not preclude completion of movement of an irradiated fuel assembly to a safe position. This effectively precludes a spent fuel handling accident from occurring.
SURVEILLANCE REQUIREMENTS	SR 3.7.6.1 This SR verifies that sufficient water is available in the event of a fuel handling accident. The water level in the spent fuel storage pool and upper containment fuel storage pool must be checked periodically. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES (continued)

REFERENCES

1. UFSAR, Section 9.1.2.
2. UFSAR, Section 15.7.4.
3. Deleted
4. NUREG-0800, Section 15.0.1, Revision 0, July 2000.
5. 10 CFR 50.67, "Accident Source Term."
6. Regulatory Guide 1.183, July 2000.

B 3.7 PLANT SYSTEMS

B 3.7.7 Main Turbine Bypass System

BASES

BACKGROUND	The Main Turbine Bypass System is designed to control steam pressure when reactor steam generation exceeds turbine requirements during unit startup, sudden load reduction, and cooldown. It allows excess steam flow from the reactor to the condenser without going through the turbine. The bypass capacity of the system is 30.4% of the Nuclear Steam Supply System rated steam flow. Sudden load reductions within the capacity of the steam bypass can be accommodated without reactor scram. The Turbine Bypass System consists of three hydraulically operated combined stop and control valves. The bypass valves are controlled by the turbine-generator and Pressure Control System, as discussed in FSAR Section 7.7.1.5. Normally, the bypass control valves are held closed and the pressure regulator controls the turbine control valves, directing all steam flow to the turbine. If the speed control load restricts steam flow to the turbine, the pressure regulator controls system pressure by opening the bypass control valves. If the capacity of the bypass valves is exceeded while the turbine cannot accept an increase in steam flow, the system pressure will rise and the reactor protection system action will cause shutdown of the reactor.
APPLICABLE SAFETY ANALYSES	The Main Turbine Bypass System is assumed to function during the rod withdrawal error (RWE) at power event, as discussed in FSAR Section 15.4.2, loss of feedwater heating event (LOFWH), as discussed in FSAR Section 15.1.1 and the slow opening of the recirculation control valve events as described in FSAR Section 15.4.5. Opening the bypass valves during these events mitigates the increase in reactor vessel pressure, which affects the MCPR and LHGR during the event. Only the RWE and LOFWH events initiating from near RTP will open the bypass valves. The basis for the applicable power range of the Main Turbine Bypass System is the slow opening of the recirculation control valve. Two or more inoperable Main Turbine Bypass valves may result in LHGR and MCPR penalties.

BASES (continued)

LCO

Two of the three Main Turbine Bypass valves are required to be OPERABLE to limit peak pressure in the main steam lines and maintain reactor pressure within acceptable limits during events that cause slow pressurization, such that the Safety Limit MCPR is not exceeded. With two or more Main Turbine Bypass valves inoperable, modifications to the LHGR limits (LCO 3.2.3) and the MCPR limits (LCO 3.2.2) may be applied to allow continued operation.

Main Turbine Bypass valves are considered OPERABLE when they are capable of opening in response to increasing main steam line pressure. This response is within the assumption of the applicable analysis. The LHGR and MCPR limits for two or more inoperable Main Turbine Bypass valves are specified in the COLR.

APPLICABILITY

The Main Turbine Bypass System is required to be OPERABLE at $\geq$ 70% RTP to ensure that the fuel cladding integrity safety limit and the cladding 1% plastic strain limit are not violated during the slow opening of the recirculation control valve event. As discussed in the Bases for LCO 3.2.2 and LCO 3.2.3, sufficient margin to these limits exists below 70% RTP. Additionally, the Main Turbine Bypass valves are not expected to open when the event initiates from below 70% RTP. Therefore, these requirements are only necessary when operating at or above this power.

ACTIONS

A.1

If the Main Turbine Bypass system is inoperable, or the LHGR and MCPR limits for two or more inoperable Main Turbine Bypass valves, as specified in the COLR, are not applied, the assumptions of the design basis transient analysis may not be met. Under such circumstances, prompt action should be taken to restore the Main Turbine Bypass System to OPERABLE status or adjust the LHGR and MCPR limits accordingly. The 2 hour Completion Time is reasonable, based on the time to complete the Required Action and the low probability of an event occurring during this period requiring two of the three Main Turbine Bypass valves.

(continued)

BASES (continued)

B.1

If the Main Turbine Bypass System cannot be restored to OPERABLE status or the LHGR and MCPR limits for two or more inoperable Main Turbine Bypass valves are not applied, THERMAL POWER must be reduced to < 70% RTP. As discussed in the Applicability section, operation at <70% RTP results in sufficient margin to the required limits, and the Main Turbine Bypass system is not required to protect fuel integrity during the feedwater controller failure, maximum demand event. The 4 hour Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.7.1

Cycling each Main Turbine Bypass valve through one complete cycle of full travel demonstrates that the valves are mechanically OPERABLE and will function when required. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.7.7.2

The Main Turbine Bypass System is required to actuate automatically to perform its design function. This SR demonstrates that, with the required system initiation signals, the valves will actuate to their required position. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES None