Maine Yankee
RELIABLE ELECTRICITY SINCE 1972

329 BATH ROAD • BRUNSWICK, MAINE 04011 • (207) 798-4100

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MN-94-75 JRH-94-178

UNITED STATES NUCLEAR REGULATORY COMMISSION
Attention: Document Control Desk
Washington, DC 20555

References: (a) License No. DPR-36 (Docket No. 50-309)
(b) USNRC Letter to MYAPCo dated June 28, 1989: Safety-Related Motor-Operated Valve Testing and Surveillance (Generic Letter No. 89-10)
(c) MYAPCo Letter to USNRC dated February 1, 1990 (MN-90-15)
(d) USNRC Letter to MYAPCo dated June 28, 1993: Inaccuracy of Motor-Operated Valve Diagnostic Equipment (Generic Letter 89-10, Supplement 5)
(e) MYAPCo Letter to USNRC dated September 27, 1993 (MN-93-88)
(f) USNRC Letter to MYAPCo dated March 8, 1994 (Generic Letter 89-10, Supplement 6)
(g) MYAPCo Letter to USNRC dated April 27, 1994 (MN-94-40)

Subject: Maine Yankee Motor-Operated Valve Testing and Surveillance - Response to Generic Letter No. 89-10

Gentlemen:

NRC Generic Letter 89-10, Reference (b), required licensees to develop a program for the testing, inspection and maintenance of all safety-related and position-changeable motor-operated valves (MOVs) consistent with items a. through h. of the generic letter. Maine Yankee responded to the generic letter by Reference (c) and stated we would complete the Generic Letter 89-10 program within 5 years of the date of Reference (b) (i.e., June 28, 1994).

Item m. of Reference (b), requires licensees to notify the NRC in writing within 30 days after the actions described in the first paragraph of item i. have been completed. The first paragraph of item i. states that each licensee should complete all design basis reviews, analyses, verifications, tests and inspections that have been instituted to comply with items a. through h. within 5 years of the date of the Generic Letter. Consistent with item m. of Generic Letter 89-10, Maine Yankee has completed the original requirements of items a. through h. of Reference (b). The Maine Yankee program status for items a. through h. is included as Attachment A.

In responding to References (d) and (f), Maine Yankee (Reference (e) and (g)) stated that two additional outages would be required to apply the Liberty Technologies Part 21 information issued in October 1992 and the Liberty Technology's Customer Service Bulletins CSB 031 Addendum and CSB 032 of February 25, 1994 and March 14, 1994, respectively. This additional time is necessary to ensure our valves are set up with the best available technical evaluation of the valve's test data. Any retesting will be performed during the outage of the valve's next scheduled test. Attachment B provides specific details.

A064 1/1

We trust this information is satisfactory. Please contact us should you have any questions.

Very truly yours,

James R. Hebert

James R. Hebert, Manager
Licensing & Engineering Support Department

WBD/jag

Attachments

c: Mr. Thomas T. Martin
Mr. J. T. Yerokun
Mr. E. H. Trottier
Mr. Patrick J. Dostie

ATTACHMENT A

NRC Generic Letter 89-10 Recommended Actions

NRC Recommended Action Item a.

Review and document the design basis for the operation of each MOV. This documentation should include the maximum differential pressure expected during both the opening and closing of the MOV for both normal operations and abnormal events, to the extent that these MOV operations and events are included in the existing approved design basis.

Maine Yankee Status

Maine Yankee has reviewed and documented the design basis for each MOV as specified in NRC action item a. This item is complete.

NRC Recommended Action Item b.

Using the results from item a., establish the correct switch settings. This should include establishing a program to review and revise, as necessary, the methods for selecting and setting all switches (i.e., torque, torque bypass, position limit, overload) for each valve operation (opening and closing). One purpose of this letter is to ensure that a program exists for selecting and valve operator switches to ensure high reliability of safety-related MOVs.

Maine Yankee Status

Maine Yankee has revised its switch setting program in response to industry developments, the NRC Phase 1 inspection of its Program, and experience gained during its MOV Program development. The MOV Program, the Maintenance Procedures, and the MOV Coordinators ensure that the switches are set and maintained correctly.

This item is complete in accordance with our original commitment. Some fine tuning may be necessary once all our design basis test results have been reanalyzed to the latest industry data (see our response (Reference (g)) to Supplement 6 of GL 89-10).

NRC Recommended Action Item c.

Individual MOV switch settings should be changed, as appropriate, to those established in response to item b. Whether the switch settings are changed or not, the MOV should be demonstrated to be operable by testing it at the design basis differential pressure and/or flow determined in response to item a. Testing MOVs at design basis conditions is not recommended where such testing is precluded by the existing plant configuration. An explanation should be documented for any cases where testing with the design basis differential pressure or flow cannot practicably be performed. This explanation should include a description of the alternatives to design basis differential pressure testing or flow testing that will be used to verify the correct settings.

NOTE: This letter is not intended to establish a recommendation for valve testing for the condition simulating a break in the line containing the MOV. However, a break in the line should be considered in the analyses described in items a., b., and c. if MOV operation is relied on in the design basis.

Each MOV should be stroke tested, to verify that the MOV is operable at no-pressure or no-flow conditions even if testing with differential pressure or flow cannot be performed.

Maine Yankee Status

Maine Yankee has design basis tested 33 MOVs (see Table 1). One of the 33 MOVs, LD-M-2, is a Y-Globe valve which cannot be tested with VOTES; therefore, it was only tested with the Motor Power Monitor (MPM). Maine Yankee has 6 MOVs where the system energy assists the valves in performing their safety function. These are globe valves with either pressure under the seat such as PR-M-89, PR-M-90, RC-M-54, RC-M-55 which must open, or MS-M-255 and LD-M-2 with flow over the seat which must close. For these, a static test is more demanding than a dynamic test. These were tested but not with VOTES diagnostic test equipment. The NRC confirmed in Supplement 6 that MOVs assisted by system energy do not need to be included in the GL 89-10 test program.

It was not practicable or necessary to design basis test the remaining five (5) MOVs in the Program. These have adequate margin and low PRA risk significance. We are using the two step process for these valves and the first step is complete. We are waiting receipt of useable industry data to complete the second step.

Maine Yankee considers this item complete.

NRC Recommended Action Item d.

Prepare or revise procedures to ensure that correct switch settings are determined and maintained throughout the life of the plant. These procedures should include provisions to monitor MOV performance to ensure the switch settings are correct. This is particularly important if the torque bypass switch setting have been significantly raised above that required.

It may become necessary to adjust MOV switch settings because of the effects of wear of aging. Therefore, it is insufficient to merely verify that the switch settings are unchanged from previously established values. The switch settings should be verified in accordance with the program schedule (see item j). The ASME Code Section XI stroke-timing test required by 10 CFR Part 50 is not oriented toward verification of switch settings. Therefore, additional measures should be taken to adequately verify that the switch settings ensure MOV operability. The switch settings need not be verified each time the ASME Code stroke-timing test is performed.

Maine Yankee Status

The MOV Program and the Maintenance Procedures ensure that periodic testing is performed to monitor and maintain correct switch settings. Maine Yankee considers this item complete.

NRC Recommended Action Item e.

Regarding item a., no change to the existing plant design basis is intended and none should be inferred. The design-basis review should not be restricted to a determination of estimated maximum design basis differential pressure, but should include an examination of the pertinent design and installation criteria that were used in choosing the particular MOV. For example, the review should include the effects on MOV performance of design basis degraded voltage, including the capability of the MOV's power supply and cables to provide the high initial current needed for the operation of the MOV.

Maine Yankee Status

Maine Yankee does not plan to modify the original design basis of MOVs as a result of our MOV Program. Maine Yankee recognized the importance of original design and installation criteria when developing our motor operated valve program. Our program considers the effects of degraded voltage conditions on MOV performance.

Recently, the calculations for degraded voltage have been revised and we have accounted for the loss of torque due to the temperature rise in Reliance motors. Maine Yankee considers this item complete.

NRC Recommended Action Item f.

Documentation of explanations and the description of actual test methods used for accomplishing item c. should be retained as part of the required records for the MOV.

It is also recognized that it may be impracticable to perform in situ MOV testing at design basis degraded voltage conditions. However, the switch settings established in response to item b. should at least be established to account for the situation where the valves may be called on to operate at design basis differential pressure, or flow, and under degraded voltage conditions. If the licensee failed to consider degraded voltage, power supply, or cable adequacy for MOVs in systems covered by Bulletin 85-03, the design review and established switch settings for those MOVs should be reevaluated. Alternatives to testing a particular MOV in situ at design basis pressure or flow, where such testing cannot practicably be performed, could include a comparison with appropriate design basis results on other MOVs, either in situ or prototype. If such test information is not available, analytical methods and extrapolations to design basis conditions, based on the best data available, may be used until test data at design basis conditions become available to verify operability of the MOV. If this two-stage approach is followed, it should be accomplished within the schedule outlined in item i. and would allow for MOV testing and surveillance to proceed without excessive delay.

Testing of MOVs at design basis conditions need not be repeated unless the MOV is replaced, modified, or overhauled to the extent that the licensee considers that the existing test results are not representative of the MOV in its modified configuration.

Maine Yankee Status

This completes our original commitment.

Over the 5-year development period of the MOV Program, many improvements have been made in documenting test results and accounting for conditions such as degraded voltage. Maine Yankee is in the process of revising test results based on the Best Fit Straight Line (BFSL) vs. Curve Fit (CF) issue and Liberty Technologies Customer Service Bulletins CSB-031 (Addendum) and CSB-032. It should be noted that Maine Yankee performed a formal evaluation on these issues to ensure there were no operability concerns, however, the revised evaluations may indicate a more optimum setting. These would be performed during the next scheduled retest. Maine Yankee in its response to Supplements 5 and 6 requested two additional outages to complete any required retesting.

NRC Recommended Action Item g.

A number of deficiencies, misadjustments, and degraded conditions were discovered by licensees, either as a result of their efforts to comply with Bulletin 85-03 or from other experiences. A list of these conditions (including improper switch settings) is included in Attachment A to this letter for licensee review and information.

Maine Yankee Status

This item does not request action. The information in Attachment A was reviewed and taken into consideration during the design basis reviews, the maintenance performed and the testing to ensure these conditions did not exist in the MOVs in Maine Yankee's MOV Program.

NRC Requested Action Item h.

Each MOV failure and corrective action taken, including repair, alteration, analysis, test, and surveillance, should be analyzed or justified and documented. The documentation should include the results and history of each as-found deteriorated condition, malfunction, test, inspection, repair, or alteration. All documentation should be retained and reported in accordance with plant requirements.

It is suggested that these MOV data be periodically examined (at least every 2 years) or after each refueling outage after program implementation) as part of a monitoring and feedback effort to establish trends of MOV operability. These trends could provide the basis for a licensee revision of the testing frequency established to periodically verify the adequacy of MOV switch settings (see items d. and j.). For this monitoring and feedback effort, a well-structured and component-oriented system (e.g., the Nuclear Plant Reliability Data System [NPRDS]) encourages the use of the industry-wide NPRDS, appropriately modified, for this purpose in view if the multiple uses for these data.

Maine Yankee Status

In general, we believe Maine Yankee's various programs and procedures provide documentation of the types mentioned, and the documentation is retained and reported in accordance with Maine Yankee procedures. At Maine Yankee the Discrepancy Report and Repair Order (DR/RO) system identifies discrepancies and provides a vehicle for recording and storing corrective actions taken. This includes repair and component substitution alterations. Other alterations are performed using Maine Yankee's design change process. Analysis, test, or surveillance activities, when conducted, are generally recorded as part of their test or surveillance procedure or in EDCR packages. Root cause evaluations are generally considered when the discrepancy is repetitive in nature.

Maine Yankee procedures do not require as found conditions to be recorded on routine maintenance or preventive maintenance activities. Corrective maintenance (DR/RO) may not note any as found conditions beyond the discrepancy for which corrective action is being taken. If it is planned or seems prudent, preventive maintenance may be performed on an MOV prior to any diagnostic testing. "As found" conditions for MOVs may not reflect "each as-found deteriorated condition".

The Maine Yankee Discrepancy Report and Repair Order (DR/RO) system was replaced by a computer based Work Order (WO) system between the 1990 and 1992 outages. The new system provides a more convenient method of reviewing any maintenance performed on MOVs.

The Maintenance Department Manager has established a MOV Maintenance Coordinator position and one of his duties is to periodically examine failures and repairs.

The Engineering Department has developed a draft performance trending program which will be applied to trend test results. They plan on obtaining trending data points during the 1995 outage and use this data to establish the long-term performance trending program.

Maine Yankee considers the current trending activities adequate and has plans to improve them as we gain more trending data through testing.

ATTACHMENT B

Impacts of Supplements 5 & 6 to Maine Yankee's GL 89-10 Program

Supplement 5 Impact

Maine Yankee was mobilizing (ramping up) for their 1993 outage when Supplement 5 was received. Supplement 5 was received in July 1993 less than 30 days before Maine Yankee's third and final outage for GL 89-10. Maine Yankee's 3rd outage for GL 89-10 was from July 30, 1993 through October 13, 1993. Maine Yankee was able to apply the new stem constants and torque affect for calibrations on the threaded portion of the stem during the 1993 outage.

The major impact was the need to revise all the test results from the 1990 and 1992 outages to include the new stem material constants and the torque affect for calibrations on the threaded portion of the stem.

Also, Maine Yankee had to wait until the VOTES 2.33 software was issued in June 1994 before it could revise the test reports from the 1990 outage which used VOTES 1.0 software.

Maine Yankee recognized upon receipt of Supplement 5 that if the revision of the test results indicated a more optimum switch setting then two additional outages would be needed to adjust and test that MOV.

Supplement 6 Impact

Supplement 6 dated April 27, 1994 was received well after Maine Yankee's 3rd and final outage and just prior to the 5-year deadline of June 28, 1994.

Approximately one month prior to receiving Supplement 6 to GL 89-10, Maine Yankee received Liberty Customer Service Bulletins (CSBs) 031 Addendum and 032. This new industry data required a major amount of test evaluation rework which Maine Yankee could not finish by June 28, 1994. Once the test evaluations are completed, they may require additional adjustments to some MOV switch settings.

A formal evaluation was performed in relation to CSB 031 and 032 and no operability concerns were identified. Therefore, Maine Yankee elected to make any additional adjustments during the valves next scheduled retest.

Maine Yankee is in the process of optimizing the switch settings in response to design basis test results, in accordance with established methodology. As previously stated, the DBS indicates that the existing MOV settings continue to be adequate to assure valve operability.

During the Program development phase of the MOV Program, Maine Yankee used four methods to calculate the thrust needed to operate a valve. These were:

1. Industry Calculation (modified)
2. Limitorque Calculation
3. MUD
4. MOVATS Data Base

Usually the most conservative number was used to set the switches. Then the valve was set up and statically tested to ensure enough thrust was available. During the 1993 outage, Maine Yankee used 5 strokes to get an adequate statistical sample to account for uncertainties. Following these tests, the MOV was dynamically tested with 3 strokes to get an adequate statistical sample. Finally, the MOV was

statically stroked 5 times to ensure that the dynamic testing did not affect the MOV. During the 1990 and 1992 outages, Maine Yankee used 3 strokes for static tests and 3 strokes for dynamic tests. The test results were then evaluated by a knowledgeable engineer.

The dynamic test results were analyzed to make sure that adequate margin existed. In all cases adequate margin existed and none of the MOVs had to be adjusted. This provided Maine Yankee confidence that the analytical method was sufficiently conservative enough to set switches properly for dynamic conditions.

Maine Yankee is in the process of changing the calculation method by eliminating the Limitorque and MOVATS calcs and updating the Maine Yankee calculations with the dynamic test results, as originally planned. The new calculation method uses:

1. Industry Calculation (modified)
2. MUD
3. Maine Yankee test results

The results of the final calculation may require minor changes to the switch settings. The adjustments would be made during the next scheduled retest of the MOV. This is expected to take two outages.

TABLE 1
DYNAMIC (IN SITU) TEST SUMMARY

MOV #	DESIGN BASIS			IN SITU TEST			YEAR OF LAST TEST
	OPENING DP	CLOSING DP	SYS FLOW	OPENING DP	CLOSING DP	SYS FLOW	
CH-M-1	66	66	560	56	56*	247	1993
CH-M-87	67	67	560	56	56*	230	1993
CS-M-1	195	195	3700	200*		0	1992
CS-M-2	195	195	3700	200*		0	1992
CS-M-91	40	40	4000	41.5*		0	1990
CS-M-92	40	40	4000	41.5*		0	1990
HSI-M-11	2600	2600	285	NOTE 4, 6 *	2530	336	1993
HSI-M-12	2600	2600	285	NOTE 4, 6 *	2542	336	1993
HSI-M-21	2600	2600	285	NOTE 4, 6 *	2520	350	1993
HSI-M-22	2600	2600	285	NOTE 4, 6 *	2437	347	1993
HSI-M-31	2600	2600	285	NOTE 4, 6 *	2545	331	1993
HSI-M-32	2600	2600	285	NOTE 4, 6 *	2545	331	1993
HSI-M-41	2600	2600	850	NOTE 4, 6 *	2550*	762	1993
HSI-M-42	2600	2600	850	NOTE 4, 6 *	2525*	770	1993
HSI-M-50	66	213	850	176*	176*	2267	1993
HSI-M-51	66	213	850	176*	176*	1870	1993
HSI-M-54	215	215	850	190*	190	740, NOTE 2	1992
HSI-M-55	215	215	850	190*	190	740, NOTE 2	1992
LD-M-2	2420	2420	913	2240	2240*, NOTE 6	90	1993
LSI-M-40	20	20	10000	25	1.7*	2350	1993
LSI-M-41	20	20	10000		2.2*	2200	1993
PCC-M-43	105	105	4170	102*	102	5875	1990
PCC-M-90	105	105	616	98.9	98.9*	6290	1992
PCC-M-150	105	105	616	104	104*	3600	1993
PCC-M-219	104	104	2100	94.8	94.8*	6700	1992
PR-M-16	2410	2410	2632	2248	2248*	NOTE 3	1981
PR-M-17	2410	2410	2632	2248	2248*	NOTE 3	1981
RC-M-15	2511	2511	50	2560*	2560	75 - 100	1990
RC-M-25	2511	2511	50	2550*	2550	75 - 100	1990
RC-M-35	2511	2511	50	2499*	2499	75 - 100	1992
SCC-M-165	105	105	4170	102*	102	>6000	1990
SIA-M-53	213	213	1400	190+, NOTE 1	190+, NOTE 1*	350	1992
SIA-M-54	213	213	1400	190+, NOTE 1	190+, NOTE 1*	350	1992

* = Required stroke direction for safety function

DP in PSID; Flow in GPM

NOTE 1 - Similar line up as HSI-M-54/55, except min. flow line closed to produce pump dead head - gauge oscillation precluded obtaining a pressure reading.

NOTE 2 - HSI-M-54 and HSI-M-55 also were stroked during DP test of HSI-M-50 and HSI-M-51. Therefore, they have performed satisfactorily at flows greater than their design basis.

NOTE 3 - Full flow test at 2248 psig. Refer to Tech. Eval. 428-91.

NOTE 4 - These valves are tested near design basis every cycle.

NOTE 5 - Five pound downstream pressure assumed (possible 0 to 8) for HSI-M-11, 12, 21, 22, 31.

NOTE 6 - System energy aids in required valve stroke direction.