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RS-13-175

10 CFR 50.90

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: License Amendment Request to Revise Technical Specifications Section 3.7.2, "Main Steam Isolation Valves (MSIVs)"

Reference: NRC Memorandum, "Operability Determination for the Callaway Plant Technical Specifications Requirements When One Main Steam Isolation Valve Actuator Train is Removed from Service," dated October 19, 2006

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC, (EGC), requests amendments to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2.

The proposed amendments will revise Technical Specifications (TS) Section 3.7.2, "Main Steam Isolation Valves (MSIVs)," to incorporate the MSIV actuator trains into the Limiting Condition for Operation (LCO) and provide associated Conditions and Required Actions. In addition, Surveillance Requirement (SR) 3.7.2.2 is revised to clearly identify that the MSIV actuator trains are required to be tested in accordance with the SR.

These changes are considered necessary based on the referenced NRC staff interpretation that SR 3.7.2.2 requires both actuator trains for a single valve to be surveillance tested. The NRC staff interpretation results in declaring an MSIV inoperable with one actuator train inoperable. The Completion Time of 8 hours for an inoperable MSIV due to one inoperable actuator train is not commensurate with the safety significance of an inoperable actuator train. Therefore, new Conditions, Required Actions, and Completion Times for inoperable actuator train(s) are being proposed.

This attached amendment request is subdivided as follows:

Attachment 1 provides a description and evaluation of the proposed changes.
Attachments 2 and 3 provide the marked-up TS pages for Braidwood Station and Byron Station, respectively, with the proposed changes indicated.
Attachments 4 and 5 provide the marked-up TS Bases pages for Braidwood Station and Byron Station, respectively, with the proposed changes indicated. The TS Bases pages are provided for information only and do not require NRC approval.

The proposed change has been reviewed by the Braidwood Station and Byron Station Plant Operations Review Committees and approved by their respective Nuclear Safety Review Boards in accordance with the requirements of the EGC Quality Assurance Program.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

EGC requests approval of the proposed license amendment by August 21, 2014. Once approved, the amendment will be implemented within 60 days.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Dwi Murray at (630) 657-3695.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of August 2013.

Respectfully,

David M. Gullott
Manager – Licensing
Exelon Generation Company, LLC

Attachments:
1. Evaluation of Proposed Changes
2. Proposed Technical Specifications Changes for Braidwood Station, Units 1 and 2
3. Proposed Technical Specifications Changes for Byron Station, Units 1 and 2
4. Proposed Technical Specifications Bases Changes for Braidwood Station, Units 1 and 2
5. Proposed Technical Specifications Bases Changes for Byron Station, Units 1 and 2

cc: NRC Regional Administrator – Region III
NRC Senior Resident Inspector – Braidwood Station
NRC Senior Resident Inspector – Byron Station
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1
Evaluation of Proposed Changes

Subject: License Amendment Request to Revise Technical Specifications Section 3.7.2, "Main Steam Isolation Valves (MSIVs)"

ATTACHMENT 1
Evaluation of Proposed Changes

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2.

Exelon Generation Company, LLC, (EGC) proposes to revise Technical Specifications (TS) Section 3.7.2, "Main Steam Isolation Valves (MSIVs)," to incorporate the MSIV actuator trains into the Limiting Condition for Operation (LCO) and provides associated Conditions and Required Actions. Additionally, Surveillance Requirement (SR) 3.7.2.2 is revised to clearly identify that the MSIV actuator trains are required to be tested in accordance with the SR.

The proposed changes address an NRC staff interpretation that SR 3.7.2.2 requires both actuator trains for a single valve to be tested (Reference 1). The NRC staff interpretation results in declaring an MSIV inoperable when one actuator train is inoperable. The existing Completion Time of 8 hours for an inoperable MSIV due to one inoperable actuator train is not commensurate with the safety significance of the condition. Therefore, new Conditions, Required Actions, and Completion Times for inoperable actuator train(s) are being proposed.

2.0 DETAILED DESCRIPTION

TS 3.7.2, "Main Steam Isolation Valves (MSIVs)," specify operability and surveillance requirements for the MSIVs, which includes Conditions and Required Actions to be entered when one or more MSIVs are inoperable. Currently, TS 3.7.2 does not specifically address or reflect the two independent actuator trains for one MSIV. Inoperability of one of the two actuator trains associated with an MSIV does not by itself make the valve incapable of closing since the remaining OPERABLE actuator train can alone effect valve closure on demand. Declaring an MSIV inoperable and entering the Condition(s) and Required Action(s) for an inoperable MSIV due only to one inoperable actuator train, is unnecessarily restrictive. Therefore, EGC proposes to incorporate requirements specifically for the MSIV actuator trains within TS 3.7.2 such that the specification would include appropriate Conditions and Required Actions to address inoperable MSIV actuator trains.

Consistent with other Improved Standard Technical Specifications format, the proposed Completion Times for inoperable MSIV actuator trains are based on a hierarchy of Conditions such that shorter Completion Times would be specified for increasingly degraded conditions. Conditions addressing inoperable actuator trains would be specified first in TS 3.7.2, (i.e., listed before the Conditions that are currently in place for addressing inoperability of the MSIVs themselves). Therefore, TS 3.7.2 specifies that when only an actuator train is declared inoperable, the applicable Condition for the inoperable actuator train would be entered first. Then, depending on the number of actuator trains that are concurrently inoperable and the associated Required Action for the applicable Condition; or if the applicable Required Action and Completion Time cannot be met, the MSIV(s) associated with the inoperable actuator train(s) would be declared inoperable so that the Condition(s) addressing inoperability of the MSIV(s) would thus be entered.

ATTACHMENT 1
Evaluation of Proposed Changes

The following proposed changes will revise TS 3.7.2:

- LCO 3.7.2 is revised to include the actuator trains in the LCO. LCO 3.7.2 is revised to state: "Four MSIVs and their associated actuator trains shall be OPERABLE."

- New Conditions A through E are added to TS 3.7.2 to address inoperable MSIV actuator trains. The existing Conditions that address inoperable valves are relabeled such that those Conditions would become Conditions F through I for TS 3.7.2. The proposed new Conditions related specifically to the actuator trains would address various degrees or combinations of inoperable actuator trains as follows:

    - New Condition A would address the condition of having one MSIV actuator train inoperable (for a single valve). The proposed Required Action for this Condition would require restoring the inoperable actuator train to OPERABLE status within 7 days.

    - New Condition B would address the condition of having two MSIV actuator trains inoperable for different valves (i.e., one actuator train inoperable for each of two MSIVs) such that the actuator trains are not in the same ESF division. The proposed Required Action for this Condition would require restoring at least one actuator train to OPERABLE status within 72 hours.

    - New Condition C would address the situation when two MSIV actuator trains are inoperable for different valves and the inoperable actuator trains are both in the same ESF division. The proposed Required Action for this Condition would require restoring at least one actuator train to OPERABLE status within 24 hours.

    - New Condition D would address the situation when both actuator trains for one MSIV are inoperable. The Required Action proposed for this Condition would require immediately declaring the affected MSIV inoperable.

    - New Condition E would address the condition of having three or more MSIV actuator trains inoperable, or the condition when, after entering Conditions A, B, or C, it is determined that the Required Action and Completion Time of any of those Conditions cannot be met. The Required Action for this Condition would require immediately declaring each affected MSIV inoperable.

- SR 3.7.2.2 is revised to clearly identify that the MSIV actuator trains are required to be tested in accordance with the SR. SR 3.7.2.2 is revised to state: "Verify each actuator train actuates the MSIV to the isolation position on an actual or simulated actuation signal."

Attachments 2 and 3 provide the marked up TS pages for Braidwood and Byron Stations, respectively, for the proposed changes.

Attachments 4 and 5 include the marked up TS Bases pages associated with the proposed changes and are provided for information only.

3.0 TECHNICAL EVALUATION

Background

On July 13, 2006, at a NRC inspection exit meeting, the NRC identified a potential Green finding and associated non-cited violation for Wolf Creek for a violation of TS 3.7.2 in that a MSIV was not restored to OPERABLE status within the 8 hour Completion Time as required by TS 3.7.2, Required Action A.1. Shortly after the exit meeting, licensee requested a meeting with the NRC staff to present information regarding the Wolf Creek analyses and compliance with Technical Specifications. The licensee was notified subsequent to the exit meeting and prior to a meeting with the NRC staff that the potential Green finding and associated non-cited violation was being withdrawn pending further review.

On August 16, 2006, Wolf Creek and Callaway Plant personnel met with the NRC staff (NRR and Region IV personnel) to provide information on the MSIV operation, design bases, safety analyses, and Technical Specifications. The meeting was an informational meeting and the NRC did not provide a specific position at the meeting (Reference 2).

On August 21, 2006, the NRC Project Manager communicated to Wolf Creek personnel that the position that SR 3.7.2.2 is interpreted by the NRC staff that the SR requires both actuator trains be surveillance tested. Since SR 3.0.1 requires SRs to be met and that failure to meet a SR, whether such failure is experienced during the performance of the SR or between performances of the SR, shall be a failure to meet the LCO. Therefore, the failure of an actuator train is a failure to meet the SR which results in LCO 3.7.2 not being met and the MSIV should be declared inoperable absent any specific Conditions associated to actuator trains.

On October 19, 2006, the NRC concluded in a memorandum (Reference 1) that the loss of an MSIV actuator train would result in Callaway having to declare the associated MSIV inoperable.

The NRC staff interpretation results in declaring an MSIV inoperable for those plants with dual MSIV actuator trains when one actuator train is inoperable. The existing Completion Time for an inoperable MSIV does not typically provide a reasonable amount of time to effect repairs to one inoperable actuator train. Declaring an MSIV inoperable and having to enter the Condition(s) and Required Action(s) for an MSIV inoperable due only to one inoperable actuator train is unnecessarily restrictive. Therefore, EGC proposes to incorporate requirements specifically for the MSIV actuator trains within TS 3.7.2 such that the specification would include Conditions and Required Actions to address inoperable MSIV actuator trains.

Technical Analysis

Main Steam Isolation Valves (MSIVs)

The MSIVs isolate steam flow from the secondary side of the steam generators following a steam line isolation signal. One MSIV is installed in each of the main steam lines outside the containment and downstream of the main steam safety valves. The MSIVs prevent uncontrolled blowdown from more than one steam generator in the event of a postulated design basis accident. Each MSIV is a gate valve with a double gate design that is hydraulically operated. As described in the Updated Final Safety Analysis Report (UFSAR), the valve is designed to

close in less than 5 seconds based on the limiting accident of a steam line break outside the containment to limit cool down rate of the reactor coolant system.

Each MSIV is equipped with two redundant hydraulic actuator trains such that either actuator train can independently perform the safety function to fast-close the valve on demand. The MSIVs fail as is on loss of control or actuation power and are interlocked with the Engineered Safety Features (ESF) system to auto close on the following main steam line isolation signals: manual; low steam line pressure; high negative rate steam line pressure; containment pressure high-high (Hi-2).

MSIV Actuator Train

The Braidwood and Byron Stations' MSIV configuration consists of four valves per unit with one valve per loop. The MSIVs are hydraulically actuated double disk gate valves. The actuator system is designed to provide a rapid closure in the event of a receipt of an isolation signal. The electrical design of the MSIV control circuit has independent and redundant "Active" train (Train A) and "Standby" train (Train B) actuator components. Both the active and standby trains are activated by the main steam line isolation signals. Each train is powered from a separate ESF division that is actuated by a separate and independent MSIV emergency closure signal.

For the 'A' and 'D' MSIVs, the active trains are powered by the Division 1 ESF bus, while the standby trains are powered by the Division 2 ESF bus. Conversely, the 'B' and 'C' MSIVs active trains are powered by the Division 2 ESF bus, while the standby trains are powered by the Division 1 ESF bus. Both MSIV actuator trains (active and standby) will receive automatic closure signals on low steam line pressure signals in any one steam line, high negative steam pressure rate signals in any steam line, or on a high-high containment pressure signal. Upon receipt of a closure signal, one MSIV control solenoid valve per individual train energizes, allowing pilot air to shuttle a four-way valve per individual train in the necessary position to allow pressurized hydraulic fluid to flow from the charged accumulators to the hydraulic cylinder, causing the double disk gate valve to close and isolate the associated steam line within the 5 seconds closure criterion.

Because of complete redundancy (i.e., independent active train and standby train components), the actuator is capable of performing its fast closure function with either one of the two hydraulic systems. Assuming a single failure of one of the redundant actuator trains, the valve will close within five seconds. When both the active and standby trains actuator components are utilized, as is the case upon receipt of a low steam line pressure, high-high containment pressure, manual, or high negative rate steam line pressure signal, the valve will close in less than 5 seconds.

A pneumatic and hydraulic actuator train is composed solely of skid-mounted components at the MSIV location. The actuator train does not include any portion of the analog channels or protection system actuation logic and actuation relays that provide inputs to the valve actuator trains. The Engineered Safety Features Actuation System (ESFAS) Instrumentation specification provides separate Conditions, Required Actions, and Surveillance Requirements for the analog channels and protection system logic and relays.

Justification for the Completion Times is as follows:

- Condition A - With only a single actuator train inoperable on one MSIV, a Completion Time of 7 days for Required Action A.1 is reasonable due to the fact that with one actuator train inoperable and the dual-redundant actuator design, the affected valve would still be capable of closing on demand (assuming no additional failures) via the remaining OPERABLE actuator train. The proposed 7 day Completion Time takes into account the design redundancy, reasonable time for repairs, and the low probability of a design basis accident occurring during this period.

- Condition B - With one inoperable actuator train on one MSIV and one inoperable actuator train on another MSIV, such that the actuator trains are not in the same ESF division, a Completion Time of 72 hours for Required Action B.1 is reasonable. This is based on the dual-redundant actuator train design which ensures that with only one actuator train inoperable on each of the affected MSIVs, each MSIV would still be capable of closing on demand, assuming no additional failures. Compared to Condition A however, it is appropriate to have a shorter Completion Time for Condition B since with an actuator train inoperable on each of two MSIVs, there is an increased likelihood that an additional failure (such as the failure of an actuation logic train) would cause an MSIV to fail to close.

- Condition C - With one inoperable actuator train on one MSIV and one inoperable actuator train on another MSIV, but with both inoperable actuator trains in the same ESF division, a Completion Time of 24 hours for Required Action C.1 is appropriate. Like the above cases, the dual-redundant actuator train design for each MSIV ensures that a single inoperable actuator train for any valve would not prevent the affected valve from closing on demand. In this regard, 24 hour Completion Time is reasonable and conservative since only one actuator train per valve is permitted to be inoperable (for two MSIVs), so that the remaining OPERABLE actuator train on each affected MSIV remains capable of effecting valve closure on demand (assuming no additional failures). A Completion Time of 24 hours is also considered appropriate given the low probability of an event occurring during such an interval that would demand MSIV closure. Additionally, the Completion Time is consistent with Condition G of TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," which provides a 24-hour Completion Time for restoring one train to OPERABLE status. Condition G is applicable to Function 4.b (Steam Line Isolation – Automatic Actuation Logic and Actuation Relays) which provides the actuation logic from the Solid State Protection System to the actuator trains. A loss of one actuation logic train would be equivalent to a loss of all actuator trains that receive a signal from that actuation logic.

  However, compared to the Required Action for Condition B above, a shorter Completion Time for Condition C is appropriate since with two actuator trains inoperable in the same ESF division, an additional failure such as the failure of an actuation logic train in the other ESF division could cause both affected MSIVs to fail to close on demand.

- For Conditions D and E, the Completion Time of "immediately" is conservative and appropriate. For Condition D, for example, when both actuator trains for one MSIV are inoperable, it is appropriate to require immediately declaring the valve inoperable since having both actuator trains inoperable would constitute a condition that renders the affected

MSIV incapable of closing on demand.

With respect to Condition E, for the Condition when the Required Action and associated Completion Time of Condition A, B, or C is not met, it follows that the affected MSIV(s) should immediately be declared inoperable since the assumption is that the Completion Time(s) of Condition A, B, or C has expired or cannot be met. This "default" Condition is in keeping with the intent that when only the actuator trains for affected MSIVs are inoperable (and not the valves themselves), the Conditions and Required Actions for the inoperable valve actuator trains should be entered first, and then if those Required Actions cannot be met, the affected MSIVs should be declared inoperable so that the Conditions and Required Actions for the inoperable valves are then entered. Required Action E.1 ensures the affected MSIV(s) are promptly declared inoperable. This format or approach is consistent with other Technical Specifications and the format of the Improved Standard Technical Specifications (NUREG-1431).

For the other portion of Condition E, i.e., for the condition when three or more actuator trains are inoperable, it is conservative and appropriate as well to immediately declare the affected MSIVs inoperable for this condition. For the situation of having three inoperable actuator trains, for example, such a condition could involve two inoperable actuator trains on one valve and one inoperable actuator train on another valve, or one inoperable actuator train on each of three valves. In each case, the inoperable actuator trains could all be in the same ESF division or be staggered among the two ESF divisions. In the former case, a single assumed failure such as an instrument logic train failure could cause one or two valves to fail to close on demand. In the latter case, such a single failure could cause either none of the valves to fail to close on demand, or all three to fail to close on demand. Thus, immediately declaring the affected MSIVs inoperable is appropriate. In any case, the conditions addressed by Condition E would constitute an inoperability that exceeds the scope of any of the conditions addressed by Conditions A, B. or C, and it is conservative in this case to simply require declaring all of the affected MSIVs inoperable.

- The Bases of Surveillance Requirements (SR) 3.7.2.2 are revised to clearly identify that the MSIV actuator trains are required to be tested in accordance with the SR. Since the current SR do not clearly articulate applicability to the actuator trains and the NRC staff interpretation is that the actuator trains are encompassed within the SR, a revision to the SR Bases to clarify this point is appropriate.

A probabilistic risk analysis (PRA) was performed to evaluate the risk impacts of the proposed Completion Times associated with the MSIV actuator trains. This risk analysis was not used to establish the proposed Completion Times; however, it was used to validate the acceptability of the proposed Completion Times. The risk analysis followed the guidance suggested in Regulatory Guide (RG) 1.174 and RG 1.177 to determine the significance of the proposed Completion Times.

The risk analysis examined two sets of risk metrics, which are the change in annual average core damage frequency (CDF)/large early release frequency (LERF), and the incremental conditional core damage probability (ICCDP)/incremental conditional large early release probability (ICLERP). The risk analysis modeled the allowed outage times (AOTs) proposed as Completion Times for TS Conditions A, B, and C. The calculation used in the analysis

represented the proposed Completion Times for each condition's configuration over the fuel cycle for each Braidwood and Byron Stations' unit.

Based on the analysis, the risk metrics results for each Braidwood and Byron Stations' unit are well below the recommended values of RG 1.174 and RG 1.177 as shown in the following table, which demonstrates that the risk of the proposed Completion Times are acceptable.

Proposed Completion Times Risk Results

Risk Metric	Target	Braidwood Unit 1	Braidwood Unit 2	Byron Unit 1	Byron Unit 2
ΔCDF	1.0E-6	9.17E-10	9.17E-10	9.17E-10	9.39E-10
ΔLERF	1.0E-7	7.82E-11	9.79E-11	7.49E-11	1.06E-10
ICCDP	5.0E-7	1.01E-10	1.01E-10	1.01E-10	1.04E-10
ICLERP	5.0E-8	1.01E-11	1.26E-11	9.59E-12	1.21E-11

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The following NRC requirements and guidance documents are applicable to the review of the proposed changes.

10 CFR 50 , Appendix A, General Design Criterion (GDC) 2, "Design bases for protection against natural phenomena," requires that the safety related portion of the Main Steam Supply System be protected from the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, and external missiles.

10 CFR 50 , Appendix A, GDC 4, "Environmental and dynamic effects design bases," requires that the Main Steam Supply System be designed to remain functional after a safe shutdown earthquake or to perform its intended function following postulated hazards such as internal missiles, or pipe break.

10 CFR 50 , Appendix A, GDC 22, "Protection system independence," requires that the Main Steam Supply System be designed to assure that the effects of natural phenomena, and of normal operating, maintenance, testing, and postulated accident conditions on redundant channels do not result in loss of the protection function, or be demonstrated to be acceptable on some other defined basis.

10 CFR 50 , Appendix A, GDC 34, "Residual heat removal," requires that component redundancy be provided for the Main Steam Supply System so that safety functions can be performed, assuming a single active component failure coincident with the loss of offsite power.

10 CFR 50 , Appendix A, GDC 57, "Closed system isolation valves," requires that the Main Steam Supply System line that penetrates primary reactor containment and is not part of the reactor coolant pressure boundary or is not connected directly to the containment atmosphere shall have at least one containment isolation valve. This valve shall be either automatic, or

locked closed, or capable of remote manual operation, be located outside containment and as close to the containment as practical.

10 CFR 50.36(c)(2), "Limiting conditions for operation," paragraph (i) defines the limiting conditions for operation as the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. Furthermore, Criterion 3 of 10 CFR 50.36(c)(2)(ii) requires that a TS LCO must be established for a structure, system, or component that is part of the primary success path and functions to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

10 CFR 50.36(c)(3), "Surveillance requirements," defines surveillance requirements as requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

The proposed changes do not affect the MSIVs and associated actuator train design and operation, which continue to meet all the GDC requirements. The proposed TS changes are consistent with and in compliance with the above regulatory requirements and criteria. Therefore, the proposed changes will assure safe operation by continuing to meet applicable regulations and requirements.

4.2 Precedents

The NRC has approved similar license amendment requests to revise TS for main steam isolation valves actuator trains as follows:

1. Letter from Jack Donohew (NRC) to Charles Naslund (Union Electric Company), "Callaway Plant, Unit 1 - Issuance of Amendment Re: Main Steam Isolation Valve Actuator Trains (TAC No. MC7212)," dated June 16, 2006 (ADAMS Accession Number ML0608101690).

2. Letter from Jack Donohew (NRC) to Rick Muench (Wolf Creek Nuclear Operating Company), "Wolf Creek Generating Station - Issuance of Amendment Re: Addition of Actuator Trains to Main Steam and Main Feedwater Isolation Valves Technical Specifications (TAC No. MD2895)," dated November 7, 2006 (ADAMS Accession Number ML062610085).

3. Letter from Jack Donohew (NRC) to James Levine (Arizona Public Service Company), "Palo Verde Nuclear Generating Station, Units 1, 2, and 3 - Issuance of Amendments Re: Main Steam Isolation Valve Actuator Trains (TAC Nos. MD3066, MD3067, and MD3068)," dated November 17, 2006 (ADAMS Accession Number ML063110505).

4.3 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC, (EGC), is requesting amendments to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2.

The proposed changes will revise Technical Specification (TS) 3.7.2, "Main Steam Isolation Valves (MSIVs)," to incorporate the MSIV actuator trains into the Limiting Condition for Operation (LCO) and provides associated Conditions and Required Actions. Additionally, Surveillance Requirement (SR) 3.7.2.2 is revised to clearly identify that the MSIV actuator trains are required to be tested in accordance with the SR. The proposed changes will address NRC staff interpretation that SR 3.7.2.2 requires both actuator trains for a single valve to be tested. The NRC staff interpretation results in declaring an MSIV inoperable when one actuator train is inoperable. The existing Completion Time of 8 hours for an inoperable MSIV due to one inoperable actuator train is not commensurate with the safety significance of the condition. Therefore, new Conditions, Required Actions, and Completion Times for inoperable actuator train(s) are being proposed.

EGC has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92(c), "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed changes provide requirements for MSIVs that have dual actuators which receive signals from separate instrumentation trains. The design and functional performance requirements, operational characteristics, and reliability of the MSIVs and actuator trains are unchanged. There is no impact on the design safety function of the MSIVs to close (as an accident mitigator), nor is there any change with respect to inadvertent closure of an MSIV (as a potential transient initiator). Since no failure mode or initiating condition that could cause an accident (including any plant transient) is created or affected, the change cannot involve a significant increase in the probability of an accident previously evaluated.

   With regard to the consequences of an accident and the equipment required for mitigation of the accident, the proposed changes involve no design or physical changes to the MSIVs or any other equipment required for accident mitigation. With respect to MSIV actuator train Completion Times, the consequences of an accident are independent of equipment Completion Times as long as adequate equipment availability is maintained. The proposed MSIV actuator Completion Times take into account the redundancy of the actuator trains and are limited in extent consistent with other Completion Times specified in the Technical Specifications. Adequate equipment availability would therefore continue to be required by the Technical Specifications. On this basis, the consequences of applicable, analyzed accidents are not significantly affected by the proposed changes.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed changes to incorporate requirements for the MSIV actuator trains do not involve any design or physical changes to the facility, including the MSIVs and actuator trains themselves. No physical alteration of the plant is involved, as no new or different type of equipment is to be installed. The proposed changes do not alter any assumptions made in the safety analyses, nor do they involve any changes to plant procedures for ensuring that the plant is operated within analyzed limits. As such, no new failure modes or mechanisms that could cause a new or different kind of accident from any previously evaluated are being introduced.

   Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in margin of safety?

   Response: No.

   The proposed changes to incorporate requirements for the MSIV actuator trains do not alter the manner in which safety limits or limiting safety system settings are determined. No changes to instrument/system actuation setpoints are involved. The safety analysis acceptance criteria are not affected by this change and the proposed changes will not permit plant operation in a configuration outside the design basis.

   Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, EGC concludes that the proposed amendments do not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

EGC has evaluated the proposed amendments for environmental considerations. The review has resulted in the determination that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendments do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendments meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendments.

6.0 REFERENCES

1. NRC Memorandum, "Operability Determination for the Callaway Plant Technical Specifications Requirements When One Main Steam Isolation Valve Actuator Train is Removed from Service," dated October 19, 2006 (ADAMS Accession Number ML061730396)

2. Summary of August 16, 2006, Meeting with Representatives of Wolf Creek Nuclear Operating Corporation and Union Electric Company dated September 20, 2006 (ADAMS Accession Number ML062410484)

3. Technical Specification Task Force (TSTF) Improved Standard Technical Specifications Change Traveler, TSTF-504-T, Revision 0, "Revised the MSIV and MFIV Specifications to Provide Actions for Actuator Trains," dated September 14, 2007

ATTACHMENT 2
Proposed Technical Specifications Changes for Braidwood Station, Units 1 and 2

Braidwood Station, Units 1 and 2

Facility Operating License Nos. NPF-72 and NPF-77

Mark-up of Technical Specifications Page

3.7.2 – 1
3.7.2 – 2

3.7 PLANT SYSTEMS

3.7.2 Main Steam Isolation Valves (MSIVs)

LCO 3.7.2 Four MSIVs and their associated actuator trains shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 except when all MSIVs are closed.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
INSERT 1		
~~A.~~ One MSIV inoperable in MODE 1.	~~A~~.1 Restore MSIV to OPERABLE status.	8 hours
~~B.~~ Required Action and associated Completion Time of Condition ~~A~~ not met.	~~B~~.1 Be in MODE 2.	6 hours
~~C.~~ ---------NOTE--------- Separate Condition entry is allowed for each MSIV. ---------- One or more MSIV inoperable in MODE 2 or 3.	~~C~~.1 Close MSIV. AND ~~C~~.2 Verify MSIV is closed.	8 hours Once per 7 days
~~D.~~ Required Action and associated Completion Time of Condition ~~C~~ not met.	~~D~~.1 Be in MODE 3. AND ~~D~~.2 Be in MODE 4.	6 hours 12 hours

INSERT 1

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One MSIV actuator train inoperable.	A.1 Restore MSIV actuator train to OPERABLE status.	7 days
B. Two MSIVs each with one actuator train inoperable such that the inoperable actuator trains are in different ESF Divisions.	B.1 Restore one MSIV actuator train to OPERABLE status.	72 hours
C. Two MSIVs each with one actuator train inoperable and both inoperable actuator trains are in the same ESF Division.	C.1 Restore one MSIV actuator train to OPERABLE status.	24 hours
D. Two MSIV actuator trains inoperable on the same MSIV.	D.1 Declare the affected MSIV inoperable.	Immediately
E. Three or more MSIV actuator trains inoperable. <u>OR</u> Required Action and associated Completion Time of Condition A, B, or C not met.	E.1 Declare each affected MSIV inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.2.1	----------NOTE---------- Only required to be performed in MODES 1 and 2. ---------- Verify closure time of each MSIV is ≤ 5 seconds.	In accordance with the Inservice Testing Program
SR 3.7.2.2	----------NOTE---------- Only required to be performed in MODES 1 and 2. ---------- Verify each MSIV ~~actuates~~ actuator train actuates the to the isolation position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program

ATTACHMENT 3
Proposed Technical Specifications Changes for Byron Station, Units 1 and 2

Byron Station, Units 1 and 2

Facility Operating License Nos. NPF-37 and NPF-66

Mark-up of Technical Specifications Page

3.7.2 – 1
3.7.2 – 2

3.7 PLANT SYSTEMS

3.7.2 Main Steam Isolation Valves (MSIVs)

LCO 3.7.2 Four MSIVs and their associated actuator trains shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 except when all MSIVs are closed.

ACTIONS

INSERT 1

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A.~~ One MSIV inoperable in MODE 1.	~~A~~.1 Restore MSIV to OPERABLE status.	8 hours
~~B.~~ Required Action and associated Completion Time of Condition ~~A~~ not met.	~~B~~.1 Be in MODE 2.	6 hours
~~C.~~ ---------NOTE--------- Separate Condition entry is allowed for each MSIV. ---------- One or more MSIV inoperable in MODE 2 or 3.	~~C~~.1 Close MSIV. AND ~~C~~.2 Verify MSIV is closed.	8 hours Once per 7 days
~~D.~~ Required Action and associated Completion Time of Condition ~~C~~ not met.	~~D~~.1 Be in MODE 3. AND ~~D~~.2 Be in MODE 4.	6 hours 12 hours

INSERT 1

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One MSIV actuator train inoperable.	A.1 Restore MSIV actuator train to OPERABLE status.	7 days
B. Two MSIVs each with one actuator train inoperable such that the inoperable actuator trains are in different ESF Divisions.	B.1 Restore one MSIV actuator train to OPERABLE status.	72 hours
C. Two MSIVs each with one actuator train inoperable and both inoperable actuator trains are in the same ESF Division.	C.1 Restore one MSIV actuator train to OPERABLE status.	24 hours
D. Two MSIV actuator trains inoperable on the same MSIV.	D.1 Declare the affected MSIV inoperable.	Immediately
E. Three or more MSIV actuator trains inoperable. <u>OR</u> Required Action and associated Completion Time of Condition A, B, or C not met.	E.1 Declare each affected MSIV inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.2.1	----------NOTE---------- Only required to be performed in MODES 1 and 2. ---------- Verify closure time of each MSIV is ≤ 5 seconds.	In accordance with the Inservice Testing Program
SR 3.7.2.2	----------NOTE---------- Only required to be performed in MODES 1 and 2. ---------- Verify each MSIV ~~actuates~~ actuator train actuates the to the isolation position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program

ATTACHMENT 4
Proposed Technical Specifications Bases Changes for Braidwood Station, Units 1 and 2

Braidwood Station, Units 1 and 2

Facility Operating License Nos. NPF-72 and NPF-77

Mark-up of Technical Specifications Bases Pages

B 3.7.2 – 1
B 3.7.2 – 3
B 3.7.2 – 4
B 3.7.2 – 5
B 3.7.2 – 6

BASES

BACKGROUND

The 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), to prevent MSSV isolation from the steam generators by MSIV closure. Closing the MSIVs isolates each steam generator from the others, and isolates the turbine, Steam Dump System, and other auxiliary steam supplies from the steam generators.

INSERT A →

The MSIVs close on a main steam isolation signal generated by Steam Line Low Pressure, Steam Line High Negative Rate, or High-2 containment pressure. The MSIVs fail as is 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 automatic closure signal as do their associated MSIVs. The MSIVs may also be actuated manually.

A description of the MSIVs is found in the UFSAR, Section 10.3 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The design basis of the MSIVs is established by the analysis for the large Steam Line Break (SLB) outside containment, discussed in the UFSAR, Section 15.1.5 (Ref. 2). It is also affected by the accident analysis of the SLB events presented in the UFSAR, Section 6.2 (Ref. 3). 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 accident analysis compares several different SLB events against different acceptance criteria. The large SLB outside containment upstream of the MSIV is limiting for offsite dose, although a break in this short section of main steam header has a very low probability. The large SLB inside containment 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 (RCS) 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.

APPLICABLE SAFETY ANALYSES (continued)

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 to minimize radiological releases.

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.

The MSIVs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires that four MSIVs and their associated actuator trains 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.

INSERT B

This LCO provides assurance that the MSIVs will perform their design safety function to mitigate the consequences of accidents that could result in exposures comparable to the 10 CFR 50.67 (Ref. 4) limits or the NRC staff approved licensing basis.

and required actuator trains

APPLICABILITY The MSIVs must be OPERABLE in MODE 1, and in MODES 2 and 3 except when closed, 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 the steam generator energy is low.

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

INSERT C

F → A.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.

INSERT D →

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 an additional means for containment isolation.

G → B.1

If the MSIV cannot be restored to OPERABLE status within 8 hours, 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 MODE 2 within 6 hours and Condition C would be entered. The Completion Time is reasonable, based on operating experience, to reach MODE 2 and to close the MSIVs in an orderly manner and without challenging plant systems.

H

ACTIONS (continued)

H

~~C.1 and C.2~~

Condition ~~C~~ is modified by a Note indicating that separate Condition entry is allowed for each MSIV.

Since the MSIVs are required to be OPERABLE in MODES 2 and 3, 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 Condition ~~A~~. F

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 Completion 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.

I

~~D.1 and D.2~~

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 4 within 12 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 plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1

on an actual or simulated actuation signal [from each actuator train]

This SR verifies that MSIV closure time is ≤ 5 seconds. The MSIV closure time is assumed in the accident and containment analyses. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. Based on ASME Code (Ref. 5), the MSIVs are not closure time tested at power.

The Frequency is in accordance with the Inservice Testing Program. This test is conducted in MODE 3 with the unit at operating temperature and pressure. This SR is modified by a Note. This Note allows entry into and operation in MODE 3 prior to performing the SR. This allows a delay of testing until MODE 3, to establish conditions consistent with those under which the acceptance criterion was generated.

SR 3.7.2.2

actuator train can close its respective

This SR verifies that each MSIV ~~can close~~ on an actual or simulated actuation signal. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. This Note allows entry into and operation in MODE 3 prior to performing the SR. This allows a delay of testing until MODE 3, to establish conditions consistent with those under which the acceptance criterion was generated.

REFERENCES

1. UFSAR, Section 10.3.
2. UFSAR, Section 15.1.5.
3. UFSAR, Section 6.2.
4. 10 CFR 50.67.
5. ASME Code for Operation and Maintenance of Nuclear Power.

INSERT A

The MSIV is a gate valve with dual-redundant hydraulic actuator trains. Either actuator train can independently perform the safety function to fast-close the MSIV on demand. Each actuator train consists of a hydraulic accumulator controlled by solenoid valves on the associated MSIV. For each MSIV, one actuator train is associated with ESF Division 1, and one actuator train is associated with ESF Division 2.

A pneumatic and hydraulic actuator train is composed solely of skid-mounted components at the MSIV location. The actuator train does not include any portion of the analog channels or protection system actuation logic and actuation relays that provide inputs to the valve actuator trains. LCO 3.3.2, "Engineered Safety Features Actuation System (ESFAS) Instrumentation," provides separate Conditions, Required Actions, and Surveillance Requirements for the analog channels and protection system logic and relays.

INSERT B

An MSIV actuator train is considered OPERABLE when it is capable of fast-closing the associated MSIV on demand and within the required isolation time. This includes having adequate accumulator pressure to support fast-closure of the MSIV within the required isolation time.

INSERT C

A.1

With a single actuator train inoperable on one MSIV, action must be taken to restore the inoperable actuator train to OPERABLE status within 7 days. The 7-day Completion Time is reasonable in light of the dual-redundant actuator train design such that with one actuator train inoperable, the affected MSIV is still capable of closing on demand via the remaining OPERABLE actuator train. The 7-day Completion Time takes into account the redundant OPERABLE actuator train to the MSIV, reasonable time for repairs, and the low probability of an event occurring that requires the inoperable actuator train to the affected MSIV.

B.1

With one actuator train on one MSIV inoperable; and one actuator train on an additional MSIV inoperable, such that the inoperable actuator trains are not in the same ESF Division, action must be taken to restore one of the inoperable actuator trains to OPERABLE status within 72 hours. With one actuator train inoperable on two different MSIVs that are not in the same ESF Division, there is an increased likelihood that an additional failure (such as the failure of an actuator logic train) could cause one MSIV to fail to close. The 72-hour Completion Time is reasonable since the dual-redundant actuator train design ensures that with only one actuator train on each of two affected MSIVs inoperable, each MSIV is still capable of closing on demand.

C.1

With one actuator train on one MSIV inoperable; and one actuator train on an additional MSIV inoperable, such that both inoperable actuator trains are in the same ESF Division, action must be taken to restore one of the inoperable actuator trains to OPERABLE status within 24 hours. The 24-hour Completion Time provides a reasonable amount of time for restoring at least one

actuator train since the dual-redundant actuator train design for each MSIV ensures that a single inoperable actuator train cannot prevent the affected MSIV(s) from closing on demand. With two actuator trains inoperable in the same ESF Division, an additional failure (such as the failure of an actuator logic train in the other ESF Division) could cause both affected MSIVs to fail to close on demand. The 24 hour Completion Time takes into the redundant OPERABLE actuator trains to the affected MSIVs and the low probability of an event occurring that requires the inoperable actuator trains to the affected MSIVs.

D.1

Required Action D.1 provides assurance that the appropriate Condition is entered for the affected MSIV if its associated actuator trains become inoperable. Failure of both actuator trains for a single MSIV results in the inability to close the affected MSIV on demand.

E.1

With three or more MSIV actuator trains inoperable or when Required Action A.1, B.1, or C.1 are not completed within the required Completion Time, the affected MSIVs may be incapable of closing on demand and must be immediately declared inoperable. Having three actuator trains inoperable could involve two inoperable actuator trains on one MSIV and one inoperable actuator train on another MSIV, or an inoperable actuator train on each of three MSIVs, for which the inoperable actuator trains could all be in the same ESF Division or be staggered among the two ESF Divisions.

Depending on which of these conditions or combinations is in effect, the condition or combination could mean that all of the affected MSIVs remain capable of closing on demand (due to the dual-redundant actuator train design), or that at least one MSIV is inoperable, or that with an additional single failure up to three MSIVs could be incapable of closing on demand. Therefore, in some cases, immediately declaring the affected MSIVs inoperable is conservative (when some or all of the affected MSIVs may still be capable of closing on demand even with a single additional failure), while in other cases it is appropriate (when at least one of the MSIVs would be inoperable, or up to three could be rendered inoperable by an additional single failure). Required Action E.1 is conservatively based on the worst-case condition and therefore requires immediately declaring all the affected MSIVs inoperable.

INSERT D

Condition F is entered when one MSIV is inoperable in MODE 1, including when both actuator trains for one MSIV are inoperable. When only one actuator train is inoperable on one MSIV, Condition A applies.

ATTACHMENT 5
Proposed Technical Specifications Bases Changes for Byron Station, Units 1 and 2

Byron Station, Units 1 and 2

Facility Operating License Nos. NPF-37 and NPF-66

Mark-up of Technical Specifications Bases Pages

B 3.7.2 – 1
B 3.7.2 – 3
B 3.7.2 – 4
B 3.7.2 – 5
B 3.7.2 – 6

B 3.7 PLANT SYSTEMS

B 3.7.2 Main Steam Isolation Valves (MSIVs)

BASES

BACKGROUND

The 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), to prevent MSSV isolation from the steam generators by MSIV closure. Closing the MSIVs isolates each steam generator from the others, and isolates the turbine, Steam Dump System, and other auxiliary steam supplies from the steam generators.

INSERT A →

The MSIVs close on a main steam isolation signal generated by Steam Line Low Pressure, Steam Line High Negative Rate, or High-2 containment pressure. The MSIVs fail as is 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 automatic closure signal as do their associated MSIVs. The MSIVs may also be actuated manually.

A description of the MSIVs is found in the UFSAR, Section 10.3 (Ref. 1).

BASES

APPLICABLE SAFETY ANALYSES

The design basis of the MSIVs is established by the analysis for the large Steam Line Break (SLB) outside containment, discussed in the UFSAR, Section 15.1.5 (Ref. 2). It is also affected by the accident analysis of the SLB events presented in the UFSAR, Section 6.2 (Ref. 3). 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 accident analysis compares several different SLB events against different acceptance criteria. The large SLB outside containment upstream of the MSIV is limiting for offsite dose, although a break in this short section of main steam header has a very low probability. The large SLB inside containment 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 (RCS) 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.

BASES

APPLICABLE SAFETY ANALYSES (continued)

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 to minimize radiological releases.

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.

The MSIVs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires that four MSIVs and their associated actuator trains 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.

INSERT B

This LCO provides assurance that the MSIVs will perform their design safety function to mitigate the consequences of accidents that could result in exposures comparable to the 10 CFR 50.67 (Ref. 4) limits or the NRC staff approved licensing basis.

BASES

and required actuator trains

APPLICABILITY

The MSIVs must be OPERABLE in MODE 1, and in MODES 2 and 3 except when closed, 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 the steam generator energy is low.

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

INSERT C

F → ~~A.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.

INSERT D →

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 an additional means for containment isolation.

G → ~~B.1~~

H

If the MSIV cannot be restored to OPERABLE status within 8 hours, 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 MODE 2 within 6 hours and Condition ~~C~~ would be entered. The Completion Time is reasonable, based on operating experience, to reach MODE 2 and to close the MSIVs in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

H

~~C~~.1 and ~~C~~.2

Condition ~~C~~ is modified by a Note indicating that separate Condition entry is allowed for each MSIV.

Since the MSIVs are required to be OPERABLE in MODES 2 and 3, 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 Condition ~~A~~.

F

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 Completion 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.

I

~~D~~.1 and ~~D~~.2

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 4 within 12 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 plant systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.2.1

on an actual or simulated actuation signal [from each actuator train]

This SR verifies that MSIV closure time is ≤ 5 seconds. The MSIV closure time is assumed in the accident and containment analyses. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. Based on ASME Code (Ref. 5), the MSIVs are not closure time tested at power.

The Frequency is in accordance with the Inservice Testing Program. This test is conducted in MODE 3 with the unit at operating temperature and pressure. This SR is modified by a Note. This Note allows entry into and operation in MODE 3 prior to performing the SR. This allows a delay of testing until MODE 3, to establish conditions consistent with those under which the acceptance criterion was generated.

SR 3.7.2.2

actuator train can close its respective

This SR verifies that each MSIV ~~can close~~ on an actual or simulated actuation signal. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. This Note allows entry into and operation in MODE 3 prior to performing the SR. This allows a delay of testing until MODE 3, to establish conditions consistent with those under which the acceptance criterion was generated.

REFERENCES

1. UFSAR, Section 10.3.
2. UFSAR, Section 15.1.5.
3. UFSAR, Section 6.2.
4. 10 CFR 50.67.
5. ASME Code for Operation and Maintenance of Nuclear Power Plants.

INSERT A

The MSIV is a gate valve with dual-redundant hydraulic actuator trains. Either actuator train can independently perform the safety function to fast-close the MSIV on demand. Each actuator train consists of a hydraulic accumulator controlled by solenoid valves on the associated MSIV. For each MSIV, one actuator train is associated with ESF Division 1, and one actuator train is associated with ESF Division 2.

A pneumatic and hydraulic actuator train is composed solely of skid-mounted components at the MSIV location. The actuator train does not include any portion of the analog channels or protection system actuation logic and actuation relays that provide inputs to the valve actuator trains. LCO 3.3.2, "Engineered Safety Features Actuation System (ESFAS) Instrumentation," provides separate Conditions, Required Actions, and Surveillance Requirements for the analog channels and protection system logic and relays.

INSERT B

An MSIV actuator train is considered OPERABLE when it is capable of fast-closing the associated MSIV on demand and within the required isolation time. This includes having adequate accumulator pressure to support fast-closure of the MSIV within the required isolation time.

INSERT C

A.1

With a single actuator train inoperable on one MSIV, action must be taken to restore the inoperable actuator train to OPERABLE status within 7 days. The 7-day Completion Time is reasonable in light of the dual-redundant actuator train design such that with one actuator train inoperable, the affected MSIV is still capable of closing on demand via the remaining OPERABLE actuator train. The 7-day Completion Time takes into account the redundant OPERABLE actuator train to the MSIV, reasonable time for repairs, and the low probability of an event occurring that requires the inoperable actuator train to the affected MSIV.

B.1

With one actuator train on one MSIV inoperable; and one actuator train on an additional MSIV inoperable, such that the inoperable actuator trains are not in the same ESF Division, action must be taken to restore one of the inoperable actuator trains to OPERABLE status within 72 hours. With one actuator train inoperable on two different MSIVs that are not in the same ESF Division, there is an increased likelihood that an additional failure (such as the failure of an actuator logic train) could cause one MSIV to fail to close. The 72-hour Completion Time is reasonable since the dual-redundant actuator train design ensures that with only one actuator train on each of two affected MSIVs inoperable, each MSIV is still capable of closing on demand.

C.1

With one actuator train on one MSIV inoperable; and one actuator train on an additional MSIV inoperable, such that both inoperable actuator trains are in the same ESF Division, action must be taken to restore one of the inoperable actuator trains to OPERABLE status within 24 hours. The 24-hour Completion Time provides a reasonable amount of time for restoring at least one

actuator train since the dual-redundant actuator train design for each MSIV ensures that a single inoperable actuator train cannot prevent the affected MSIV(s) from closing on demand. With two actuator trains inoperable in the same ESF Division, an additional failure (such as the failure of an actuator logic train in the other ESF Division) could cause both affected MSIVs to fail to close on demand. The 24 hour Completion Time takes into the redundant OPERABLE actuator trains to the affected MSIVs and the low probability of an event occurring that requires the inoperable actuator trains to the affected MSIVs.

D.1

Required Action D.1 provides assurance that the appropriate Condition is entered for the affected MSIV if its associated actuator trains become inoperable. Failure of both actuator trains for a single MSIV results in the inability to close the affected MSIV on demand.

E.1

With three or more MSIV actuator trains inoperable or when Required Action A.1, B.1, or C.1 are not completed within the required Completion Time, the affected MSIVs may be incapable of closing on demand and must be immediately declared inoperable. Having three actuator trains inoperable could involve two inoperable actuator trains on one MSIV and one inoperable actuator train on another MSIV, or an inoperable actuator train on each of three MSIVs, for which the inoperable actuator trains could all be in the same ESF Division or be staggered among the two ESF Divisions.

Depending on which of these conditions or combinations is in effect, the condition or combination could mean that all of the affected MSIVs remain capable of closing on demand (due to the dual-redundant actuator train design), or that at least one MSIV is inoperable, or that with an additional single failure up to three MSIVs could be incapable of closing on demand. Therefore, in some cases, immediately declaring the affected MSIVs inoperable is conservative (when some or all of the affected MSIVs may still be capable of closing on demand even with a single additional failure), while in other cases it is appropriate (when at least one of the MSIVs would be inoperable, or up to three could be rendered inoperable by an additional single failure). Required Action E.1 is conservatively based on the worst-case condition and therefore requires immediately declaring all the affected MSIVs inoperable.

INSERT D

Condition F is entered when one MSIV is inoperable in MODE 1, including when both actuator trains for one MSIV are inoperable. When only one actuator train is inoperable on one MSIV, Condition A applies.