

March 13, 1997

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362  
180 Day Response to Generic Letter 96-05: "Periodic Verification of  
Design-Basis Capability of Safety-Related Motor-Operated Valves"  
San Onofre Nuclear Generating Station  
Units 2 and 3

This letter provides the Southern California Edison's (Edison's) 180-day response to Generic Letter (GL) 96-05 for San Onofre Nuclear Generating Station (SONGS) Units 2 and 3.

Edison is currently implementing a process to verify that all safety-related Motor Operated Valves (MOV) at the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 currently in the scope of the GL 89-10 MOV program continue to be capable of performing their safety functions within the current licensing bases. The valve reliability assurance process will ensure that changes in performance resulting from degradation (such as those caused by age) will be properly identified and accounted for. Safety-related MOV reliability will be assured at SONGS by implementing the following three part process:

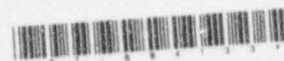
- 1) Periodic valve maintenance,
- 2) Periodic performance verification testing, and
- 3) Test data reconciliation and trending.

1/1  
Aφ73

Details of the MOV reliability assurance process are provided in the enclosed report. The MOV reliability assurance process was originally implemented as part of the GL 89-10 MOV program at SONGS. Revisions to the GL 89-10 program to assure that the MOV reliability assurance process is consistent with GL 96-05 requirements are in process and will be fully implemented prior to the start of the Unit 2 Cycle 10 refueling outage.

9703180152 970313  
PDR ADOCK 05000361  
P PDR

San Onofre Nuclear Generating Station  
P. O. Box 128  
San Clemente, CA 92674-0128  
714-368-7420



180039

If you have any questions or would like additional information, please let me know.

Sincerely,

*Jd Rainsberg*

Enclosure

- cc: L. J. Callan, Regional Administrator, NRC Region IV
- K. E. Perkins, Jr., Director, Walnut Creek Field Office, NRC Region IV
- J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 & 3
- M. B. Fields, NRC Project Manager, San Onofre Units 2 and 3

State of California

County of San Diego

Subscribed and sworn before me this 13th day of March, 1997.

*Mariane Sanchez*  
Notary



ENCLOSURE

NRC GENERIC LETTER 96-05 RESPONSE SUMMARY

PERIODIC VERIFICATION OF DESIGN BASIS CAPABILITY  
OF SAFETY-RELATED MOTOR OPERATED VALVES

## Summary Report

### Response to Generic Letter 96-05 for San Onofre Units 2 and 3

#### EXECUTIVE SUMMARY

Southern California Edison (Edison) is currently implementing the requested actions of Generic Letter (GL) 96-05, "Periodic Verification of Design Basis Capability of Safety-Related Motor Operated Valves" at the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. In response to the generic letter guidance that the design basis capability of safety-related motor operated valves (MOV) be maintained for the life of the plant, SONGS is establishing a comprehensive process of periodic maintenance, performance verification testing, and performance trending for all safety-related MOVs within the existing GL 89-10 MOV program scope.

In order to assure that SONGS implements an effective program for periodic verification of safety-related MOV design-basis capability, Edison is developing a program which focuses on providing confidence that safety-related MOVs remain operable by assuring that no significant age related degradation of MOVs occurs. An appropriate mix of valve exercising and diagnostic testing will be utilized to provide confirmation of long term MOV operability. The program will monitor valve performance and evaluate the suitability of periodic maintenance intervals. Adjustments to the periodic verification program will be implemented as appropriate based on the results of periodic testing.

The process for assuring long term reliability of MOVs at Edison is considered a "living" program. Age related performance degradation of MOVs will be controlled by an intensive level of periodic preventative maintenance. MOV material condition will be inspected as part of the periodic maintenance activities. If significant age related degradation is present, corrective maintenance will be performed as necessary. Confirmation of MOV performance capability will be achieved by periodic performance verification testing. Periodic performance verification testing will also provide validation of specified maintenance intervals. The trending of performance verification test results will provide a performance trend indicator for like valves within the designated MOV population. Emergent technical issues which have the potential for affecting MOV performance will continue to be evaluated in a timely manner in accordance with existing SONGS procedures.

The requirement for assuring that safety-related MOVs remain capable of operating under design basis conditions for the life of the plant was originally specified by GL 89-10, "Safety Related Motor Operated Valve Testing and Surveillance." The current procedures for verification of MOV long term operability were originally

developed as part of the GL 89-10 MOV Program at SONGS. As requested in GL 96-05, the SONGS GL 89-10 program has been reviewed and is currently being revised to comply with the guidance in GL 96-05.

Implementation of the valve reliability assurance process scope, as described below, requires minor revisions to several existing SONGS documents. Revision of these documents, to assure the successful implementation of GL 96-05 commitments, is currently in-process and will be fully implemented prior to the start of the Unit 2 Cycle 10 refueling outage.

#### **SUMMARY DESCRIPTION OF GL 96-05 COMPLIANCE ACTIVITIES**

The guidelines for periodically verifying that safety-related motor operated valves (MOV's) maintain the capability to perform their safety-related function have been provided by GL 96-05 (Reference 1). Similar guidelines had been established by Generic Letter 89-10 (Reference 2). The guidelines of GL 96-05 have subsequently superseded the guidelines of GL 89-10. The specific program elements, which are being developed at SONGS to assure that the safety-related MOV's within the scope of the GL 89-10 MOV program remain capable of performing their intended safety-related functions in compliance with the current guidelines of GL 96-05, are described in this section. The applicable population of safety-related MOV's is defined in the GL 89-10 population verification assessment (Reference 5).

Edison is establishing a process to verify that safety-related MOV's within the scope of the GL 89-10 MOV program at SONGS Units 2 and 3 continue to be capable of performing their safety functions within the current licensing bases. SONGS will rely on a three part process for assuring valve reliability is maintained. This process will include periodic valve maintenance, periodic performance verification testing, and test data reconciliation and performance trending. This three step process was originally developed as part of the GL 89-10 MOV program at SONGS. The long-term operability of safety-related MOV's at SONGS will be based on these three program elements and provides the basis for compliance with the guidelines of GL 96-05. The program elements are described below:

#### **Periodic Maintenance Process**

In response to GL 89-10, Edison developed a periodic maintenance program (Reference 3) for MOV's. The MOV periodic maintenance program established a repetitive maintenance interval and basis for each safety-related MOV within the scope of the generic letter. As part of the original GL 89-10 commitment, the maximum periodic maintenance interval established for the majority of safety-related MOV's was no greater than three refueling cycles, although some periodic maintenance intervals were as long as six refueling outages. During the GL 89-10 closeout inspection (Reference 4), Edison committed to revising the periodic maintenance interval for all safety-related MOV's, as necessary, so that no interval will be longer than three refueling cycles. The revised periodic maintenance intervals (when implemented)

will provide confidence that all safety-related MOVs are capable of performing their intended safety-related function without any significant age related degradation over the course of the maintenance interval. As a maintenance history is developed for each MOV, Edison may revise the periodic maintenance interval in the future (increase or decrease) of a given MOV as needed to assure that age related degradation does not significantly affect the design basis capability of the MOV.

Periodic maintenance inspections will be performed to assess the material condition of the actuator and will include inspection of the actuator lubrication and internal parts. The intent of the periodic maintenance activity is to assure that age-related wear of an actuator is corrected before any significant performance degradation occurs. In addition to the MOV inspection/repair for each valve, the current periodic maintenance program specifies a valve stem lubrication once per refueling cycle. The significant resources committed to providing regularly scheduled maintenance of MOVs will minimize the potential for age-related wear or performance degradation of the valve actuator assembly. Valve specific maintenance intervals are identified in the GL 89-10 MOV Periodic Maintenance Program Document (Reference 3).

#### Performance Verification Process

To confirm that the existing periodic maintenance frequency for MOVs is adequate and that the long-term operability of MOVs is maintained, Edison is also implementing an MOV periodic verification process. The periodic verification process will consist of regularly scheduled periodic performance verification testing of safety related MOVs. Periodic performance verification testing requirements and intervals are identified in Technical Paper 14 of the GL 89-10 MOV Design Standard (Reference 6). The requirements of the periodic testing process are summarized below and will apply to all safety-related MOVs as noted:

- 1) A surveillance test of all safety-related MOVs within the GL 89-10 MOV program scope will be performed at an interval no greater than one refueling cycle. Verification of each valve to successfully complete a full open and close stroke will be provided as a result of this test and documented as part of the current In-Service Testing Program.
- 2) All safety-related MOVs within the GL 89-10 MOV program scope will be fully stroked statically at an interval no greater than three refueling cycles with a diagnostic device that provides a quantitative verification of the motor actuator thrust and/or torque output. This testing will be performed in conjunction with the scheduled periodic maintenance activities on the valves and includes (when possible) an as-found and as-left

test. Results of the static testing will be evaluated by the MOV Test Data Reconciliation Procedure (Reference 7).

- 3) All valve factor dependent valves (i.e., gate valves) within the program population considered to have a low thrust and/or valve factor margin will be fully stroked dynamically (if practicable) at an interval no greater than three refueling cycles. The diagnostic test equipment utilized should provide a quantitative verification of the motor actuator output thrust and torque as well as system parameters of pressure and flow (if available) in order to provide a basis for determining valve factor. Results of the dynamic testing will be evaluated by the MOV Test Data Reconciliation Procedure (Reference 7).

The purpose of the periodic verification process is to confirm that all safety-related MOVs remain capable of operating in accordance with their design basis and validate the designated repetitive maintenance interval. As noted previously, Edison considers the MOV program to be a living program and may revise the maintenance and/or test intervals (increase or decrease) of specific MOVs when warranted by the results and conclusions of the periodic verification process. Edison is currently utilizing the Motor Operated Valve Analysis and Test System (MOVATS) as the diagnostic system for analyzing MOV performance when performing static and dynamic testing. MOVATS static testing, when performed in accordance with the MOVATS test procedure (Reference 9), will provide the necessary quantitative data to verify that each MOV continues to operate within its required setpoint window and maintain adequate design basis operability margin. In addition, by comparing previous baseline test data obtained as part of GL 89-10 testing to as-found periodic verification test data, the actuator output of torque and thrust can be evaluated to confirm that actuator capability has not significantly degraded. As emerging MOV diagnostic technologies become available, Edison may utilize different diagnostic methods and/or equipment. Diagnostic systems other than MOVATS will be considered acceptable assuming they can provide adequate verification of MOV performance capability.

Edison's GL 89-10 MOV setpoint calculation methodology (Reference 6) was developed to predict the required valve forces to operate under design basis conditions. Dynamic testing performed in accordance with GL 89-10 confirmed that for globe and butterfly valves the force required to overcome dynamic pressure was consistent with the standard force equation of pressure times effective pressure area and bounded by the setpoint calculation methodology. Dynamic test results indicated that there was not a similar level of predictability of pressure forces for gate valves. GL 89-10 dynamic testing of gate valves confirmed that the pressure force could vary for similar valves due to differences in internal friction effects. Using dynamic test data to calculate valve factors provided a basis of comparison between similar

valves. Edison utilizes a bounding valve factor value based on in-situ testing and industry test results, such as those provided by the Electric Power Research Institute (EPRI) Performance Prediction Program, to determine required dynamic forces for gate valves. As a result of in-situ testing and industry findings, it has been shown that valve factors can vary for identical valves. Subsequently, Edison has concluded that dynamic periodic verification testing should be considered for a select population of gate valves in order to determine if the variability in measured valve factors for like valves is attributable to degradation or a break-in process referred to as "plateauing" by EPRI.

The population of gate valves which will be considered for periodic dynamic testing will initially be limited to low margin valves. In-situ testing and industry data have confirmed that the friction between stellite to stellite contact surfaces of gate valves typically increases with the number of valve strokes until it reaches a plateau value. The highest valve factor measured by Edison during dynamic in-situ testing of gate valves was approximately 0.65 (Reference 8). Low margin gate valves are considered to be any valve whose existing output thrust capability margin is less than or equal to 20% of the design basis thrust or torque requirement. Edison uses as-left design basis margin to back calculate a value for allowable valve factor. A gate valve is also considered to be a low margin valve if it has an allowable valve factor less than or equal to 0.8 and will be included in the population of valves which receive periodic, dynamic, verification testing. The initial interval established for periodic dynamic verification testing is three refueling cycles. Periodic dynamic testing will determine if there is any significant valve factor degradation occurring between verification intervals which could significantly increase the required operating requirements of the valve and possibly jeopardize the capability of the MOV to perform its design basis function. If a significant change in valve factor is noted as a result of valve periodic dynamic testing, the implication on like valves will be considered. The scope and interval for periodic dynamic testing of low margin gate valves may be revised as test data is accumulated and no significant valve factor degradation is detected.

#### Test Data Reconciliation and Performance Trending Process

Performance verification testing will be implemented to provide assurance that the long-term operability of MOVs is maintained for the life of the plant and to confirm that currently specified periodic maintenance intervals are adequate to prevent any significant MOV performance degradation. The evaluation of test data will be performed as part of the test data reconciliation process and provide the basis for MOV performance trending.

Test data reconciliations will be performed for all periodic verification tests (static or dynamic) which utilize the motor operated valve analysis and test system (MOVATS) or equivalent. Test data reconciliations will be performed in accordance with the MOV Test Data Reconciliation procedure (Reference 7) developed for



GL 89-10. The test data reconciliation of static test results will verify that the actuator torque and thrust output do not significantly degrade and that the output capability remains within current specified setpoints. Periodic static testing of MOVs is to be performed in conjunction with the periodic maintenance activities described previously and include an as-found and as-left static MOVATS test when possible in order to determine stem factor and design basis margin degradation of the MOV. The test data reconciliation procedure will confirm that the MOV is operating within the existing setpoint requirements as well as evaluate MOV performance degradation during the specified maintenance interval. The output capability of an MOV to produce torque/thrust will not degrade significantly if adequate maintenance of the component is provided to minimize age-related degradation. Static testing and evaluation of test data will be used to provide confirmation of existing periodic maintenance intervals and will provide verification that the maintenance frequency is adequate to prevent any significant actuator performance degradation.

As stated previously, Edison believes that periodic, dynamic testing is not required for globe or butterfly valves. The dynamic thrust/torque requirements for these types of valves was found during design basis testing to be consistently bounded by the Edison's setpoint calculation methodology. It is anticipated that any significant valve related degradation of these valve designs will be visible during static testing. The hydrodynamic performance requirements for these valves is not anticipated to change significantly with time given their design characteristics. Should industry experience indicate a need to consider periodic dynamic testing for these types of valves, Edison will re-evaluate this position and revise our testing as necessary.

Periodic verification testing is expected to provide the data necessary to confirm the long-term operability of safety-related MOVs and provide a basis for establishing performance degradation rates. The performance degradation of an MOV will be evaluated by the test data reconciliation process and include consideration of guidelines established by ASME Code Case OMN-1 (Reference 10). The trending of valve performance is conducted as part of the MOV Trend Report (Reference 8). The Trend Report was originally implemented in response to GL 89-10 and provides a consolidated evaluation of valve performance for the defined MOV population. MOV margin capabilities and performance degradation issues are tracked in the Trend Report. In addition, a qualitative performance comparison of similar valve types or groups is provided to assess overall performance. Both the Test Data Reconciliation Procedure and the Trend Report were reviewed by the NRC during the GL 89-10 closeout inspection (Reference 4) and found to be acceptable.

#### Additional Considerations

There are several additional elements of the current MOV program at SONGS which provide indirect value in assuring that the safety-related MOVs remain capable of

performing their intended function. Reliable computer based systems for MOV configuration and setpoint control were originally developed in response to GL 89-10. The Nuclear Consolidated Database (NCDB) is the primary configuration control database developed for use at SONGS. A specific module for GL 89-10 MOVs was developed within NCDB to provide a controlled reference source for MOV configuration data. This database documents the physical configuration data for each MOV and the current specified setpoints and control switch logic. SONGS setpoint calculation methodology for predicting required operating thrust/torque at design basis conditions has been developed into a computer program known as MOCALC. This setpoint calculation program permits Edison to maintain the necessary configuration control of the current MOV switch settings. Revisions to the setpoint calculation methodology can be implemented in a controlled and documented manner when necessary for emergent technical issues.

As previously outlined, SONGS will be relying on an intensive preventive maintenance process for assuring MOV performance does not degrade significantly and these valves will be able to perform their safety-related function. A computer database work tracking system (MOSAIC) is utilized to assure successful planning, scheduling, and implementation of these MOV maintenance activities.

It is recognized that there will continue to be considerable resources expended by the industry in assuring long term operability of MOVs. It is anticipated that emerging technical issues which potentially affect the operation of MOVs will be discovered as a result of this continued focus on equipment performance. SONGS will rely on its Independent Safety Engineering Group (ISEG) to identify published emergent issues such as NRC generated documents and vendor information notices. In addition, a group of dedicated MOV personnel at SONGS will maintain involvement with existing industry groups and utility peers in an effort to keep involved with emergent MOV issues.

### Conclusions

When fully implemented, the valve reliability assurance process will verify on a periodic basis that all safety-related MOVs at SONGS (within the current scope of GL 89-10) remain capable of performing their safety functions within the current licensing bases.

## References

- 1) Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-related Motor-Operated Valves," Dated September 18, 1996
- 2) Generic Letter 89-10, "Safety Related Motor Operated Valve Testing and Surveillance," Dated June 28, 1989
- 3) M-42652, "GL 89-10 Motor Operated Valves PM Requirements and Intervals"
- 4) GL 89-10 Closeout Inspection conducted 10/21/96 thru 11/21/96 (Inspection Report No. 50-361/96-10; 50-362/96-10)
- 5) A-94-NM-MOV-POP-VER-001, "GL 89-10 MOV Population Verification for SONGS Unit 2 & 3"
- 6) MS-123-125, "Design Standard - Generic Letter 89-10 Motor Operated Valve Design Standard"
- 7) S0123-XXIV-15.1, "Motor Operated Valve Test Data Reconciliation"
- 8) S0123-V-3.4, "MOV Data Trending"
- 9) S0123-I-9.30, "Motor Operated Valve Analysis and Test System"
- 10) ASME Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor Operated Valve Assemblies in LWR Power Plants"