INSPECTION REQUIREMENTS FOR GENERIC LETTER 89-10, SAFETY-RELATED MOTOR-OPERATED VALVE TESTING AND SURVEILLANCE

SALP FUNCTIONAL AREA: Maintenance (MAINT)

APPLICABILITY: 2515

2515/109-01 PURPOSE

The purpose of this temporary instruction (TI) is to provide guidance to NRC headquarters, regional, and site resident personnel for performing inspections of the activities of nuclear power plant licensees and construction permit holders in response to Generic Letter 89-10 (June 28, 1989), "Safety-Related Motor-Operated Valve Testing and Surveillance." This TI was updated as Revision 1 to incorporate information obtained from the performance of inspections of programs being developed by nuclear power plant licensees in response to Generic Letter 89-10. Subsequently, this TIwas updated as Revision 2 to provide guidance on the closure of the NRC staff review of GL 89-10 programs. Revision 3 notes the issuance of Generic Letter 96-05 (September 18, 1996), "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves."

2515/109-02 OBJECTIVE

The objective of this TI is to provide inspectors with sufficient uniform guidance to determine whether the licensee or construction permit holder has established and is implementing a program that will ensure the proper performance of motor-operated valves (MOVs) in safety-related systems. Part 1 of this TI involved the review of the licensee's program developed in response to Generic Letter 89-10. Upon request, the Mechanical Engineering Branch (EMEB) of the Office of Nuclear Reactor Regulation (NRR) provided assistance to the region in the performance of Part 1 of this TI. The inspections under Part 1 of this TI have been completed, and the guidance for Part 1 inspections is being retained in this TI as background information. Part 2 of this TI involves evaluation of the implementation of the generic letter program by means of sampling MOVs for detailed review. Many Part 2 inspections have been conducted, but some items remain open for subsequent review and closure. Where the Region determines that a GL 89-10 close-out inspection is appropriate, Part 3 of this TI provides guidance for the evaluation of the completion of the GL 89-10 program. EMEB will support region inspections to Parts 2 and 3 of this TI, as resources permit.

2515/109-03 BACKGROUND

The NRC regulations require that MOVs important to safety be treated in a manner that provides assurance of their intended performance. Criterion 1 to Appendix A, General Design Criteria for Nuclear Power Plants, of 10 CFR Part 50 states, in part, that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. The quality assurance program (which includes testing) to be applied to safety-related components is described in Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, to Part 50.

In Generic Letter 89-10, the NRC staff requested holders of operating licenses and construction permits to provide additional assurance of the capability of safety-related MOVs and certain other MOVs in safety-related systems 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 necessary corrective action, and trending MOV problems. Supplement 1 to Generic Letter 89-10 (June 13, 1990) provides the results of public workshops held to discuss the generic letter. In Supplement 2 to Generic Letter 89-10 (August 3, 1990) the NRC staff stated that inspections of program descriptions would not commence until January 1, 1991, and, thus, the program descriptions need not have been available on site until that date. Based on the results of NRC-sponsored MOV tests, Supplement 3 to Generic Letter 89-10 (October 25, 1990) requested licensees of boiling water reactor (BWR) nuclear plants to take action in advance of the Generic Letter 89-10 schedule to resolve concerns about the capability of MOVs used for containment isolation in the steam supply line of the High Pressure Coolant Injection and Reactor Core Isolation Cooling systems and in the supply line of the Reactor Water Cleanup system as well as other systems directly connected to the reactor vessel. Supplement 4 to Generic Letter 89-10 (February 12, 1992) allowed BWR licensees to not address inadvertent MOV operation as part of their Generic Letter 89-10 programs based on a staff study of increase core melt probability resulting from inadvertent MOV operation. Supplement 5 to Generic Letter 89-10 (June 28, 1993) addressed MOV diagnostic equipment accuracy. Supplement 6 to Generic Letter 89-10 (March 8, 1994) addressed such issues as grouping of MOVs and schedule. Supplement 7 to GL 89-10 (January 24, 1996) removed the recommendation that MOV mispositioning be considered by pressurized-water reactor licensees in responding to GL 89-10.

Expectations of the staff in the Generic Letter 89-10 programs are:

(1) The licensee should use the best available MOV test data when sizing and setting its MOVs.

(2) The licensee should test all MOVs in its Generic Letter 89-10 program under maximum achievable differential pressure and flow up to design basis conditions, where practicable. If the licensee chooses not to test an MOV even though testing is practicable, the licensee should be able to justify (as discussed in Supplement 6 to Generic Letter 89-10 with respect to grouping) that a test was not necessary to demonstrate the capability of the MOV to perform its safety function.

(3) The licensee should consider industry test data.

(4) The licensee should have justification for its assumption for each parameter in its MOV calculations.

(5) The licensee should assume a reasonable value based on industry test data for a parameter where it does not have plant specific justification for the parameter.

(6) Where the licensee assumes realistic values based on test data for all parameters, the licensee should take action where the calculation predicts MOV capability problems.

(7) The licensee should undertake prompt evaluation of test results to determine capability under design-basis conditions prior to declaring the MOV operable and returning it to service.

(8) The licensee should have justification for the accuracy of its MOV diagnostic equipment.

Where a licensee follows a different approach than outlined in the staff's expectations, the staff will expect the licensee to have justification for its approach.

2515/109-04 BASIC REQUIREMENTS

PART 1 Program Review

04.01 Review licensee (hereinafter, this term also applies to construction permit holder) commitments in response to the generic letter.

04.02 Evaluate whether the licensee has established a program to provide assurance that the MOVs within the scope of Generic Letter 89-10 are capable of operating under design-basis differential pressure and flow conditions. For each aspect of the generic letter listed below, the inspector should make a determination of whether the licensee's actions are adequate.

a. Establishment of the scope of the program (as part of this evaluation,the inspector should sample several MOVs and assess whether their inclusion or exclusion was appropriate).

b. Development of plans and procedures for the performance of design-basis reviews of the MOVs in the generic letter program.

c. Development of plans and procedures for performing calculations to verify proper sizing of MOVs in the generic letter program and to set their switches adequately.

d. Development of plans and procedures for demonstrating the capability of the MOVs in the generic letter program.

e. Development of plans and procedures for periodic verification of the capability of MOVs in the generic letter program.

f. Development of plans and procedures for analyzing each MOV failure, for justifying corrective action, and for trending MOV failures and corrective actions for MOVs in the generic letter program.

g. Establishment of a schedule for the completion of the individualrecommended actions of the generic letter.

The inspector should verify that all elements of the MOV program are encompassed by the quality assurance criteria of Appendix B to 10 CFR Part 50.

04.03 As part of the review of the licensee's program established in response to Generic Letter 89-10, it will be necessary to review certain aspects of the licensee's

overall program for providing assurance of the proper performance of MOVs. Whereas the following is a list of areas that the inspector may need to address, an asterisk indicates those areas that must be evaluated as part of this TI.

a. Plan, scope and oversight of the MOV program.

b. Design control for motor and actuator size, torque and limit switchsettings, thermal overload protection, and torque switch limiter plate values.

c. Control of MOV switch settings*.

d. Preparation and implementation of inservice testing (IST) program and procedures in accordance with 10 CFR 50.55a and the ASME Boiler and Pressure Vessel Code.

e. Preparation and implementation of preventive and corrective maintenance program and procedures.

f. Training of personnel involved in MOV activities*.

g. Followup and trending of MOV maintenance and problems.

h. Processing and control of operating experience and vendor notifications to the same level of importance as NRC Information Notices (such as receiving all vendor notifications, taking appropriate action, and incorporating applicable information into the training program).

i. Control of MOV modifications and design changes.

j. Procurement of replacement parts and equipment.

k. Control of use of diagnostics (including procedures, training, and evaluation of results)*.

l. Control of open MOV maintenance items.

PART 2 Verification of Program Implementation

04.04 Select a sample of MOVs for detailed review from the population of MOVs in the generic letter program.

04.05 Verify that the licensee has performed design-basis reviews of the sampled MOVs consistent with the generic letter or its commitments (where accepted under Part 1), as appropriate.

04.06 Verify that the licensee has adequately sized the sampled MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate. Verify that switch settings are consistent with the expected design conditions for operation of the valve.

04.07 Verify that the licensee has demonstrated the design-basis capability of the sampled MOVs and the adequacy of the licensee's program applied to the sampled MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

04.08 Verify that the licensee has established a method for periodic verification of adequate capability of the sampled MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

04.09 Verify that (1) the licensee has analyzed MOV failures which have occurred and has an effective corrective action plan to prevent reoccurrence and (2) the licensee trends failures of MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

04.10 Verify that the licensee is meeting the program schedule in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

04.11 Verify quality assurance program implementation in the design control and testing of the sampled MOVs.

Part 3

04.12 Verify the scope of the licensee's GL 89-10 program and the status of each GL 89-10 MOV.

04.13 Verify that the licensee has completed its design-basis review of GL 89-10 MOVs.

04.14 Verify that the licensee has the established size and setting of GL 89-10 MOVs.

04.15 Verify that the licensee has completed its demonstration of design-basis capability of GL 89-10 MOVs.

04.16 Verify that the licensee has established plans for periodic verification of MOV design-basis capability.

04.17 Verify that the licensee has established an adequate process to analyze and trend MOV problems.

04.18 Verify that the licensee has met its GL 89-10 schedule commitments.

04.19 Verify that the licensee has implemented its quality assurance program with respect to GL 89-10 program.

04.20 Verify that the licensee has resolved open, unresolved, and follow-up items from previous GL 89-10 inspections.

2515/109-05 INSPECTION GUIDANCE

05.01 General Guidance

a. Inspection Preparation. The inspector should contact EMEB prior to the inspection to discuss whether the region is requesting the assistance of NRR in performing the inspection.

b. Plan. In planning the performance of an inspection according to this TI, the inspector should evaluate the results of previous inspections under this TI to determine those commitments made by the licensee that are acceptable in meeting the objectives of Generic Letter 89-10. In advance of a GL 89-10 inspection, the inspector should request a status of previous inspection items that were not closed.

The inspector will need certain MOV data to complete Parts 2 and 3 of this TI. The inspector should request that the licensee have available the input data for each MOV calculation and the results of static and dynamic MOV tests. EMEB can assist the inspector in determining the specific MOV data that will be needed.

The region should attempt to observe some amount of MOV testing and maintenance either during the Part 2 inspection or at some other time.

Many licensees have completed the verification of the design-basis capability of their GL 89-10 MOVs. Periodic verification of design-basis capability and trending of problems will continue throughout the operating life of the plant. The staff intends to close GL 89-10 on the basis of the licensee's completion of the design-basis verification of safety-related MOVs, and the licensee's establishment of plans for periodic verification of MOV design-basis capability and for trending of MOV problems. On September 18, 1996, the NRC 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 the 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 staff will conduct a more-complete review of licensee programs for MOV periodic verification as part of the implementation ofGL 96-05.

Pursuant to 10 CFR 50.54(f), GL 89-10 stated that licensees shall notify the NRC in writing within 30 days after completion of their GL 89-10 program (with the exception of periodic verification of MOV capability). Upon receipt of the completion notification, the staff will determine whether a close-out inspection is appropriate.

If a closeout inspection is performed, the Region would indicate acceptance of the licensee's response to the verification portion of GL 89-10 regarding the MOV design-basis capability in its closeout inspection report provided:

(1) the licensee had submitted a letter notifying the staff of its completion of the MOV design-basis capability verification portion of GL 89-10,

(2) the Region found the licensee's GL 89-10 program to have been adequately implemented during the closeout inspection, and

(3) NRR concurs in the closeout inspection report as discussed in this TI.

For closeout inspections, the NRR review of the draft Region inspection report may require more time than the one-day or two-day period needed for typical TI 2515/109, Part 2, inspections. The Region may follow the guidance in this TI for meeting report-issuance time goals when the report is submitted to NRR for concurrence.

In cases where NRR and a Region agree that a closeout inspection is not necessary, NRR (with concurrence of the applicable Region) will prepare a letter to the licensee discussing the NRC staff's evaluation of the licensee's response to GL 89-10.

c. Additional Information. Supplement 1 to Generic Letter 89-10 contains detailed information regarding the staff positions on the implementation of the generic letter. The inspector should review that supplement before conducting an

inspection of the MOV program. In addition, the inspector should review the memorandum dated April 30, 1993, from J. E. Richardson to the regions for information on the various aspects of Generic Letter 89-10 programs. On July 12, 1994, NRR provided guidance on the closure of staff review of GL 89-10 programs in a memorandum from B. W. Sheron to the regions. On July 2, 1996, NRR provided guidance on lubrication of valves prior to surveillance testing in a memorandum from F. J. Hebdon to Region II.

05.02 Specific Guidance

PART 1 Program Review

a. Inspection Requirement 04.01. In accordance with the reporting requirements of 10 CFR 50.54(f) of the NRC regulations, licensees were to have advised the NRC in writing by December 28, 1989, whether the schedule and recommendations of the generic letter would be met. Because of the complexity of the issue and the delay in the issuance of Supplement 1 to the generic letter, licensees were not held to the December 28 response date, but were allowed additional time in providing the response. Where the schedule of the generic letter will not be met, licensees were to have provided the NRC with the revised schedule and technical justification in writing. For any recommendation that could not be met, or was proposed not to be met, licensees were to have informed the NRC and provided a technical justification, including any proposed alternate action, in writing. Following this initial submittal, the generic letter indicated that licensees are to submit, in writing, any future changes to scheduled commitments. These revised schedules or alternate actions may be implemented before NRC review, but their justification should be retained on site. The inspector should review the responses submitted by the licensee, and the NRC staff replies, to determine the commitments of the licensee with respect to Generic Letter 89-10, and the staff's position on those commitments.

b. Inspection Requirement 04.02. In the generic letter, the staff requested that the program description and schedule for all generic letter recommended actions be available in accordance with the following schedule: (1) for plants with an operating license, by June 28, 1990, or the first refueling outage after December 28, 1989, whichever was later, and (2) for plants with a construction permit, by June 28, 1990, or operating license issuance, whichever was later. (Paragraph k of Generic Letter 89-10 allows licensees not to count refueling outages that began before December 28, 1989, in following the schedule outlined in the generic letter.) Because of the delay in issuing Supplement 1 to the generic letter, the staff stated in Supplement 2 that program descriptions did not need to be available on site until at least January 1, 1991.

c. Inspection Requirement 04.02.a. The scope of the generic letter was originally intended to include all safety-related MOVs and position-changeable MOVs in safety-related systems. Through Supplement 1, the definition of "position-changeable" in the generic letter has been limited to any MOV in a safety-related piping system that is not blocked from inadvertent operation from the control room. As indicated by the staff's response to Question 25 in Supplement 1 to Generic Letter 89-10, the licensee might determine that the scope of MOVs to be dynamically tested may be reduced by eliminating MOVs in hard-piping ventilation systems with low design-basis differential pressure where static loads are significant compared to dynamic loads.

In Supplement 4 to Generic Letter 89-10, the staff removed the recommendation that BWR licensees address inadvertent MOV operation as part of

their Generic Letter 89-10 programs on the basis of a staff study of core melt probability. Supplement 7 to GL 89-10 removed the recommendation that MOV mispositioning be considered by pressurized-water reactor licensees in responding to GL 89-10.

d. Inspection Requirement 04.02.b. Item a of the generic letter recommended actions requests the review and documentation of the design basis for the operation of each MOV within the generic letter program. This review should include a determination of the design-basis differential pressure and flow expected considering both normal operations and abnormal conditions.

e. Inspection Requirement 04.02.c. Item b of the generic letter recommended actions requests that licensees review, and revise as necessary, the methods for selecting and setting all MOV switches. The methods used by the licensee for selecting, setting, and adjusting switches should be documented in written procedures. For example, the calculations for sizing the MOV and setting its switches should be justified. The motor sizing calculations must consider degraded voltage conditions. The selection of the torque switch bypass setting should be based on analysis of the characteristics of the MOV. The limit switch settings should be determined by analysis of the MOV characteristics and verified through actual operation of the valve. Adequate bases must exist for the stem factors, efficiencies, friction coefficients, and other assumed parameters. Instrument inaccuracies must also be taken into account.

f. Inspection Requirement 04.02.d. Item c of the generic letter recommended actions requests that MOVs in the generic letter program be tested in situ at their design-basis conditions.

g. Inspection Requirement 04.02.e. Item d of the generic letter recommended actions requests that procedures be prepared or revised to ensure that adequate switch settings are determined and maintained throughout the life of the plant. Item j of the generic letter states the surveillance interval should be based on the licensee's evaluation of the safety importance of the MOV as well as its maintenance and performance history and recommended that the surveillance interval should not exceed 5 years or three refueling outages, whichever is longer, unless a longer interval is justified by the licensee. In GL 96-05, the staff requested licensees to establish a program, or to ensure the effectiveness of the 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. GL 96-05 supersedes GL 89-10 and its supplements with regard to periodic verification.

   Following the initial verification of MOV capability under design-basis conditions, the MOV switch settings will need to be re-verified if the MOV is replaced (which would constitute the need for a complete demon- stration of design-basis capability), modified, or overhauled to the extent that the licensee considers that the existing test results are not representative of the MOV in its modified configuration. Because of the interrelationship of various operating parameters, the performance of the MOV can be affected by routine maintenance work, such as valve packing adjustments.

h. Inspection Requirement 04.02.f. Item h of the generic letter recommended actions requests that licensees ensure that each MOV failure is analyzed and the resulting corrective action (including repair, alteration, analysis, test, and surveillance) is justified. As recommended in the generic letter, the failure analysis and justification of the corrective action should be documented. This documentation should include the results and history of each as-found

deteriorated condition, malfunction, test, inspection, analysis, repair, or alteration. All documentation should be retained and reported in accordance with plant requirements. The MOV data on failures and corrective action are recommended to be examined at least every 2 years or after each refueling outage as part of a monitoring and feedback effort to establish trends of MOV performance. In addition to plant specific data, the monitoring and feedback effort should include industry-wide MOV data.

i. Inspection Requirement 04.02.g. Item i of the generic letter requests that all design-basis reviews, analyses, verifications, tests, and inspections that were instituted in order to complete the generic letter recommended actions for the initial program be available in accordance with the following schedule: (1) for plants with an operating license, by June 28, 1994, or three refueling outages after December 28, 1989, whichever is later, and (2) for plants with construction permits, by June 28, 1994, or before operating license issuance, whichever is later. Within 30 days after completion of this initial program, the licensee is to notify the NRC in writing. The inspector should review the schedule proposed by the licensee and should determine its adequacy.

j. Inspection Requirement 04.03. No specific guidance provided.

PART 2 Verification of Program Implementation

k. Inspection Requirement 04.04. The focus of the inspections under Part 2 of the TI will be design basis capability of specific MOVs. The inspector should determine whether the licensee has justified the capability of each selected MOV. The inspector should determine whether the licensee has satisfied the plant technical specifications and NRC regulations where operability concerns are identified. If the licensee cannot justify the operability of a sampled MOV, the inspector should expand the review to similar MOVs.

Six to ten MOVs within the scope of the generic letter program should be selected for detailed review during the inspection. The licensee may be alerted before the inspection to the particular MOVs to be inspected in order to assemble the necessary documentation or to ensure that it is readily available at the site during the inspection. During the inspection, the inspector may find other MOVs that should be included in the sample.

The sample should include safety significant MOVs from those MOVs tested at or near design-basis differential pressure conditions and MOVs addressed under Stage 1 of the two-stage approach. In general, the inspector should focus on marginal MOVs and not MOVs in low differential pressure systems. The sample should include various sizes and types of valves and actuators, to the extent practical. The sample should also include at least one limit-closed MOV if applicable to the plant. The inspector may use various methods to obtain the MOV sample, such as Supplement 3 MOVs, PRA findings, licensee prioritizations, marginal MOVs, MOV test failure reports, or MOV problems at similar plants. In addition, the inspector should select some MOVs for review of the feedback of the test results into the MOV sizing and switch setting methodology.

In most instances, the inspectors determined that the scope of the licensees' Generic Letter 89-10 programs met the intent of the generic letter during the Part 1 inspections. Therefore, the inspector should focus on any changes to the scope of the program since the performance of the Part 1 inspection. In Part 3 of this TI, inspection guidance is provided to evaluate changes in the scope of GL 89-10 programs since the Part 1 inspection.

When observing MOV testing, the inspector should: (1) witness licensee testing of MOVs, (2) verify test equipment is setup and calibrated in accordance with vendor recommendations, (3) verify qualification of test personnel, (4) determine test equipment inaccuracies and test data accuracy, and (5) verify test results are adequately reviewed prior to declaring MOVs operable.

When observing MOV maintenance, the inspector should: (1) review and/or witness licensee maintenance of MOVs, (2) verify that licensee has established formal procedures for maintenance of MOVs, (3) verify qualification of personnel and proper involvement of QC personnel, (4) have the licensee provide a historical listing of significant MOV maintenance activities (including all MOVs found to be inoperable or which failed over the past 3 years), (5) review selected problem reports for proper disposition, and (6) review selected work packages for completeness and performance of post maintenance testing (including diagnostic as appropriate).

The inspector may perform a walkdown of MOVs as time permits. Where a walkdown is performed, the following observations should be made (to the extent possible without disrupting plant operations): (1) nameplate data, (2) MOV condition, orientation, and environment location, (3) presence of any leaks from grease plugs and T-drains, (4) handwheel clearance, (5) stem position indication, (6) limit switch type, material, and condition, (7) torque switch material, condition, and settings, (8) torque switch limiter plate presence and limiting values, (9) obvious inadequacies in electrical connections, (10) presence of grease or moisture in switch compartment, and (11) adequacy of ongoing maintenance (such as, clarity of procedures, compliance with procedures, adequate personnel training, and proper use of lubricants).

l. Inspection Requirement 04.05. The inspector should verify the adequacy of the design-basis reviews for the sampled MOVs using information provided in Part 1 of this TI and the results of the Part 1 inspection. The inspector should review any changes to the design basis reviews for the sampled MOVs and the basis for the changes.

In Part 3 of this TI, staff review of licensee consideration of pressure locking and thermal binding of gate valves is discussed.

If the licensee's evaluation of degraded voltage issues has been previously reviewed during the EDSFI inspections only those aspects specific to MOVs and not covered by the EDSFI should be reviewed during this inspection. The inspector should review the EDSFI report to ascertain which aspects of this issue have been addressed previously. The region may handle a generic degraded voltage issue as an EDSFI followup item. As a minimum, the inspector should ensure that the licensee has calculated the lowest motor terminal voltage commensurate with design-basis conditions and has factored this information into the MOV program.

m. Inspection Requirement 04.06. The inspector should verify the adequacy of the licensee's calculations for MOV sizing and appropriate switch settings, and any necessary adjustments, for the sampled MOVs using information from Part 1 of this TI and the results of the Part 1 inspection. The Idaho National Engineering Laboratory (INEL) developed a computer program to assist inspectors in this effort as part of an NRC contract.

The inspector should consider the values assumed in the licensee's MOV calculations. The inspector may challenge the licensee's determination of the

operability of an MOV where the calculations reveal that the MOV might be incapable of performing its safety function. In such cases, the inspector should determine whether the licensee has taken corrective action in accordance with Appendix B to 10 CFR Part 50.

Where a licensee is using limit controlled rather than torque controlled MOVs, the inspector should verify that the licensee understands the important considerations in the use of limit control for MOVs.

n. Inspection Requirement 04.07. The inspector should verify the adequacy of the method used to demonstrate the capability of the sampled MOVs using information from Part 1 of this TI and the results of the Part 1 inspection. The licensee should be alert for deficiencies (such as spring pack relaxation) when preparing the MOV for testing.

The inspector should not focus on the licensee's overall definition of "testing where practicable," but rather on the specific sample of MOVs. Where an MOV has sufficient margin, the inspector should not be concerned with a lack of testing. However, where an MOV appears not to have sufficient margin, the inspector should raise that concern with the region to determine whether additional licensee action, including testing, is necessary. The staff discusses the acceptability of grouping of MOVs as a possible alternative, where justified, to testing MOVs where practicable in Supplement 6 to Generic Letter 89-10. If a licensee is grouping MOVs rather than testing MOVs where practicable, the inspector should focus on the design basis capability of the specific sampled MOVs, rather than the licensee's justification for the overall grouping of MOVs. The inspector should consider the overall grouping of MOVs to be an open or unresolved item until reviewed by the region and NRR. If the licensee cannot justify the operability of a sampled MOV, the inspector should expand the review to similar MOVs.

The inspector should verify that the licensee has a plan to justify its method of extrapolating MOV test data.

Where a licensee obtains test data from another licensee, it need not perform a QA audit of that facility because the program will be under Appendix B to 10 CFR Part 50. The inspector should verify that the licensee understands the technical aspects of the data collection at the other facility.

Where a licensee uses diagnostic equipment during MOV testing, the inspector should verify that the licensee has justified the accuracy of that equipment. In Supplement 5 to Generic Letter 89-10, the staff required licensees to notify the staff of their MOV diagnostic equipment and to report whether they had taken actions or planned to take actions (including schedule) to address new information on the accuracy of MOV diagnostic equipment. The inspector should verify that the licensee has re-examined its MOV program and identified measures to account for uncertainties in properly setting valve operating thrust to ensure MOV operability. The inspector should verify that the licensee has evaluated the schedule necessary to consider the new information on MOV diagnostic equipment inaccuracy and to respond to that information. The inspector should verify that the licensee's schedule is consistent with the safety significance of the accuracy problems. The inspector should review Supplement 5 to Generic Letter 89-10 for examples of increased inaccuracy of MOV diagnostic equipment and the staff's position on the acceptability of methods to address specific examples of diagnostic equipment inaccuracy. The inspector should categorize other approaches to addressing MOV diagnostic equipment accuracy problems as unresolved or followup items. The region

should discuss the review of those approaches with NRR. The inspector should also verify that the licensee has an adequate training program for personnel operating MOV diagnostic equipment and analyzing the information obtained. As part of that training, the licensee should ensure that plant personnel understand the inherent sensitivities and limitations of the diagnostic equipment.

o. Inspection Requirement 04.08. The inspector should verify that the licensee has established plans for periodic verification of MOV design-basis capability. In GL 96-05, the staff requested licensees to establish a program, or to ensure the effectiveness of the 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. GL 96-05 supersedes GL 89-10 and its supplements with regard to periodic verification. The staff will conduct a more-complete review of licensee programs for MOV periodic verification as part of the implementation ofGL 96-05. In response toGL 96-05, the licensee will be expected to consider the benefits (such as identification of decreased thrust output and increased thrust requirements) and potential adverse effects (such as accelerated aging or valve damage) when establishing the appropriate periodic verification testing for each safety-related MOV. The inspector should focus on the justification for the design basis capability of specific MOVs rather than the overall periodic verification program.

If the inspector finds the licensee using motor current for post-maintenance testing following packing adjustment or replacement, the inspector should classify this finding as an unresolved or open issue. If the inspector finds that the licensee has tightened packing without a thrust verification, the inspector should raise this potential operability concern with the region. If the licensee does not perform a thrust verification following tightening valve packing to the original bolt torque, the inspector should verify that the licensee can demonstrate that the operability of the MOV has not been adversely affected.

p. Inspection Requirement 04.09. The inspector should verify the adequacy of the licensee's analysis of MOV failures, justification of corrective action, and trending of failures and corrective actions for the sampled MOVs using information from Part 1 of this TI and the results of the Part 1 inspection. The inspector should also perform a general review of the licensee's corrective action and trending program.

q. Inspection Requirement 04.10. The inspector should review the current status of the generic letter program to determine whether the accepted schedule is being met.

r. Inspection Requirement 04.11. The inspector should verify the implementation of the licensee's QA program in the design control and testing of sampled MOVs.

Part 3 Verification of Program Completion

s. Inspection Requirement 04.12. Since the completion of inspections of GL 89-10 under Parts 1 and 2 of this TI, some licensees have modified the scope of their GL 89-10 programs. During the close-out inspection, the licensee will be expected to able to justify any changes in the scope of the GL 89-10 program. Supplement 1 to GL 89-10 provided information on the scope of GL 89-10. More recently, the staff evaluated a proposed change in the scope of the GL 89-10 program at the Hatch nuclear power plant. The results of the staff review is provided in a Safety Evaluation forwarded to J. T. Beckham, Jr., Georgia Power

Company, by K. N. Jabbour, NRR Division of Reactor Projects I/II, on October 16, 1995.

Where a licensee has modified the scope of its GL 89-10 program since the previous inspection, the inspector should determine whether the licensee has adequately justified the removal of any MOVs from the GL 89-10 program. Considerations for the review of the licensee's scope of its GL 89-10 program are provided in the attachment to this TI.

In implementing GL 89-10, the licensee is expected to have verified the design-basis capability of each MOV in its GL 89-10 program. As a result, the licensee should have available a specific status for each GL 89-10 MOV. Although not necessarily in a single document, the licensee should have available the following status of each GL 89-10 MOV:

1. Valve number and system label name
2. Safety function description (and probabilistic-risk-assessment priority if applicable)
3. Manufacturer, type, and size for valve, actuator, and motor for each MOV
4. Control switch thrust versus calculated minimum and maximum thrust
5. Test status (static/dynamic/Design-Basis Differential-Pressure/ Percent DBDP during test)
6. Basis for closure:
   (a) Full d/p or extrapolated partial d/p test
   (b) Static test only
      (1) grouping with other valves d/p tested
      (2) prototype testing
      (3) reliance on EPRI or industry test data
      (4) large calculated margin
      (5) other (PRA, etc.)
7. Remaining activities with schedule for completion

To close the staff's review of GL 89-10, the inspector should conduct a summary review of the status of information for GL 89-10 MOVs to determine if adequate assurance of design-basis capability has been demonstrated. The inspector need not conduct a detailed review of each MOV.

t. Inspection Requirement 04.13. The guidance provided for design-basis reviews under Part 2 of this TI are also applicable to Part 3, except as follows:

On August 17, 1995, the staff issued GL 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," that provides recommendations for licensees and permit holders to consider in addressing pressure locking and thermal binding. The staff is reviewing licensee submittals in response to GL 95-07 and may conduct limited inspections under separate inspection guidance, as necessary, to evaluate licensee actions to resolve this issue. Therefore, the inspector need not devote significant resources to evaluate licensee actions regarding pressure locking and thermal binding during GL 89-10 inspections.

Supplement 7 to GL 89-10 removed the recommendation that MOV mispositioning be considered by pressurized-water reactor licensees in responding to GL 89-10.

u. Inspection Requirement 04.14. The guidance provided under Part 2 of this TI remains applicable. The inspector should determine whether the licensee has

completed its sizing and setting calculations for each GL 89-10 MOV and has justified its assumptions.

v. Inspection Requirement 04.15. The guidance provided under Part 2 of this TI remains applicable. The inspector should assess the adequacy of the licensee's treatment of measurement error in their analysis of test data and torque switch setpoint analysis.

w. Inspection Requirement 04.16. For closure review, the inspector should verify that the licensee has established plans for periodic verification of MOV design-basis capability. In GL 96-05, the staff requested licensees to establish a program, or to ensure the effectiveness of the 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. GL 96-05 supersedes GL 89-10 and its supplements with regard to periodic verification. The staff will conduct a more-complete review of licensee programs for MOV periodic verification as part of the implementation ofGL 96-05. In response toGL 96-05, the licensee will be expected to consider the benefits (such as identification of decreased thrust output and increased thrust requirements) and potential adverse effects (such as accelerated aging or valve damage) when establishing the appropriate periodic verification testing for each safety-related MOV.

The NRC staff recently provided guidance on pre-lubrication of valves prior to inservice testing (IST) under 10 CFR 50.55a in a memorandum, dated July 2, 1996, from F. J. Hebdon, NRR, to Jon R. Johnson, Region II. In the attachment to the memorandum, the staff states that the performance of maintenance on a component to ensure its proper operation prior to conducting a test negates the validity of the test in assessing the operational readiness of the component. In American Society of Mechanical Engineers (ASME) Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor Operated Valve Assemblies in LWR Power Plants," the ASME states that certain maintenance activities, such as stem lubrication, shall not be conducted if they might invalidate the as-found condition for inservice testing. The inspector should consider this guidance in evaluating licensee MOV programs.

x. Inspection Requirement 04.17. The guidance provided under Part 2 of this TI remains applicable.

y. Inspection Requirement 04.18. In Supplement 6 to GL 89-10, the staff provided guidance for licensees that cannot meet their GL 89-10 schedule commitments. The inspector should address the schedule where concerns exist regarding the completion status of the GL 89-10 program.

z. Inspection Requirement 04.19. The inspector should assess the involvement of the licensee's QA personnel in the GL 89-10 program such as by licensee self-assessments.

aa. Inspection Requirement 04.20. Many issues remained open following previous GL 89-10 inspections that will need to be resolved before GL 89-10 closure. For example, the licensee is expected to be able to justify assumptions and actions taken during the implementation of its GL 89-10 program. The following is a list of some issues to be addressed and assumptions to be justified as applicable:

a. Valve factor (including area assumption)
b. Stem friction coefficient
c. Load sensitive behavior

d. Margins for stem lubrication degradation and springpack relaxation (or plans to address as part of the long-term program)
e. Motor performance factors
   (1) motor rating
   (2) efficiencies used in open and close directions
   (3) application factor
   (4) power factor used in degraded voltage calculations
f. Basis for extrapolation method of partial d/p thrust measurements
g. Torque switch repeatability
h. Use of Limitorque, Kalsi, or other sources for increasing thrust and torque allowable limits
i. Equipment error
j. Post-maintenance testing, especially valve packing adjustments
k. Grouping of MOVs
l. Trending of MOV problems.

The staff's closure letter or inspection report (as applicable) will specify where any additional information is needed.

2515/109-06 REPORTING REQUIREMENTS

On a temporary basis, EMEB/NRR must concur on each report of an inspection using this TI to help provide consistency in the staff positions. The inspection report will be considered ready for issue when submitted for NRR concurrence.

A copy of the inspection reports shall be sent to the Mechanical Engineering Branch, Division of Engineering, NRR, and the appropriate branch chief (or section chief) in the other regions.

2515/109-07 COMPLETION SCHEDULE

Following the Part 1 inspection, the regions should conduct a Part 2 inspection at each plant site. The regions and NRR will determine the most efficient method to close the staff's review of the GL 89-10 program at each plant site. Where a close-out inspection is conducted, the regions should use the guidance of Part 3 of this TI. For the longer term, it is anticipated that this TI will be incorporated into a comprehensive inspection procedure to address all MOV activities at a nuclear plant.

2515/109-08 EXPIRATION

This TI will remain in effect until 04/30/99.

2515/109-09 CONTACT

Questions concerning this TI should be addressed to Thomas G. Scarbrough, EMEB/DE/NRR, at (301) 415 -2794 or the lead LPM, Allen G. Hansen, ADR3/SRSP/NRR, at (301) 415-1390 .

2515/109-10 STATISTICAL DATA REPORTING

Direct inspection effort for this TI should be reported against 2515/109 for RITS reporting.

The SIMS issue number for this TI is GL-89-10.

2515/109-11 ORIGINATING ORGANIZATION INFORMATION

11.01 Organizational responsibility. EMEB/NRR initiated this TI as part of its responsibility for coordination of the NRC review of the activities of licensees and construction permit holders in response to Generic Letter 89-10. EMEB will work with the regions to provide a consistent regulatory effort in implementing this TI. EMEB will support inspections to Parts 2 and 3 of this TI, as resources permit. EMEB will review the results of inspections performed by headquarters and region personnel. Based on that review and other information, EMEB will evaluate the need for additional regulatory action.

11.02 Estimated resources. It is estimated that 3 inspector-days will be needed for preparation of an inspection using this TI. In the original version of this TI, the actual inspection time was estimated to be 9 and 6 inspector-days for Parts 1 and 2 (assuming 6 sampled MOVs under Part 2), respectively. This estimate did not include site orientation and the entrance and exit meetings. Follow-up administrative time (such as report writing) was estimated to be 7 inspector-days for either Part 1 or 2. The Direct Inspection Effort on site was estimated to be 72 and 48 hours for Parts 1 and 2, respectively. The regions found that significantly more time was needed to conduct the Part 1 inspections because of the complexity of the issue, the extent of MOV problems being discovered at nuclear plants, and the slow response of some licensees to resolving the MOV issue. The actual inspection time for Part 2 inspections could be (but is not required to be) up to 30 inspector-days. This estimate does not include site orientation and entrance and exit meetings. The regions may apply fewer inspection resources for plants with less complex issues. The Direct Inspection Effort on site for Part 3 is estimated to be 96 hours. Where a licensee submits a close-out package summarizing its program in advance of the inspection, the inspection time onsite might be significantly reduced.

11.03 Parallel inspection procedures. Inspection Procedure 73756, Inservice Testing of Pumps and Valves, addresses licensee programs established in response to 10 CFR Part 50.55a and Section XI of the ASME Boiler and Pressure Vessel Code.

2515/109/12 TRAINING

EMEB will continue to hold periodic workshops for region personnel on the performance of Generic Letter 89-10 inspections. Each region had one or more inspectors attend the MOV advanced diagnostic training offered by the NRC Technical Training Center to allow the region to review licensee evaluations of MOV test data.

2515/109-13 REFERENCES

Bulletin 85-03 (November 15, 1985), "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings."

Supplement 1 to Bulletin 85-03 (April 27, 1988).

Generic Letter 89-10 (June 28, 1989), "Safety-Related Motor-Operated Valve Testing and Surveillance."

Supplement 1 to Generic Letter 89-10 (June 13, 1990), "Results of the Public Workshops."

Supplement 2 to Generic Letter 89-10 (August 3, 1990), "Availability of Program Descriptions."

Supplement 3 to Generic Letter 89-10 (October 25, 1990), "Consideration of the Results of NRC-Sponsored Tests of Motor-Operated Valves."

Supplement 4 to Generic Letter 89-10 (February 12, 1992), "Consideration of Valve Mispositioning in Boiling Water Reactors."

Supplement 5 to Generic Letter 89-10 (June 28, 1993), "Inaccuracy of Motor-Operated Valve Diagnostic Equipment."

Supplement 6 to Generic Letter 89-10 (March 8, 1994), "Information on Schedule and Grouping, and Staff Responses to Additional Public Questions."

Supplement 7 to Generic Letter 89-10 (January 24, 1996), "Valve Mispositioning in Pressurized-Water Reactors."

Memorandum (April 30, 1993) from J. E. Richardson, Director, NRR Division of Engineering, to Region Division Directors (Microfiche 74988/001).

Memorandum (December 20, 1993) from James T. Wiggins, Acting Director, NRR Division of Engineering, to Region Division Directors.

Memorandum (July 12, 1994) from Brian W. Sheron, Director, NRR Division of Engineering, to Region Division Directors.

Memorandum (July 2, 1996) from Frederick J. Hebdon, Director, Project Directorate II-3, NRR, Division of Reactor Projects I/II, to Jon R. Johnson, Acting Director, Division of Reactor Projects, Region II.

Generic Letter 95-07 (August 17, 1995), "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves."

Safety Evaluation by NRR Regarding Reclassification of Generic Letter 89-10 Motor-Operated Valve Active Safety Functions, forwarded by letter dated October 16, 1995, from K. Jabbour, Project Directorate II-2, NRR Division of Reactor Projects I/II, to J. Beckham, Georgia Power Company.

Generic Letter 96-05 (September 18, 1996), "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves."

END

Attachment:
Considerations in Reviewing Licensee Scope of Generic Letter 89-10 Programs

ATTACHMENT

CONSIDERATIONS IN REVIEWING LICENSEE SCOPE OF GENERIC LETTER 89-10 PROGRAM

1. 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.

2. 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 affect on the operation of the safety train if placed in the nonsafety position, could be removed from the GL 89-10 program. However, containment isolation valves will always have a safety function to close regardless of their system performance requirements.

3. Section 3.1.2 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," issued by GL 89-04 (Supplement 1), "Guidance on Developing Acceptable Inservice Testing Programs," dated April 4, 1995, discusses the capability of plant components and surveillance testing. In this regard, safety-related MOVs that are placed in a position that prevents the safety-related system (or train) from performing its safety function must be capable of returning to their safety position, or the system (or train) must be declared inoperable and the appropriate plant technical specifications followed.

4. 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. In Bulletin 85-03, the staff requested BWR plants to ensure that MOVs in the Reactor Core Isolation Cooling (RCIC) system can perform their safety function.

5. The consideration of pipe breaks should be consistent with the staff's licensing review for the individual facility (i.e., in accordance with Standard Review Plan (SRP) Section 3.6.2).

6. Supplements 4 and 7 to GL 89-10 removed the recommendation that licensees of BWR and PWR nuclear plants, respectively, consider inadvertent mispositioning of MOVs as part of their GL 89-10 programs.

7. The consideration of long-term passive failures in piping should be consistent with the staff's licensing review for the individual facility and should be in accordance with SRP 3.6.1. Further, the licensee's evaluation of passive failures must consider valve and pump seal failures as discussed in SECY 77-439.

8. Licensees may rely on analysis results for each design-basis event and each system's required capability to satisfy event acceptance limits provided in the updated final safety analysis report (FSAR) where the licensee can demonstrate that the information in the updated FSAR is consistent with the licensing basis of the facility.
9. 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. 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.

END