

November 29, 2006

TSTF-06-32
PROJ0753

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Request for Pre-Submittal Meeting on TSTF Traveler to Address Main Steam
Isolation Valve Operability

Dear Sir or Madam:

On October 19, 2006, the NRC issued a Task Interface Agreement (TIA) response regarding the Operability requirements for Main Steam Isolation Valves (MSIVs) with dual actuation trains (NRC Accession Number ML061730396). After reviewing the TIA, the TSTF is considering the submittal of a generic change (known as a TSTF Traveler) to the Improved Standard Technical Specifications to provide a standardized set of Technical Specifications that provide MSIV requirements for plants with this design.

The attached paper provides the TSTF's analysis and the approach we are considering. We request a meeting with the NRC Staff at your earliest convenience to discuss this issue prior to the development and submittal of a TSTF Traveler. Please contact Mr. Brian Mann at (301) 984-4400 to discuss meeting arrangements.

Should you have any questions, please do not hesitate to contact us.



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Main Steam Isolation Valve (MSIV) Operability

Problem Statement

For plants with dual Main Steam Isolation Valve (MSIV) Actuation Trains on each MSIV, the Nuclear Regulatory Commission (NRC) staff has taken the position that an MSIV is inoperable if one of the MSIV Actuation Trains is inoperable. The NRC has encouraged plants to submit license amendment requests (LARs) to include Conditions for one MSIV Actuation Train inoperable. The industry position is that for most plants the MSIV is Operable when one MSIV Actuation Train is inoperable on one MSIV. Therefore, including a Condition for one MSIV Actuation Train inoperable is inconsistent with the definition of "Limiting Condition for Operation" in 10 CFR 50.36.

Effect on Plant Safety

Failure of the MSIV(s) to close as assumed in the accident analysis could lead to blow-down of more than one Steam Generator in the event of a High Energy Line Break (HELB), exceeding the analysis acceptance criteria.

A new Technical Specifications (TS) requirement to shutdown the unit due to one inoperable MSIV Actuation Train could result in an unnecessary plant transient in response to a condition in which the plant safety analyses are met.

Issue Scope

This issue is applicable to Pressurized Water Reactors (PWRs) designed with two MSIV Actuation Trains on each MSIV.

Definition of Key Terms

Limiting Condition 10 CFR 50.36 defines Limiting Condition for Operation (LCO) as: for Operation

"Limiting conditions for operation are 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."

Surveillance Requirements

10 CFR 50.36 defines Surveillance Requirements (SRs) as:

"Surveillance requirements are 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."

Main Steam Isolation Valve (MSIV) Operability

Single Failure	<p>10 CFR 50, Appendix A, defines a single failure as:</p> <p>"A single failure means an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of a passive component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions."</p>
Operable / Operability	<p>The Improved Standard Technical Specifications (ISTS) define Operable / Operability as:</p> <p>A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).</p>
MSIV Operability	<p>The ISTS LCO 3.7.2 on MSIVs states:</p> <p>"[Two/Four] MSIVs shall be OPERABLE."</p> <p>Note: Babcock and Wilcox (B&W) and Combustion Engineering (CE) nuclear steam supply system (NSSS) plants are designed with two Steam Generators. The number of MSIVs can be one or two per Steam Generator or main steam line. Westinghouse NSSS plants are designed with two, three, or four Steam Generators and a corresponding number of MSIVs.</p> <p>The ISTS LCO 3.7.2 Bases define MSIV Operability as follows:</p> <p>"This LCO requires that [two/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.</p> <p>This LCO provides assurance that the MSIVs will perform their design safety function to mitigate the consequences of</p>

Main Steam Isolation Valve (MSIV) Operability

accidents that could result in offsite exposures comparable to the 10 CFR 100 (Ref. 4) limits or the NRC staff approved licensing basis."

MSIV Actuation Trains The MSIV Actuation Train provides the motive force to close the MSIV. Each MSIV is designed with one or two MSIV Actuation Trains. For designs with more than one MSIV Actuation Train, each train is capable of independently closing the MSIV and the electrical solenoids for the pneumatic/hydraulic MSIV Actuation Trains are energized from separate safety-related sources and receive the closure signal from separate Engineered Safety Feature Actuation System (ESFAS) logic trains.

Background and Precedents

The MSIVs isolate steam flow from the secondary side of the steam generators following a Steam Line Break (SLB) Accident. MSIV closure terminates flow from the unaffected (intact) steam generators. One or two MSIVs are located in each main steam line. Closing the MSIVs isolates each steam generator from the others. The MSIVs close on a main steam isolation signal. The design basis of the MSIVs is established by the containment analysis for a spectrum of loss of coolant accidents and SLBs inside containment and in the plant's auxiliary building (or equivalent). 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 MSIV Actuation Trains are not discussed in the ISTS Specifications or Bases.

The issue was first identified at the Callaway Plant as an Unresolved Item in the 1Q2005 Inspection Report 2005002. The inspectors identified that the licensee did not consider both actuation trains as required attendant equipment for MSIV Operability.

The issue was raised again by the NRC at Wolf Creek Generating Station (WCGS) in the 2Q2006 NRC resident inspector exit meeting. At the request of Callaway Plant and WCGS, a meeting was held on August 16, 2006, to present the design of the MSIVs at their plants and the effect of the MSIV Actuation Trains on the operation of the MSIVs. In the meeting, the NRC stated they had developed a preliminary position but would not share it at that time since the purpose of the meeting was to permit the licensees to provide information prior to the NRC finalizing their position. The NRC stated if single failure protection has been lost, the plant should be in a TS Action statement. The NRC acknowledged it could be possible to demonstrate through the safety analysis all required safety functions could be completed even if one of the MSIVs failed to close. However, the NRC did not believe that the TS currently reflected this.

Currently, Callaway has amended its operating license (revised TS 3.7.2). WCGS and Palo Verde Nuclear Generating Station have submitted LARs to add Conditions to the MSIV Specification and Main Feedwater Isolation Valve (MFIV) Specification (for WCGS only) for inoperable MSIV Actuation Train(s) and MFIV Actuation Train(s) (WCGS only). These LARs include a Condition for one MSIV Actuation Train

Main Steam Isolation Valve (MSIV) Operability

inoperable on one MSIV. The licensees have submitted the LARs to avoid NRC pressure to declare an MSIV (or MFIV - WCGS only) inoperable (which has an 8 hour (4 hour - WCGS MFIV only) Completion Time leading to plant shutdown) should one MSIV (MFIV) Actuation Train become inoperable. Throughout this white paper the discussion of MSIV operability and TS applications also applies to the MFIVs at WCGS.

On October 12, 2006, representatives of the NRC, the Nuclear Energy Institute (NEI), the Technical Specifications Task Force (TSTF), and the affected licensees met to discuss the issue. The industry requested that the NRC make the draft TIA public and solicit stakeholder input prior to issuing the TIA and establishing an NRC position. The NRC stated that they were considering developing a Regulatory Issue Summary (RIS) on this issue.

At the October 12 meeting, the NRC stated that their position is based on Generic Letter 80-30, which discusses the use of the term Operable as it applies to the single failure criterion for safety systems, and on the TS usage rules. They did not provide any detail on how those documents were applied. The NRC acknowledged that their position was generic, however, they did not believe they were creating a new regulatory position.

On October 19, 2006, NRC headquarters issued a Task Interface Agreement (TIA) response on this issue. The TIA response provides the NRC's position regarding MSIV Operability.

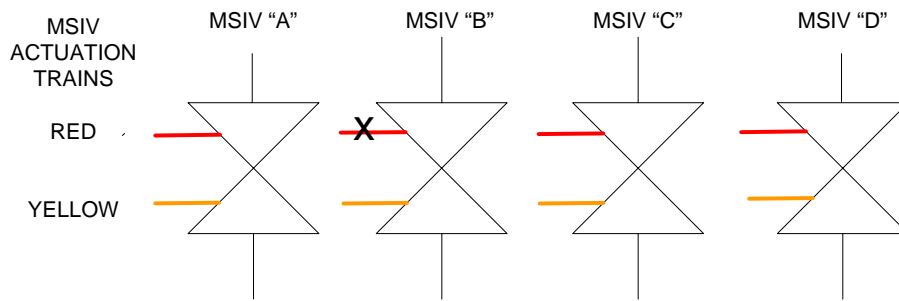
Analysis and Recommendations

The ISTS Bases state that the MSIVs are considered OPERABLE when the isolation times are within limits, and they close on an isolation actuation signal. This defines Operability in terms of each individual MSIV. However, the LCO Bases also link Operability to the collective function of all of the MSIVs when it states that the MSIVs will perform their design safety function to mitigate the consequences of accidents.

For a typical plant SLB analysis, it is assumed that a single failure results in one of the MSIVs failing to close. The plant design is such that having all but one MSIV close still results in the blowdown of only one Steam Generator as assumed in the analysis. This requirement makes the MSIV LCO unusual. Most TS LCOs require two trains of a system to be Operable and each train is independent and redundant of the other. This implements the single failure criteria in that it is assumed that one train fails to operate following an accident and the redundant train performs the safety function. In contrast, the MSIV LCO requires each MSIV to be Operable and the design basis assumption is that all but one MSIV will be available to perform the safety function following an accident. For plants with two MSIVs, this is similar to most other TS LCOs. However, for plants with more than two MSIVs, the safety function requires all but one of the MSIVs to be available following an accident and an assumed single failure.

Assume a plant has four MSIVs, which we will refer to as A, B, C, and D. Further assume that each MSIV has two MSIV Actuation Trains, referred to as Red and Yellow, which receive closure signals from the Red and Yellow ESFAS logic trains. At the start of the event, the Red MSIV Actuator Train on MSIV "B" is unavailable.

Main Steam Isolation Valve (MSIV) Operability



- Assume a HELB event occurs, and the assumed single failure is the failure of MSIV A to close. MSIVs C and D would close and the Yellow MSIV Actuation Train on MSIV B would close MSIV B. Therefore, three MSIVs would close and the accident analysis MSIV assumptions are met.
- Assume a HELB event occurs, and the assumed single failure is the failure of the Yellow ESFAS logic train. The Red MSIV Actuation Trains for MSIVs A, C, and D will close the MSIVs and the B MSIV will not close. Therefore, three MSIVs would close and the accident analysis MSIV assumptions are met.
- Assume a SLB event occurs, and the assumed single failure is the failure of the Red ESFAS logic train. The Yellow MSIV Actuation Trains for MSIVs A, B, C, and D will close the MSIVs. Therefore, four MSIVs will close and the accident analysis MSIV assumptions are met.
- Assume a HELB event occurs, and the assumed single failure is the emergency power to the Yellow ESFAS logic train and the associated systems actuated by the Yellow ESFAS logic train. The Red MSIV Actuation Trains for MSIVs A, C, and D will close the MSIVs and the B MSIV will not close. Therefore, three MSIVs will close and the accident analysis MSIV assumptions are met.

Therefore, for a typical plant the unavailability of one MSIV Actuation Train on one MSIV does not result in an inability of the MSIVs to perform their design safety function to mitigate the consequences of accidents. In this condition the MSIVs are Operable and the MSIV LCO is met.

ISTS SR 3.7.2.1 states, "Verify the isolation time of each MSIV is $\leq [4.6]$ seconds." ISTS SR 3.7.2.2 states, "Verify each MSIV actuates to the isolation position on an actual or simulated actuation signal." These SRs confirm the portion of Operability described in the LCO Bases as "The MSIVs are considered OPERABLE when the isolation times are within limits, and they close on an isolation actuation signal." As already noted, the MSIV Actuation Trains are not mentioned in the TS or Bases.

Should one MSIV Actuation Train on an MSIV be unavailable, an Operability Evaluation is required to determine if the MSIVs are Operable. As shown above, for the typical plant the MSIVs continue to be able to perform their individual and collective safety

Main Steam Isolation Valve (MSIV) Operability

function. However, the evaluation must also consider whether the Surveillance Requirements are met because SR 3.0.1 states that SRs must be met at all times and failure to meet the SR is considered failure to meet the LCO. Therefore, whether or not the MSIV safety function can be performed, if an SR cannot be met the LCO is considered not met.

The MSIV SRs are written in terms of verification of "each MSIV," and meeting the SR considers the effect of the unavailable MSIV Actuation Train on the affected MSIV, not the collective MSIV function (which is already considered in the Operability Evaluation, as described above). At a plant with two MSIV Actuation Trains, the MSIV Actuation Trains are fully redundant and, as a result, either train can close the MSIV within the assumed isolation time when an isolation signal is received. If the affected MSIV can close within the time specified in the SR acceptance criteria while in the degraded condition of one MSIV Actuation Train unavailable, SR 3.7.2.1 is met.

At a plant with two MSIV Actuation Trains, each MSIV Actuation Train receives an isolation signal from a different ESFAS logic train. Typical plant practice requires performing the Surveillance with input from each ESFAS logic train. If one MSIV Actuation Train is not available, the SR cannot be met with the associated ESFAS logic signal. Under SR 3.0.1, SRs must be met at all times when the equipment is required to be Operable. If an SR is not met, SR 3.0.1 states that the associated LCO is not met and LCO 3.0.2 provides further direction. Therefore, with one MSIV Actuation Train unavailable, the MSIV LCO is not met. The only applicable Condition is for an inoperable MSIV. However, this relationship between the SR and the LCO is not consistent with 10 CFR 50.36. As shown above, with one unavailable MSIV Actuation Train on one MSIV, the MSIVs are still Operable. 10 CFR 50.36 states that the purpose of SRs is to demonstrate that the LCO is met. In this case, the LCO is met even though the SR is not met. As a result, the SR should be revised to be consistent with 10 CFR 50.36.

Next Steps

1. The TSTF should develop a Traveler that revises Specification 3.7.2 and the associated Bases. The Traveler should:
 - a. Provide a bracketed discussion in the LCO Bases for plants with two MSIV Actuation Trains. The bracketed discussion should state that one MSIV Actuation Train on one MSIV results in a degraded but Operable condition.
 - b. Provide a bracketed Condition or Conditions for plants with two MSIV Actuation Trains that addresses the condition of two inoperable MSIV Actuation Trains on separate MSIVs. Two Conditions, one applicable when the two inoperable MSIV Actuation Trains are on the same ESFAS logic train and one when they are on the opposite logic trains, will provide more flexibility than a single Condition.
 - c. Revise SR 3.7.2.2 to state "Verify each MSIV actuates to the isolation position on [an][each required] actual or simulated actuation signal." The Bases of SR 3.7.2.2

Main Steam Isolation Valve (MSIV) Operability

should be revised to explain when "each required" would be included, what is required, and referencing the discussion added to the LCO Bases.