3/4.7.1.5 MAIN STEAM LINE ISOLATION VALVES

Insert A'

The OPERABILITY of the main steam line isolation valves ensures that no more than one steam generator will blow down in the event of a steam line rupture. This restriction is required to: (1) minimize the positive reactivity effects of the Reactor Coolant System cooldown associated with the blowdown, and (2) limit the pressure rise within containment in the event the steam line rupture occurs within containment. The OPERABILITY of the main steam isolation valves within the closure times of the Surveillance Requirements are consistent with the assumptions used in the safety analyses.

3/4.7.2 STEAM GENERATOR PRESSURE/TEMPERATURE LIMITATION

The limitation on steam generator pressure and temperature ensures that the pressure-induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations of 70°F and 200 psig are based on a steam generator RT_{NDT} of 60°F and are sufficient to prevent brittle fracture.

3/4.7.3 REACTOR PLANT COMPONENT COOLING WATER SYSTEM

The OPERABILITY of the Reactor Plant Component Cooling Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses.

3/4.7.4 SERVICE WATER SYSTEM

The OPERABILITY of the Service Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses.

3/4.7.5 ULTIMATE HEAT SINK

The limitation on the ultimate heat sink temperature ensures that cooling water at less than the design temperature limit is available to either: (1) provide normal cooldown of the facility or (2) mitigate the effects of accident conditions within acceptable limits.

Insert A to Page B 3/4 7-3

3/4.7.1.5 MAIN STEAM LINE ISOLATION VALVES

BACKGROUND

The main steam line isolation valves (MSIVs) isolate steam flow from the secondary side of the steam generators following a high energy line break (HELB). MSIV closure terminates flow from the unaffected (intact) steam generators.

One MSIV is located in each main steam line outside, but close to, containment. The MSIVs are downstream from the main steam safety valves (MSSVs) and auxiliary feedwater (AFW) pump turbine steam supply, to prevent MSSV and AFW isolation from the steam generators by MSIV closure. Closing the MSIVs isolates each steam generator from the others, and isolates the turbine, Steam Bypass System, and other auxiliary steam supplies from the steam generators.

The MSIVs close on a main steam isolation signal generated by low steam generator pressure, high containment pressure, or steam line pressure negative rate (high). The MSIVs fail closed on loss of control or actuation power.

Each MSIV has an MSIV bypass valve. Although these bypass valves are normally closed, they receive the same emergency closure signal as do their associated MSIVs. The MSIVs may also be actuated manually.

A description of the MSIVs is found in the FSAR, Section 10.3.

APPLICABLE SAFETY ANALYSIS

The design basis of the MSIVs is established by the containment analysis for the large steam line break (SLB) inside containment, discussed in the FSAR, Section 6.2. It is also affected by the accident analysis of the SLB events presented in the FSAR, Section 15.1.5. The design precludes the blowdown of more than one steam generator, assuming a single active component failure (e.g., the failure of one MSIV to close on demand).

The limiting temperature case for the containment analysis is the SLB inside containment, with a loss of offsite power following turbine trip, and failure of the MSIV on the affected steam generator to close. At hot zero power, the steam generator inventory and temperature are at their maximum, maximizing the analyzed mass and energy release to the containment. Due to reverse flow and failure of the MSIV to close, the additional mass and energy in the steam headers downstream from the other MSIV contribute to the total release. With the most reactive rod cluster control assembly assumed stuck in the fully withdrawn position, there is an increased possibility that the core will become critical and return to power. The reactor is ultimately shut down by the boric acid injection delivered by the Emergency Core Cooling System.

The accident analysis compares several different SLB events against different acceptance criteria. The large SLB outside containment upstream of the MSIVs is limiting for offsite dose, although a break in this short section of main steam header has a very low probability. The large SLB upstream of the MSIV

Insert A to Page B 3/4 7-3

at hot zero power is the limiting case for a post trip return to power. The analysis includes scenarios with offsite power available and with a loss of offsite power following turbine trip. With offsite power available, the reactor coolant pumps continue to circulate coolant through the steam generators, maximizing the Reactor Coolant System cooldown. With a loss of offsite power, the response of mitigating systems is delayed. Significant single failures considered include failure of an MSIV to close.

The MSIVs serve only a safety function and remain open during power operation. These valves operate under the following situations:

a. An HELB inside containment. In order to maximize the mass and energy release into containment, the analysis assumes that the MSIV in the affected steam generator remains open. For this accident scenario, steam is discharged into containment from all steam generators until the remaining MSIVs close. After MSIV closure, steam is discharged into containment only from the affected steam generator and from the residual steam in the main steam header downstream of the closed MSIVs in the unaffected loops. Closure of the MSIVs isolates the break from the unaffected steam generators.

b. A break outside of containment and upstream from the MSIVs is not a containment pressurization concern. The uncontrolled blowdown of more than one steam generator must be prevented to limit the potential for uncontrolled RCS cooldown and positive reactivity addition. Closure of the MSIVs isolates the break and limits the blowdown to a single steam generator.

c. A break downstream of the MSIVs will be isolated by the closure of the MSIVs.

d. Following a steam generator tube rupture, closure of the MSIVs isolates the ruptured steam generator from the intact steam generators. In addition to minimizing radiological releases, this enables the operator to maintain the pressure of the steam generator with the ruptured tube below the MSSV setpoints, a necessary step toward isolating the flow through the rupture.

e. The MSIVs are also utilized during other events, such as a feedwater line break. This event is less limiting so far as MSIV OPERABILITY is concerned.

LCO

This LCO requires that four MSIVs in the steam lines be OPERABLE. The MSIVs are considered OPERABLE when the isolation times are within limits, and they close on an isolation actuation signal.

This LCO provides assurance that the MSIVs will perform their design safety function to mitigate the consequences of accidents that could result in offsite exposures comparable to the 10CFR100 limits or the NRC Staff approved licensing basis.

Insert A to Page B 3/4 7-3

APPLICABILITY

The MSIVs must be OPERABLE in MODE 1 and in MODES 2 and 3, except when closed and deactivated when there is significant mass and energy in the RCS and steam generators. When the MSIVs are closed, they are already performing the safety function.

In MODE 4, even though steam generator energy is low, the MSIVs must be operable in MODE 4 except when closed and deactivated.

In MODE 5 or 6, the steam generators do not contain much energy because their temperature is below the boiling point of water; therefore, the MSIVs are not required for isolation of potential high energy secondary system pipe breaks in these MODES.

ACTIONS

MODE 1

With one MSIV inoperable in MODE 1, action must be taken to restore OPERABLE status within 8 hours. Some repairs to the MSIV can be made with the unit hot. The 8 hour Completion Time is reasonable, considering the low probability of an accident occurring during this time period that would require a closure of the MSIVs.

The 8 hour Completion Time is greater than that normally allowed for containment isolation valves because the MSIVs are valves that isolate a closed system penetrating containment. These valves differ from other containment isolation valves in that the closed system provides a passive barrier for containment isolation.

If the MSIV cannot be restored to OPERABLE status within 8 hours, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in MODE 2 within 6 hours. The Completion Times are reasonable, based on operating experience, to reach MODE 2 and to close the MSIVs in an orderly manner and without challenging plant systems.

MODES 2, 3, and 4

Since the MSIVs are required to be OPERABLE in MODES 2, 3, and 4, the inoperable MSIVs may either be restored to OPERABLE status or closed. When closed, the MSIVs are already in the position required by the assumptions in the safety analysis.

The 8 hour Completion Time is consistent with that allowed in Mode 1.

For inoperable MSIVs that cannot be restored to OPERABLE status within the specified Completion Time, but are closed, the inoperable MSIVs must be verified on a periodic basis to be closed. This is necessary to ensure that the assumptions in the safety analysis remain valid. The 7 day verification time is reasonable, based on engineering judgment, in view of MSIV status

Insert A to Page B 3/4 7-3

indications available in the control room, and other administrative controls, to ensure that these valves are in the closed position.

If the MSIVs cannot be restored to OPERABLE status or are not closed within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed at least in MODE 3 within 6 hours, and in MODE 5 within the next 30 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from MODE 2 conditions in an orderly manner and without challenging unit systems. The Action Statement is modified by a note indicating that separate condition entry is allowed for each MSIV.

SURVEILLANCE REQUIREMENTS

INSERT 1

R

4.7.1.5.1 This surveillance verifies that MSIV closure time is less than 10 seconds on an actual or simulated actuation signal in MODES 1, 2, and 3 when tested pursuant to Specification 4.0.5. The MSIV closure time is assumed in the accident analyses. This surveillance is normally performed upon returning the plant to operation following a refueling outage. The test is conducted in MODE 3 with the plant at suitable (appropriate) conditions (e.g., pressure and temperature). This surveillance requirement is modified by an exception which allows a delay of testing until MODE 3, to establish conditions consistent with those under which the acceptance criterion was generated. This exception to Specification 4.0.4 would also allow the MSIVs to be cycled to demonstrate post repair OPERABILITY. Action requirements shall not apply until OPERABILITY has been verified. In addition, if the closure time of the MSIV is less than 10 seconds when verified in accordance with Specification 4.7.1.5.2, the OPERABILITY demonstration of the MSIV in MODES 1, 2, or 3 is not required per Specification 4.7.1.5.1.

on an actual or simulated actuation signal

INSERT 1

R

4.7.1.5.2 This surveillance verifies that MSIV closure time is less than 120 seconds in MODE 4 when tested pursuant to Specification 4.0.5. This MSIV closure time is assumed in the analyses. This surveillance is normally performed upon returning the plant to operation following a refueling outage. The test is conducted in MODE 4 with the plant at suitable (appropriate) conditions (e.g., pressure and temperature). This surveillance requirement is modified by an exception which allows a delay of testing until MODE 4, to establish conditions consistent with those under which the acceptance criterion was generated. This exception to Specification 4.0.4 would also allow the MSIVs to be cycled to demonstrate post repair OPERABILITY. Action requirements shall not apply until OPERABILITY has been verified.

R

Insert 1

A simulated signal is defined as any of the following engineered safety features actuation system instrumentation functional units per technical specifications Table 4.3-2; 4.a.1) Manual Initiation, Individual, 4.a.2) Manual Initiation, System, 4.c, Containment Pressure - High-2, 4.d Steam line pressure - Low, and 4.e Steam line Pressure - Negative Rate - High.

Docket No. 50-423
B15331

Attachment 2

Millstone Nuclear Power Station, Unit No. 3

Correction to a Proposed Revision to Technical Specification
Main Steam Line Isolation Valve

Retyped Pages

August 1995

BASES

3/4.7.1.5 MAIN STEAM LINE ISOLATION VALVES (continued)

If the MSIV cannot be restored to OPERABLE status within 8 hours, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in MODE 2 within 6 hours. The Completion Times are reasonable, based on operating experience, to reach MODE 2 and to close the MSIVs in an orderly manner and without challenging plant systems.

MODES 2, 3, and 4

Since the MSIVs are required to be OPERABLE in MODES 2, 3, and 4, the inoperable MSIVs may either be restored to OPERABLE status or closed. When closed, the MSIVs are already in the position required by the assumptions in the safety analysis.

The 8 hour Completion Time is consistent with that allowed in Mode 1.

For inoperable MSIVs that cannot be restored to OPERABLE status within the specified Completion Time, but are closed, the inoperable MSIVs must be verified on a periodic basis to be closed. This is necessary to ensure that the assumptions in the safety analysis remain valid. The 7 day verification time is reasonable, based on engineering judgment, in view of MSIV status indications available in the control room, and other administrative controls, to ensure that these valves are in the closed position.

If the MSIVs cannot be restored to OPERABLE status or are not closed within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed at least in MODE 3 within 6 hours, and in MODE 5 within the next 30 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from MODE 2 conditions in an orderly manner and without challenging unit systems. The Action Statement is modified by a note indicating that separate condition entry is allowed for each MSIV.

SURVEILLANCE REQUIREMENTS

4.7.1.5.1 This surveillance verifies that MSIV closure time is less than 10 seconds on an actual or simulated actuation signal in MODES 1, 2, and 3 when tested pursuant to Specification 4.0.5. A simulated signal is defined as any of the following engineered safety features actuation system instrumentation functional units per Technical Specification Table 4.3-2: 4.a.1) manual initiation, individual, 4.a.2) manual initiation, system, 4.c. containment pressure high-2, 4.d. steam line pressure low, and 4.e. steam line pressure - negative rate high. The MSIV closure time is assumed in the accident analyses. This surveillance is normally performed upon returning the plant to operation following a refueling outage. The test is conducted in MODE 3 with the plant at suitable (appropriate) conditions (e.g., pressure and temperature). This surveillance requirement is modified by an exception which allows a delay of testing until MODE 3, to establish conditions consistent with those under which the acceptance criterion was generated. This exception

SURVEILLANCE REQUIREMENTS (continued)

to Specification 4.0.4 would also allow the MSIVs to be cycled to demonstrate post repair OPERABILITY. Action requirements shall not apply until OPERABILITY has been verified. In addition, if the closure time of the MSIV is less than 10 seconds when verified in accordance with Specification 4.7.1.5.2, the OPERABILITY demonstration of the MSIV in MODES 1, 2, or 3 is not required per Specification 4.7.1.5.1.

4.7.1.5.2 This surveillance verifies that MSIV closure time is less than 120 seconds on an actual or simulated actuation signal in MODE 4 when tested pursuant to Specification 4.0.5. A simulated signal is defined as any of the following engineered safety features actuation system instrumentation functional units per Technical Specification Table 4.3-2: 4.a.1) manual initiation, individual, 4.a.2) manual initiation, system, 4.c. containment pressure high-2, 4.d. steam line pressure low, and 4.e. steam line pressure - negative rate high. This MSIV closure time is assumed in the analyses. This surveillance is normally performed upon returning the plant to operation following a refueling outage. The test is conducted in MODE 4 with the plant at suitable (appropriate) conditions (e.g., pressure and temperature). This surveillance requirement is modified by an exception which allows a delay of testing until MODE 4, to establish conditions consistent with those under which the acceptance criterion was generated. This exception to Specification 4.0.4 would also allow the MSIVs to be cycled to demonstrate post repair OPERABILITY. Action requirements shall not apply until OPERABILITY has been verified.

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The limitation on steam generator pressure and temperature ensures that the pressure-induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations of 70°F and 200 psig are based on a steam generator RT_{NDT} of 60°F and are sufficient to prevent brittle fracture.

3/4.7.3 REACTOR PLANT COMPONENT COOLING WATER SYSTEM

The OPERABILITY of the Reactor Plant Component Cooling Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses.

3/4.7.4 SERVICE WATER SYSTEM

The OPERABILITY of the Service Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses.