



Boston Edison

Pilgrim Nuclear Power Station
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GL96-05

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U.S. Nuclear Regulatory Commission
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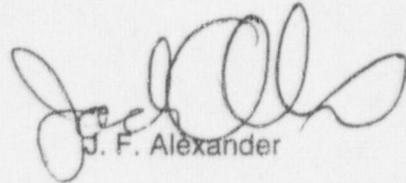
**BOSTON EDISON COMPANY RESPONSE TO
NRC REQUEST FOR ADDITIONAL INFORMATION
REGARDING GENERIC LETTER 96-05 PROGRAM (TAC NO. M97086)**

Reference: NRC Letter, "Request for Additional Information Regarding Generic Letter 96-05 Program at Pilgrim Nuclear Power Station," dated September 14, 1998.

This letter provides the Boston Edison Company response to the NRC request for additional information included in the above referenced letter. This response relates to the closure of Generic Letters 89-10 and 96-05, and issues raised in NRC Inspection Report No. 97-13 concerning motor operated valve close-out activities.

This letter makes no commitments.

Should you have any questions regarding the above subject matter, please contact Walter Lobo at 508-830-7940.



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BOSTON EDISON COMPANY RESPONSE TO
NRC REQUEST FOR ADDITIONAL INFORMATION
REGARDING GENERIC LETTER 96-05 PROGRAM (TAC NO. M97086)

- References:
1. NRC Letter to Boston Edison, "Pilgrim Inspection Report 50-293/97-13 and Notice of Violation," dated February 6, 1998.
 2. Boston Edison Letter No. 98-087, "Supplementary Information Related to Closure of Generic Letter 89-10," dated June 26, 1998.
 3. Boston Edison Letter No. 98-086, "Response to Safety Evaluation - Joint Owners' Group Program on Periodic Verification of Motor Operated Valves," dated June 26, 1998.
 4. NRC Letter to Boston Edison, "Request for Additional Information Regarding Generic Letter 96-05 Program at Pilgrim Nuclear Power Station," dated September 14, 1998.

Background

In Reference 2, Boston Edison Company (BECo) committed to provide information regarding the implementation of MOV program activities cited in the Inspection Report 97-13. In Reference 3, BECo described the implementation of the Joint Owners Group (JOG) program. In Reference 4, the NRC requested additional information concerning (1) long-term aspects of MOV program; noted in the inspection report 97-13, (2) MOV periodic verification program in response to GL 96-05, and (3) implementation of JOG program elements related to Limitorque Technical Update 98-01 and its Supplement 1.

Request for Additional Information No. 1

In NRC Inspection Report No. 50-293/97-13, the NRC staff closed its review of (MOV) program implemented at the Pilgrim Nuclear Power Station in response to Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." In the inspection report, the NRC staff noted certain aspects of the licensee's MOV program that would be addressed over the long term. For example, the licensee indicated that it (1) would obtain additional industry information or use the Electric Power Research Institute (EPRI) MOV Performance Predication Methodology (PPM) to bolster the assumed valve factors for several MOVs (including specific marginal MOVs); (2) would complete its draft calculation M-772, "Evaluation of MOV Coefficient of Friction," in support of its stem friction coefficient assumptions; and (3) had not completed the revision of certain MOV design calculations. In the report, the inspectors noted that the licensee's assumptions for the design basis differential pressure for the recirculation pump suction and discharge isolation valves and associated valve factors needed clarification. The inspectors also indicated that more information was needed to validate the vendor's predicted torque requirements for two motor-operated butterfly valves in the Reactor Building Closed Cooling Water System. The licensee stated in a letter dated June 26, 1998, that it is evaluating the capability of a number of MOVs using the EPRI MOV PPM and that it would notify the NRC of the results of those evaluations by November 15, 1998. The licensee should describe the actions taken to address the specific long-term aspects of the MOV program at Pilgrim that were noted in the NRC inspection report.

BECo Response

Generic Letter 89-10 Inspection Report Items

1. PPM Results Summary

Valve Factors

Reference 1 noted that certain non-tested valve types required additional valve factor information to support the Boston Edison program assumptions. Reference 1 included a table which identified the applicable valve types and the number of valves in each category. The table has been reproduced below, and the applicable valve numbers have been included.

VALVE SIZE & TYPE	MANUFACT-URER	ANSI CLASS	BECo VALVES
16", 18" FWG	Anchor/Darling	150#	MO-2301-36 MO-1001-7A/B/C/D MO-1001-43A/B/C/D MO-1400-3A/B
10" FWG	Anchor/Darling	900#	MO-2301-8
4" FWG	Powell	150#	MO-2301-33, 34
20" FWG	Powell	600#	MO-1001-47
4" FWG	Powell	900#	MO-1301-49
10" FWG	Velan	300#	MO-1001-23A/B MO-1001-26A/B
8" FWG	Velan	600#	MO-2301-4
3" FWG	Velan	600#	MO-1301-17 MO-220-2
20" FWG	Walworth	600#	MO-1001-50
3" FWG	Westinghouse	1525# 2035#	MO-220-1 MO-1301-16
24" DDG	Anchor/Darling	900#	MO-202-5A/B
4" Globe	Anchor/Darling	1500#	MO-1201-80
2" Globe	Powell	600#	MO-1301-62
4" Globe	Powell	900#	MO-1301-53
6" Globe	Velan	300#	MO-1001-37A/B
10" Globe	Velan	900#	MO-2301-10
18" Globe	Walworth	600#	MO-1001-28A/B

As described in Reference 2, Boston Edison initiated a program to implement the EPRI MOV Performance Prediction Program (PPM) for a number of MOVs, including the valves listed in the above table. The valve factor results for each of the groups were back calculated from the PPM results to be consistent with PNPS's definition of valve factor. The PPM either was not applicable or was only partly applicable for some valves because of the methodology's stated limitations e.g. not applicable for nonstellite seats. In these cases, alternate technical methods were used based on "best available information".

For nine of the thirty-six valves, the PFM evaluations provided higher valve factors than had previously been used and which will likely result in modifications to restore

margins. The margins are expected to be restored by gear changes or by adjusting the torque switch setting.

For the remaining valves, the PPM evaluations provided a higher, similar or lower valve factor. Review of margin calculations for these valves indicates that modifications are not necessary.

MOVs with Low Margins

Reference 1 identified several MOVs with relatively low margins in their safety function stroke direction. As described in Reference 2, Boston Edison indicated the PPM was being used as a tool to evaluate valves with small design margins.

For seven of eight gate and globe valves, the PPM evaluations either confirmed or provided higher valve factors than had previously been used. These results will likely result in modifications to restore margins. The margins are expected to be restored by gear changes or by adjusting the torque switch setting.

For the remaining gate valve, the PPM evaluation provided a lower valve factor, indicating that modifications are not necessary.

MO-3813 Butterfly Valve

Boston Edison has reviewed the methodology used for calculating margin for butterfly valves, and has concluded that it is very conservative. For MO-3813, the valve has a safety function only to close. The vertical stem, symmetrical disk design has a self-closing design under flow conditions. The design calculations also conservatively extrapolate the measured total closing required torque from tested conditions to design basis conditions. A significant fraction of the total closing required torque is not sensitive to differential pressure and is not expected to change appreciably with differential pressure, therefore, the linear extrapolation of these torque requirements is conservative and the calculation over predicts the required torque to close and seat the valve. The butterfly valve calculation will be revised to reflect these results and no further modifications to this valve are considered necessary.

The modifications described above represent our best judgment as to the extent of required changes at this time. If during the detailed design and implementation phase additional changes become necessary, this information would be available for your review. The PNPS MOV program uses a 10% design margin to evaluate the need for additional corrective actions. This margin is the additional actuator thrust/torque available, corrected for all uncertainties and expected degradations, above that required to operate the valve under design basis conditions.

It is our intent to complete the modifications for low margin valves and "PPM revised valve factor" valves by the end of RFO12.

Required Thrust Predictability

The PPM results determined that most valves have predictable thrusts. However, some valves have the potential for galling of the carbon steel guide surfaces and some valves have the potential for guide rail bending in the closing direction (which could lead to loss of leak tightness if differential pressure is subsequently reversed). Four valves were conservatively identified as having "unpredictable" thrusts due either to potentially sharp

disk guide bottom edges (vendor drawings did not specify control of edge rounding) or due to potentially severe guide galling leading to disk binding. PNPS is currently evaluating the need for further valve inspections, analyses, and/or modifications to resolve these issues. The valve factor results from the PPM are based on proper resolution of these potential valve internal damage and thrust predictability issues.

Also, the predicted unwedging requirements of the PPM are being compared with plant in-situ unwedging data to further validate the PPM methodology.

These evaluations are planned to be complete by the end of 1998.

2. Recirculation Pump Isolation Valves (MO-202-5A/B)

Boston Edison contracted the original recirculation system designer, General Electric, to perform a detailed plant specific design basis review of the functions of the recirculation pump isolation valves. This review determined that the original valve purchase specification requirement for the recirculation discharge valves to close with a 200 psi differential was based on a LOCA closure function. However, this value was used by General Electric to bound several plant designs, including Pilgrim Station. The 200 psid requirement was not based on a plant specific analysis for Pilgrim Station. Therefore for the LOCA closure case, it is appropriate to use the plant specific calculated differential pressure of 32 psid.

The detailed design basis review by General Electric also concluded that there was no specific design requirement which identified closure to isolate a recirculation pump seal failure as a safety related or non-safety related function of the recirculation pump isolation valves. Therefore, there is no need to evaluate the case of 200 psid assumed for seal failure for either the discharge valves (MO-202-5A/B) or the suction valves (MO-202-4A/B). Our UFSAR is being revised to reflect this clarification.

The PPM evaluations for MO-202-5A/B provided higher valve factors than had previously been used. The design basis operating conditions for MO-202-5A/B, as well as MO-202-4A/B, have also been clarified. Review of the margin calculations for these valves indicates that modifications are not necessary.

3. Stem Friction Coefficient

Calculation M772, which provided the basis for PNPS's stem friction coefficient, has been verified and approved by Boston Edison and a copy has been provided to the NRC. Review of the calculation indicates that coefficients of friction in the opening direction do not increase from static to dynamic tests (and in many cases, friction decreases). Therefore, the 15% correction for rate of loading in the opening direction is overly conservative and is being removed from our program.

4. Butterfly Valves MO-4083 and MO-4084

Reference 1 noted that MO-4083 and MO-4084 had not been dynamically tested. Reference 1 also noted that more information was needed to validate the vendor's torque requirements as part of Boston Edison's long term MOV program.

A PPM evaluation has been completed for these valves. The PPM evaluation results indicate an increase in the total required torque, above the vendor's prediction. However, the required torque is within the capability of the motor operator and no further action is needed.

5. MOV Design Calculations

Reference 1 identified that there had been instances in which design calculations had not been revised to reflect diagnostic test results, and that there were some instances which represented inconsistencies between design calculations and field conditions.

Boston Edison has been working on a significant effort to revise and update the MOV design calculations to improve efficiency and consistency for the life of the plant. This includes developing a calculation method which will permit more timely update of the calculations to reflect test results. This effort will result in preparation of many more calculations to support the long term MOV program. As part of this current initiative, the items noted in Reference 1 will be included in the upcoming calculation revisions.

Request for Additional Information No. 2

In a letter dated June 26, 1998, the licensee updated its commitment to implement the Joint Owners Group (JOG) Program on MOV Periodic Verification in response to GL96-05. The JOG program specifies that the methodology and discrimination criteria for ranking MOVs according to their safety significance are the responsibility of each participating licensee. In a previous letter dated June 18, 1997, the licensee had generally described the risk ranking of MOVs at Pilgrim for application of the JOG program. As Pilgrim is a boiling water reactor (BWR) nuclear plant, is the licensee applying the Boiling Water Reactor Owners' Group (BWROG) methodology for ranking MOVs based on their safety significance as described in BWROG Topical Report NEDC 32264 and the NRC safety evaluation dated February 27, 1996. If not, the licensee should describe the methodology used for risk ranking MOVs at Pilgrim in more detail.

BECo Response

Joint Owners Group Program on MOV Periodic Verification

Reference 4 requested that Boston Edison describe the methodology used for risk ranking MOVs as part of the JOG program on MOV periodic verification. Boston Edison was not a participant in the development of BWROG Topical Report NEDC 32264; therefore, this document has not been used to justify MOV risk categorization. Boston Edison has developed a separate methodology for this purpose. The details of the method follow.

A safety ranking for each of the valves within the scope of the program has been completed to assign a high, medium, or low safety risk significance. The risk ranking process has been performed by an expert panel.

The topics to be considered when establishing the risk category included, as applicable:

- IPE versus deterministic risk assessment
- probability
- functional redundancy
- safety function (core cooling, containment cooling, decay heat removal, containment isolation)
- MOV program guidance

Items considered by the expert panel included:

- relative value of each safety function
- system analytical margins
- knowledge of Emergency Operating Procedures and operator training

- feasibility of operator action
- MOV environment (internal and external)

The basis for establishing the risk category for each of the MOVs in the program will be documented.

Request for Additional Information No. 3

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 safety evaluation dated October 30, 1997, on the JOG program, the NRC staff specified that licensees are responsible for addressing the thrust or torque delivered by the MOV motor actuator and its potential degradation. In NRC Inspection Report 97-13, the inspectors noted that, at Pilgrim, the licensee had already responded to the potentially adverse industry information regarding MOV performance identified in NRC Information Notice 96-48 (August 21, 1996), "Motor-Operated Valve Performance Issues". For example, the licensee's methods of calculating Limitorque valve actuator capability included the use of (1) actuator pullout efficiencies in both stroke directions; (2) a 0.9 application factor for alternating current motors; and (3) an exponent of 2.2 to calculate degraded voltage factors for alternating current motors. The licensee should briefly describe the plan at Pilgrim for ensuring adequate MOV motor actuator output capability, including consideration of any impact on the Pilgrim MOV program resulting from the recent guidance in Limitorque Technical Update 98-01 and its Supplement 1.

BECo Response

MOV Actuator Output Capability

As noted in Reference 4, the Boston Edison method of calculating Limitorque actuator capability included the use of actuator pullout efficiencies in both stroke directions; an application factor of 0.9 for AC motors; and an exponent of 2.2 to calculate degraded voltage factors for AC motors. These program requirements meet or exceed the requirements of Limitorque Technical Update 98-01 and Technical Update 98-01, Supplement 1. The Technical Update and Supplement 1 identified three categories of AC actuators which would require evaluation by alternate means. Boston Edison has one actuator in one of the categories. This valve has been evaluated using an alternate method as described in Technical Update 98-01 and its Supplement, and has been shown to have adequate output capability.

Concerning addressing the potential degradation of MOV actuator delivered thrust or torque, PNPS will continue to 1) perform periodic static diagnostic testing of MOV's, consistent with previous commitments, to confirm MOV capability and proper control switch settings; 2) perform appropriate preventative maintenance activities such as periodic stem lubrication, actuator gear case inspection, and actuator refurbishment to provide reasonable confidence of proper actuator performance; and 3) apply appropriate margins to account for actuator degradations such as stem lubrication degradation, spring pack relaxation, and rate of loading.

As part of the continuing MOV program, Boston Edison is trending static coefficient of friction measured during diagnostic testing. Boston Edison will review the results of dynamic tests which are conducted to observe any trends that may be present for rate of loading degradation. These tests include those scheduled to be performed periodically by Boston Edison in support of the JOG periodic verification program.

PNPS is involved in various industry organizations to keep apprised of the latest available information concerning MOV performance. PNPS will continue to incorporate necessary enhancements to the MOV program based upon our evaluation of the most current information.