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Docket Number 50-346

License Number NPF-3

Serial Number 2451

March 14, 1997

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Subject: Program Description Response to NRC Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," for the Davis-Besse Nuclear Power Station

Ladies and Gentlemen:

This letter provides Toledo Edison's (TE) program description response for the Davis-Besse Nuclear Power Station (DBNPS) to the Nuclear Regulatory Commission (NRC) Generic Letter (GL) 96-05,"Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," dated September 19, 1996, (Log 4917).

The Generic Letter requested the following actions:

> Each addressee of this generic letter is requested to establish a program, or to 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 bases of the facility. The program should ensure that changes in required performance resulting from degradation (such as those caused by age) can be properly identified and accounted for. Addressees that have developed periodic verification programs in response to GL 89-10 should review those programs to determine whether any changes are appropriate in light of the information in this generic letter.

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The GL requires that all holders of operating licenses for nuclear power reactors submit the following written response to the NRC.

1. Within 60 days from the date of this generic letter, a written response indicating whether or not the addressee will implement the action(s) requested herein. If the addressee intends to implement the requested action(s), the addressee shall submit a schedule for completing implementation. If an addressee chooses not to implement the requested action(s), the addressee shall submit a description of any proposed alternative course of action, the schedule for completing the alternative course of action (if applicable), and the safety basis for determining the acceptability of the planned alternative course of action.

2. Within 180 days from the date of this generic letter, or upon notification to the NRC of completion of GL 89-10 (whichever is later), the addressee shall submit a written summary description of its MOV periodic verification program established in accordance with the Requested Actions paragraph or the alternative course of action established by the addressee in response to item 1 above.

Toledo Edison Response

1. The initial response to GL 96-05 was submitted to the NRC (Serial Number 2415) on November 18, 1996. The current periodic verification program for motor operated valves (MOVs) was implemented in the fall of 1994. The initial response stated that the current program as described in the DBNPS MOV Program Manual satisfies the requested actions of GL 96-05.

2. The attached "Summary Description of the DBNPS MOV Periodic Verification Program" describes the attributes of the MOV program implemented at the DBNPS that are consistent with the intent of GL 96-05. The "Motor Operated Valve Program Manual" (Revision 6) approved on March 21, 1996, provides the basis for the information contained in the summary description. The DBNPS will continue to implement and maintain a program to verify on a periodic basis that safety-related MOVs continue to demonstrate their capability to perform their safety function within the licensing bases of the DBNPS. This program should ensure that changes in capability can be identified and documented.

   The DBNPS is continuing to evaluate the use of a periodic verification program which employs a blended approach of probabilistic and deterministic methods. In general, this methodology may be used at the DBNPS to determine testing scope and frequency based primarily on margin and safety significance, and will also include consideration of such items as benefits and adverse effects of testing and the MOV environment. If this evaluation indicates that implementation of a new periodic verification program would maintain the overall plant risk at acceptably low levels while reducing the cost of future implementation, it is projected that the program would then be revised by the end of the current operating cycle to allow implementation to begin during the Eleventh Refueling Outage (RFO) scheduled to begin in April, 1998.

The present ASME Section XI In-Service Test (IST) Program will continue to be implemented in its present form. However, changes to the current IST Program, for example, justifying the use of periodic stroke testing in lieu of stroke time testing, may be reconsidered when our 10 year IST Program update is prepared for the third IST interval which begins in the year 2000.

Should you have any questions or require additional information, please contact Mr. James L. Freels, Manager - Regulatory Affairs, at (419) 321-8466.

Very truly yours,

John K Wood

DLM/dlc

attachment

cc: A. G. Hansen, NRC/NRR Project Manager
A. B. Beach, Regional Administrator, NRC Region III
S. Stasek, NRC Region III, DB-1 Senior Resident Inspector
J. R. Williams, Chief of Staff, Ohio Emergency Management Agency, State of Ohio (NRC Liaison)
Utility Radiological Safety Board

RESPONSE TO NRC GENERIC LETTER 96-05

FOR

DAVIS-BESSE NUCLEAR POWER STATION

UNIT NUMBER 1

This letter is submitted in conformance with Atomic Energy Act of 1954 Section 182a as amended and 10 CFR 50.54(f), in response to NRC Generic Letter 96-05, (Log No. 4917), "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves."

By: JKWood

J. K. Wood, Vice President - Nuclear

Swore and subscribed before me this 14th day of March, 1997.

Nora Lynn Flood

Notary Public, State of Ohio
Nora Lynn Flood
My Commission expires September 3, 1997.

Summary Description of the Davis-Besse Nuclear Power Station Motor Operated Valve Periodic Verification Program

Background

As a result of the loss of main and auxiliary feedwater event at the Davis-Besse Nuclear Power Station (DBNPS) on June 9, 1985, when some motor operated valves (MOVs) failed to operate on demand, Toledo Edison (TE) embarked on an action plan to test all MOVs important to safe plant operation. This initial test program met the intent of IE Bulletin 85-03, "Motor Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings", and later was developed into the DBNPS Motor Operated Valve Reliability and Improvement Program, which encompassed all MOVs in the plant. After issuance of Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance", the current DBNPS MOV Program evolved. After NRC staff inspection and review of this program, a determination was made by the NRC that the DBNPS MOV Program implementation is acceptable and meets the intent of GL 89-10. The notification for closeout of NRC review of GL 89-10 was sent to the DBNPS (Log Number 4932) on October 17, 1996.

Scope and Design Basis Conditions

Valves that were determined to be within the scope of testing for GL 89-10 will be tested periodically as described in the MOV Program Manual. Static testing of all GL 89-10 valves every 5 years or three refueling outages, whichever is longer, is incorporated into the program. In addition, dynamic testing is conducted on those valves for which testing is practicable and provides meaningful test results within the same frequency as static testing. Probabilistic Risk Assessment (PRA) was performed to determine the safety significance of each valve initially tested within the scope of GL 89-10. These results were used to prioritize initial testing activities and also as an input in prioritizing periodic verification testing.

The design basis limiting conditions, of differential pressure, flow and temperature, under which each valve must operate is documented in individual calculations. Where appropriate, conservative values of design basis differential pressure, and the effect of non-safety related functions, were assumed in the calculations. This adds conservatism to the design basis conditions used to calculate the thrust/torque requirements.

Determination of Thrust/Torque Requirements

The reliability of MOVs is optimized by ensuring a conservative determination of minimum required thrust (MRT) for gate and globe valves. In the absence of valve specific test data, the MRT is calculated using standard assumptions for certain parameters including valve factor and load sensitive behavior (LSB). The operator capability is likewise calculated using valve specific test data or a standard assumption for stem factor as necessary. These values, along with values for valve operator limits and inertia, are used to determine the target thrust range for torque controlled valves and to evaluate the capability of limit controlled valves. Due to the conservative basis of the calculated MRT, no additional margin is required and valve setup anywhere in the target thrust

range is considered acceptable. However, as a standard practice, the torque switch is set to provide a thrust or torque switch trip near the middle of the target thrust range. This provides additional margin above the MRT and provides margin to the motor limit.

If a sufficient target thrust range cannot be established for torque controlled valves using test data and standard assumptions, the valve is evaluated for margin improvement. Likewise, for limit controlled valves, if the calculated motor limit is not greater than the calculated MRT using test data and standard assumptions, the valve is evaluated for margin improvement. Interim acceptability for any valve in these categories is evaluated on a case by case basis. This evaluation may consider, for example, reduced margins for LSB for untested valves or detailed error analysis.

For butterfly valves, standard assumptions in the absence of test data were chosen to provide conservatism in required torque. For example, a seat torque coefficient and bearing friction coefficient which bounded available data was selected. Also, where manufacturer's data was available to predict hydrodynamic torque, these results were compared to results from the generalized disc model and the more conservative results used. In general, no credit was taken for self-closing capability, which may have reduced closing torque requirements in some cases.

In addition to these requirements, for four valves that have motor brakes installed, a torque penalty to overcome locked brakes was incorporated in the thrust calculation.

Valve Test Control

Valve setup and testing is performed by written procedures which utilize the data package for each MOV established from calculated results. All testing is controlled and conducted in accordance with a Maintenance Work Order. Test results are analyzed in the field by an engineer trained in MOV testing prior to returning the valve to service. A follow-up evaluation is performed by engineers for each valve to ensure nothing was overlooked in the field evaluation and to provide for additional analyses for use in resolution of any condition requiring corrective action to justify continued valve capability.

Any valve failure is reported on a Potential Condition Adverse to Quality Report (PCAQR). The PCAQ procedure addresses the failure, reportability, remedial actions, root cause, and corrective action to prevent reoccurrence (CATPR).

Preventive Maintenance

Preventive Maintenance (PM) activities are being performed to ensure that certain activities are performed on MOVs on a periodic basis. The frequency of each activity is based on a number of factors, including risk significance, vendor recommendations, service conditions, and valve environment. The PM process is also used to ensure periodic valve stroking is conducted to meet environmental qualification requirements. Grease checks, stem lubrication, mechanical checks and electrical checks are incorporated into the PM activities for GL 96-05 valves.

Identification of Potential Degradation

Testing of MOVs incorporates various methods of diagnostic testing, including, but not limited to, thrust and torque measurement, and motor power monitoring. The primary test system utilized is the VOTES, valve operation test and evaluation system. This testing is effective in detecting age-related degradation of MOV capability. Margin improvements, such as resetting torque or limit switches, is performed as required to maintain margin. Modifications to valves have also been performed to improve margin.

The test program identifies that potential degradation can result from decreases in motor actuator output capability. The effects of this mechanism are assessed by performing selected as found static testing prior to maintenance or modification activities which could impact valve performance. For example, a number of as found static tests have been conducted prior to stem lubrication. In addition, other testing is being performed to assess such effects as stem lubrication (by performing pre and post lubrication testing) and butterfly valve seat hardening (by obtaining as found torque measurements).

The test program identifies the potential for increases in thrust or torque requirements to operate the valves. Dynamic testing is performed on a periodic basis at conditions similar to previous tests on all valves for which the dynamic testing would be expected to show effects of valve aging.

The program provides for identification of possible adverse impact of dynamic testing on certain valves. For example, at least one valve will not be tested at full design basis DP due to the small margin to available limits observed during a previous test.

Trending and Continued Improvement

Prior to and following a valve test, a review is usually conducted of previous test data for that valve, and similar valves as necessary, to assess previous and expected valve performance. A summary of MOV-related PCAQRs and industry problems is maintained and evaluated periodically for trends and generic issues. All MOV related Maintenance Work Orders (MWOs) are reviewed by the Test / Performance unit prior to implementation. A summary of the results of these MWOs is maintained and reviewed periodically for impact on PM frequency and to identify problem valves or generic issues.

Diagnostic test results are evaluated for continued improvement of the program. Examples include: evaluation of VOTES Motor Power Monitor (MPM) results to identify rotor bar degradation, comparison of test traces among similar valves to assess similar behavior for possible grouping purposes, comparison of static and dynamic test traces for a given valve to assess how meaningful the dynamic test is, and correlation of VOTES MPM equivalent thrust with VOTES thrust measurements to assess the accuracy of MPM equivalent thrust. Use of equivalent thrust in place of thrust measurements provides for less intrusive testing, and allows the potential of increasing the test frequency for an otherwise inaccessible (e.g. containment during power operation) valve.

Periodic Reporting

A periodic report is prepared at least every two years to document periodic review of MOV related issues. The report summarizes the following issues:

- Preventive Maintenance findings: A summary of such items as grease condition findings and trends, other maintenance related findings, identification of valves requiring relubrication based on grease conditions, and recommended changes to PM frequency are described.

- Periodic Verification: Results of periodic verification are summarized. This summary includes such items as valves tested, type of test, test result conclusions, and any recommended changes to test frequency. This includes any periodic verification performed following corrective maintenance and/or modifications.

- Industry experience: A summary of valve related industry issues, such as Information Notices, Operating Experience reports, and Maintenance Information reports is included. This information is evaluated for trends, applicability to the DBNPS and generic issues.

- In house experience: A summary of valve related PCAQRs is included. This summary is evaluated for trends and generic issues.

- Miscellaneous items, such as implementation of new diagnostic equipment or summary of diagnostic trending, may also be discussed in the report.