

OCTOBER 7, 1996

Tennessee Valley Authority
ATTN: Mr. Oliver D. Kingsley, Jr.
President, TVA Nuclear and
Chief Nuclear Officer
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: INSPECTOR FOLLOWUP ITEM 50-260/95-19-01 AND 50-296/95-19-01
REDUCED SCOPE OF VALVES IN GENERIC LETTER 89-10 PROGRAM

Dear Mr. Kingsley:

The subject item questioned a reduction in the scope of motor-operated valves (MOVs) included in your Generic Letter (GL) 89-10 program. This is to inform you that the NRC has completed an assessment of this issue. The assessment, which is enclosed, concluded that criteria used by TVA in reevaluating the safety functions of the Browns Ferry MOVs were unsatisfactory and may have resulted in inappropriate removal of MOVs from the Browns Ferry GL 89-10 program.

We request that you reexamine the safety functions of your MOVs consistent with the information provided in the enclosed assessment and provide any appropriate corrections to your GL 89-10 and other programs. Please inform us of your findings and of your planned and completed actions within 90 days of the date of this letter. Based on our evaluation and your review, we plan to verify by inspection that Browns Ferry can demonstrate the design-basis capability of the MOVs that are returned to the GL 89-10 program.

If you have any questions or comments regarding this matter please call me at (404) 331-5596.

Sincerely,
ORIGINAL SIGNED BY
PAUL FREDRICKSON

Paul E. Fredrickson, Chief
Special Inspection Branch
Division of Reactor Safety

Docket Nos. 50-259, 50-260, 50-296
License Nos. DPR-33, DPR-52, DPR-68

Enclosure: Assessment

cc w/encl: (See page 2)

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PDR ADOCK 05000259
Q PDR

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cc w/encl:

O. J. Zeringue, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Dr. Mark O. Medford, Vice President
Technical Services
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

R. D. Machon
Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P. O. Box 2000
Decatur, AL 35602

Raul R. Baron, General Manager
Nuclear Assurance and Licensing
Tennessee Valley Authority
4J Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Pedro Salas, Manager
Licensing and Industry Affairs
Tennessee Valley Authority
4J Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Timothy E. Abney, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P. O. Box 2000
Decatur, AL 35609

(cc w/encl cont'd - See page 3)

TVA

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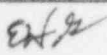


(cc w/encl cont'd)
General Counsel
Tennessee Valley Authority
ET 10H
400 West Summit Hill Drive
Knoxville, TN 37902

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611

State Health Officer
Alabama Department of Public Health
434 Monroe Street
Montgomery, AL 36130-1701

Distribution w/encl:
E. W. Merschoff, RII
M. S. Lesser, RII
J. F. Williams, NRR
F. J. Hebdon, NRR
S. E. Sparks, RII
H. L. Whitener, RII
C. F. Smith, RII
D. H. Thompson, RII
J. H. Moorman, RII
P. Steiner, RII
G. A. Hallstrom, RII
PUBLIC

NRC Senior Resident Inspector
U.S. Nuclear Regulatory Commission
10833 Shaw Road
Athens, AL 35611

OFFICE	RII DR5	RII DR6	RII DRP			
SIGNATURE						
NAME	GIRARD	FREDRICKSON	LESSER			
DATE	10 / 4 / 96	10 / 7 / 96	10 / 4 / 96	10 / / 96	10 / / 96	10 / / 96
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ASSESSMENT OF REMOVAL OF CERTAIN MOTOR-OPERATED VALVES
FROM THE SCOPE OF THE GENERIC LETTER 89-10 PROGRAM
BROWNS FERRY NUCLEAR POWER PLANT, UNITS 2 AND 3
DOCKET NOS. 50-260 AND 50-296

BACKGROUND

In late 1994, the Tennessee Valley Authority (TVA, the licensee) reevaluated the safety functions of the motor-operated valves (MOV) in the program developed in response to Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," at the Browns Ferry Nuclear Plant (BFN) Units 2 and 3. As a result, the licensee removed 20 MOVs from the scope of the GL 89-10 program at each unit. Based on a report by its contractor, the licensee determined that 19 of the 20 subject MOVs merely helped ensure dependable system operation and prevent unnecessary challenges to safety systems. The licensee has placed these 19 MOVs in a category it refers to as System Operational Enhancement (SOE) valves. According to the licensee, SOE valves were subject to the same calculations, drawings, and setup requirements as GL 89-10 valves. The licensee has stated that GL 89-10 programmatic provisions, such as differential pressure testing, periodic reverification and trending of diagnostic test data, would not be applied to the SOE valves. The licensee does indicate that reverification of MOV acceptability would be performed if maintenance activities that are capable of altering the switch settings to the point where they are no longer within the acceptable range are performed.

The remaining MOV, 2/3-FCV-78-68, apparently was not classified by the licensee as within the scope of GL 89-10 or as an SOE valve.

ASSESSMENT

A. GL 89-10 VERSUS SOE CLASSIFICATION

In GL 89-10, the staff requested licensees to ensure the capability of MOVs in safety-related systems to perform their intended functions by reviewing MOV design bases, verifying MOV switch settings initially and periodically, testing MOVs under design-basis conditions where practicable, improving evaluations of MOV failures and corrective action, and trending MOV problems. GL 89-10 included safety-related MOVs and mispositionable MOVs within its scope when issued. GL 89-10 notes that the term "safety-related" refers to those systems and components that are relied on to remain functional during and following design-basis events to ensure (i) the integrity of the reactor coolant pressure boundary, (ii) the capability to shut down the reactor and maintain it in a safe shutdown condition, and (iii) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines of 10 CFR Part 100. In Supplements 4 and 7 to GL 89-10, the staff eliminated the recommendation that mispositionable valves be considered in GL 89-10 programs. Therefore, the licensee should consider each MOV classified as safety-related to be within the scope of GL 89-10.

ENCLOSURE

GL 89-10 allowed flexibility for licensees to establish MOV programs at their nuclear power plants. In issuing GL 89-10 and its supplements, the staff recognized that licensees may take different approaches in verifying the design-basis capability of individual safety-related MOVs. In Supplement 1 to GL 89-10, the staff provided examples of when safety-related MOVs could be removed from consideration for dynamic testing under GL 89-10.

Supplement 1 also states that it would not be possible to remove an MOV that must change position to perform its safety function completely from the GL 89-10 program because the operability of the MOV under its design-basis conditions must be demonstrated. A licensee may be able to remove safety-related MOVs from the scope of GL 89-10 if it is not required to reposition for any design-basis event. Supplement 6 to GL 89-10 provides guidance for grouping of MOVs if certain MOVs cannot be tested under dynamic conditions or where a licensee is attempting to reduce the amount of MOV dynamic testing.

The staff believes that the licensee may be able to demonstrate the design-basis capability of its SOE valves based on the licensee's assertion that the same calculations, drawings, and setup requirements are prepared for the SOE valves as for the GL 89-10 valves. However, the licensee would need to justify the thrust and torque requirements established for its SOE valves in light of the lack of dynamic test data for these valves. The licensee could accomplish this justification by grouping its SOE valves with valves tested under dynamic conditions at Browns Ferry, at other plants or test facilities, or by using industry methodologies, such as the EPRI MOV Performance Prediction Methodology as discussed in the staff's Safety Evaluation (SE) dated March 15, 1996.

The staff does not believe that the licensee's SOE classification meets the intent of GL 89-10 because the licensee indicates that the design-basis capability of the SOE valves will not be periodically verified and their performance will not be trended. The omission of periodic verification of MOV design-basis capability and performance trending could result in the MOV failing to perform its safety function at some time in the future as a result of degradation. Therefore, the staff does not consider the licensee's establishment of an SOE classification to be an acceptable alternative to GL 89-10 for safety-related valves.

As discussed below, the staff has identified some issues associated with TVA's criteria used to determine which valves are within the scope of GL 89-10. These concerns could lead to some components being improperly classified as SOE valves.

On September 18, 1996, the staff issued GL 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves", requesting licensees to establish a program, or to ensure the effectiveness of their current program, to verify on a periodic basis that safety-related MOVs continue to be capable of performing their safety functions within the current licensing bases of the facility. The Browns Ferry licensee's SOE valve classification with its omission of periodic verification and trending would not meet the intent of GL 96-05 for safety-related MOVs.

B. LICENSEE CRITERIA FOR GL 89-10 SCOPE REDUCTION AT BROWNS FERRY

In reevaluating the safety function of its GL 89-10 MOVs, the licensee relied on a report titled "Assessment of Browns Ferry Units 2 and 3 Motor Operated Valves" (dated November 11, 1994, and prepared by its contractor, S. Levy Incorporated). The licensee's report states that

the assessment of GL 89-10 provisions as they apply to Browns Ferry focused on the MOVs listed in TVA's "NRC Generic Letter 89-10 - Motor Operated Valve Evaluation" (Revision 9) and consisted of three tasks. In the first task, the licensee's contractor applied specific criteria to determine the MOVs considered to have an active safety function. In the second task, the licensee's contractor evaluated MOVs that TVA had previously identified as SOE valves to determine if any of these MOVs had an active safety function using its specific criteria. In the third task, the licensee's contractor identified those MOVs that it believed could be eliminated from the GL 89-10 program at Browns Ferry.

The criteria used by TVA in reevaluating the safety function of its GL 89-10 MOVs are essentially the same as those used by the licensee of the Hatch nuclear plant in reevaluating the safety function of its GL 89-10 MOVs. In a letter dated October 10, 1995, the staff provided its SE on the Hatch licensee's justification for the assigned safety function of several MOVs. Similar discussion is provided in the SE (dated June 25, 1996) related to the request by the licensee of the Duane Arnold nuclear power plant to remove several MOVs from its GL 89-10 program.

Below, the staff provides its views on the specific criteria used by the Browns Ferry licensee in reevaluating the safety function of its MOVs:

1. Licensee Criterion 1 states that demonstration of the operability of MOVs for normal plant operation are considered satisfied by attaining a normal plant operating condition and that no specific additional testing of the valves is required.

A licensee fulfilling the intent of GL 89-10 should ensure that safety-related MOVs can perform their design-basis functions including normal operations. The scope of GL 89-10 extends to safety-related MOVs as defined in the NRC regulations. In GL 89-10, the staff requests licensees to determine the design-basis for the operation of each safety-related MOV including the maximum differential pressure expected during both the opening and closing of the MOV for both normal operations and abnormal events, to the extent that these MOV operations and events are included in the existing approved design-basis. The need for any specific additional testing as discussed in the criterion would depend on the licensee's justification.

2. Licensee Criterion 2 states that the provisions of GL 89-10 are limited to valves changing position from the normal operating position to the position required to mitigate design-basis events. The criterion then states that a valve is required to change position only if the consequences of the design-basis event would exceed the event acceptance limits if it did not change position.

In applying this criterion, a licensee would need to justify its bases for asserting that the consequences of a safety-related MOV being unable to reposition during any design-basis event are not significant. For example, in Supplement 1 to GL 89-10, the staff stated that safety-related MOVs that are always in their safety position, or would have no effect on the operation of the safety train if placed in the nonsafety position, could be removed from the GL 89-10 program. Further, containment isolation valves will always have a safety function to close regardless of their system performance requirements. As discussed above, GL 89-10 allows licensees flexibility in justifying

that specific MOVs are capable of performing their safety function under the applicable design-basis conditions.

In addition, safety-related MOVs that are placed in a position that prevents the safety-related system (or train) from performing its safety function must be demonstrated to be capable of returning to their safety position, or the system (or train) must be declared inoperable and the appropriate plant technical specifications followed.

3. Licensee Criterion 3 states that valve operability as defined in GL 89-10 is not required during periods of system or component testing, or when the plant operating mode is controlled by plant technical specifications. As a basis for this criterion, the licensee references industry documents dated April 1969 and January 1973 on surveillance test intervals and allowable repair times.

The licensee's criterion is inconsistent with staff positions on the capability of safety-related equipment. The NRC regulations require that plant components be capable of performing their safety functions. This is discussed in Section 3.1.2 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," issued via GL 89-04 (Supplement 1), "Guidance on Developing Acceptable Inservice Testing Programs," dated April 4, 1995. In Supplement 1 to GL 89-10, the staff discussed the consideration of differential pressure and flow conditions when an MOV may need to change positions. In GL 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," the staff stated that the use of probabilistic risk assessment or probabilities of the occurrence of accidents or external events is not acceptable for making operability decisions.

As noted above, safety-related MOVs that are placed in a position that prevents the safety-related system (or train) from performing its safety function must be demonstrated to be capable of returning to their safety position, or the system (or train) must be declared inoperable and the appropriate plant technical specifications followed.

Some licensees have asserted that their licensing basis does not include consideration of the operability of surveillance test valves when in their non-safety position. With respect to such valves, the staff has accepted demonstration (such as described in the Duane Arnold SE) that these valves have design-basis capability, together with administrative procedure and commitments to maintain their capability until agreement is reached with the staff on the required licensing basis, as sufficient to close the staff's review of the GL 89-10 program. The proposed generic letter on MOV periodic verification specifically includes surveillance test valves for long-term performance capability.

4. Licensee Criterion 4 states that design-basis events are limited to anticipated operational transients and accidents as defined by the safe shutdown analysis.

The licensee's criterion does not appear consistent with the guidance in GL 89-10. In the second footnote in GL 89-10, the staff states that design-basis events are defined as conditions of normal operation, including anticipated operational occurrences,

design-basis accidents, external events, and natural phenomena for which the plant must be designed to ensure the function delineated as "safety-related" can be performed. The staff further states in the footnote that the design bases for each plant are those documented in pertinent licensee submittals, such as the final safety analysis report.

The BFN licensee's report states that TVA assigned certain MOVs in the Reactor Core Isolation Cooling (RCIC) system as SOE valves. As a basis for this assignment, the licensee's report asserted that the RCIC system is not required for any design-basis event and that the emergency operating procedures identify the potential for using the HPCI system for reactor pressure control. As discussed in a letter to the licensee dated April 11, 1995, the staff noted that TVA had reclassified certain functions of the RCIC system as "quality-related" from its original "safety-related" classification. In the April 11, 1995 letter, the staff concluded that the licensee's reclassification of the RCIC system was acceptable based on (1) the determination that the RCIC system is not required to mitigate a design-basis accident or abnormal operational transient, (2) the licensee's commitment, for other regulatory requirements such as station blackout, to comply with relevant standards which should assure the continuing ability of the RCIC system to function as required, (3) the lack of change in the Technical Specification requirements for RCIC operability, and (4) the lack of change in inservice testing and inspection requirements.

In Bulletin 85-03, "Motor-Operated Valve Common Mode Failures during Plant Transients due to Improper Settings," the staff requested licensees to ensure that MOVs in high pressure coolant injection/core spray and emergency feedwater systems (RCIC systems for BWR plants) that are required to be tested for operational readiness in accordance with 10 CFR-50.55a(g) are set and maintained properly. The staff has considered the expansion of the scope of Bulletin 85-03 to all safety-related systems in GL 89-10 to encompass the RCIC system for BWR plants. Where a licensee does not classify its RCIC system as safety-related (such as at Browns Ferry), the licensee will be expected to maintain justification by some means that this system is, and will continue to be, capable of performing its intended function consistent with licensing commitments, such as Maintenance Rule and Station Blackout requirements. The licensee will also be expected to demonstrate that the applicable RCIC MOVs can perform their safety-related containment isolation functions.

5. Licensee Criterion 5 states that system functional requirements for design-basis events are established by the safe shutdown analysis.

This licensee criterion does not appear consistent with the definitions of "safety-related" and "design-basis events" discussed above.

6. Licensee Criterion 6 states that pipe breaks are not assumed to occur when the system is not significantly pressurized.

This licensee criterion does not appear consistent with the staff position on the consideration of pipe breaks. The consideration of pipe breaks should be consistent with the staff's licensing review for the individual facility.

7. Licensee Criterion 7 states that consideration of valve mispositioning is not required as discussed in Supplement 4 to GL 89-10.

The staff does not object to this licensee criterion. The staff agrees that Supplement 4 to GL 89-10 removed the recommendation that licensees of BWR nuclear plants consider inadvertent mispositioning of MOVs as part of their GL 89-10 programs.

8. Licensee Criterion 8 states that long-term passive failures in piping are not considered to be part of design-basis events.

This licensee criterion does not appear consistent with the staff position on the consideration of pipe breaks. The consideration of long-term passive failures in piping should be consistent with the staff's licensing review for the individual facility. Further, the licensee's evaluation of passive failures must consider valve and pump seal failures as discussed in SECY 77-439.

9. Licensee Criterion 9 states that analysis results for each design-basis event and each system's required capability to satisfy event acceptance limits are provided in the updated final safety analysis report (FSAR).

The staff does not object to this licensee criterion, provided the licensee can demonstrate that the information provided in the updated FSAR is consistent with the licensing basis of the facility.

10. Licensee Criterion 10 states that the single failure criterion is applied to systems required to mitigate the consequences of accidents and that this criterion means that only one single failure proof path success must be provided.

The staff agrees that licensees are required to meet the single failure criterion in the NRC regulations. Other criteria may also apply at the same time (e.g., loss of offsite power). Further, safety systems are required to meet the redundancy provisions of Appendix A to 10 CFR Part 50.

11. Licensee Criterion 11 states that the single failure criterion is not applied to anticipated operational transients.

The consideration of the single failure criterion as applied to anticipated operational transients should be consistent with the staff's licensing review for the individual facility.

C. SCOPE OF GL 89-10 PROGRAM AT BROWNS FERRY

The staff reviewed the safety function of MOVs in the GL 89-10 program at Browns Ferry, including the licensee's reevaluation of the safety function for its GL 89-10 MOVs. Based on this review, the staff has concerns regarding the assigned safety function for certain Browns Ferry GL 89-10 MOVs in light of the above guidance.

For further consideration by the licensee, the staff identifies potential functions and capabilities for the MOVs recently deleted from the Browns Ferry GL 89-10 program and for MOVs that were not included in the Browns Ferry GL 89-10 program:

1. MOVs Recently Deleted From Browns Ferry GL 89-10 program.

- a. The staff believes MOVs that have a containment isolation function must be capable of performing that function regardless of system performance requirements. The following MOV appears to have a containment isolation function not addressed by the licensee:

FCV-70-47 PRIMARY CONTAINMENT OUTLET VALVE FROM RBCCW SYSTEM

- b. As discussed in Item B.4, above, the TVA reclassified its RCIC system as "quality related" instead of its original "safety-related" classification. Therefore, although the flow performance of the RCIC system is not safety-related (and not within the scope of GL 89-10 at Browns Ferry), the licensee should ensure that licensing commitments, such as those associated with the Maintenance Rule and Station Blackout, are satisfied to provide confidence that the RCIC system can perform its intended function. Also as discussed above, the licensee must demonstrate the capability of the applicable RCIC MOVs to perform their safety-related containment isolation function. For the information of the licensee with respect to licensing commitments, it does not appear that the capability of the following RCIC MOVs has been addressed:

FCV-71-08 RCIC TURBINE STEAM SUPPLY VALVE

FCV-71-25 LUBE OIL COOLING WATER SUPPLY FOR RCIC

FCV-71-34 PUMP MIN. FLOW BYPASS VALVE FOR RCIC

FCV-71-39 RCIC PUMP INJECTION VALVE

- c. The staff considers the residual heat removal (RHR) system to have a safety function. The following MOVs are associated with the RHR system and their capability does not appear to have been addressed by the licensee:

FCV-74-07 RHR LOOP I MINIMUM FLOW BYPASS ISOLATION VALVE

FCV-74-30 RHR LOOP II MINIMUM FLOW BYPASS ISOLATION VALVE

- d. The staff considers the capability to isolate a pipe break during plant shutdown conditions to be an important function. The capability of the following MOVs does not appear to have been addressed by the licensee:

FCV-74-47 RHR SHUTDOWN COOLING SUPPLY HEADER OUTBD CONT. ISOL. VALVE

FCV-74-48 RHR SHUTDOWN COOLING SUPPLY HEADER INBD CONT.
ISOLATION VALVE

- e. As noted in the discussion of Criteria 2 and 3 above, the staff believes that MOVs placed in their nonsafety position during valve or system testing must be capable of returning to their safety position or the system (or train) must be declared inoperable. It appears that the licensee aligns the following MOVs to their nonsafety position during testing while assuming the system (or train) remains operable, but has not addressed their capability to return to the safety position:

FCV-71-19 CST SUCTION FROM RCIC PUMP

FCV-73-35 HPCI SYSTEM PUMP TEST RETURN VALVE

FCV-73-36 HPCI/RCIC SYSTEM PUMP TEST RETURN VALVE

FCV-73-81 HPCI ISOLATION VALVE BYPASS VALVE

FCV-74-52 RHR LOOP I OUTBD LPCI THROTTLE VALVE

FCV-74-66 RHR LOOP II OUTBD LPCI THROTTLE VALVE

FCV-75-22 CORE SPRAY LOOP I TEST VALVE

FCV-75-23 CORE SPRAY LOOP I OUTBD INJECTION VALVE

FCV-75-50 CORE SPRAY LOOP II TEST VALVE

FCV-75-51 CORE SPRAY LOOP II OUTBD INJECTION VALVE

In addition, FCV-74-52 and 74-66 appear to have a redundant safety function with FCV-74-53 and 74-67, respectively, to close to allow operation of the suppression pool cooling mode of the RHR system.

- f. Where consistent with the above guidance, the staff does not object to the deletion of the following MOV from the Browns Ferry GL 89-10 program:

FCV-78-68 CONNECTION TO REACTOR WELL

2. MOVs Originally Omitted From Browns Ferry GL 89-10 program

- a. The following MOVs are not required to mitigate any design-basis accident, but have a need to operate for events such as station blackout, and should be assessed by the licensee in accordance with its licensing commitments:

FCV-71-09 RCIC TURBINE TRIP

FCV-71-17/18 RCIC PUMP DISCHARGE VALVE

- b. The following MOVs appear to be placed in their nonsafety position during testing while assuming the system (or train) remains operable, but the licensee has not addressed their capability to return to the safety position:

FCV-71-37 RCIC PUMP DISCHARGE (per licensing commitments)

FCV-71-38 RCIC PUMP TEST RETURN (per licensing commitments)

FCV-73-34 HPCI PUMP DISCHARGE

FCV-75-02 CORE SPRAY PUMP A SUCTION FROM SUPPRESSION POOL

FCV-75-11 CORE SPRAY PUMP C SUCTION FROM SUPPRESSION POOL

FCV-75-30 CORE SPRAY PUMP B SUCTION FROM SUPPRESSION POOL

FCV-75-39 CORE SPRAY PUMP D SUCTION FROM SUPPRESSION POOL

- c. The following MOVs appear to have a safety function associated with shutdown pipe break scenarios that the licensee has not addressed:

FCV-74-12/13/24/35 RHR PUMP SUCTION FROM SUPPRESSION POOL

FCV-75-02 CORE SPRAY PUMP A SUCTION FROM SUPPRESSION POOL

FCV-75-11 CORE SPRAY PUMP C SUCTION FROM SUPPRESSION POOL

FCV-75-30 CORE SPRAY PUMP B SUCTION FROM SUPPRESSION POOL

FCV-75-39 CORE SPRAY PUMP D SUCTION FROM SUPPRESSION POOL

CONCLUSION

The staff concludes that the SOE classification by the Browns Ferry licensee does not meet the intent of GL 89-10 or the proposed generic letter on MOV periodic verification. The staff concludes that the criteria used by TVA in reevaluating its MOVs could lead to inappropriate deletion of a safety function for some MOVs. Because of problems with the criteria TVA used to determine the scope of its GL 89-10 program, some valves may have been improperly classified as SOE instead of GL 89-10. The licensee should include MOVs with safety-related functions within its GL 89-10 program. Above, the staff provided its views on TVA's reevaluation of the safety function of the subject MOVs removed from the GL 89-10 program at Browns Ferry. The staff identified several MOVs that should be reevaluated by TVA based on the staff's review.

For MOVs that do not have safety-related functions (e.g. RCIC for Browns Ferry), the licensee will be expected to maintain the MOVs in accordance with its licensing commitments such as Maintenance Rule or Station Blackout requirements.

With respect to surveillance test valves, the staff has allowed licensees to demonstrate design-basis capability, together with administrative controls and commitments to maintain that capability (until resolution of the appropriate licensing basis for these valves is reached with the staff), as acceptable for closing the staff review of those MOVs under GL 89-10.

TVA should reconsider the safety functions for its MOVs consistent with the information provided above. For those MOVs subject to licensing commitments but outside the scope of GL 89-10 (such as particular Browns Ferry RCIC MOVs), the licensee should assess whether those MOVs can perform their intended functions in accordance with the licensing commitments. The licensee should recognize that containment isolation valves will always have a safety function to close regardless of their system performance requirements.