November 17, 2000

Mr. James A. Hutton
Director-Licensing
PECO Energy Company
Nuclear Group Headquarters
Correspondence Control
P.O. Box 160
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SUBJECT: LIMERICK GENERATING STATION (LGS), UNITS 1 AND 2, GENERIC LETTER 96-05, "PERIODIC VERIFICATION OF DESIGN-BASIS CAPABILITY OF SAFETY-RELATED MOTOR-OPERATED VALVES" (TAC NOS. M97062 AND M97063)

Dear Mr. Hutton:

On September 18, 1996, the U.S. Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," requesting that each nuclear power plant licensee establish a program, or ensure the effectiveness of its current program, to verify on a periodic basis that safety-related motor-operated valves (MOVs) continue to be capable of performing their safety functions within the current licensing basis of the facility.

By letter dated November 15, 1996, PECO Energy Company (PECO) notified the NRC in response to GL 96-05 that it had established a program to periodically verify that the safety-related MOVs at LGS Units 1 and 2 continue to be capable of performing their safety functions within the current licensing basis of the facility. By letter dated March 14, 1997, PECO provided a summary description of its MOV periodic verification program and revisions to the program planned to be implemented at LGS Units 1 and 2. By letter dated May 14, 1998, PECO updated its commitment to GL 96-05. By letter dated July 2, 1999, PECO provided additional information regarding its GL 96-05 program in response to a request for additional information forwarded by the NRC staff on March 22, 1999.

The NRC staff has reviewed PECO's submittals and applicable NRC inspection reports for the MOV program at LGS Units 1 and 2. The NRC staff finds that PECO has established an acceptable program to verify periodically the design-basis capability of the safety-related MOVs at LGS Units 1 and 2 through its commitment to all three phases of the Joint Owners Group Program on MOV periodic verification and the additional actions described in its submittals. As discussed in the enclosed safety evaluation, the NRC staff concludes that PECO is adequately addressing the actions requested in GL 96-05.

The NRC staff may conduct inspections at LGS Units 1 and 2 to verify the implementation of the MOV periodic verification program is in accordance with PECO's commitments.

This completes the staff's review of GL 96-05 and the staff is hereby closing TAC Nos. M97062 and M97063.

Sincerely,

/RA/

Bartholomew C. Buckley, Sr. Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

LICENSEE RESPONSE TO GENERIC LETTER 96-05, "PERIODIC VERIFICATION OF DESIGN-BASIS CAPABILITY OF SAFETY-RELATED MOTOR-OPERATED VALVES,"

LIMERICK GENERATING STATION, UNITS 1 AND 2

DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

Many fluid systems at nuclear power plants depend on the successful operation of motor-operated valves (MOVs) in performing their safety functions. Several years ago, MOV operating experience and testing, and research programs sponsored by the nuclear industry and the U.S. Nuclear Regulatory Commission (NRC), revealed weaknesses in a wide range of activities (including design, qualification, testing, and maintenance) associated with the performance of MOVs in nuclear power plants. For example, some engineering analyses used in sizing and setting MOVs did not adequately predict the thrust and torque required to operate valves under their design-basis conditions. In addition, inservice tests of valve stroke time under zero differential-pressure and flow conditions did not ensure that MOVs could perform their safety functions under design-basis conditions.

Upon identification of the weaknesses in MOV performance, significant industry and regulatory activities were initiated to verify the design-basis capability of safety-related MOVs in nuclear power plants. After completion of these activities, nuclear power plant licensees began establishing long-term programs to maintain the design-basis capability of their safety-related MOVs. This safety evaluation (SE) addresses the program developed by PECO Energy Company (the licensee) to verify periodically the design-basis capability of safety-related MOVs at the Limerick Generating Station, Units 1 and 2.

2.0 REGULATORY REQUIREMENTS

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," to Part 50 of Title 10 of the *Code of Federal Regulations* (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 to be applied to safety-related components is described in Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50. In Section 50.55a of 10 CFR Part 50, the NRC requires licensees to establish inservice testing (IST) programs in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, and more recently the ASME Code for Operation and Maintenance (OM) of Nuclear Power Plants.

In response to concerns regarding MOV performance, NRC staff issued Generic Letter (GL) 89-10 (June 28, 1989), "Safety-Related Motor-Operated Valve Testing and Surveillance," which requested that nuclear power plant licensees and construction permit holders 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 necessary corrective action, and trending MOV problems. The staff requested that licensees complete the GL 89-10 program within approximately three refueling outages or 5 years from the issuance of the GL. Permit holders were requested to complete the GL 89-10 program before plant startup or in accordance with the above schedule, whichever was later.

The NRC staff issued seven supplements to GL 89-10 that provided additional guidance and information on MOV program scope, design-basis reviews, switch settings, testing, periodic verification, trending, and schedule extensions. GL 89-10 and its supplements provided only limited guidance regarding MOV periodic verification and the measures appropriate to assure preservation of design-basis capability. Consequently, the NRC staff determined that additional guidance on the periodic verification of MOV design-basis capability should be prepared. On September 18, 1996, the NRC staff issued GL 96-05, “Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves,” requesting each licensee establish a program, or ensure the effectiveness of its 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 basis of the facility. In GL 96-05, the NRC staff summarized several industry and regulatory activities and programs related to maintaining long-term capability of safety-related MOVs. For example, GL 96-05 discussed non-mandatory ASME Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor Operated Valve Assemblies in LWR [light-water reactor] Power Plants, OM Code 1995 Edition; Subsection ISTC," which allows the replacement of ASME Code requirements for MOV quarterly stroke-time testing with exercising of safety-related MOVs at least once per operating cycle and periodic MOV diagnostic testing on a frequency to be determined on the basis of margin and degradation rate. In GL 96-05, the NRC staff stated that the method in OMN-1 meets the intent of the GL with certain limitations. The NRC staff also noted in GL 96-05 that licensees remain bound by the requirements in their code of record regarding MOV stroke-time testing, as supplemented by relief requests approved by the NRC staff.

In GL 96-05, licensees were requested to submit the following information to the NRC:

a. within 60 days from the date of GL 96-05, a written response indicating whether or not the licensee would implement the requested actions; and

b. within 180 days from the date of GL 96-05, or upon notification to the NRC of completion of GL 89-10 (whichever is later), a written summary description of the licensee’s MOV periodic verification program.

The NRC staff is preparing an SE on the response of each licensee to GL 96-05. The NRC staff intends to rely to a significant extent on an industry initiative to identify valve age-related degradation which could adversely affect the design-basis capability of safety-related MOVs (described in Section 3.0) where a licensee commits to implement that industry program. The

NRC staff will conduct inspections to verify the implementation of GL 96-05 programs at nuclear power plants as necessary.

3.0 JOINT OWNERS GROUP PROGRAM ON MOV PERIODIC VERIFICATION

In response to GL 96-05, the Boiling Water Reactor Owners Group (BWROG), Westinghouse Owners Group (WOG), and Combustion Engineering Owners Group (CEOG) jointly developed an MOV periodic verification program to obtain benefits from the sharing of information between licensees. The Joint Owners Group (JOG) Program on MOV periodic verification is described by the BWROG in its Licensing Topical Report NEDC-32719, “BWR Owners’ Group Program on Motor-Operated Valve (MOV) Periodic Verification,” and described by the WOG and the CEOG in their separately submitted Topical Report MPR-1807, “Joint BWR, Westinghouse and Combustion Engineering Owners’ Group Program on Motor-Operated Valve (MOV) Periodic Verification.” The stated objectives of the JOG program on MOV periodic verification are: (1) to provide an approach for licensees to use immediately in their GL 96-05 programs; (2) to develop a basis for addressing the potential age-related increase in required thrust or torque under dynamic conditions; and (3) to use the developed basis to confirm, or if necessary to modify, the applied approach. The specific elements of the JOG program are: (1) providing an "interim" MOV periodic verification program for applicable licensees to use in response to GL 96-05; (2) conducting a dynamic testing program over the next 5 years to identify potential age-related increases in required thrust or torque to operate gate, globe, and butterfly valves under dynamic conditions; and (3) evaluating the information from the dynamic testing program to confirm or modify the interim program assumptions.

The JOG interim MOV periodic verification program includes: (1) continuation of MOV stroke-time testing required by the ASME Code IST program; and (2) performance of MOV static diagnostic testing on a frequency based on functional capability (age-related degradation margin over and above margin for GL 89-10 evaluated parameters) and safety significance. In implementing the interim MOV static diagnostic test program, licensees will rank MOVs within the scope of the JOG program according to their safety significance. The JOG program specifies that licensees need to justify their approach for risk ranking MOVs. In Topical Report NEDC 32264, "Application of Probabilistic Safety Assessment to Generic Letter 89-10 Implementation," BWROG described a methodology to rank MOVs in GL 89-10 programs with respect to their relative importance to core-damage frequency and other considerations to be added by an expert panel. In an SE dated February 27, 1996, the NRC staff accepted the BWROG methodology for risk ranking MOVs in boiling water reactor nuclear plants with certain conditions and limitations. In the NRC SE, dated October 30, 1997, on the JOG program on MOV periodic verification, the NRC staff indicated its view that the BWROG methodology for MOV risk ranking is appropriate for use in response to GL 96-05. With respect to Westinghouse-designed pressurized water reactor nuclear plants, WOG prepared Engineering Report V-EC-1658, “Risk Ranking Approach for Motor-Operated Valves in Response to Generic Letter 96-05.” On April 14, 1998, the NRC staff issued an SE accepting with certain conditions and limitations the WOG approach for ranking MOVs based on their risk significance. Licensees not applicable to the BWROG or WOG methodologies need to justify their MOV risk-ranking approach individually.

The objectives of the JOG dynamic test program are to determine degradation trends in dynamic thrust and torque, and to use dynamic test results to adjust the test frequency and

method specified in the interim program if warranted. The JOG dynamic testing program includes: (1) identification of conditions and features which could potentially lead to MOV degradation; (2) definition and assignment of valves for dynamic testing; (3) testing valves three times over a 5-year interval with at least a 1-year interval between valve-specific tests according to a standard test specification; (4) evaluation of the results of each test; and (5) evaluation of collective test results.

In the last phase of its program, the JOG will evaluate the test results to validate the assumptions in the interim program to establish a long-term MOV periodic verification program to be implemented by licensees. A feedback mechanism will be established to ensure timely sharing of MOV test results among licensees and to prompt individual licensees to adjust their own MOV periodic verification program, as appropriate.

Following consideration of NRC staff comments, the BWROG submitted Licensing Topical Report NEDC-32719 (Revision 2) describing the JOG program on July 30, 1997. Similarly, the CEOG and the WOG submitted Topical Report MPR-1807 (Revision 2) describing the JOG program on
August 6 and 12, 1997, respectively. On October 30, 1997, the NRC staff issued an SE accepting the JOG program with certain conditions and limitations as an acceptable industry-wide response to GL 96-05 for valve age-related degradation. On October 19, 1999, the Babcock & Wilcox Owners Group (B&WOG) forwarded Topical Report MPR-1807 (Revision 2) to the NRC, and stated that the B&WOG is now participating in the JOG program on MOV periodic verification. In a letter dated May 15, 2000, the NRC staff informed the B&WOG that Topical Report MPR-1807 (Revision 2) is acceptable for referencing in B&WOG plants' licensing applications to the extent specified and under the limitations delineated in the report and the associated NRC SE dated October 30, 1997.

4.0 LIMERICK GL 96-05 PROGRAM

On November 15, 1996, PECO Energy Company notified the NRC in response to GL 96-05 that it had established a program to periodically verify that the safety-related MOVs at Limerick continue to be capable of performing their safety functions within the current licensing basis of the facility. On March 14, 1997, the licensee provided a summary description of its MOV periodic verification program and revisions to the program planned to be implemented at Limerick. In a letter dated May 14, 1998, the licensee updated its commitment to GL 96-05. On July 2, 1999, the licensee provided additional information regarding its GL 96-05 program in response to a request forwarded by the NRC staff on March 22, 1999.

In its letter dated March 14, 1997, the licensee described its then-current MOV periodic verification program at Limerick and revisions to the program planned to incorporate recent industry developments. The licensee is participating in the JOG program on MOV periodic verification and revised its MOV program to be consistent with the JOG recommendations. The licensee planned to develop and implement the revised MOV periodic verification program by early 1999. In its letter dated May 14, 1998, the licensee updated its commitment to participate in the JOG program as a member of the BWROG. The licensee did not take any technical exceptions to the JOG program, but requested schedule relief for implementation of the JOG interim MOV static diagnostic test program for certain valves. In its letter dated July 2, 1999, the licensee reported that it had revised its MOV risk-ranking process to follow the general

guidance provided by the BWROG methodology in Topical Report NEDC-32264A (Revision 2) as accepted by the NRC SE dated February 27, 1996, and other generic industry guidelines.

5.0 NRC STAFF EVALUATION

The NRC staff has reviewed the information provided in the licensee's submittals describing the program to verify periodically the design-basis capability of safety-related MOVs at Limerick in response to GL 96-05. NRC Inspection Reports (IRs) 50-352 & 353/92-80, 93-28, and 95-19 provided the results of inspections to evaluate the licensee's program at Limerick to verify the design-basis capability of safety-related MOVs in response to GL 89-10. The staff closed the review of the licensee's GL 89-10 program in IR 95-19 based on verification of the design-basis capability of safety-related MOVs at Limerick. The staff's evaluation of the licensee's response to GL 96-05 is described below.

5.1 MOV Program Scope

In GL 96-05, the NRC staff indicated that all safety-related MOVs covered by the GL 89-10 program should be considered in the development of the MOV periodic verification program. The NRC staff noted that the program should consider safety-related MOVs that are assumed to be capable of returning to their safety position when placed in a position that prevents their safety system (or train) from performing its safety function; and the system (or train) is not declared inoperable when the MOVs are in their nonsafety position.

In IR 92-80, the NRC staff reviewed the licensee's GL 89-10 program and concluded that several MOVs had been omitted from the program scope. In IR 93-28, the NRC staff noted that the subject MOVs valves had been included in the GL 89-10 MOV program at Limerick. In a letter dated November 15, 1996, the licensee did not take exception to the scope of GL 96-05. In its letter dated March 14, 1997, the licensee stated that its then-current program did not include certain MOVs assumed to be capable of returning to their safety position when infrequently or for short periods of time were placed in a position that prevented their safety system or train from performing its safety function. The licensee asserted that many of these MOVs repeatedly demonstrated design-basis capability during routine plant operation and that many have low design-basis differential pressure and flow service conditions similar to static test conditions. In response to an NRC staff question regarding its treatment of those MOVs, the licensee indicated in its letter dated July 2, 1999, that the specific MOVs in such applications had been included in the GL 96-05 program at Limerick. The licensee reported that these MOVs will be subject to periodic verification testing based on margin and safety significance consistent with its commitment to GL 96-05. The licensee stated that the periodic system and valve diagnostic testing will provide adequate confidence commensurate with safety significance that: (1) the MOVs continue to maintain their "system recovery from test" function; and (2) potential degradation mechanisms (e.g., stem lubricant degradation) will be detected before MOV functional operability is challenged. The licensee noted that all other aspects of its GL 96-05 program remain applicable to these MOVs.

The NRC staff considers the licensee to have made adequate commitments regarding the scope of its MOV program.

5.2 MOV Assumptions and Methodologies

Licensees maintain their assumptions and methodologies used in the development of MOV programs consistent with the plant configuration throughout the life of the plant (a concept commonly described as a “living program”). For example, the design basis of safety-related MOVs is maintained up to date, including consideration of any plant modifications or power uprate conditions.

In IR 95-19, the NRC staff reviewed the licensee’s justification for the assumptions and methodologies used in the MOV program in response to GL 89-10 at Limerick. With certain long-term items discussed in the following section, the staff determined that the licensee had adequately justified the assumptions and methodologies used in its MOV program. The licensee’s letter dated July 2, 1999, indicated that it has adopted, as appropriate, recent improvements to industry guidance for predicting MOV motor actuator output. The NRC staff considers the licensee to have adequate processes in place to maintain the assumptions and methodologies used in its MOV program, including the design basis of its safety-related MOVs.

5.3 GL 89-10 Long-Term Items

When evaluating the GL 89-10 program at Limerick, the NRC staff discussed in IR 95-19 several items of the licensee’s MOV program to be addressed over the long term. In its letter dated July 2, 1999, the licensee reported on the status of those long-term GL 89-10 items. For example, the licensee dynamically tested eight low pressure coolant injection valves and three Crane valves to validate valve factors used in their design calculations. The licensee has verified that its selection of valve factors from in-situ test data, where not set to the statistically bounding value, is based on representative test data in accordance with the guidance in Supplement 6 to GL 89-10. The licensee is continuing to evaluate its statistically derived bounding valve factors based on actual test data obtained from Limerick and other sources. The licensee also reviews MOV test data from the JOG program for applicability to Limerick.

In IR 95-19, the NRC staff discussed qualitative and quantitative aspects of the licensee’s program for trending MOV performance at Limerick. For example, the licensee uses a computerized database with the capability to trend various MOV information. This allows analysis of diagnostic test data, MOV failure data, preventive maintenance actions, and corrective maintenance items. The licensee also monitors load sensitive behavior and stem lubricant performance for adjustment of MOV margins as appropriate. In IR 95-19, the NRC staff concluded that the licensee’s provisions for tracking and trending MOV performance were effective and acceptable for GL 89-10 closure.

With the licensee’s ongoing MOV activities and trending program, the NRC staff considers the licensee to be adequately addressing the GL 89-10 long-term items at Limerick.

5.4 JOG Program on MOV Periodic Verification

In its letter dated May 14, 1998, the licensee updated its commitment to implement the JOG program on MOV periodic verification as described in Topical Report NEDC-32179 (Revision 2). In an SE dated October 30, 1997, the NRC staff accepted the JOG program as an

industry-wide response to GL 96-05 with certain conditions and limitations. The JOG program consists of the following three phases: (1) the JOG interim static diagnostic test program; (2) the JOG 5-year dynamic test program; and (3) the JOG long-term periodic test program. In its letter dated May 14, 1998, the licensee stated that it was adopting the JOG interim program and that full compliance with the JOG program entailed development and implementation of the revised long-term JOG program following completion of the JOG dynamic test program. The staff considers the licensee's commitment in response to GL 96-05 to include implementation of all three phases of the JOG program at Limerick. The conditions and limitations discussed in the NRC SE dated October 30, 1997, apply to the JOG program at Limerick. The staff considers the commitments by the licensee to implement all three phases of the JOG program at Limerick to be an acceptable response to GL 96-05 for valve age-related degradation.

In its letter dated July 2, 1999, the licensee stated that the MOV risk-ranking process at Limerick followed the general guidance provided by the BWROG methodology in Topical Report NEDC 32264A (Revision 2), and other generic industry guidelines. In particular, the licensee's MOV risk-ranking approach at Limerick included a multi-step process of: (1) identification of the MOV program scope relative to the plant probabilistic safety assessment (PSA); (2) calculation of the MOV (component level) PSA risk-importance measures related to core damage frequency and large early release frequency including Risk Achievement Worth and Fussell-Vesely importance measures; (3) categorization of MOVs as High, Medium, or Low Risk; and (4) performance of an Expert Panel review to compensate for limitations and assumptions inherent in the plant PSA and to finalize the MOV risk ranking. The NRC staff notes that the BWROG also provided an example list of risk-significant MOVs for consideration by each licensee in applying the owners group methodology. The conditions and limitations discussed in the NRC SE (dated February 27, 1996) on BWROG Topical Report NEDC-32264 apply to Limerick. Based on the licensee's summary, the NRC staff considers the licensee's methodology for risk ranking MOVs at Limerick to be acceptable.

In its letter dated May 14, 1998, the licensee stated that interim MOV static diagnostic testing under the JOG program at Limerick would be performed on a test frequency based on the safety significance and functional capability of each GL 96-05 MOV. The licensee did not take any technical exceptions to the JOG program, but requested schedule relief for implementation of the JOG interim static diagnostic test program for low safety significant, high margin MOVs. First, the licensee needed 6 months from May 14, 1998, to revise its program documents and engineering tools which support implementation of the revised MOV program. Second, the licensee needed transition schedule extensions to obtain sufficient trendable test data and to perform an engineering analysis necessary to validate the extension of the test interval for low safety significant, high margin MOVs beyond the initial 5-year period. The licensee stated that all other MOVs in its GL 96-05 program at Limerick will be tested within the intervals specified by the JOG program. In the SE dated October 30, 1997, on the BWROG Topical Report NEDC-32719 describing the JOG program, the NRC staff stated that MOVs with scheduled test intervals beyond 5 years need to be grouped with other MOVs that will be tested on intervals less than 5 years in order to validate assumptions for the longer test intervals. In its May 14, 1998, letter, the licensee indicated that, immediately upon adopting the JOG program, a significant number of low safety significant, high margin MOVs would exceed the initial 5-year test interval because their original baseline diagnostic tests were performed under the GL 89-10 program. The licensee reported that these particular MOVs possessed significant margin above their capability requirements such that no MOV operability concerns were expected from

any performance degradation. The licensee stated that it would continue to perform MOV periodic verification testing during the transition period and would complete the diagnostic tests for the low safety significant, high margin MOVs by May 14, 2002. Based on the information provided by the licensee, the NRC staff finds the licensee's interim MOV static test program frequency, including the schedule for implementation, to be acceptable.

The JOG program is intended to address most gate, globe and butterfly valves used in safety-related applications in the nuclear power plants of participating licensees. The JOG indicates that each licensee is responsible for addressing any MOVs outside the scope of applicability of the JOG program. The NRC staff recognizes that the JOG has selected a broad range of MOVs and conditions for the dynamic testing program, and that significant information will be obtained on the performance and potential degradation of safety-related MOVs during the interim static diagnostic test program and the JOG dynamic test program. As the test results are evaluated, the JOG might include or exclude additional MOVs with respect to the scope of its program. Although the test information from the MOVs in the JOG dynamic test program might not be adequate to establish a long-term periodic verification program for each MOV outside the scope of the JOG program, sufficient information should be obtained from the JOG dynamic test program to identify any immediate safety concern for potential valve age-related degradation during the interim period of the JOG program. Therefore, the NRC staff considers it acceptable for the licensee to apply its interim static diagnostic test program to GL 96-05 MOVs that currently might be outside the scope of the JOG program with the feedback of information from the JOG dynamic test program to those MOVs. In the NRC SE dated October 30, 1997, the NRC staff specifies that licensees implementing the JOG program must determine any MOVs outside the scope of the JOG program (including service conditions) and justify a separate program for periodic verification of the design-basis capability (including static and dynamic operating requirements) of those MOVs.

5.5 Motor Actuator Output

The JOG program focuses on the potential age-related increase in the thrust or torque required to operate valves under their design-basis conditions. In the NRC SE dated October 30, 1997, on the JOG program, the NRC staff specifies that licensees are responsible for addressing the thrust or torque delivered by the MOV motor actuator and its potential degradation. Although the JOG does not plan to evaluate degradation of motor actuator output, significant information on the output of motor actuators will be obtained through the interim MOV static diagnostic test program and the JOG dynamic test program. Several parameters obtained during MOV static and dynamic diagnostic testing help identify motor actuator output degradation when opening and closing the valve including, as applicable, capability margin, thrust and torque at control switch trip, stem friction coefficient, load sensitive behavior, and motor current.

In its letter dated July 2, 1999, the licensee stated that the potential degradation of thrust and torque delivered by the MOV actuator can be identified through periodic static diagnostic testing. The licensee noted that its GL 96-05 MOVs are tested at frequencies within the limits of the JOG program taking into consideration the trending of as-found diagnostic test data. The licensee periodically assesses MOV performance by trending in accordance with plant procedures. The licensee also reassesses the frequency for MOV lubrication, preventative maintenance, and MOV periodic verification testing during the trending process to ensure that adequate margin is available to accommodate degradation.

In Technical Update 98-01 and its Supplement 1, Limitorque Corporation provided updated guidance for predicting the torque output of its ac-powered motor actuators. In its letter dated July 2, 1999, the licensee reported that it had performed a comprehensive assessment of the revised industry guidance contained in the Limitorque update. The licensee stated that it had applied a methodology developed by the Commonwealth Edison Company to predict the output of applicable ac-powered MOVs at Limerick. The licensee also stated that it had performed more rigorous motor heat-up calculations in lieu of the bounding maximum equipment qualification temperature limits. In IR 50-277 and 278/99-01, the NRC staff documented its review of the evaluation of Limitorque Technical Update 98-01 at this licensee's Peach Bottom Atomic Power Station, Units 2 and 3. At Peach Bottom, the staff reported that: (1) the licensee had performed a comprehensive assessment of the new information regarding MOV output capability contained in Limitorque Technical Update 98-01; (2) the licensee's operability determinations applied best available industry data in calculating motor actuator performance capability with reasonable technical assumptions; and (3) the licensee's long-term corrective actions appropriately addressed restoration of MOV margins. In its letter dated July 2, 1999, the licensee stated that the evaluation of Limitorque Technical Update 98-01 at Limerick applied the same approach and generic methodology as at Peach Bottom. The licensee will address any changes to the Commonwealth Edison methodology in accordance with its plant procedures.

In its letter dated July 17, 1998, forwarding Technical Update 98-01, Limitorque indicates that a future technical update will be issued to address the application of dc-powered MOVs. In its letter dated July 2, 1999, the licensee stated that it is participating in the BWROG project to develop an improved dc-powered MOV output methodology. The licensee is monitoring this issue and will evaluate the updated dc-powered MOV information as it becomes available. Any MOV operability concerns that might be identified in the future will be processed in accordance with established regulatory requirements and plant-specific commitments.

The NRC staff considers the licensee to be establishing sufficient means to monitor MOV motor actuator output and its potential degradation.

6.0 CONCLUSION

The NRC staff finds that the licensee has established an acceptable program to verify periodically the design-basis capability of the safety-related MOVs at Limerick through its commitment to all three phases of the JOG program on MOV periodic verification and the additional actions described in its submittals. Therefore, the staff concludes that the licensee is adequately addressing the actions requested in GL 96-05. The staff may conduct inspections at Limerick to verify the implementation of the MOV periodic verification program is in accordance with the licensee's commitments; this NRC SE; the NRC SE dated October 30, 1997, on the JOG program on MOV periodic verification; and the NRC SE dated February 27, 1996, on the BWROG methodology for ranking MOVs by their safety significance.

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