NEI

NUCLEAR ENERGY INSTITUTE

Alexander Marion
DIRECTOR, ENGINEERING

September 27, 1995

Mr. Richard H. Wessman
Mechanical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: EPRI MOV Performance Predication Program (PPP) Findings and Conclusions & 10 CFR 21 Considerations

Dear Mr. Wessman:

Enclosed is a letter dated September 15, 1995, from the EPRI MOV Performance Prediction Program (PPP) Technical Advisory Group (TAG) chair, Mike Eidson, to the program participants. The enclosed letter summarizes the important contributions and finding resulting from the EPRI MOV Program. Because some of these findings are potentially significant, Mr. Scarbrough of your staff requested that the TAG evaluate the need to report such generic findings to the NRC under 10 CFR 21.

10 CFR 21.21(c)(2) does not require notification to the Commission under Part 21 when the NRC has been otherwise informed in writing of information related to potential defects that could create a substantial safety hazard. In addition to the enclosed letter, NEI has formally transmitted to the NRC over thirty (30) EPRI MOV Program technical reports that document the program bases, methodologies, and results, including the Topical Report, TR-103237, which your staff is currently reviewing. In addition, the NRC's publication NUREG/CP-0137, "Proceeding of the Third NRC/ASME Symposium on Valve and Pump Testing," summarizes many of the important EPRI MOV Program results. Therefore, we believe that licensees are not required under 10 CFR 21 to further notify the NRC of results of the EPRI MOV PPP.

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D-8-7 EPRI
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YG01 1/1
Rec'd OCP 10/31/96

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Should you have any additional questions or concerns, please contact me.

Sincerely,

Alex Marion

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Enclosure

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Southern Nuclear Operating Company
the southern electric system

September 15, 1995

Technical Points of Contact
Executive Points of Contact

EPRI MOV Performance Prediction Program (PPP)
Status of NRC Review & Summary of Program Contributions and Conclusions

The NRC review of the EPRI MOV PPP Topical Report (TR-103237) is continuing; EPRI and Technical Advisory Group (TAG) are working to address and resolve each of the Staff's concerns and questions. The present schedule, which was jointly developed by the Staff and EPRI, indicates the Safety Evaluation Report (SER) will be issued in December 1995 with a Supplemental SER (SSER) for some of the non-computer code gate valve methods to follow in the first quarter 1996. Upon receipt of the SER and SSER, EPRI will issue a new revision of the Topical Report as a proprietary-approved report. The revised report will include appropriate text revisions, a new appendix to document the NRC concerns and EPRI responses, and the SER and SSER. Issuance of the revised Topical Report by EPRI in 1996 will signify completion of the program. A summary of the important program contributions, findings, and conclusions follows.

The EPRI MOV Program provides validated methods based on engineering first principles to predict valve design basis performance requirements for common gate, globe, and butterfly valves in safety-related applications. While the original goal was to cover approximately 75% of the population, the various methods actually cover over 86% of PWR & BWR safety-related MOV population and obviate the need for MOV design basis in situ testing. The program provides valuable engineering tools to identify and correct problematic valves and potentially unpredictable valves; in addition, the program provides six methods to deterministically assess MOV "rate-of-loading." The program methods include alternatives to reduce conservatism based on valve specific information and/or test data, and the results substantiate engineering assumptions pertaining to extrapolation of valve seat friction coefficients and determination of stem-to-stem nut friction coefficients. The program results and insights can also provide a basis for new and improved valve designs.

The program results include several important findings and conclusions, which are summarized below:

- The traditional methods for predicting (calculating) gate valve performance may be non-conservative for many applications (primarily due to inadequate equations, design features, and manufacturing controls, and variable friction coefficients).
- Edge radii on disc seats and guide slots and on body seats are critical to gate valve performance and predictability; sharp edges can also result in material removal (typically as minute slivers) when the valve is stroked.

- Stellite friction coefficient increases with DP valve strokes in cold water to a plateau level ($\mu \cong 0.6$), quickly stabilizes ($\mu \cong 0.4 - 0.5$) when exposed to high temperature, and decreases as load increases. (Stellite also exhibits excellent wear properties.)
- Carbon steel surfaces enter a galling regime when exposed to temperatures > 100°F under sustained loading conditions. (With adequate guide clearances, gate valve thrust requirements can be predicted.)
- Gate valves with a cross-T-head stem-to-disc connection exhibit a susceptibility to parasitic thrust and torque loads which can change whenever a valve is disassembled and reassembled.
- Gate valves with carbon steel guides and disc guide slots with tight clearances may fail to close under blowdown conditions.
- Many existing gate valve manufacturing and design processes/controls and plant maintenance practices will result in poor valve performance. For example: seat and guide edges are not controlled; guides are too short or not sufficiently supported; poor material combinations are used; valve seats recessed too deeply in body allowing disc-to-body interference; valve seats installed backwards (non-hard-faced surfaces exposed); tolerance stackup permits inappropriate valve stem-to-disc interface; and excessive or restrictive clearances exist between body guide and disc guide slots.
- Traditional methods for predicting (calculating) globe valve performance for incompressible flow conditions are non-conservative for globe valves in which the DP acts across the plug guide (rather than the plug seat).
- Globe valve thrust requirements for some designs can be excessive under compressible flow and blowdown conditions due to the potential for plug side loading.
- Rate-of-loading effects can reduce measured static no-load output thrust by up to approximately 30% for dynamic full-load conditions.
- Rate-of-loading phenomena characteristics are not amenable to analytical treatment for motor-operated rising stem gate and globe valves, but may be assessed using valve in situ data.
- Hydrodynamic torque coefficients used by some butterfly valve manufacturers may be non-conservative for certain applications; valves located near elbows are especially vulnerable.
- Butterfly valve seats should be periodically replaced to avoid hardening/degradation.

As this program draws to a close, the TAG desires to thank each program participant for their support. In addition, the TAG commends the EPRI Staff and Program Contractors for their significant contributions to the industry. Continuing support for this program (including training, code maintenance and upgrades, and methodology enhancements) will be provided by the EPRI MOV Program Users Group (EMPUG). Should you have any questions pertaining the information in this letter, please call me at (205) 868-5978.

Sincerely,

Michael Eidson

Michael Eidson, Chairman
EPRI MOV PPP TAG

movppp6.mge

cc: Chris Hansen (Yankee) [EMPUG]
John Hosler (EPRI)
Jim Lang (EPRI)
Dave Morey (SNC)
Robert Saccone (PP&L) [O&M Subcommittee]
Tom Tipton (NEI)