*Union Electric*

One Ameren Plaza
1901 Chouteau Avenue
PO Box 66149
St. Louis, MO 63166-6149
*314.621.3222*

October 24, 2005

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555-0001

Ladies and Gentlemen: ULNRC- 05224

**DOCKET NUMBER 50-483**
**CALLAWAY PLANT**
**UNION ELECTRIC COMPANY**
**SUPPLEMENT/REVISION TO LICENSE AMENDMENT REQUEST OL-1258**
**FOR REVISION OF TECHNICAL SPECIFICATION 3.7.3,**
**"MAIN FEEDWATER ISOLATION VALVES (MFIVs)"**

By letter dated September 9, 2005 (i.e., AmerenUE Letter ULNRC-05206) AmerenUE (Union Electric) requested amendment of the Facility Operating License for the Callaway Plant (License No. NPF-30) to revise Technical Specification (TS) 3.7.3, "Main Feedwater Isolation Valves (MFIVs)." The primary change proposed per the amendment request (which is still under review by the NRC) is to revise the stroke time test requirement for the MFIVs such that the single-value 15-second stroke time limit currently specified in TS 3.7.3 for the MFIVs would be replaced with a reference to a figure that specifies the stroke time limit as a function of steam generator steam pressure. This change is based on AmerenUE's determination that a pressure-dependent stroke time limit is more appropriate for the type of actuator installed on the MFIVs. (New system-medium actuators were installed on the MFIVs during Refuel 13.)

To incorporate the proposed change, a new Surveillance Requirement (SR) was proposed in order to establish the new pressure-dependent stroke time limit for the MFIVs. This required a proposed change to remove the MFIVs from the scope of the existing SR that specifies the stroke time limit as a single value, as this SR provides the stroke time limit not only for the MFIVs (at present) but also for the main feedwater regulating valves (MFRVs) and main feedwater regulating valve bypass valves (MFRBVs).*

* As noted in the September 9 application, another license amendment (No. 167) affecting TS 3.7.3 has been approved but is not yet implemented. This amendment added the MFRVs and MFRVBVs to the scope of TS 3.7.3 which is to be retitled, "Main Feedwater Isolation Valves (MFIVs) and Main Feedwater Regulating Valves (MFRVs) and Main Feedwater Regulating Valve Bypass Valves (MFRVBVs)." This amendment was anticipated while the changes addressed in the September 9 application (and in this supplement) were being developed. The marked-up TS and TS Bases pages provided in the September 9 application and as provided in this supplement already reflect the changes to be implemented per Amendment 167.

A001

Another change that was proposed in the September 9 application concerned a Note associated with both of the current SRs under TS 3.7.3. This Note addresses conditions under which the SRs are required to be performed. It was explained that this Note is no longer applicable to the MFIVs due to the system-medium actuators on the MFIVs and the corresponding changes being made for the MFIV stroke time limit(s). Deletion of the Note from both SRs was consequently proposed. Subsequent to the September 9 submittal, however, and based on further discussions of the changes regarding this Note, it was confirmed that the Note is still applicable to the MFRVs and MFRBVs and therefore should not be deleted but instead retained or modified so that it would continue to be applicable to the MRFVs and MFRVBVs. Based on this determination, AmerenUE is submitting this letter and its attachments as a supplement to the September 9 amendment request in order to revise the changes proposed for the affected SRs (so as to maintain the Note for the MFRVs and MFRVBVs per the affected SRs).

In addition to revision of the Technical Specification changes requested per AmerenUE's September 9 license amendment application, NRC review of the amendment application has led to the identification and transmittal of several technical questions and/or requests for information regarding the proposed TS changes. All of these questions and/or requests and the AmerenUE responses for them are provided in Attachment 6 to this letter.

Other essential/supporting information and documents are provided as attachments to this letter. Attachment 1 provides additional description and explanation of the modification being made to the changes requested in the September 9 application. Attachment 2 contains updated marked-up TS pages that reflect the net changes being proposed for TS 3.7.3 (i.e., the changes proposed in the September 9 application as modified by this supplement). Attachment 3 contains revised TS pages (to reflect incorporation of the mark-ups). (Please note that the pages provided per Attachments 2 and 3 supersede the pages originally provided per Attachments 2 and 3 in AmerenUE's September 9 submittal, respectively.) In addition, Attachment 4 contains updated, proposed changes to the TS Bases (in marked-up form). The Bases changes provided in Attachment 4 supersede the Bases changes originally provided in the September 9 submittal. They are provided for information only and will be implemented pursuant to the TS Bases Control Program, TS 5.5.14, upon approval of the requested license amendment.

With regard to the regulatory evaluations provided in the September 9 application, it has been determined that the proposed modification to the changes presented in the September 9 application does not change the conclusions of those regulatory evaluations. That is, no environmental impact statement or

environmental assessment needs to be prepared in connection with the issuance of the proposed license amendment as determined by evaluation of the proposed changes against the requirements of 10 CFR 51.22(b). In addition, the determination pursuant to CFR 50.92 that the proposed amendment does not involve a significant hazard consideration, including the basis for that determination, also remains unchanged. Nevertheless, minor corrections to the statements made in the No Significant Hazards evaluation provided in the September 9 application are required since the Note that was proposed to be deleted is no longer being deleted for the MFRVs and MFRVBVs, and since the Note was mentioned in the evaluation. Therefore, a revised No Significant Hazards evaluation reflecting the minor changes is provided as Attachment 5.

No new commitments are identified in this letter. However, the commitments identified in Attachment 5 of AmerenUE's September 9 amendment request remain valid and unchanged. This includes the commitment and request regarding implementation of the requested amendment, which is to allow the amendment to be implemented no later than MODE 3 entry (ascending) during startup from the Refuel 15 outage.

Finally, it may be noted that pursuant to 10 CFR 50.91, a copy of this supplement to AmerenUE's amendment application is being provided to the designated Missouri State official. In addition, this letter and its attachments were reviewed by Callaway's Onsite Review Committee and Nuclear Safety Review Board. Please contact us for any questions you may have regarding this amendment application.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

Executed on: October 24, 2005

Keith D. Young
Manager, Regulatory Affairs

TBE/DJW/jdg

Attachments:
1) Evaluation
2) Marked-up Technical Specification Pages
3) Revised/Retyped Technical Specification Pages
4) Proposed Technical Specification Bases Changes (For Information Only)
5) Revised Evaluation for No Significant Hazards Consideration
6) Responses to NRC Questions Regarding LAR OL-1258

cc: U.S. Nuclear Regulatory Commission (Original and 1 copy)
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

Mr. Bruce S. Mallett
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack N. Donohew (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 7E1
Washington, DC 20555-2738

Missouri Public Service Commission
Governor Office Building
200 Madison Street
PO Box 360
Jefferson City, MO 65102-0360

Deputy Director
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

**ULNRC-05224**

**ATTACHMENT 1**

**EVALUATION**

## 1.0 Background

The changes addressed herein concern the Technical Specification (TS) test requirements for the main feedwater isolation valves (MFIVs) employed at the Callaway plant. The MFIVs were modified during Refuel 13 such that they were equipped with system medium actuators in which the system fluid pressure assists in closing the valve. Based on the characteristics of the new actuators it was determined that changes to the Technical Specifications should be made to more appropriately specify a pressure-dependent stroke time limit for the valves in lieu of the single-value stroke time limit currently specified.

Pursuant to this intent, proposed changes to the Technical Specifications were submitted via AmerenUE letter ULNRC-05206 dated September 9, 2005. The changes proposed per AmerenUE's license amendment request (LAR) are currently under review by the NRC staff. However, upon further consideration of the changes proposed therein, AmerenUE has determined that one of the changes proposed in its September 9 LAR should be modified, as further explained below.

### 1.1 Current TS Requirements

Operability and testing requirements for the MFIVs are specified in TS 3.7.3, "Main Feedwater Isolation Valves (MFIVs) and Main Feedwater Regulating Valves (MFRVs) and Main Feedwater Regulating Bypass Valves (MFRVBVs)." [TS 3.7.3 specifies operability and testing requirements for the MFRVs and MFRVBVs as well, based on the changes being incorporated for recent Amendment 167, as explained in the cover letter.] With regard to testing requirements, two Surveillance Requirements (SRs) are specified under TS 3.7.3, as follows:

(1) SR 3.7.3.1 requires verifying that the closure time of each MFIV, MFRV and MFRVBV is $\leq$ 15 seconds.
(2) SR 3.7.3.2 requires verifying that each MFIV, MFRV, and MFRVBV actuates to the isolation position on an actual or simulated actuation signal.

For each of these SRs a Note is attached, which states, "Only required to be performed in MODES 1 and 2." The purpose of the Note is to allow entry into MODE 3 prior to performing the SRs, so that testing can be delayed until conditions appropriate for performing the required tests are established. The modification to be made to the changes proposed in AmerenUE's September 9 LAR concerns this Note.

1.2 TS Changes Proposed Per License Amendment Request

As noted above, the primary change proposed per AmerenUE's September 9 amendment request would revise the stroke time test requirement for the MFIVs such that the single-value 15-second stroke time limit specified for the MFIVs would be replaced with a reference to a figure that specifies the stroke time limit as a function of steam generator steam pressure. This change, it was noted, is consistent with the characteristics of the system-medium actuators utilized for the MFIVs. The pressure range represented on the proposed figure is such that it extends from pressures corresponding to full power operation down to zero or near zero steam generator steam pressure such as would exist during MODE 4 conditions. Further, the proposed curve is based on determined performance characteristics for the MFIVs such that a stroke-time test can be performed at any pressure to satisfy the stroke time test requirement.

To effect the proposed change, AmerenUE proposed to revise TS 3.7.3 to incorporate new Surveillance Requirement (SR) 3.7.3.3 which would specifically provide the stroke time test requirement for the MFIVs. As proposed, SR 3.7.3.3 refers to proposed TS Figure 3.7.3-1 which would provide the acceptance criteria, i.e., the pressure-dependent stroke time curve (described above) for the new SR.

With the development of new SR 3.7.3.3 for the MFIVs, it was necessary to revise current SR 3.7.3.1 because SR 3.7.3.1 is where the current 15-second stroke time limit is specified for the MFIVs as well as for the MFRVs and MFRVBVs. The proposed revision to SR 3.7.3.1 would remove the MFIVs from the requirement to verify a closure time of less than or equal to 15 seconds, as SR 3.7.3.1 would continue to require the MFRVs and MFRVBVs to meet the requirement.

As part of the changes proposed for TS 3.7.3, an additional change to SR 3.7.3.1, as well as an identical change to SR 3.7.3.2, was proposed in order to delete the aforementioned Note specified for each of these surveillance requirements. The change to delete the Notes was based on a determination that the Note is no longer needed. It has now been determined, however, that this Note should not be deleted as originally proposed, but should instead be retained for the MFRVs and MFRVBVs. The basis for this determination, as well as additional explanation, is provided below.

**2.0 Revision of Proposed TS Changes**

As noted in Section 1.1, the Note attached to SR 3.7.3.1 and SR 3.7.3.2 was originally provided to allow entry into MODE 3 prior to performing the SRs, so that the testing required by these SRs can be delayed until conditions appropriate for performing the required tests are established. Under the current TS, the provisions of the Note apply

to testing of any of the valves (i.e., MFIVs, MFRVs, and MFRVBVs) when tested pursuant to SR 3.7.3.1 or SR 3.7.3.2.

For stroke-time testing the MFIVs, however, it was explained in the September 9 LAR that with the establishment of a pressure-dependent stroke-time test acceptance curve for the MFIVs (based on the characteristics of their system-medium actuators), it is possible to test the valves at any pressure throughout the extensive range of the curve, even at low pressure / MODE 4 conditions. (The characteristics of the system-medium actuators are such that it is no more conservative to test the valves at operating conditions than it is at lower pressure / MODE 4 conditions, for confirming operability of the valves.) With this possibility, it was recognized that testing the MFIVs in MODE 4 permits operability of the valves to be verified prior to entering the applicability of TS 3.7.3 (i.e., MODES 1, 2, and 3). Further, it was recognized that deleting the Note would eliminate any confusion regarding whether the stroke-time limit has to be met for MODE 3 (in light of the fact that the valves are not currently required to be tested until after entry into MODE 3 per the provisions of the Note). Based on these facts and considerations, it was concluded that there is no longer any need for the Note with its provision to delay testing of the valves until entry into MODE 3, so it was proposed that the Note be deleted from SR 3.7.3.1. For similar reasons, it was determined that the provisions of the NOTE are also no longer needed for testing of the MFIVs to satisfy SR 3.7.3.2. Thus, it was proposed that the Note be deleted entirely, i.e., from both SR 3.7.3.1 and SR 3.7.3.2.

In deleting the Note, however, its applicability to the MFRVs and MSRVBVs was not fully considered. That is, although these valves can be tested prior to entry into the Applicability of TS 3.7.3, testing at conditions less than normal operating pressure/temperature conditions is not conservative for these valves since they are air-operated and are thus unlike the MFIVs with their system-medium actuators. As such, it is appropriate to challenge these valves under NOP/NOT conditions in order to verify that they meet their stroke time limits, as testing of the valves at lower pressures is less challenging to this kind of valve. It is therefore appropriate to retain the Note for these valves, as it will be retained for both SRs. (Typically, the tests required for each of these SRs are performed and satisfied together, since both SRs require stroking the valve closed and both tests can be efficiently satisfied for each valve with one stroke of the valve).

Based on the above, it is proposed that the Note not be deleted from SR 3.7.3.1 and SR 3.7.3.2 as originally proposed in the September 9 LAR. The Note will thus be retained as-is for SR 3.7.3.1, as SR 3.7.3.1 will only apply to the MFRVs and MFRVBVs per the proposed changes (i.e., since the stroke-time test requirements for the MFIVs will be relocated to SR 3.7.3.3). To retain the Note for SR 3.7.3.2, however, it must be revised to indicate that it only applies to the MFRVs and MFRVBVs. Thus, the Note should be revised to read as follows for SR 3.7.3.2:

---NOTE---
For the MFRVs and MFRVBVs, only required to be performed in MODES 1 and 2.
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The addition of the phrase, "For the MFRVs and MFRVBVs" to the Note (as shown above) will clearly indicate that the provision of the Note (for only requiring the applicable SRs to be performed in MODES 1 and 2) is only applicable to the MFRVs and MFRVBVs.

To clearly indicate the net changes being proposed by AmerenUE for TS 3.7.3 (i.e., to reflect the effect of the above modification to the changes proposed in the September 9 LAR), new mark-ups of the affected TS pages are provided in Attachment 2. In addition, revised TS pages reflecting incorporation of the proposed mark-ups are provided as Attachment 3. The marked-up and revised TS pages provided as Attachments 2 and 3 to this submittal thus supersede the marked-up and revised pages provided as Attachments 2 and 3 to the September 9 submittal, respectively.

In addition to the above, the TS Bases changes that were originally provided for information in Attachment 4 of the September 9 submittal also require modification due to the above change, as the Bases will need to reflect the continued presence of the Note and to indicate that it only applies to the MFRVs and MFRVBVs. Revised Bases pages (in marked-up form), reflecting the changes originally indicated in the September 9 submittal but as modified by the above, are provided in Attachment 4. The TS Bases changes indicated in Attachment 4 thus supersede the changes provided in Attachment 4 of the September 9 submittal. The Bases changes are provided for information only and will be implemented pursuant to the TS Bases Control Program (TS 5.5.14) after approval of the requested amendment.

## 3.0 Regulatory Evaluations

### 3.1 No Significant Hazards Consideration (NHSC)

Retaining the Note for the MRFVs and MFRVBVs is not a net change for these valves (since the Note currently exists for these valves). All other changes proposed in the September 9 submittal are still being proposed and are unchanged from that submittal. Thus, the NHSC evaluation provided in the September 9 submittal remains applicable and unchanged for those changes. However, the modification proposed now to not delete the Note for the MFRVs and MFRVBVs requires minor changes to be made to some of the statements made in the NHSC evaluation, i.e., wherever deletion of the Note is mentioned.

Based on the above, a revised NHSC evaluation is provided as Attachment 5 to this submittal. The evaluation still applies to all of the net changes being proposed for TS 3.7.3 as described and requested in the September 9 application, but as modified by this supplement to that application. It may be emphasized that the conclusions of the NHSC evaluation remain unchanged.

3.2 Environmental Consideration

As indicated in the cover letter, the evaluation provided in the September 9 application for environmental consideration remains unchanged. (The conclusion that the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and that an environmental assessment is therefore not required, is unchanged.)

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ATTACHMENT 2

MARKED-UP OF TECHNICAL SPECIFICATION PAGES

FOR INFORMATION ONLY

3.7 PLANT SYSTEMS

## 3.7.3 Main Feedwater Isolation Valves (MFIVs) and Main Feedwater Regulating Valves (MFRVs) and Main Feedwater Regulating Valve Bypass Valves (MFRVBVs)

LCO 3.7.3 Four MFIVs, four MFRVs, and four MFRVBVs shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3 except when:

a. MFIV is closed and de-activated; or
b. MFRV is closed and de-activated or closed and isolated by a closed manual valve; or
c. MFRVBV is closed and de-activated, or closed and isolated by a closed manual valve, or isolated by two closed manual valves.

ACTIONS

NOTE

Separate Condition entry is allowed for each valve.

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. One or more MFIVs inoperable. | A.1 | Close MFIV. | 72 hours |
| | AND | | |
| | A.2 | Verify MFIV is closed. | Once per 7 days |
| B. One or more MFRVs inoperable. | B.1 | Close or isolate MFRV. | 72 hours |
| | AND | | |
| | B.2 | Verify MFRV is closed or isolated. | Once per 7 days |
| C. One or more MFRVBVs inoperable. | C.1 | Close or isolate bypass valve. | 72 hours |
| | AND | | |
| | C.2 | Verify bypass valve is closed or isolated. | Once per 7 days |

(continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| D. Two valves in the same flow path inoperable | D.1 Isolate affected flow path. | 8 hours |
| E. Required Action and associated Completion Time not met. | E.1 Be in MODE 3.<br>AND<br>E.2 Be in MODE 4. | 6 hours<br><br>12 hours |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | | FREQUENCY |
|---|---|---|
| SR 3.7.3.1 | ----------NOTE----------<br>Only required to be performed in MODES 1 and 2.<br>----------<br>Verify the closure time of each MFIV, MFRV and MFRVBV is ≤ 15 seconds. | In accordance with the Inservice Testing Program |
| SR 3.7.3.2 | ----------NOTE----------<br>Only required to be performed in MODES 1 and 2.<br>----------<br>Verify each MFIV, MFRV and MFRVBV actuates to the isolation position on an actual or simulated actuation signal. | 18 months |

For the MFRVs and MFRVBVs

INSERT A

OL 1258

INSERT A

| | | |
|---|---|---|
| SR 3.7.3.3 | Verify the closure time of each MFIV is within the limits of Figure 3.7.3-1. | In accordance with the Inservice Testing Program |

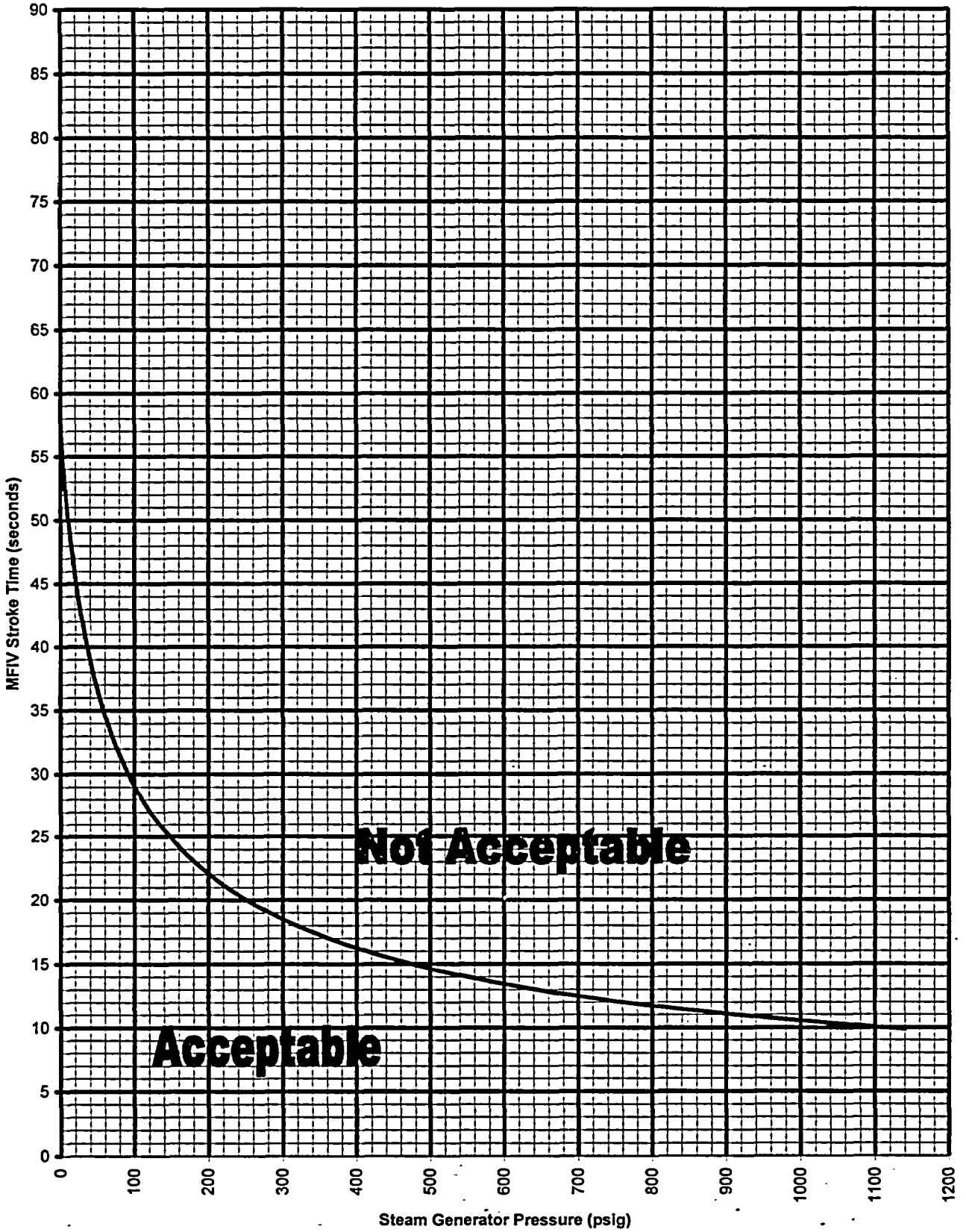


Figure 3.7.3-1 (Page 1 of 1)
MFIV Stroke Time Limit vs Steam Generator Pressure
3.7-8a

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ATTACHMENT 3

REVISED/RETYPED TECHNICAL SPECIFICATION PAGES

(to be provided later)

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ATTACHMENT 4

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES
(For Information Only)

B 3.7 PLANT SYSTEMS

B 3.7.3 Main Feedwater Isolation Valves (MFIVs) and Main Feedwater Regulating Valves (MFRVs) and Main Feedwater Regulating Valve Bypass Valves (MFRVBVs)

BASES

BACKGROUND

The MFIVs isolate main feedwater (MFW) flow to the secondary side of the steam generators following a high energy line break (HELB). The MFRVs and MFRVBVs function to control feedwater flow to the SGs and provide backup isolation of MFW flow in the event an MFIV fails to close. Because an earthquake is not assumed to occur coincident with a spontaneous break of safety related secondary piping, loss of the non-safety grade MFRVs and MFRVBVs is not assumed. If the single active failure postulated for a secondary pipe break is the failure of a safety grade MFIV to close, then credit is taken for closing the non-safety grade MFRVs and MFRVBVs.

INSERT 1

The MFIV is a 14-inch gate valve with a system-medium actuator. The assumed single active failure of one of the redundant MFIV actuation trains will not prevent the MFIV from closing.

Closure of the MFIVs or MFRVs and MFRVBVs terminates flow to the steam generators, terminating the event for feedwater line breaks (FWLBs) occurring upstream of the MFIVs or MFRVs and MFRVBVs. The consequences of events occurring in the main steam lines or in the MFW lines downstream from the MFIVs will be mitigated by their closure. Closure of the MFIVs or MFRVs and MFRVBVs effectively terminates the addition of feedwater to an affected steam generator, limiting the mass and energy release for steam line breaks (SLBs) or FWLBs inside containment, and reducing the cooldown effects for SLBs.

The MFIVs isolate the nonsafety related portions from the safety related portions of the system. In the event of a secondary side pipe rupture inside containment, the valves limit the quantity of high energy fluid that enters containment through the break, and provide a pressure boundary for the controlled addition of auxiliary feedwater (AFW) to the intact loops.

One MFIV and one MFRV are located on each MFW line, outside but close to containment. The MFRV Bypass valves are located in six inch lines that bypass flow around the MFRVs during low power operation. As shown in Reference 6, an MFIV cannot be isolated with closed manual valves; the MFRV can be isolated upstream by a closed manual valve; and the MFRVBV can be isolated both upstream and downstream with a closed manual valve. The MFIVs and MFRVs and MFRVBVs are located upstream of the AFW injection point so that AFW may be supplied to the steam generators following MFIV or MFRV and MFRVBV closure. The piping volume from these valves to the steam generators is accounted for

(continued)

INSERT 1

Since the MFIV actuators are system-medium actuators, the MFIV isolation time is a function of steam generator steam pressure.

BASES

BACKGROUND (continued)

in calculating mass and energy releases, and purged and refilled prior to AFW reaching the steam generator following either an SLB or FWLB.

The MFIVs and MFRVs and MFRVBVs close on receipt of any safety injection signal, a $T_{avg}$ - Low coincident with reactor trip (P-4), a low-low steam generator level, or steam generator water level - high high signal. MFIVs may also be actuated manually. In addition to the MFIVs and MFRVs and MFRVBVs a check valve inside containment is available. The check valve isolates the feedwater line penetrating containment and ensures the pressure boundary of any intact loop not receiving auxiliary feedwater.

The MFIV actuators consist of two separate system-medium actuation trains each receiving an actuation signal from one of the redundant ESFAS channels. A single active failure in one power train would not prevent the other power train from functioning. The MFIVs provide the primary success path for events requiring feedwater isolation and isolation of non-safety-related portions from the safety-related portion of the system, such as, for auxiliary feedwater addition.

The MFRV and MFRVBV actuators consist of two separate actuation trains each receiving an actuation signal from one of the redundant ESFAS channels. Both trains are required to actuate to close the valve.

A description of the MFIVs and MFRVs and MFRVBVs is found in the FSAR, Section 10.4.7 (Ref. 1).

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APPLICABLE SAFETY ANALYSES

Credit is taken in accident analysis for the MFIVs to close on demand. The function of the MFRVs and associated bypass valves as discussed in the accident analysis is to provide a diverse backup function to the MFIVs for the potential failure of an MFIV to close even though the MFRVs are located in the non-safety-related portion of the feedwater system. Further assurance of feedwater flow termination is provided by the SGFP trip function; however, SGFP trip is not credited in accident analysis. The accident analysis credits the main feedwater check valves as backup to the MFIVs to prevent SG blowdown for pipe ruptures in the non-seismic Category I portions of the feedwater system outside containment.

INSERT 2 →

Criterion 3 of 10 CFR 50.36(c)(2)(ii) indicates that components that are part of the primary success path and that actuate to mitigate an event that presents a challenge to a fission product barrier should be in Technical Specifications. The primary success path of a safety analysis consists of the combination and sequences of equipment needed to operate (including redundant trains/components) so that the plant response to the event remains within appropriate acceptance criteria. The primary success path does not include backup and diverse equipment. The

(continued)

INSERT 2

The impact of an MFIV isolation time as a function of steam generator steam pressure on the safety analyses has been evaluated in References 2 and 7. The evaluation concluded that a variable MFIV isolation time is acceptable with respect to the safety analyses. Figure 3.7.3-1 is a curve of the MFIV isolation time limit as a function of steam generator steam pressure. Meeting the MFIV isolation times in Figure 3.7.3-1 ensures that the evaluations performed in References 2 and 7 remain valid.

BASES

APPLICABLE SAFETY ANALYSES (continued)

MFIVs, with their dual-redundant actuation trains, are the primary success path for feedwater isolation. The MFIVs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii). The MFRVs and MFRVBVs are backup and diverse equipment. The MFRVs and MFRVBVs satisfy Criterion 4 of 10 CFR 50.36(c )(2)(ii).

LCO

This LCO ensures that the MFIVs and MFRVs and MFRVBVs will isolate MFW flow to the steam generators, following an FWLB or main steam line break. The MFIVs will also isolate the nonsafety related portions from the safety related portions of the system.

This LCO requires that four MFIVs and four MFRVs and four MFRVBVs be OPERABLE. The ~~MFIVs and~~ MFRVs and MFRVBVs are considered OPERABLE when isolation times are within limits when given an isolation actuation signal and they are capable of closing on an isolation actuation signal. For the MFRVs and MFRVBVs, the LCO requires only that the trip close function is OPERABLE. No OPERABILITY requirements are imposed on the analog controls shown on Reference 5.

INSERT 3

Failure to meet the LCO requirements can result in additional mass and energy being released to containment following an SLB or FWLB inside containment. A feedwater isolation signal on high steam generator level is relied on to terminate an excess feedwater flow event.

APPLICABILITY

The MFIVs and MFRVs and MFRVBVs must be OPERABLE whenever there is significant mass and energy in the Reactor Coolant System and steam generators. This ensures that, in the event of an HELB, a single failure cannot result in the blowdown of more than one steam generator. In MODES 1, 2, and 3, the MFIVs and MFRVs and MFRVBVs are required to be OPERABLE to limit the amount of available fluid that could be added to containment in the case of a secondary system pipe break inside containment.

Exceptions to the APPLICABILITY are allowed for the following cases where the valve is assured of performing its safety function (Reference 6):

a. When the MFIV is closed and de-activated, it is performing its safety function. Requiring the valve closed and de-activated provides dual assurance that it is performing its safety function. When the valve is de-activated, power is removed from the actuation solenoids on the valves.

b. When the MFRV is closed and de-activated or is closed and isolated by a closed manual valve, it is performing its safety function.

(continued)

INSERT 3

The MFIVs are considered OPERABLE when isolation times are within the limits of Figure 3.7.3-1 when given a fast close signal and they are capable of closing on an isolation actuation signal.

NO CHANGES
For Information Only

BASES

APPLICABILITY (continued)

Requiring the valve closed and de-activated provides dual assurance that it is performing its safety function. When the valve is de-activated, power is removed from the actuation solenoids on the valves. Requiring the valve closed and isolated by a closed manual valve also provides dual assurance that it is performing its safety function.

c. When the MFRVBV is closed and de-activated, or is closed and isolated by a closed manual valve, or is isolated by two closed manual valves, it is performing its safety function. Requiring the valve closed and de-activated provides dual assurance that is performing its safety function. When the valve is de-activated, power is removed from the actuation solenoids on the valves. Requiring the valve closed and isolated by a closed manual valve also provides dual assurance that it is performing its safety function. Finally, there is dual assurance that the safety function is being performed when the MFRVBV is isolated by two closed manual valves.

In MODES 4, 5, and 6, steam generator energy is low. Therefore, the MFIVs and MFRVs and MFRVBVs are not required to mitigate the effects of a feedwater or steamline break in these MODES.

ACTIONS

The ACTIONS table is modified by a Note indicating that separate Condition entry is allowed for each valve.

A.1 and A.2

With one MFIV in one or more flow paths inoperable, action must be taken to restore the affected valves to OPERABLE status; or to close inoperable affected valves within 72 hours. When these valves are closed, they are performing their required safety function.

The 72 hour Completion Time takes into account the redundancy afforded by the dual-redundant actuation trains on the MFIVs, the redundancy afforded by the remaining OPERABLE valves, and the low probability of an event occurring during this time period that would require isolation of the MFW flow paths. The 72 hour Completion Time is reasonable, based on operating experience.

Inoperable MFIVs that are closed must be verified on a periodic basis that they are 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 valve status indications

(continued)

NO CHANGES
FOR INFORMATION ONLY

BASES

ACTIONS

A.1 and A.2 (continued)

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

If the MFIVs are closed and de-activated, this LCO does not apply as discussed in the Applicability section of these Bases.

B.1 and B.2

With one MFRV in one or more flow paths inoperable, action must be taken to restore the affected valves to OPERABLE status, or to close or to isolate inoperable affected valves within 72 hours. When these valves are closed or isolated, they are performing their required safety function.

The 72 hour Completion Time takes into account the redundancy afforded by the remaining OPERABLE valves and the low probability of an event occurring during this time period that would require isolation of the MFW flow paths. The 72 hour Completion Time is reasonable, based on operating experience.

Inoperable MFRVs, that are closed or isolated, must be verified on a periodic basis that they are closed or isolated. 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 valve status indications available in the control room, and other administrative controls to ensure that the valves are closed or isolated. If the MFRVs are closed and de-activated, or closed and isolated by a closed manual valve, this LCO does not apply as discussed in the Applicability section of these Bases.

C.1 and C.2

With one MFRVBV in one or more flow paths inoperable, action must be taken to restore the affected valves to OPERABLE status, or to close or to isolate inoperable affected valves with 72 hours. When these valves are closed or isolated, they are performing their required safety function.

The 72 hour Completion Time takes into account the redundancy afforded by the remaining OPERABLE valves and the low probability of an event occurring during this time period that would require isolation of the MFW flow paths. The 72 hour Completion Time is reasonable, based on operating experience.

(continued)

NO CHANGES,
FOR INFORMATION ONLY

BASES

ACTIONS

C.1 and C.2 (continued)

Inoperable MFRVBVs that are closed or isolated must be verified on a periodic basis that they are closed or isolated. 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 valve status indications available in the control room, and other administrative controls, to ensure that these valves are closed or isolated.

If the MFRVBVs are closed and de-activated, or closed and isolated by a closed manual valve, or isolated by two closed manual valves, this LCO does not apply as discussed in the Applicability section of these Bases.

D.1

Two inoperable valves in the same flow path is treated the same as loss of the isolation capability of this flow path. For each feedwater line there are two flow paths, defined as flow through the MFRV/MFIV and flow through the MFRVBV/MFIV. Because the MFIV, MFRV, and MFRVBV are of different designs, a common mode failure of the valves in the same flow path is not likely. However, under these conditions, affected valves in each flow path must be restored to OPERABLE status, or the affected flow path isolated within 8 hours. This action returns the system to the condition where at least one valve in each flow path is performing the required safety function. The 8 hour Completion Time is reasonable, based on operating experience, to complete the actions required to close the MFIV or MFRV and MFRVBV, or otherwise isolate the affected flow path.

E.1 and E.2

If the MFIV(s) and MFRV(s) and MFRVBV(s) cannot be restored to OPERABLE status, or 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 in at least 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 full power conditions in an orderly manner and without challenging unit systems.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

This SR verifies that the closure time of each ~~MFIV~~ MFRV and MFRVBV is ≤ 15 seconds from each actuation train when tested pursuant to the Inservice Testing Program. The ~~MFIV and~~ MFRV and MFRVBV 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. The ~~MFIVs and~~ MFRVs should not be tested at power since even a partial stroke exercise increases the risk of a valve closure with the unit generating power.

The Frequency for this SR is in accordance with the Inservice Testing Program. Per Reference 4, if it is necessary to adjust stem packing to stop packing leakage and if a required stroke test is not practical in the current plant MODE, it should be shown by analysis that the packing adjustment is within torque limits specified by the manufacturer for the existing configuration of packing, and that the performance parameters of the valve are not adversely affected. A confirmatory test must be performed at the first available opportunity when plant conditions allow testing. Packing adjustments beyond the manufacturer's limits may not be performed without (1) an engineering analysis and (2) input from the manufacturer, unless tests can be performed after adjustments.

This test is conducted in MODE 3 with the unit at nominal operating temperature and pressure, as discussed in Reference X. This SR is modified by a Note that 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 3.7.3.2

This SR verifies that each MFIV and MFRV and MFRVBV is capable of closure on an actual or simulated actuation signal. For the MFIVs the manual fast close handswitch in the Control Room provides an acceptable actuation signal. Each actuation train must be tested separately. For the MFRVs and the MFRVBVs, actuation of solenoids locally at the MFRVs and MFRVBVs constitutes an acceptable simulated actuation signal. This Surveillance is normally performed upon returning the unit to operation following a refueling outage in conjunction with SR 3.7.3.1. However, it is acceptable to perform this surveillance individually.

The frequency of MFIV and MFRV and MFRVBV testing is every 18 months. The 18 month Frequency for testing is based on the refueling

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.3.2 (continued)

cycle. This Frequency is acceptable from a reliability standpoint. This SR is modified by a NOTE that allows entry into and operation in MODE 3 prior to performing the SR for the MFRVs and MFRVBVs. This allows a delay of testing until MODE 3, to establish conditions consistent with those necessary to perform SR 3.7.3.1 and SR 3.7.3.2 concurrently.

INSERT 4

REFERENCES

1. FSAR, Section 10.4.7, Condensate and Feedwater System.
2. ASME, Boiler and Pressure Vessel Code, Section XI.
3. FSAR, Table 7.3-14, NSSS Instrument Operating Conditions for Isolation Functions.
4. NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."
5. FSAR Figure 7.2-1, Sheets 13 and 14.
6. FSAR Figure 10.4-6, Sheets 1 and 2.
7. WCAP-16265-P, dated August 2004.
8.

INSERT 5

INSERT 4

SR 3.7.3.3

This SR verifies that the closure time of each MFIV is within the limits of Figure 3.7.3-1 from each actuation train when tested pursuant to the Inservice Testing Program. The MFIV closure time is assumed in the accident and containment analyses. Figure 3.7.3-1 is a curve of the MFIV isolation time limit as a function of steam generator steam pressure, since there is no pressure indication available at the MFIVs. The acceptance curve for the MFIV stroke time conservatively accounts for the potential pressure differential between the steam generator pressure indication and the pressure at the MFIVs. Meeting the MFIV isolation times in Figure 3.7.3-1 ensures that the evaluations performed in Reference 2 and Reference 7 remain valid. This Surveillance is normally performed upon returning the unit to operation following a refueling outage. These valves should not be tested at power since even a partial stroke exercise increases the risk of a valve closure with the unit generating power.

The Frequency for this SR is in accordance with the Inservice Testing Program.

INSERT 5

Westinghouse Letter, SCP-05-027, Revision 2, dated September 9, 2005.

ULNRC-05224

ATTACHMENT 5

REVISED EVALUATION FOR
NO SIGNIFICANT HAZARDS CONSIDERATION

## No Significant Hazards Consideration (NSHC)

This license amendment request proposes to change the Technical Specifications to add a surveillance requirement that incorporates an MFIV stroke time limit that is dependent upon steam generator steam pressure, for all applicable operating Modes. The change to the Note(s) on SR 3.7.3.1 and SR 3.7.3.2 is incidental to the stroke time change for the MFIVs. Because conformance to the new pressure-dependent stroke-time test acceptance criteria can be demonstrated at low pressure conditions, the MFIVs will be able to be stroke-time tested prior to entry into Mode 3, thus rendering the Note unnecessary or not applicable. The proposed changes do not involve a significant hazards consideration for Callaway Plant based on the three standards set forth in 10CFR50.92(c), as discussed below:

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

Response: No.

Revision of the MFIV stroke time limit has no impact on the frequency of occurrence of those events for which feedwater isolation is credited or assumed. The MFIVs themselves are not part of the initiating mechanisms or failure modes for such events (such as steamline break or feedwater line break). Therefore, the proposed change has no impact on the probability of occurrence of such events and does not involve a significant increase in the probability of an accident previously evaluated.

With regard to consequences of previously evaluated accidents, evaluations were documented in References 7.1, 7.2, and 7.3 that assessed the impact of the change in MFIV actuators and an associated 15-second MFIV stroke time (for operating conditions that include secondary system pressures above the reference pressure that corresponds to P-11 permissive) on LOCA mass and energy releases; main steamline break mass and energy releases; LOCA and LOCA related transients; non-LOCA transients; LOCA hydraulic forces and steam releases used for radiological consequence calculations. The consequences of those evaluations are not adversely affected by the proposed change to an increasing MFIV stroke time limit where appropriate for lower secondary system pressures. The evaluations discussed in Section 4.0 demonstrate that such an increase in the MFIV stroke time from the 15 seconds assumed in the analyses performed in support of the Callaway RSG Program (Reference 7.3) to a higher bounding stroke time value of 90 seconds where appropriate for lower secondary system pressures is acceptable with respect to the impacted accident analyses. The resulting interpolated TS curve proposed as TS Figure 3.7.3-1 provides an MFIV stroke time limit that is pressure dependent but bounding, as it ensures the applicable FSAR Chapter 15 events that credit MFIV closure remain bounding.

Therefore, the proposed change does not result in a significant increase in the probability or consequences of an accident previously evaluated.

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

Response: No.

The proposed changes do not involve any hardware or design changes nor any changes in the methods by which safety-related plant systems perform their safety function. No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures are introduced as a result of this request. There will be no adverse effect or challenges imposed on any safety-related system as a result of the proposed change.

Therefore, the proposed change does not create a new or different kind of accident from any accident previously evaluated.

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

Response: No.

The proposed changes to incorporate a pressure-dependent MFIV surveillance stroke time limit and to modify the Note(s) on SR 3.7.3.1 and SR 3.7.3.2 do not affect any safety analysis acceptance criteria nor involve any change to a safety analysis limit, limiting safety system setting, or safety system performance criterion. There will be no effect on the manner in which safety limits or limiting safety system settings are determined nor will there be any effect on those plant systems necessary to assure the accomplishment of protection functions. The radiological dose consequence acceptance criteria will continue to be met. There will be no significant impact on the overpower limit, departure from nucleate boiling ratio limits, heat flux hot channel factor ($F_Q$), nuclear enthalpy rise hot channel factor (F-delta-H), loss of coolant accident peak cladding temperature (LOCA PCT), peak local power density, or any other margin of safety. The radiological dose consequence acceptance criteria listed in the Standard Review Plan will continue to be met.

Therefore, the proposed change does not involve a significant reduction in the margin of safety.

Conclusion

Based on the above evaluations, AmerenUE concludes that the activities associated with the changes described above present no significant hazards consideration under the standards set forth in 10 CFR 50.92 and accordingly, a finding by the NRC of no significant hazards consideration is justified.

ULNRC-05224

ATTACHMENT 6

RESPONSES TO NRC QUESTIONS REGARDING LAR OL-1258

Responses to NRC Questions Regarding LAR OL-1258

1. *The safety analysis limit curve for the MFIV closure time is presented in the figure provided in Attachment 6 to ULNRC-05206. This curve shows the MFIV safety analysis limits are 90 seconds at or below the P-11 permissive, and 15 seconds above the P-11 permissive. Therefore, it appears that this license amendment request is to change the safety analysis limit for the MFIV closure time from 15 seconds to 90 seconds at or below the P-11 permissive, but that the safety analysis limit above P-11 (i.e., the 15 seconds) is not being changed. The proposed Figure 3.7.3-1 (showing the acceptable MFIV closure times as a function of SG pressure) has a curve which is always less than the two MFIV safety analysis limits, so that demonstrating the MFIV closure time is within the acceptable range in Figure 3.7.3-1 would demonstrate that the measured MFIV closure time is also within the safety analysis limits and, therefore, the MFIV is operable with respect to its closure time. Discuss if the NRC staff's interpretation of the amendment request is correct and why, if the MFIV safety analysis limit above the P-11 permissive is not being changed, the effect of the 15-second closure time on accidents above the P-11 permissive is addressed in ULNRC-05206.*

**Response:**

The above interpretation is correct with respect to what is shown on proposed Figure 3.7.3-1, but it should be noted that it is not the intent of the license amendment request (LAR) to request changing the safety analysis limit for the MFIV closure time from 15 to 90 seconds. More precisely, the LAR was submitted for the purpose of changing the Technical Specification acceptance criteria for the MFIV closure time.

The noted safety analysis limits (15 seconds and 90 seconds) apply within their respective pressure ranges (as defined by secondary system pressure being above or below the secondary system pressure associated with P-11). However, the analyses take into account the fact that secondary system pressures can change significantly during some analyzed faults/events, so that a transition in secondary system pressure from an initial operating level above P-11 to a level below P-11 can occur in a short period of time, during which time main feedwater isolation may be assumed to occur. Thus, although a 15-second stroke time analysis limit is already part of the current licensing basis for Callaway, it is still necessary to address it in the context of the new analyses that have been done for the 90-second analysis limit, as applicable.

The steam line break (SLB) is an example of an event that can involve significant depressurization of the secondary system and where both analysis limits may be considered. This event is addressed in the Analysis section of the LAR (i.e., in Section 4.1 of Attachment 1 of the LAR), wherein a steam line break initiated from operating conditions below P-11, as well as one initiated from conditions above P-11, is addressed.

In the context of these discussions, both MFIV stroke-time analysis limits (90 seconds and 15 seconds) are mentioned since both pressure ranges are involved or considered.

2. *Where in Attachment 1 to ULNRC-05206, is it explained that the secondary system pressure (i.e., SG pressure) that corresponds to operating conditions at the reference permissive P-11 is 600 psig?*

**Response:**

The steam generator steam pressure of 600 psig corresponds to the point at which the Safety Analysis Limits "curve" transitions from a stroke time of 90 seconds to 15 seconds on the figure provided as Attachment 6 to the LAR. However, 615 psia is the value identified and discussed in several places within the Technical Analysis section of Attachment 1 to the LAR. These pressures are related to the P-11 permissive but they differ due to a conservatism that was applied in the MFIV analyses (i.e., re-analyses), as further explained below.

With regard to P-11, this permissive, which is set at 1970 psig pressurizer pressure, allows manual blocking of safety injection (SI) actuation based on low pressurizer pressure, i.e., $\leq$ 1885 psig (primary system), and low steam line pressure, i.e., $\leq$ 615 psig (secondary system). These blocks allow normal plant cooldown and depressurization without safeguards actuation from a safety injection signal (SIS) or steam line isolation (SLI) signal (SLIS). The permissive to block SI on a low pressurizer pressure condition is generated by two out three pressurizer pressure channels indicating below 1970 psig. The block is effected by depressing two main control board (MCB) block pushbuttons, one for each train, when below the P-11 setpoint. When pressurizer pressure increases above 1970 psig on two of three channels, the SI blocks are automatically reset (defeated). Similar provisions exist to block SI/SLI on a low steam line pressure condition (such that separate sets of block/reset pushbuttons are utilized for the pressurizer pressure safety injection and steam line pressure safety injection/steam line isolation signals). The applicable setpoint for SI/SLI is a low steam line pressure of 615 psig on two out of three channels for any of the four steam lines.

Besides the above functions/blocks associated with P-11, it should be noted that P-11 is also a procedural action limit (during plant depressurization/cooldown) by which the plant is required to be borated to Mode 5 (200°F) levels when SI is blocked, as noted in the LAR (Section 4.1 of Attachment 1).

Although 615 psig is the pressure value corresponding to the main steam line pressure setpoint that may be associated with P-11 (as described above), for the MFIV evaluations and re-analyses a conservative secondary side pressure of 615 psia was used, which corresponds to approximately 600 psig. This is conservative since boration to Mode 5 (200°F) levels will be procedurally effected at or by the time the low steam line pressure

setpoint of 615 psig is reached (for P-11), which is above the 600 psig value assumed in the MFIV analyses.

3. *Has Reference 7.6, WCAP-9226-P, been reviewed and approved by NRC, and if so, what is the date of the NRC approval letter?*

**Response:**

WCAP-9226 is referenced in sections of the Callaway FSAR; in the license amendment request (LAR) that was submitted to support steam generator replacement (ULNRC-05056, dated September 17, 2004), and in the original submittal to revise the MFIV stroke time to 15 seconds (ULNRC-04592, dated June 27, 2003). The WCAP is referred to as "WCAP-9226" or "WCAP-9226-P" in some cases, but in at least one case it is identified as "WCAP-9226-P-A," thus indicating that it is an NRC-approved licensing topical report.

In Section 15.1.5 of the Callaway FSAR, in particular, where the analysis of a main steam line rupture is addressed, a reference to this WCAP is made as Reference 6 in the list of references provided for this FSAR section. The list of references is given in Section 15.1.6. Reference 6 is in fact the NRC approval letter that was issued for WCAP-9226-P (proprietary version) and WCAP-9227 (which is the non-proprietary version). The letter is identified as follows:

[Reference] 6. Letter from A. C. Thadani (NRC) to W. J. Johnson (Westinghouse), January 31, 1989, Subject: "Acceptance for Referencing of Licensing Topical Report, WCAP-9226-P (Proprietary) and WCAP-9227 (Non-proprietary), Reactor Core Response to Excessive Secondary Steam Releases."

4. *On page 6 of 16 of Attachment 1 to ULNRC-05206, with respect to the steam line break (SLB) below P-11, it states, "Furthermore, the addition of main feedwater to the steam generators from these conditions would be significantly less than that assumed in the current FSAR analysis." Where in Attachment 1 is a statement that describes the effect of the addition of main feedwater to the steam generators from these conditions, as assumed in the current FSAR analysis?*

**Response:**

The hot zero-power (HZP) steam line break (SLB) is identified as a limiting event per the discussion on page 5 of Attachment 1 to ULNRC-05206. This event is addressed so as to gauge the effects of an SLB occurring at conditions below P-11 relative to the HZP SLB.

Although main feedwater availability would be limited during no-load/HZP conditions, main feedwater flow is conservatively assumed in the analysis to increase to a nominal (full-power) mass flow rate at the beginning of the transient. This maximizes the initial feedwater flow to increase the heat removal capacity of the steam generators. This feedwater flow is maintained until feedwater isolation occurs. Auxiliary feedwater (AFW) flow is then assumed to be initiated.

As further stated on page 5, a very conservative auxiliary feedwater flow (AFW) model is utilized, in which AFW flow to the steam generators is assumed so as to maximize the cooldown of the RCS. The model preferentially directs the majority of the AFW flow to the faulted steam generator (i.e., the steam generator with the broken steam line), resulting in very significant asymmetric RCS loop temperatures. Although the cooldown effect (initially from the assumed main feedwater flow and then from the assumed AFW flow, to the steam generators) causes a positive reactivity insertion in the reactor core via the negative moderator temperature coefficient, it is this asymmetric temperature distribution in the core that makes the SLB a limiting DNBR transient.

For an SLB event initiated below P-11, the discussion on page 6 is intended to explain why such events are less limiting (compared to the HZP SLB). Two points are made to explain why. One is that plant procedures require the RCS to be borated to Mode 5 levels when the safety injection signal is blocked at P-11 (on low steam line pressure), thereby negating any positive reactivity addition that could otherwise result in a return to power. The second point is that during such conditions (below P-11), feedwater flow to the steam generators would be significantly less than that assumed in the analysis. Thus, an SLB event initiated from conditions below P-11 would not challenge the applicable DNBR limits regardless of the MFIV stroke time assumed.

5. *On page 7 of 16 in Attachment 1 to ULNRC-05206, there is a sentence at the end of the subsection on main feedwater malfunctions which states, "Feedwater flow is significantly reduced in lower mode conditions." What does this statement mean in light of the fact that it follows the statement, "Feedwater malfunction events initiated from conditions where the MFIV stroke time to be assumed would be in excess of 15 seconds [(i.e., at or below the P-11 permissive)] ... would not be severe enough to challenge the safety analysis DNBR limits"? I assume references to feedwater mean main feedwater.*

**Response:**

The feedwater malfunctions of concern with respect to potential DNBR concerns are those that could result in either increased feedwater flow or decreased feedwater temperature (for reasons similar to the SLB). In a manner similar to what was done for the discussion of the SLB in the LAR, the feedwater malfunction evaluation provided in the LAR first identifies and describes the limiting feedwater malfunction, which is in this

case a feedwater malfunction that occurs at hot full-power (HFP) conditions, and then compares or gauges the effects of less severe cases relative to the limiting case.

The first point made in the discussion is that there is no immediate, significant reduction in secondary system pressure at the onset of a feedwater malfunction (at least not prior to main feedwater isolation). As a result, MFIV stroke time would not be affected. (Secondary system pressure would not fall to below P-11 levels until after the MFIVs closed.) The second point made is that for a feedwater malfunction that is initiated at lower pressure conditions (such as at or below P-11 levels), there would be less of a driver for main feedwater flow during the transient time before isolation, and so any potential cooling effect due to feedwater flow would be less severe than the HFP case, even for a longer MFIV stroke time.

Thus, the statement, "Feedwater flow is significantly reduced in lower mode conditions," is primarily meant to address an event that starts in Mode 3 below P-11. The statement, "Feedwater malfunction events initiated from conditions where the MFIV stroke time to be assumed would be in excess of 15 seconds [(i.e., at or below the P-11 permissive)] ... would not be severe enough to challenge the safety analysis DNBR limits," is meant to address the potential for increased MFIV stroke times for an event that starts in Mode 1 but which potentially results in the secondary side depressurizing.

In these evaluations/discussions (above and in the LAR), "feedwater" generally means main feedwater. The discussions in the responses and in the license amendment request either directly refer to main feedwater or to auxiliary feedwater, or it is clear from the context of the discussion which feedwater system is addressed. The following example provides a case where the term "feedwater" flow refers to both "main feedwater" and "auxiliary feedwater": In Attachment 1 to ULNRC-05206, on page 9 of 16, the fifth paragraph includes the following statement, "Conservatisms in the methodology related to feedwater flow include very large increases in the main feedwater flow rate due to the increase in steam demand, and a large auxiliary feedwater flow rate based on maximizing the output of the AFW pump."

6. *Where in the FSAR, TS Bases, or previous submittals is there a description of the main feedwater system that includes the feedwater lines, pumps, MFIVs, check valves, and SGs?*

**Response:**

Callaway FSAR Section 10.4.7 describes the Condensate and Feedwater Systems. This section includes or refers to FSAR Figure 10.4-6, Sheets 1 and 2, which are Piping and Instrumentation Diagrams (P&IDs) for the system(s). Nevertheless, a brief description of the main feedwater system is provided as follows.

The function of the main feedwater system is to deliver feedwater to the steam generators. The feedwater system preheats, pressurizes, and transports feedwater from the main condensate system and heater drain pumps to the steam generators. The feedwater system extends from the feed pump suction valves to the inlet of the steam generators.

The feedwater system includes two, 50-percent capacity, variable speed, turbine-driven pumps and two trains of high pressure (HP) feedwater heaters. The feedwater pumps raise the feedwater pressure to meet the flow demand on the system. The main feedwater pumps (MFPs) are horizontal, single-stage, centrifugal pumps, each coupled to a steam turbine. The MFP turbines are supplied with steam from the main steam bypass header at low plant loads, and from the moisture separator reheater (MSR) outlet during normal operation above approximately 25 percent power.

The MFPs discharge to the HP feedwater heaters through a common header. The HP heaters consist of two trains of three heaters each. The feedwater is heated by the high pressure (HP) feedwater heaters. Feedwater from the HP heater trains flows into another common feed header. This common feed header splits into four feed lines to supply the individual steam generators.

Each feed line contains a feedwater control (regulating) valve (MFRV) and feedwater control (regulating) valve bypass control valve (MFRVBV) in parallel. Downstream, just prior to penetrating containment, each line contains a feedwater isolation valve (MFIV) in series with the MFRV. The MFIV and MFRV are in a different flow path than the MFIV and MFRVBV. The MFIVs are located upstream of the auxiliary feedwater injection point so that auxiliary feedwater may be supplied to the steam generators following MFIV closure.

The MFIVs form the containment isolation barrier for each feed line. The MFIVs are installed to prevent uncontrolled blowdown from any steam generator in the event of a feedwater pipe rupture in the turbine building. In the event of a secondary cycle pipe rupture inside containment, the MFRV (and associated MFRVBVs) provide a diverse backup to the MFIVs to limit the quantity of high energy fluid that enters the containment through the broken loop.

In addition to the MFIVs, check valves inside containment, downstream of the auxiliary feedwater connection, are situated in the feedlines. In the event of a secondary pipe rupture inside containment, the main feedwater check valves provide a diverse backup to the MFIV to ensure the pressure boundary of any intact loop not receiving auxiliary feedwater. In the event of a feed line rupture between the containment and the main feedwater check valve, the feedwater check valve will close and terminate blowdown from the steam generator.

7. *In the background on the MFIV actuators, on pages 2 and 3 of Attachment 1 to ULNRC-05206, there are the statements that the actuators use the pressure of the process fluid to close the MFIVs, an inherent feature of the actuators is that the valve closure time is a function of the system conditions (pressure and temperature), and the valves tend to close more slowly at lower SG pressure. Explain the relationship used to correlate the system conditions at the MFIVs to the pressure in the SGs so that the MFIV closure time in Figure 3.7.3-1 is presented as a function of the SG pressure.*

**Response:**

The vendor-calculated single-train performance curve was established using shop test data and validated with Callaway-specific single-actuation train field test data under high Mode 4 and Mode 3 normal operating pressure/normal operating temperature (NOP/NOT) conditions. To establish desired stroke time test margin, discussions with Westinghouse determined that a stroke time of 90 seconds below P-11 could be supported through re-evaluation and re-analyses. Based upon this information, the vendor-supplied single-train performance curve was adjusted upwards to provide test acceptance criteria that would be well within the analysis values, particularly the limit of 90 seconds with no steam generator steam pressure at the MFIV. This pressure-based performance curve was then correlated to steam generator steam pressure by conservatively reducing the pressure for each corresponding stroke time point on the curve by 19.1 psig [which is the difference in head elevation between RSG water level at 100% (narrow range) and the elevation of the MFIVs], thus establishing the curve provided as proposed Figure 3.7.3-1.

8. *Given the figure in Attachment 6 to ULNRC-05206 on the measured MFIV closure time as a function of SG pressure, explain the basis for the assumption of a 90-second maximum time for MFIV closure at or below the P-11 permissive. (Below the P-11 permissive SG pressure, the maximum MFIV stroke time is shown in proposed Figure 3.7.3-1, for zero SG pressure, to be less than 60 seconds.)*

**Response:**

Consistent with the response to Question 7, an analysis stroke time limit of 90 seconds was selected for the range of pressure below the value corresponding to P-11 in order to fully bound expected stroke times in this range relative to the applicable accident analyses as re-evaluated for the RSGs. This provides margin between the limits/assumptions of the safety analyses and the test acceptance criteria developed for the MFIVs at low pressures.

9. *In the discussion of the MFIV control timer change on page 10 in Attachment 1 to ULNRC-05206, there is a sentence in the first paragraph that states, "In response to concerns over MFIV closure during a feed water line break with no system pressure available and based upon the hot functional testing of the MFIV actuators, the time delay was increased from 30 seconds to 60 seconds." Is this the time delay to re-energize solenoid valves MV5 and MV6 after MFIV closure, and why was the time delay extended from 30 seconds to 60 seconds when the Reference 1 application was for a maximum MFIV closure time of 15 seconds?*

**Response:**

Yes, the 60-second time delay (as revised) is the time delay to re-energize MV5 and MV6 after receipt of an MFIV closure signal. The time delay was set at 60 seconds to ensure MFIV closure with no steam generator steam pressure available. (See ULNRC-04928 dated December 12, 2003.)

10. *In the discussion of the MFIV control timer change above, the conclusion on page 11 of Attachment 1 is that the change in time delay from 60 seconds to 120 seconds does not affect the MFIV closure time. Does the MFIV control timer only determine when the solenoid valves MV5 and MV6 are re-energized following MFIV closure? That is, is the increase in the time from 60 seconds to 120 seconds intended to allow these solenoid valves to be re-energized after the maximum MFIV closure time of 90 seconds at or below the P-11 permissive? Explain what would happen if these two solenoid valves would be re-energized before MFIV closure, and what could be done, other than via the timer, to prevent this from happening. Address whether there needs to be a Technical Specification surveillance on the control timer as part of the verification of the MFIV closure time.*

**Response:**

The 120-second time delay only determines when MV5 and MV6 will re-energize after receipt of an MFIV closure signal. The increased time delay from 60 seconds to 120 seconds will ensure MFIV closure with no feedwater system pressure available (i.e. $\leq$90 seconds). If both MV5 and MV6 re-energize before MFIV closure, then a much smaller vent path for the lower piston chamber would be available and the MFIV closure time would increase. This double failure (i.e., re-energization of both MV5 and MV6) is not credible, however, since the time delays for MV5 and MV6 are parameters within separate Main Steam and Feedwater Isolation System (MSFIS) actuation logic trains.

To ensure the MSFIS logic time delays are modified correctly, a post-modification test will be performed. In addition to the post-modification test, normal operational evolutions demonstrate the ongoing functionality of the time delays. Since the time delays are numerical constants within the MSFIS logic, the numerical value cannot be

changed without an approved plant modification. Based on these facts or considerations, there is no need for a Technical Specification surveillance for the time delays.

11. *In the discussion on the implementation of MFIV testing required by SR 3.7.3.3 on page 11 of Attachment 1 to ULNRC-05206, it is stated that "it is AmerenUE's intent to perform stroke-time 'baseline' testing of the MFIVs at several pressure values over the test pressure range." Address this statement by describing what testing has been done on the MFIVs prior to this application and what testing will be done during the implementation of this proposed amendment including the test pressure range. Address the testing that would be done for "actual plant conditions (using only a single actuation train to stroke each MFIV)" and how the curve for the "calculated single train stroke time" in the MFIV closure time versus SG pressure figure, which is in Attachment 6 to ULNRC-05206, was determined. For the testing during implementation of the proposed amendment, discuss the assurance that Figure 3.7.3-1 will bound any testing of the MFIVs and what would be done if the testing using a single actuator train would show that Figure 3.7.3-1 is not conservative.*

**Response:**

Attachment 6 reflects results obtained from dual-train shop tests performed by the MFIV actuator manufacturer in their testing facility. In addition to these dual train shop tests, several single-train shop tests were also performed. Callaway has also performed post-installation stroke time tests using single actuation trains under high Mode 4 conditions and at Mode 3 NOP/NOT. In addition, Callaway has performed dual-actuation stroke time tests when in low Mode 3 conditions. These tests collectively supported development of the curves provided in the figure of Attachment 6.

Callaway intends to test the MFIVs while each steam generator is being supplied from the main feedwater system, at five different steam generator steam pressures starting at high Mode 4 conditions (approximately 100 psig steam generator steam pressure) and ending at Mode 3 NOP/NOT (approximately 1080 psig steam generator steam pressure). Each of these five different steam generator conditions will include a separate test of each actuation train. Callaway plans to perform this testing when plant conditions allow it (such as during restart from Refueling Outage 14), even if the license amendment request has not been approved. All testing will be performed in accordance with the applicable Technical Specifications. Once the requested amendment is implemented, Callaway intends to perform an MFIV stroke time test via each actuation train (for each MFIV) prior to Mode 3 entry.

See response to Question 8 for the discussion on the vendor-supplied, calculated single train performance curve.

Through discussion with the actuator manufacturer and the fact the MFIVs are not stroked frequently, little degradation or change in stroke time performance is expected. The numerous shop tests and field tests that have been performed provide assurance that this is the case. Further, the shape of the curve in proposed TS Figure 3.7.3-1 is fully expected to be confirmed by the baseline testing to be performed (as described above). In the highly unlikely event that the curve would be determined to be non-conservative, action would be taken in accordance with the guidance of NRC Administrative Letter 98-10 (for a non-conservative TS) and Callaway's corrective action program. For an isolated instance in which a single actuation train for an MFIV did not effect closure of the valve within the stroke time requirement of the proposed stroke time curve, the associated solenoid valve MV1 or MV2 would be checked for leak-by and replaced with a spare(s), if necessary.

12. *The regulatory commitment on when the amendment would be implemented is always stated in the license when the amendment is approved, and it therefore will be a condition of the operating license. Address if (1) the changes to the TS Bases and FSAR identified in Regulatory Commitment 2 and the testing described in Regulatory Commitment 3, which are listed in Attachment 5 to ULNRC-05206, being completed during the implementation of the amendment can be made conditions of this amendment and, therefore, of the operating license. The NRC staff is relying on these commitments.*

**Response:**

Incorporation of the changes to be made to the TS Bases and FSAR were identified as a commitment in this amendment request. However, as a matter of practice, such changes are required to be made in connection with any license amendment involving TS changes, to ensure consistency between those documents and the revised Technical Specifications, regardless of whether a commitment is explicitly made to do so. Such changes are routinely understood to be made without explicitly requiring them to be made via a license condition, as the licensee is bound to make the changes anyway. A license condition for this commitment would therefore not be expected.

The other identified commitments concern implementation of the requested amendment. As noted in the question, the provision for when an amendment is to be implemented is typically stated in the license amendment (i.e., in the cover letter for the amendment), so such a statement would be expected in this case as well. With regard to the commitment made for baseline testing the MFIVs, this has been identified as a regulatory commitment in the LAR as noted. Any deviation from or change to this commitment would be subject to AmerenUE management approval and would be subject to the procedural controls established at Callaway for commitment management, in accordance with the guidance of NEI 99-04. Such controls may include notification to the NRC. Thus, there would be no need for a license condition to ensure compliance with this identified regulatory commitment.

13. *In the footnote on the bottom of page 3 of Attachment 1 to ULNRC-05206, there is the statement that the TS surveillance does not explicitly state that closure time testing of the MFIVs is done using one actuator train. However, in Attachment 4 to ULNRC-05206, there is the following statement in Insert 4 for page B 3.7.3-7 of the TS 3.7.3 Bases for SR 3.7.3.3: "This SR verifies that the closure time of each MFIV is within the limits of Figure 3.7.3-1 from each actuation train when tested pursuant to the Inservice Testing Program." Discuss if this sentence would require that the verification specified in SR 3.7.3.3 would be for each MFIV with only one actuator train working. Include in this discussion, the answers to the following questions:*
*Is the measured closure time for each MFIV with only one actuator train working compared to the closure time in proposed Figure 3.7.3-1, or is the MFIV tested with both actuators working and then corrected for the single failure of one actuator train? Is the proposed Figure 3.7.3-1 for only one actuator train, or for both trains, working to close an MFIV.*

**Response:**

The footnote and Bases insert are consistent in their description of how the MFIVs are to be tested. That is, each MFIV will be closed (when stroke-time tested pursuant to proposed SR 3.7.3.3) via only one of its two actuation trains at a time. Proposed TS Figure 3.7.3-1, which is the same plot indicated by the "Sample TS Curve" on the figure provided as Attachment 6 to ULNRC-05206, assumes and is based on each MFIV being closed via a single actuation train. Attachment 6 includes additional plots such as the Calculated Dual Train Stroke Time and the Calculated Single Train Stroke Time to provide an indication of how different the test results could be when stroking the valves closed using both actuation trains versus a single train. Nevertheless, testing pursuant to SR 3.7.3.3 will require each MFIV to be closed via only a single actuation train, consistent with single-failure/redundancy concepts incorporated into the MFIV design (i.e., that either actuation train can effect closure of the MFIV(s) in the event of a failure or unavailability of the other train). As noted in the LAR, the curve of proposed Figure 3.7.3-1, which constitutes the acceptance criteria for this SR, will be validated by testing (using only a single actuation train at a time for each MFIV) as part of the implementation of the requested license amendment.