UNITED STATES
NUCLEAR REGULATORY COMMISSION
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Mr. David J. Modeen
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SUBJECT: COMMENTS ON JOINT OWNERS' GROUP AIR OPERATED VALVE PROGRAM DOCUMENT

Dear Mr. Modeen:

The NRC received a copy of the Joint Owners' Group Air Operated Valve (JOG AOV) program document in a letter dated July 19, 1999. I indicated in my July 23, 1999, response to your letter that I had asked my staff to review the JOG AOV program document and would forward any comments to NEI. Attached are NRC comments on the JOG AOV program document. Please forward these comments to the JOG AOV for their consideration. We also ask that this letter and attached comments be forwarded to the Institute of Nuclear Power Operations for distribution to licensees along with the JOG AOV report.

After reviewing the document, the staff acknowledges the extensive work that JOG AOV has put into the development of the program document. All of the relevant issues appear to be referenced. However, the staff has a number of comments with regards to their adequacy of treatment.

The staff reviewed the JOG AOV program document to evaluate whether the program sufficiently verifies that AOVs are capable of performing their design basis functions. To achieve this, the staff believes that the capability of the actuator should be verified by test information. This information should be either based on plant specific testing or justified based on industry information. Setpoints for AOVs should be defined in the JOG AOV program, based on current vendor information or diagnostic testing, and established such that the valve is capable of performing its design-basis function. Sufficient test data should be collected and evaluated prior to extending the test interval beyond the initial frequency. Finally, with regards to categorization, non safety-related valves that are determined to be high risk significant (or "high safety significant" as used in the JOG AOV program document) should be subject to the more extensive capability evaluation as intended for Category 1 valves. Elaboration of these specific points is included in the enclosed comments.

Preliminary information from the NRC study on AOVs suggests that some plants may not maintain instrument air systems consistent with current guidance. Therefore, an essential element of the JOG AOV program should be for licensees to establish measures to assure the quality and cleanliness of air systems. The staff's expectation is that licensees are continuing to implement their commitments related to the issues discussed in Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety-Related Equipment," and that licensees periodically review industry operating experience and guidance developed since the issuance of the generic letter for applicability to their facilities.

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The NEI letter transmitting the JOG AOV program document to the NRC, dated July 19, 1999, contained information on the scope of the AOV concern and the implementation of the JOG AOV program. Specifically, the letter states that industry experience and various published reports do not indicate safety significant AOV concerns that warrant generic regulatory action. The NEI letter further states that NEI considers the ongoing industry actions, including the JOG AOV program, to demonstrate that AOV performance issues are being addressed, and does not desire credit for these activities in the context of SECY-99-063, "The Use by Industry of Voluntary Initiatives in the Regulatory Process." As stated in its letter to NEI dated July 23, 1999, the NRC staff intends to continue discussions with NEI regarding implementation of the JOG AOV program and to evaluate the need for regulatory action to ensure that AOVs are capable of performing their safety functions at nuclear power plants.

If you have any questions, please do not hesitate to contact me at 301-415-3288, or an appropriate member of my staff.

Sincerely,

Eugene V. Imbro, Chief
Mechanical & Civil Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

Enclosure: As stated

NRC COMMENTS ON JOINT OWNERS GROUP
AIR OPERATED VALVE PROGRAM DOCUMENT

1. In Section 1.5, Instrument Air Systems, the Joint Owners Group Air-Operated Valve (JOG AOV) program (the Program) states the following:

> It is the responsibility of individual plants to assure that pneumatic supply systems are appropriately maintained and operated consistent with plant commitments.

The importance of the quality of the air supply in the proper operation of AOVs during design-basis events is well recognized. Poor quality air can lead to common cause failure scenarios that will result in the failure of the AOVs to move to either their desired or fail-safe position. These conditions can prevent an AOV from performing its design-basis function, regardless of the extent of analysis and testing performed on the AOV assembly.

Generic Letter (GL) 88-14, "Instrument Air Supply System Problems Affecting Safety-Related Equipment," requested licensees to review NUREG-1275, Volume 2, "Operating Experience Feedback Report-Air System Problems," and to perform a design and operations verification of their instrument air systems. GL 88-14 did not provide guidance on periodic verification of air systems. Therefore, as part of the JOG AOV program it is recommended that licensees review their evaluations of air supply systems performed in response to GL 88-14 to assure themselves that the air systems have been appropriately maintained and operated.

2. In Section 2.0, Definitions, the staff has the following comments:

The term "setpoint" should be defined because it is required for all AOVs, and is the key verification and testing method for AOVs defined in the program as Category 2. As an example, the following definition is currently being considered in the risk-informed AOV Code case being developed by the ASME Operations and Maintenance Committee on Pneumatically- and Hydraulically-Operated Valves and is viewed by the NRC staff to be acceptable:

> A point or set of points that would be set by a technician so that the valve assembly would meet its design function. Examples of setpoints would be bench set values or pressure regulator values.

3. In Section 4.1.2, Scope, the program excludes air-operated dampers based on treatment of motor-operated dampers in GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." The justification for exclusion of dampers from the motor-operated valve (MOV) programs under GL 89-10 may not be appropriate for exclusion of air-operated dampers from the JOG AOV program. The program should specify that individual licensees will assess the design-basis functions and operating experience for their air-operated dampers. Each licensee would be responsible for developing plant-specific justifications for excluding any air-operated dampers from the program.

4. In Section 4.1.2, Scope, the program should ensure that licensees consider AOVs that are placed in their non-safety position for activities, such as maintenance or testing, where the train is assumed to remain operable during that time. Similar to what was stated in GL 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," the program should include safety-related AOVs 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 AOVs are in their nonsafety position.

5. In Section 4.1.3, Categorization Process, consideration of high risk-significant AOVs that might not be classified as safety-related is a positive risk-informed attribute of the JOG AOV program. However, the program only specifies that these AOVs be considered as Category 2. NRC Regulatory Guide 1.175 (Revision 0), "An Approach for Plant Specific Risk-Informed Decision Making: Inservice Testing," states that the licensee's Risk-Informed Inservice Testing program should include non-Code components that the licensee's integrated decision making process categorized as high safety significant components. For such components, the benefits in risk reduction from ensuring their capability could be substantial, while the burden in verifying their capability may be relatively minor. Therefore, we would recommend the program include treatment of these high-safety significant AOVs as part of a more extensive capability evaluation, similar to Category 1 AOVs. JOG AOV indicated at a public meeting with the NRC staff on June 3, 1999, that there likely would be few AOVs in this group.

6. In Section 4.1.3.2, Determination of Safety-Significance:

   a) The program lists several methodologies that may be used to categorize AOVs by their safety significance. Presentations at Air-Operated Valve Users' Group (AUG) meetings suggest that the actual categorization process will be focused on the use of information from the individual plant's maintenance program supplemented by risk insights from the plant specific IPE and use of an additional integrated decision-making process (i.e., expert panel). In order to establish consistency in AOV safety significance categorization, the program should include a typical list of AOVs to be evaluated for inclusion in the program for each major plant design. The list should also specify those AOVs that are typically categorized as high risk (This was done by the Boiling Water Reactor Owners Group as part of their follow-up to GL 89-10). It is recognized that not all AOVs in these typical lists would need to be included in a individual AOV program, or categorized as high risk, because of plant-specific design considerations. However, the licensee should have a reasonable basis for excluding such AOVs from its program or categorizing them as low risk.

   b) It is noted that one acceptable method for ranking safety significance and conducting an expert panel evaluation is contained in RG 1.160, Revision 2, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." This regulatory guide does not provide the necessary guidance for risk ranking AOVs at the component level. Therefore, its use alone might not be appropriate for its intended purpose.

7. In Section 4.1.4, Mispositioning, the program states that mispositioning or inadvertent operation of an AOV is not considered based on GL 89-10, Supplements 4 and 7, which considered the safety significance of mispositioning of MOVs in boiling-water and pressurized-water reactors, respectively. Both supplements concluded that the evaluation of MOV mispositioning could be removed from the scope of GL 89-10 programs based, in part, on studies by Brookhaven National Laboratory (BNL) of the safety significance of inadvertent operation of MOVs in safety-related systems. Nevertheless, GL 89-10, Supplement 7, indicated that consideration of valve mispositioning benefits safety. The JOG AOV program should not base the exclusion of considering AOV mispositioning on the GL 89-10 program, but rather should provide guidance for licensees to evaluate the susceptibility of their AOVs to mispositioning. For example, AOVs may be more susceptible to inadvertent operation depending on the quality of the air system, the flow direction, and the application.

8. In Section 4.2, Setpoint Control, the program states the following:

> Setpoint control is required for those setpoints affecting the active safety function of the AOV. As a minimum, parameters to be maintained and documented as part of 'the plant specific setpoint control program, as applicable, are:
>
> - Actuator air supply setting(s)
> - Preload (bench set)
> - Stroke length
>
> For Category 1 valves, the above information is established as part of the design basis review (Section 4.3). For Category 2 valves, the required information is typically obtained from the current specification.

The program appears to establish reasonable guidelines for ensuring the design-basis capability of Category 1 AOVs. The program should provide for the application of lessons learned from the detailed evaluation of Category 1 AOVs to other safety-related AOVs. Although limited in details, maintenance of setpoints might provide reasonable assurance of the capability of low safety significant (Category 2) AOVs where sufficient information is obtained from Category 1 or selected Category 2 AOVs. The program should provide additional guidance to ensure that licensees establish adequate setpoint control methods. For example, a definition of setpoint should be included in the JOG-AOV program document (see comment to Section 2). Additional clarification should be provided as to the type of information that should be obtained to establish setpoints for Category 2 valves. The information should come from either current vendor information or the results of diagnostic testing. In addition, the establishment of setpoints should apply accurate information on valve packing loads and other parameters that may affect the capability of the AOV. A verification interval no greater than 10 years should be established to verify the setpoints of AOVs. These enhancements should ensure that the setpoints of Category 2 valves are established such that they will be capable of performing their safety functions.

9. In Section 4.3.3.2, Actuator Output Capability, the program should state that the actuator output capability must be verified by test information.

10. In Section 4.3.3.3, Actuator Capability Margin and Allowable Limits, the program states the following:

> Valve and actuator limits need not be evaluated if the current setpoints are within the original equipment manufacturer's (OEM) specified setpoints. As the equipment was procured as safety-related, the normal design process is expected to ensure the OEM established setpoints are within the design ratings of the valve and actuator assembly.

As discussed at the June 3, 1999, public meeting, the validity of industry data used to establish setpoints for AOVs needs to be ensured. As stated in comments on Section 4.2, the program should specify that setpoints need to be based on current vendor information or the results of diagnostic testing. In addition, the establishment of setpoints should apply accurate information on valve packing loads and other parameters that may affect the operation of the AOV.

With respect to the allowable actuator capability margin, the staff agrees with JOG AOV that the margin must be greater than 0%. The acceptability of an actuator capability margin which approaches 0% would depend on the assumptions associated with the margin calculation. In any inspection activity associated with AOVs, the staff would pay particular attention to margins that approach 0%.

11. In Section 4.4.1, Baseline Testing, the program states the following:

> Baseline testing is performed with the intent to:
>
> - Verify the functional capability
> - Validate design inputs in accordance with Appendix A [of the program]
> - Confirm required operating setpoints
> - Establish a reference for periodic testing
>
> Each plant should determine the type of baseline testing, which can range from stroke time testing to dynamic testing with diagnostics, needed to satisfy the above.

Static stroke-time testing does not ensure design-basis capability of each tested AOV. Therefore, it should not be included as a baseline test option. Further, the program does not specify when dynamic or static diagnostic periodic testing is needed. The licensee should obtain sufficient information to ensure the design-basis capability of safety-related AOVs and those high-risk AOVs that might not be categorized as having safety-related functions.

12. In Section 4.4.2, Periodic Testing, the program should specify that test data need to be evaluated over the first 5 years (or 3 refueling cycles) to support extended test intervals. Further, the verification interval should not exceed 10 years because of the absence of long-range performance information.

13. In Section 4.4.3, Post Maintenance Testing, the program should ensure that the guidance for post maintenance testing of Category 2 valves in the program is consistent with quality assurance requirements of 10 CFR 50 Appendix B to ensure that safety-related AOVs can perform their safety functions.

14. In Section 4.6, Training, the program should include specific guidance on training to incorporate lessons learned from other valve programs.

15. In Section 4.7.2, Industry Feedback, it is not clear how feedback of industry information on AOV performance will be accomplished in light of plans to disband the JOG AOV and the absence of a specific AUG program. Although general mechanisms such as the INPO Equipment Performance and Information Exchange System (EPIX) and NRC communications may help in this regard, an AOV specific approach has not been identified.

16. In Section 4.9, Tracking and Trending, the program should include quantitative and qualitative trending of AOV performance, such as review of diagnostic data, and maintenance and condition reports. These trends should be periodically reviewed.

17. In Appendix B, Uncertainties and Potential Degradations, the program should address measurement uncertainty of AOV diagnostic test methodologies. Although this could be considered in the overall assessment of uncertainties, special attention should be given to diagnostics in the AOV program because of the history of challenges with diagnostics during implementation of MOV programs. The program should include a discussion of AOV diagnostic uncertainties and their relationship to other specific uncertainties discussed in the program. In addition, the program should emphasize that the diagnostic equipment must meet quality assurance requirements.