



Commonwealth Edison
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May 11, 1992

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Mr. A. Bert Davis
 Regional Administrator
 U.S. Nuclear Regulatory Commission
 Region III
 799 Roosevelt Road
 Glen Ellyn, IL 60137

Subject: Updated Status of Outstanding MOV
 Issues for Commonwealth Edison Company
 NRC Docket Nos. 50/237, 50/249, 50/254, 50/265
 50/295, 50/304, 50/373, 50/374, 50/454, 50/455
 50/456, 50/457

Dear Dr. Murley,

Attached please find Commonwealth Edison Company's (CECo) response to several issues raised during MOV audits at several CECo nuclear stations. This response is being submitted as a result of a meeting held on April 8, 1992, at the NRC Region III headquarters.

Please direct any questions you may have to this office.

Sincerely,

Terrence W. Simpkin

T.W. Simpkin
 Nuclear Licensing Administrator

cc: R.M. Pulsifer, NRR
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INTRODUCTION

On April 8, 1992, Commonwealth Edison (CECo) provided a presentation to the NRC at the Region III Headquarters which addressed several NRC concerns related to implementation of the Generic Letter 89-10 Program at CECO. This letter documents CECO's positions presented to the NRC at that meeting. This letter also forwards additional information which supports the CECO positions and provides the schedule for validation of the CECO positions. The issues addressed in this letter are:

1. CECO's justification for the use of stem friction coefficients.
2. CECO's justification for the 36 month stem lubrication frequency in light of recommendations from Limitorque.
3. CECO's plans for post maintenance testing after packing adjustments.
4. CECO commitment for dP testing and the CECO definition of the 2-stage approach.
5. CECO's plans for using the CECO test data to validate (and update) the GL 89-10 Program.
6. CECO's resolution of the degraded voltage issue that was raised during the Dresden EDSFI with regards to impact on MOV operability.
7. CECO's justification for the use of a 0 line pressure for thrust calculations on Globe Valves.¹
8. The Corporate overview of the GL 89-10 Program.

¹ Discussed at 4/8/92 Meeting. CECO understands that the NRC considers this issue closed.

CECO'S JUSTIFICATION FOR USE OF STEM FRICTION COEFFICIENTS

CECo's Position:

CECo uses a degraded stem friction coefficient = 0.20 for all MOVs except for approximately 300 Westinghouse MOVs and some BWR blowdown valves. For Westinghouse MOVs and a limited population of blowdown valves in the BWRs, CECo uses a degraded stem friction coefficient = 0.15. For certain blowdown valves, lower stem friction coefficients (below .15) are assumed, but VOTES Torque Cartridge (VTC) testing is performed during the initial baseline test to verify the CECo assumptions. CECo feels justified in using initial or well lubricated stem friction coefficients below 0.20 based on the large quantity of industry data as outlined below:

Westinghouse:	Test Results: 0.06 to 0.11, Used: 0.15
Rotork:	Test Results: 0.074 to 0.133, Used: 0.14
Anchor Darling:	Uses 0.15
KALSI Engineering:	Test Results: 0.08 to 0.14
INEL Blowdown Testing:	Test Results: 0.1 to 0.15
EPRI Preliminary Testing:	Test Results: 0.1 to 0.16

Based on the above data, it is apparent that values for stem friction coefficients better than 0.2 are not unreasonable.

NRC Concerns:

- 1) At the Braidwood Audit, the NRC questioned CECo's stem friction coefficient assumptions. The NRC considers that the CECo justification for the lower coefficient of friction is incomplete.
- 2) The NRC identified valve tests performed by CECo and other utilities which suggested stem friction coefficients above 0.20.

CECO'S USE OF STEM FRICTION COEFFICIENTS = 0.15 (Cont'd.)

CECo's Resolution

- 1) CECo will validate our stem friction coefficient assumptions, which are based on vendor recommendations and industry bench tests, using limited VTC data. This limited VTC testing will include approximately 10 static tests per Station. In addition, CECo commits to using the VTC on a limited number of dP tests to help in characterizing Load Sensitive Behavior and to validate stem friction assumptions under design basis conditions. CECo will evaluate the results of the testing performed since January 1991 (including the initial VTC testing performed this Spring) by August 30, 1992.

The EPRI evaluation of industry stem friction coefficients is due to be completed by the end of 1992. CECo expects that the final results of the EPRI work will support our assumptions on stem friction coefficients.

- 2) The Braidwood torque values calculated by the NRC were based on generic spring pack curves. CECo believes that validation of analytical methods for determining stem friction coefficients should be based on testing. The use of Generic Spring Pack Curves/Torque Switch Settings is inappropriate to determine operability of individual MOVs due to the significant overall uncertainties in the calculations attributable to inaccuracies in the generic curves and balance of the torque switch.

An apparent stem friction coefficient is determined using actuator torque input (VTC) and measured actuator thrust output. This apparent stem friction factor accounts for more than the stem to stem nut interface (e.g. anti-rotation key friction may also exist for globe valves).

Analytical data on a statistical basis can be used to determine average friction coefficient for a large population of valves. Preliminary results for 400 CECo tests indicate an average stem friction coefficient of 0.16 based on generic spring pack curves (~300 tests), 0.17 based on tested spring pack curves (~100 tests), and 0.12 based on VTC tests (13 tests).

STEM LUBRICATION DEGRADATION AND THE 36 MONTH LUBRICATION INTERVAL

CECo's Position:

A thrust window maximum is established based on stem friction coefficients for well lubricated stems. CECO recognizes that the generated thrust at an as left torque setting may degrade over time due to several factors. Some licensees have decided to perform 18 month stem lubrication intervals to justify minimal thrust output degradation in their thrust windows. As an alternative, CECO has increased the thrust window bottom (i.e. thrust output) to allow for thrust output degradation over a 36 month stem lubrication cycle. As an additional conservatism, CECO has increased the thrust window bottom, even for MOV stems being lubricated on an 18 month lubrication interval.

NRC Concern:

During the 89-10 audits performed at CECO Stations, the NRC has questioned the appropriateness of the CECO stem lubrication intervals.

CECo Resolution:

CECo has utilized a conservative approach by increasing minimum required MOV thrust output to account for stem lubrication degradation. This conservative approach is applied even where 18 month stem lubrication cycles are in place. Furthermore, existing industry data validates that the substantial margin utilized by CECO compensates for any expected stem lubrication degradation over a 36 month period.

CECo is performing a stem lubricant degradation bench testing program at Quad Cities Station to quantify stem lubrication degradation as a function of MOV cycles and lubricant type. The test results should be available by the end of 1992.

Some of the MOVs that were VTC tested during the recently completed outages will be VTC tested again in the as found condition at both the 18 month and 36 month intervals. The results of this testing will also be used in evaluation of the CECO lubrication program.

The EPRI Test Program, to be completed by end of 1992, should provide further evidence/justification for the use of particular stem friction factors and degradation of stem lubrication over time. CECO commits to adjust our Lubrication Program, as necessary, based on the result of our testing and the EPRI Program final results.

PLANS FOR POST MAINTENANCE TESTING OF PACKING ADJUSTMENTS

CECo's Position:

CECo utilizes current signature traces to assess the impact of packing adjustments on MOV performance.

NRC Concern:

The NRC does not consider that current signature traces adequately measure the impact of packing adjustments since an increase in running load may not result in a corresponding measurable increase in motor current.

CECo's Resolution:

CECo is investigating the relationship, both analytically and through testing, between change in MOV thrust and current/power factor changes. At Quad Cities, a test program compared changes in thrust to changes in current/power factor for packing adjustments to assess the impact on margins. This program was performed during baseline VOTES testing. The preliminary results of this program were provided to the NRC during the April 8, 1992 presentation.

CECo will reassess the present post maintenance testing program, using the results of these investigations by the end of 1992. Among the alternative processes currently being considered for future use include:

- CECO is developing methodologies for initial packing installation and baseline testing which should reduce the need for further packing adjustments and better assess the impact of packing adjustment on a valve by valve basis.
- Live Load/Engineered Packing for all MOVs coupled with procedural controls on packing adjustments.
- Strain Gauge Testing using Portable VOTES equipment.
- VOTES Testing (measuring current and power factor only).
- Full VOTES Testing to measure running thrust.

CECo COMMITMENT FOR dP TESTING

CECo's Position:

CECo intends to full dP test all MOVs where practicable. This is consistent with CECo's stated position in its response to GL 89-10.

- CECo has split practicable into two parts:
 - Practicable _ No Technical Specification violations, unusual alignments, endangerment of personnel or equipment, etc.
 - Meaningful _ When the dynamic load portion of thrust is less than 10% of total thrust requirement, a static test is considered to be equivalent to a design basis test and may be performed in lieu of a dP test, at the station's discretion.

- CECo's definition of full dP test is:
 - MOVs tested at dPs greater than 90% of the design basis differential pressure
 - Certain MOVs tested between 80%-90% of the design basis differential pressure, if extrapolation of test results to 100% design based dP can be justified.

Based on this criteria, CECo will perform full dP testing on approximately 430 MOVs at our 6 stations (~30% of CECo's total GL 89-10 MOV population).

NRC Concern:

During recent audits of the GL 89-10 program at CECo's stations, the NRC strongly recommended dP testing of all practicable MOVs, regardless of the dP which can be achieved. The NRC has stated that they feel CECo is backing off from the dP testing commitment contained in CECo's GL 89-10 response.

CECo COMMITMENT FOR dP TESTING (Cont'd.)

CECo's Resolution:

CECo will perform dP testing for approximately 430 MOVs in the GL 89-10 program. This represents ~30% of the MOVs within the GL 89-10 program. In addition to the CECo testing, EPRI is performing extensive full flow dP testing of typical MOV designs used in the industry under well controlled and documented conditions. The EPRI testing results will be factored into the CECo Program.

CECo notes that the NRC economic analysis justifying the GL 89-10 program assumed that dP testing would be performed on 10% of the total GL 89-10 population. CECo's original GL 89-10 commitment for performing dP testing was consistent with this economic analysis. CECo's current dP testing plan (~30% of the total population) significantly exceeds the scope of dP testing projected in the economic justification for GL 89-10. CECo believes that it is fully complying with the commitments made in the response to GL 89-10. Absent a specific requirement to conduct partial dP testing, CECo feels that this testing will not produce useful results until a methodology is developed that will allow meaningful correlation of the data to full dP conditions. When such a methodology is developed, CECo may reevaluate our current practice.

CECo will utilize the two stage approach to disposition all MOVs which are not or cannot be dP tested. CECo's full dP testing will quantify typical values for valve factors, unwedging factors, and load sensitive behavior for most valve designs at CECo stations. This testing will also identify elements contributing to valve-to-valve variation in these critical MOV factors. MOVs that are not dP tested will be validated based on dP test results of similar MOVs, industry data, or analytical means. CECo will consider the following factors when dispositioning MOVs that are not dP tested:

- design margins
- dP load as a function of entire load
- MOV function, i.e. safety significance

The first stage approach is to group all MOVs. CECo will utilize dP tested MOVs within a group to validate MOV's not dP tested. If no dP test data exists for a particular valve group, CECo will apply the second stage approach. This will include the application of analytical methods and extrapolation based on the best available data. This could include applying INEL or EPRI test results, extrapolation from a similar group of MOVs, or partial dP testing.

CECo PLANS FOR USING THE CECo TEST DATA TO VALIDATE (AND UPDATE) THE CECo GL 89-10 PROGRAM

NRC Concern:

During NRC audits of the GL 89-10 Program at CECo Stations, the NRC has expressed concern over the feedback of test program results into the overall CECo GL 89-10 Program.

CECo Resolution:

- CECo's GL 89-10 Program includes verification of the following design assumptions:
 - Packing Load
 - Impact of Packing Adjustments
 - Stem Factors
 - Stem Factor Degradation
 - Load Sensitive Behavior
 - Valve Factors
 - Inertia Factors
 - Unwedging Factors
- CECo recognizes the need to ensure that all test data is appropriate for use when validating design assumptions. Preliminary evaluations based on the initial dP and static tests will be completed by September 30, 1992.
- CECo's current position is that static periodic testing is justified. This is consistent with the NRC position originally stated in item f of GL 89-10 and in the NRC response to Question 38 of GL 89-10, Supplement 1. Because CECo's periodic testing program will not begin for most GL 89-10 MOVs until 1994, resolution of this issue is not critical at this time. If future data indicates that static periodic testing is not justified, then periodic dP testing will be considered.

RESOLUTION OF THE DEGRADED VOLTAGE ISSUE

NRC Concern:

During Dresden EDSFI, the NRC questioned whether the second-level undervoltage (degraded voltage) setpoint was sufficiently high to ensure adequate voltage to operate all Class 1E equipment, including safety related MOVs.

CECo Resolution:

In mid 1990, in response to GL 89-10, CECo made an engineering decision to evaluate safety related MOV operability based on degraded Offsite Power Voltage Levels which are lower than the diesel voltage. Reliable Offsite Power Levels are defined as switchyard voltage seen by the stations assuming system electrical load 5% above CECo's all-time peak load and a concurrent double contingency failure on CECo's T&D system. CECo has demonstrated MOV operability using the design basis of Reliable Offsite Power Levels for degraded voltage situation.

CECo has agreed to reevaluate the degraded voltage and is in the process of determining the degraded voltage setpoint for all 6 nuclear stations by performing revised voltage calculations for each station. Revision of these calculations is a large effort requiring approximately 42,000 person-hours (\$3 million in resources) to generate the analyses.

Until the calculations are completed for each station, CECo has no evidence that this issue impacts the operability of any safety related equipment, including MOVs. Interim compensatory actions, as necessary, are being implemented as the calculations are completed to ensure operability. The revised calculations will be completed by August 1, 1992.

CECo CORPORATE INTERFACE WITH STATIONS

NRC Concern:

The NRC requested during the April 8, 1992 meeting that this response discuss the interface between the CECo Corporate Organization and the Stations relative to the GL 89-10 Program.

CECo Resolution:

CECo is in the process of redefining the corporate MOV program structure to better facilitate communication and to better define the responsibilities of the different parties. This process will result in the formation of a GL 89-10 Project Team consisting of corporate and station representatives. The Project Team will allow for more efficient transfer, evaluation, and dissemination of MOV test data between the sites and the corporate office. In addition, the Project Team will allow for more efficient implementation of the GL 89-10 program at CECo.

Examples of how the CECo Corporate Organization currently interacts with the Stations include:

- The Nuclear Engineering Department Mechanical/Structural Group is providing testing guidelines to all Stations.
- The Nuclear Engineering Department Mechanical/Structural Group is accumulating and evaluating test data for impact on the overall program.
- The Nuclear Engineering Department Mechanical/Structural Group is maintaining the Nuclear Operations Directive for MOVs and the Generic Letter 89-10 Program Document with which the stations must comply.
- The Engineering and Nuclear Construction - Maintenance Group is providing guidance to the Stations on various maintenance issues.
- Periodic MOV Coordinator Meetings are held to facilitate information exchange between the Corporate and Station organizations involved in the GL 89-10 Program.
- The Nuclear Engineering Department Mechanical/Structural Group provides substantial outage support.
- The Production Training Center provides programmatic MOV design and MOV testing training.

CONCLUSIONS

- CECo's implementation of the GL 89-10 program is conservative with respect to the NRC positions provided in the generic letter and the overall effort of the industry.
- CECo's positions discussed herein are consistent with our written commitment provided in the responses to GL 89-10 and Supplements.
- An overall improvement in MOV performance at CECo's Stations is evidenced by the improving MOV failure ratio.
- CECo is continuing to accumulate and evaluate test data to validate our analytic assumptions and to provide input to trending programs.
- CECo's design basis reviews have shown that there is a great deal of margin in a large percentage of our GL 89-10 MOVs.
- CECo's performance of activities related to the GL 89-10 program (design basis reviews, static testing, dP testing) are clearly consistent with and in some cases in advance of those activities being performed by other Licensees.