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REGION I

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LICENSEE: Rochester Gas and Electric Corporation

FACILITY: Ginna Nuclear Power Plant
Ontario, New York

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INSPECTION RESULTS: See Executive Summary

EXECUTIVE SUMMARY

GINNA MOV INSPECTION 95-06
(March 27 - May 1, 1995)

Rochester Gas and Electric Company (RG&E) is committed to complete the Ginna Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," motor-operated valve (MOV) program by June 28, 1995. An aggressive approach toward refurbishment and dynamic testing of MOVs was evident. Approximately sixty percent of the valves, including most of the risk-significant MOVs which are practical to test, will have been tested dynamically by the end of the current refueling outage. However, at the time of the inspection, much test data remained to be reviewed by the licensee to verify the design-basis capability of the remainder of MOV's (viz, those not dynamically tested) in the program.

Inconsistencies and omissions in the GL 89-10 program documents were identified. Also, changes to MOV field test procedures were required to assure adequate evaluation of dynamic test results. While these deficiencies were evidence of weak administrative control of the program, none affected MOV functionality, and it did not appear that they would delay completion of the Ginna program past the committed completion date.

Only four MOVs, which were not practical to test dynamically, require use of best available industry data to verify design-basis capability. While MOVs included in five groups typically had large (calculated) thrust margins, RG&E's grouping methodology for four of the five groups (which were two-valve groups) was not consistent with the provisions of GL 89-10, Supplement 6. Additional dynamic testing is being considered for these MOVs.

RG&E assumed a non-specific twenty-five percent margin to account (collectively) for variations in valve factor, load sensitive behavior, and stem lubrication degradation. Efforts were in progress to bound the assumptions for each of these factors (for each GL 89-10 MOV). For example, a stem lubrication degradation study was being conducted to assign specific margins for this factor prior to completion of the program.

Evaluations of gate valve pressure locking and thermal binding were conducted by contractors in 1992 and 1994. Although several instances of less than thorough review of the evaluations (by RG&E) were noted, the inspectors concluded that the operability of the susceptible gate valves was appropriately addressed. In addition, valve modifications had been performed on some MOVs to eliminate the pressure locking concern. The issue was left unresolved (UNR 95-06-09) pending the issuance of generic NRC guidance.

DETAILS

1.0 INTRODUCTION AND PURPOSE

On June 28, 1989, the NRC issued Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," requesting licensees to establish a program to ensure that switch settings for safety-related motor-operated valves (MOVs) were selected, set, and maintained properly. Six supplements to the GL have been issued to clarify the NRC request. NRC inspections of licensee actions implementing the provisions of the generic letter and its supplements have been conducted based on guidance provided in Temporary Instruction (TI) 2515/109, "Inspection Requirements for Generic Letter 89-10, Revision 1," which is divided into Part 1, "Program Review," and Part 2, "Verification of Program Implementation."

The NRC conducted the initial Part 1 program review inspection at Ginna in April 1992, as documented in Inspection Report (IR) 92-80.. A follow-up inspection (IR 94-03) was performed in April 1994 in accordance with Part 2 of TI-2515/109. However, at that time, the licensee's MOV program was not sufficiently developed to complete a full Part 2 inspection. Subsequently, by letter, dated May 27, 1994, the licensee requested an extension to their MOV program completion date. On August 9, 1994, the NRC approved the request, changing the MOV program completion date to June 28, 1995.

The purpose of this inspection was to determine the adequacy of the licensee's MOV dynamic test data, and to review and update the licensee's progress toward program completion in accordance with Part 2 of TI-2515/109.

2.0 VERIFICATION OF PROGRAM IMPLEMENTATION

Overall MOV Program Status

RG&E has 63 MOVs in the Ginna GL 89-10 program. Using their Level 1 probabilistic risk assessment, the licensee classified 29 MOVs as high risk valves and 34 MOVs as low risk valves. All MOVs were statically tested except for MOV 4734 which was to be replaced. The new MOV is scheduled to be statically and dynamically tested prior to completion of the current outage. After dynamically (i.e. under differential pressure conditions) testing the last group of MOVs during this outage (seven MOVs were scheduled for such testing), the licensee will have tested 36 (18 high and 18 low risk) of the 63 MOVs in the GL 89-10 program. Eighteen MOVs do not require dynamic testing since they have little or no design-basis differential pressure. Five MOVs (850B, 860B, 4008, 4613, and 4780) will be grouped using similar valve data from identical valves which will have been fully tested at Ginna. The last group of 4 high risk MOVs (515, 516, 852A, and 852B) are not practicable to test. The licensee also completed refurbishment of all GL 89-10 MOV actuators.

2.1 Design Basis Reviews

The inspectors evaluated the licensee's implementation of the GL 89-10 program by examining a cross-section of the Ginna MOV population, including dynamic test results. The following high risk MOVs were evaluated during this inspection:

MOV No.	MOV Function
CCW-738A	CCW to 1A RHR Heat Exchanger
SW-4616	Auxiliary Building Service Water Isolation 1A1
SAFW-9629B	Secondary Auxiliary Feedwater Pump 1D Suction
SAFW-9701B	Secondary Auxiliary Feedwater Pump 1D Discharge

The information in the following table was extracted from the licensee's test data matrix sheets, which are discussed in later sections of this report.

GINNA GATE and GLOBE VALVE DYNAMIC TEST DATA

Diagnostics: MOVATS

VALVE NUMBER	VALVE TYPE	TEST CONDITIONS (psid)		% DESIGN BASIS		DYNAMIC VALVE FACTOR [1]		STEM FRICTION COEFFICIENT		% LOAD SENSITIVE BEHAVIOR
		Open	Close	Open	Close	Open	Close	Static	Dynamic	
MOV-738A	10" Crane 150# Wedge Gate	98	98	98	98	[2] N/C	0.32	0.19	0.22	2.7
MOV-4616	20" Crane 150# Wedge Gate	103	103	108	108	N/C	0.396	0.10	0.15	19
MOV-9629B	4" Borg Warner 300# Wedge Gate	63	32	65	34	N/C	N/C	0.01	0.07	35
MOV-9701B	3" Fisher 900# Globe	1420	1420	97	97	N/C	0.03	0.13	0.16	5.6

1. Valve factor was calculated using orifice diameter.
2. "N/C" = Not Calculated.

NOTES: Ginna used EXXON Nebula EP-0 as a stem lubricant.

In determining the operational requirements and switch settings of the MOVs, GL 89-10 indicates that licensees should consider design-basis events, including conditions of normal operation, anticipated operational occurrences, and accidents. In the MOV program document titled "Design Analysis for Ginna Station GL 89-10 MOVs,"(EWR 5080, Revision 5, March 21, 1995) the licensee took exception to the definition of "design-basis" in GL 89-10, and limited its analysis to differential pressures arising from the accidents described in the accident analysis (Chapter 15) section of the Updated Final Safety Analysis Report (UFSAR). However, in a different MOV program document titled "Motor-Operated Valve Qualification Program

Plan,"(EWR 5111, Revision 1, January 1, 1994) the licensee stated that an operational review of normal, abnormal, and emergency operating procedures was performed to ensure that all anticipated modes of operation were evaluated. In March 1994 the licensee performed a review of operating procedures and derived maximum differential pressure requirements which for many MOVs were higher than those calculated in the Design Analysis document, EWR 5080. The licensee evaluated the MOVs involved and concluded that there was adequate margin to assure the operability of the valves. In addition, in 1992, dynamic tests of the turbine-driven auxiliary feedwater pump steam admission valves had resulted in differential pressure in the close direction (200 psid) substantially lower than that calculated in EWR 5080 (1005 psid).

The inspectors did not identify any MOV operability concerns, and agreed with the licensee's determination that the lower differential pressure value for the steam admission valves more accurately approximated design-basis conditions. GL 89-10, Supplement 1 (Question 16) states that licensees are expected to update, as warranted, the design-basis parameters developed as a result of implementing the MOV program. Also, the apparent contradictions within the MOV program documents (i.e., EWRs 5080 and 5111) regarding calculation of design-basis differential pressure requirements should be reconciled. This item will be reviewed during the GL 89-10 MOV program final closeout (IFI 50-244/95-06-01).

2.2 MOV Sizing and Switch Setting

RG&E developed initial MOV thrust requirements utilizing procedure MDG-22, "Safety Related MOV Thrust Calculations." The procedure used standard industry equations to calculate thrust and actuator capability. The initial set-up assumed valve factors of 0.2 (parallel disc gate valves), 0.3 (flex wedge gate valves), and 1.1 (globe valves), and used 0.2 for stem coefficient of friction. Valve orifice diameter was used to calculate disc area. A 25% margin was added to the calculated minimum required (target) thrust to account for load sensitive behavior (rate of loading), variations in valve factor, and stem lubrication degradation. Limitorque Maintenance Update 92-02 guidance for torque switch repeatability and Motor-Operated Valve Analysis and Test System (MOVATS) guidelines for diagnostic equipment inaccuracies were combined in a square root of the sum of the squares methodology and used as a multiplier to increase the minimum required thrust.

Maximum target thrust (MTT) in the closed direction was divided into two categories: (1) total seating thrust limit, which was based on the lesser of 110% of the actuator's thrust and torque ratings, or the valve's allowable thrust limit ("stall thrust"). The latter rating was derived using name plate motor starting torque and run efficiency for ac motors and pullout efficiency for dc motors. The result was adjusted to account for elevated ambient temperature and degraded voltage, and reduced by torque switch repeatability and diagnostic system inaccuracies. Similarly, the target thrust required to open an MOV under design-basis conditions was compared to the actuator's capability and the maximum target thrust (reduced by diagnostic system inaccuracies and torque switch repeatability). Pullout efficiency was used for both ac and dc motors. The licensee followed the standard Limitorque guidance concerning application factor. The inspectors concluded that the licensee's approach to initial MOV switch settings was appropriate subject to the comments which follow.

The inspectors noted that the licensee used a non-specific 25% margin to account for variations in valve factor, load sensitive behavior, and stem lubricant degradation. The inspectors observed that this undifferentiated margin may not be sufficient in all cases. For example, when tested dynamically, valve CCW-814 had a valve factor of 0.759, which is 253% greater than originally assumed. If the torque switch originally had been set at the minimum required thrust (plus the 25% margin), this valve could have failed when tested under design-basis differential pressure. Further, no margin would remain to account for load sensitive behavior and stem lubricant degradation. While successful tests conducted at design-basis conditions adequately verified initial assumptions and adequate margin, the inspectors were concerned regarding their application to valves which cannot be dynamically tested. The inspectors concluded that the licensee will need to verify the adequacy of the 25% margin and to document justifications for valve factor, rate of loading, and lubricant degradation assumptions to account for the worst case variations of these factors. This area will be reviewed during the GL 89-10 MOV program final closeout. (IFI 50-244/95-06-02)

2.3 MOV Design-Basis Capability

The licensee's dynamic test data was documented in test data matrix sheets which contained recorded and calculated information such as, flow, differential pressure, valve factor, load sensitive behavior, friction coefficient, and thrust. Based on the review of this dynamic test data, the inspectors concluded that the licensee's initial assumptions regarding valve factor, rate of loading, and stem friction coefficient were not always bounding. Gate valve factors as high as 0.759 (CCW-814 - Containment Isolation Valve for CCW Return from Reactor Support Coolers), a 35% rate of loading (SAFW-9629B), and a stem coefficient of friction of 0.22 (CCW-738A) were noted. The licensee calculated thrust margins based on the as-found valve factor, load sensitive behavior, and coefficient of friction. RG&E personnel stated that each MOV would have a valve factor based on in-plant data, with the exception of four valves which were not practicable to test, and 18 valves where the design-basis differential pressure was approximately zero. The inspectors noted that the test data matrix sheets contained many missing values for valve factor, load sensitive behavior, and coefficient of friction. Further, valve factor information was missing from the licensee's "Open Dynamic Margin Analysis" sheet. The licensee stated that although the valve factors had not been calculated, the thrust data was available. The licensee will be expected to justify the valve factors used for each MOV prior to completion of the GL 89-10 program. Further, for grouped non-tested valves, the observed values of load sensitive behavior for the tested MOVs in the group should be used where appropriate to adjust the thrust calculations. This item will be reviewed during the GL 89-10 MOV program final closeout inspection. (IFI 50-244/95-06-02)

The inspectors noted that valve CCW-738A had a stem friction coefficient of 0.22, indicating that the licensee's assumption of 0.20 was not always bounding. For valves which are not practicable to test dynamically, or for which no dynamic test data are available, the licensee will need to use a stem friction coefficient which best reflects plant-specific or industry data. The licensee was conducting a stem lubrication degradation study. When completed, the licensee will be able to assign

appropriate margins for degradation. In the interim, the licensee will be expected to select and justify an initial margin for stem lubricant degradation for all valves in the MOV program. This item will be reviewed during the GL 89-10 MOV program final closeout inspection. (IFI 50-244/95-06-02)

Program guidance documents M-1007, "Electrical Preventive Maintenance and Diagnostic Testing of Motor Operated Valves," and EWR 5111, "Motor Operated Valve Qualification Program Plan," described the method for extrapolation of partial differential pressure test data to design-basis requirements. However, procedure M-64.1.2, "MOVATS Testing of Motor Operated Valves," used by test personnel in the field, did not contain this information. The requirements for extrapolation, such as the minimum percentage of design-basis differential pressure, multi-point testing, and adjustments for each percentage point below the design-basis value, should be included in the field procedure. While the inspectors did not identify any incorrectly performed extrapolations, field procedures should provide an adequate level of information to ensure that the calculations are performed properly.

The licensee's method of extrapolation entails addition of a margin equivalent to the percentage of the design-basis differential pressure at which an MOV was tested to the extrapolated thrust value. However, industry experience has shown that data obtained under low differential pressure or flow conditions cannot always be extrapolated reliably. Further, industry testing has revealed the potential damage that can occur at blowdown conditions and this data should be considered even when extrapolating from near design-basis conditions. Consistent with GL 89-10, procedure M-1007 stated that a two-stage approach would be used to implement this aspect of the MOV program. The inspectors considered the licensee's method of extrapolation to be reasonable. However, the licensee's program did not document a plan for subsequently verifying MOV operability under design-basis conditions when test data applicable to those conditions becomes available. The method of extrapolation of partial design-basis test data should be justified prior to closure of the GL 89-10 MOV program. (IFI 50-244/95-06-03)

Post-test MOV operability verifications were performed in accordance with procedure M-64.1.2. The procedure compared thrust at control switch trip to the thrust required to overcome design-basis differential pressure, adjusted upwards to account for diagnostic system inaccuracies. The difference was considered to be the MOV thrust margin. The inspectors noted that torque switch repeatability was not included along with diagnostic system inaccuracies. In cases where torque switch repeatability is greater than diagnostic equipment inaccuracy, there potentially could be insufficient margin available to account for variations in thrust output caused by the torque switch. The licensee's test data matrix sheets contained static and dynamic thrust margins, valve factors, load sensitive behavior, stem coefficients of friction, and other detailed information. The licensee stated that the test data matrix sheets had to be completed and reviewed prior to returning an MOV to service. However, the inspectors noted that the procedure did not require the test data matrix sheets to be completed. Further, there was no documentation that the test data matrix sheets were being completed prior to returning the valve to service. The licensee agreed that completion and review of the test data matrix sheets was needed prior to returning MOVs to service. During review of the thrust margins for the selected valves (including margins for torque switch repeatability and stem lubrication degradation), the inspectors did not identify any operability concerns. However, to improve the control of dynamic test acceptance criteria and

the return of MOVs to service, the licensee agreed to include the information and the review of the test data matrix sheets in MOV field test procedure M-64.1.2. The licensee agreed to implement these procedure changes by June 28, 1995. This item will be reviewed during the final GL 89-10 MOV program closeout inspection. (IFI 50-244/95-06-04)

Attachment 4 of the MOV Qualification Program Plan (EWR 5111) provided a method for evaluating design-basis conditions, valve factors, and margins, and comparing assumed versus actual test information. These data were intended for use by the licensee to revise the MOV calculations where appropriate. The inspectors considered the described method to be acceptable; however, Attachment 4 had not been completed for any of the selected MOVs, and should be completed (with revised calculations as necessary) prior to completion of the MOV program. (IFI 50-244/95-06-05)

2.4 MOV Motor Brakes

The inspector reviewed the licensee's actions regarding NRC Information Notice 93-98, "Motor Brakes on Valve Actuator Motors." The licensee had 12 MOVs with motor brakes installed. Six valves were placed in their safety-related positions with control power removed, and four MOVs normally are pre-positioned with control power removed during normal power operation. These valves are only required to operate in certain post-accident recovery modes when degraded supply voltage is not a concern. The two remaining MOVs were analyzed during sequential loading of the emergency diesel generator. The licensee assumed that the brakes would drag each time voltage dipped during diesel generator load sequencing. The licensee analyzed valve thermal overload time delays to ensure that no premature tripping of the MOVs would occur, and verified that the increased stroke times would not affect the safety function of these valves. While concluding that there were no immediate safety concerns regarding motor brakes, the licensee was considering their removal. The inspectors concluded that the licensee's evaluation was acceptable.

2.5 Periodic Verification of MOV Capability

The purpose of a periodic verification program is to assure MOV operability between maintenance and test intervals by verifying that the control switch settings adequately accounted for the effects of wear and aging on the valve and its actuator. The licensee's plan is documented in the MOV Qualification Plan (EWR 5111) and the implementing maintenance procedure M-1007 which includes a combination of preventive maintenance and diagnostic testing performed at frequencies established through a reliability centered maintenance (RCM) program. The licensee intends to perform static diagnostic tests in conjunction with scheduled preventive maintenance, supplemented by a pilot program to test certain MOVs in the "as found" condition prior to maintenance. The MOVs to be included in the pilot program had not been selected at the time of the inspection. The licensee has no current plans to perform periodic dynamic tests, although the MOV Qualification Program Plan recognizes the possibility of doing some of this testing in the future. The licensee's program is based on the judgement that static tests are adequate to indicate age-related degradation involving stem packing and lubrication, dirt buildup, and wear. The inspectors considered that potential changes in design-basis thrust requirements due to age-related degradation may not be identified by "as left" static tests. For example, a static diagnostic test performed after stem

lubrication would not provide information regarding lubrication degradation over time, and changes in the valve factor or load sensitive behavior of an MOV would not be detected during static testing. The inspectors concluded that these factors require further technical justification regarding static testing, and that the proposed pilot program for "as-found" testing was a key element in validating the underlying assumptions of the program. **(IFI 50-244/95-06-06)**

The licensee established the periodicity of MOV preventive maintenance and testing on the basis of risk significance (derived from the Ginna Level 1 probabilistic risk assessment), available thrust margin, and historical performance and failure rate data developed by the RCM program. The inspectors noted that the Ginna RCM program included evaluation of vendor information and industry experience reports which are reviewed periodically and fed back into the program. The licensee intends to lubricate valve stems and inspect actuator grease every two years, perform preventive maintenance on high-risk and low-risk MOVs every 4.5 and six years, respectively, and perform static diagnostic testing every five and ten years, respectively. The inspectors considered that this aspect of the program contained the necessary elements for making technically informed decisions regarding periodic verification and concluded that the proposed frequencies were acceptable.

2.6 MOV Post-Maintenance Testing

Procedure M-1007 provides post-maintenance test selection guidance for the most commonly performed MOV work activities. Depending on the maintenance involved, the tests vary from a simple stroke test to a static baseline test. The need to perform a dynamic test is evaluated by MOV program engineering on a case-by-case basis, using as a general principle whether the MOV was altered such that existing baseline test conditions no longer represent the post-maintenance conditions. With one exception, the inspectors found the licensee's guidelines to be reasonable and consistent with GL 89-10 recommendations. The inspectors noted that the licensee does not intend to perform a valve thrust verification test following packing adjustment if gland nut torque remains below the value which existed at the time the diagnostic baseline test was performed. The inspectors considered this exception to be contrary to industry experience. In order to be acceptable, the licensee will need to demonstrate that packing adjustment does not affect MOV thrust requirements adversely, or that the change in packing load is within available margins. This item will be reviewed during the final GL 89-10 MOV program closeout inspection. **(IFI 50-244/95-06-07)**

2.7 MOV Failures, Corrective Actions, and Trending

The Ginna MOV trending program, described in procedures EWR 5111 and M-1007, contained the elements necessary to maintain the design-basis capabilities of safety-related MOVs. Trending reports identified key parameters such as stem factor/ coefficient of friction, running load, motor current and load voltage, stem thrust, and motor torque. The results of preventive maintenance and periodic tests (including inservice tests) are trended, and root causes and corrective actions for MOV failures are fed back into the program. Dispositions of nonconformance reports and maintenance field requests reviewed by the inspectors were technically sound. Through interface with the Operations Assessment group, vendor information is reviewed and included in MOV records. GL 89-10, item h, recommends examination of MOV performance at least every two years, or after each refueling outage. The

inspectors noted that program documents did not specify a frequency for review of MOV performance. However, the licensee stated its intention to conform to GL 89-10 guidance and acknowledged the need to document this item in procedures. The inspectors concluded that the licensee was adequately addressing this area for the GL 89-10 MOV program final closeout.

2.8 MOV Qualification Program Plan and Design Analysis Documents

During the reviews discussed in the prior sections of this report, various omissions, errors, and inconsistencies were observed in the MOV Qualification Program Plan (EWR 5111, Revision 1, January 1, 1994) and the Design Analysis for Ginna Station GL 89-10 MOVs (EWR 5080, NSL-5080-0002, Revision 5, March 21, 1995) documents. A specific inconsistency in these program documents was discussed previously in Section 2.1. Other examples in this regard were as follows:

1. The MOV Qualification Program Plan document, Section 3.1.6 for the Preventive Maintenance Program, stated that Neolube #2 is used to lubricate valve stems. This is an error, since EXXON Nebula EP-0 grease is on the valve stems every two years.

2. The MOV Qualification Program Plan document, Section 2.9.3 contained grouping criteria for MOVs which closely followed GL 89-10, Supplement 6 guidelines. However, this section did not contain a provision for the application of adverse operational information to other MOVs in the group. Unless the licensee has a technical basis otherwise, Ginna should correct the MOV Qualification Program Plan document to include consideration of adverse performance of an MOV in a group. Specifically, if an MOV fails or reveals adverse performance during testing or operation, the licensee should evaluate the applicability of this information to each MOV in the group.

3. The Design Analysis document should be revised to include the pressure locking and thermal binding (PLTB) considerations for MOVs RHR-850A/B and RCS-515/516 (PORV block valves) as discussed in the Altran technical report on PLTB (see Section 3.0).

4. The current listing of the 63 Ginna Station MOVs within the scope of GL 89-10 was not included in the MOV Qualification Program Plan document which is the main engineering document defining the overall GL 89-10 MOV program. It appeared that the governing document for listing the GL 89-10 MOVs was the Design Analysis document which is a Licensing Department and not an Engineering Department document. The licensee's MOV program coordinator indicated that a listing of the Ginna Station GL 89-10 MOVs would be included in the MOV Qualification Program Plan document comparable to the informal Ginna Station GL 89-10 MOV listing reviewed during this inspection.

5. During the MOV Part 1 inspection in 1992 there were 76 MOVs in the GL 89-10 program. As of this inspection, there were 63 MOVs. The design analysis document has a clear basis for excluding the SI-825A & B and the SI-826A, B, C, & D valves, which are locked in position with electric power removed during normal operation. However, the bases for excluding the other MOVs were not as clearly described. Although the inspector had no immediate concerns regarding the excluded MOVs, the licensee should provide a clear basis for excluding previously included MOVs to ensure completeness during the final MOV program closeout inspection.

These omissions, errors, and inconsistencies require correction and clarification and will be reviewed during the GL 89-10 MOV program final closeout along with the previous item discussed in Section 2.1.

2.9 Preparation for the GL 89-10 MOV Program Final Closeout

The inspectors reviewed most items discussed above during the first week (March 27-31, 1995) of this inspection. Although the licensee had implemented much of the MOV program, it was apparent at that time, as evidenced by the many inspector follow items (IFIs), that the licensee had a substantial work effort remaining to complete the MOV program by June 28, 1995. Therefore, at the end of this first week of inspection the inspector requested the licensee's MOV program coordinator to review the NRC memorandum, dated July 12, 1994, which contained the guidance on closure of the NRC staff review of GL 89-10 programs and to compile a "punch list" of items necessary for completing the Ginna GL 89-10 MOV program. A short followup visit was completed on April 19-20, 1995, to review this "punch list" and ensure that a mutual licensee/NRC understanding existed regarding the expectations for completion of the GL 89-10 MOV program.

The significant "punch list" items discussed between the licensee's MOV program coordinator and the inspector were as follows:

1. For the four high risk MOVs that were not practicable to test dynamically:

   a. The PORV block valves (RCS-515 and 516) were discussed. New valves and actuators were being installed during the current refueling outage. The licensee planned to use the EPRI Performance Prediction Method to validate the assumptions for these valves.

   b. The core deluge valves (RHR-852A and B) were discussed. The licensee had not determined the best method to validate the assumptions for these valves. A search of industry test data was being initiated to formulate the basis for the assumptions used in determining the switch settings for these MOVs.

2. A detailed review of the results of the 36 dynamic MOV tests was needed to complete validation of assumptions and feedback into the required thrust calculations. Instructions in the MOV Qualification Program document and its Attachment 4 existed to accomplish this work, as discussed in Section 2.3.

3. The licensee considered that the five MOVs listed below need not be dynamically tested for MOV program completion since they could be grouped with identical valves that had been fully tested at Ginna. Valve RHR-850B is the only high risk MOV in this list. Appropriate evaluation of the dynamic test data for the identical valves would be done as indicated in Item 2 above.

MOV to be Grouped	MOVs Fully Tested in the Group
RHR-850B	RHR-850A
CS-860B	CS-860A, C, & D
AFW-4008	AFW-4007
SW-4613	SW-4614
SW-4780	SW-4609

This grouping methodology is not consistent with GL 89-10, Supplement 6, since four MOVs are being grouped based on only one fully tested MOV in the group. The inspector also noted that Valve RHR-850B was a high risk MOV and that the MOV Qualification Program Plan required dynamic testing of all high risk MOVs that were practicable to test. However, the licensee considered its grouping methodology to be acceptable since the MOVs being grouped had a large available thrust margin, and future as-found dynamic testing would validate this approach. The matter of as-found dynamic testing was discussed during the May 1, 1995, telephone exit. The licensee stated they did not dynamically test valve RHR-850B due to a scheduling oversight, and that this test would be performed during the next refueling outage. The licensee's grouping methodology will be reviewed during the final GL 89-10 MOV program closeout inspection. **(IFI 50-244/95-06-08)**

Summarizing this discussion of "punch list" items within the context of the other IFIs, the inspector discussed NRC expectations regarding the verification of design-basis capability for each MOV in the GL 89-10 program. As described in the NRC memorandum, dated July 12, 1994, the licensee should have available a specific status of each GL 89-10 MOV, including key information such as: (1) control switch thrust versus calculated minimum and maximum thrust, (2) test status (i.e., static or dynamic and full or partial design basis d/p test), and (3) basis for closure (i.e., full or extrapolated d/p test or static test only). The inspector noted that, while this information need not be contained in a single document, it needed to be compiled to support a summary review of the status of all MOVs during the final GL 89-10 MOV program inspection. The licensee's MOV program coordinator acknowledged the timely need for this information. The licensee expected that the Ginna GL 89-10 MOV program would be completed by June 28, 1995, with a letter to follow within 30 days advising the NRC of program completion.

3.0 Pressure Locking and Thermal Binding of Gate Valves

The phenomenon of pressure locking is caused by valve bonnet pressure hydraulically locking the valve stem and disc, and resulting in high thrust requirements to open the valve. Plant or system temperature changes can also cause the valve disc to bind in its seat. Valve actuators generally were not sized to open the valves with high pressure fluid trapped in the bonnet or when excessive binding forces occur. The phenomena of pressure locking and thermal binding (PLTB) have been addressed in numerous industry reports and NRC circulars and notices since 1977, and more recently in NRC Information Notice 92-26, "Pressure Locking of Motor-Operated Flexible Wedge Gate Valves." A comprehensive study was published by the NRC's Office for Analysis and Evaluation of Operational Data (AEOD) in NUREG-1275, Vol. 9, issued in March 1993. An acceptable approach to evaluating this topic as applicable to gate valves within the scope of GL 89-10 was also outlined in Supplement 6 to the GL issued in March 1994.

With contractor assistance, RG&E had completed two evaluations since 1992 regarding the PLTB phenomenon. The first evaluation (Altran Evaluation of August 24, 1992) was reviewed and accepted by licensee corporate engineers on August 25, 1992 and included two specific motor-operated valves; the 6-inch, flex wedge, core deluge valves (MOVs 852A & B). The second evaluation (Altran Technical Report No. 94108-TR-01, "Investigation of Gate Valve Pressure Locking/Thermal Binding") reviewed other gate valves as discussed below. This evaluation was completed in October 1994 and was initially approved by the licensee in March 1995.

The first evaluation was prompted by a concern identified during a mid-1992 visit by AEOD staff who were reviewing the status of programs at six licensed facilities to obtain an understanding of industry preventive or corrective actions related to PLTB. The specific concern involved the susceptibility of core deluge MOVs 852A & B (normally closed) to a thermally-induced pressure locking condition since they were located approximately 16 feet from the reactor vessel with only a check valve (853A & B) installed in the downstream piping. The possibility of check valve leakage was the mechanism for postulating the pressure locking condition. The licensee concluded that the valves were not susceptible to thermally-induced pressure locking. However, by assuming that the check valves leaked, the licensee also considered these MOVs to be susceptible to pressure locking if required to open during the rapid system depressurization postulated during a design-basis loss of coolant accident (LOCA). The evaluation included calculations that determined sufficient MOV capability existed to overcome the maximum differential pressure conditions expected during a LOCA. During review of these calculations, the licensee confirmed that degraded voltage and high temperature considerations were included. MOV integrity was also assessed in this evaluation by assuring that no MOV component weak link limits were exceeded.

The second evaluation in 1994 reviewed 259 gate valves at Ginna. The review included several initial screening questions for each valve (e.g., Is the valve in the Ginna GL 89-10 or IST programs; or does the valve have a safety function to open?) to determine if additional screening questions were to be posed. Affirmative answers to any of the additional screening questions resulted in the valve being considered susceptible to pressure locking or thermal binding during plant operation. Fifty-five valves were included in this category. The licensee concluded that further corrective actions were necessary for 11 of these 55 valves, nine of which were not in the GL 89-10 program. The two GL 89-10 MOVs requiring further corrective actions were the normally closed RHR pump suction valves (MOV-850A and B), which are located in the auxiliary building and must be opened during long term recirculation cooling. (note: containment sump MOVs-851A and B are maintained locked open with electric power removed.) The contractor's (Altran) evaluation summary for these valves indicated that "provision for valve venting should be included by valve modification." The inspector determined during discussions with the licensee that this was not a safety concern since each valve had been modified in 1970 by connecting a 3/4-inch external line between the valve bonnet and the RHR pump suction piping. However, this modification had apparently been overlooked by the licensee and Altran during this evaluation.

The inspector concluded that both Altran evaluations were detailed in their preparation. However, in addition to the oversight of the MOV-850A and B bonnet vent modification during the engineering review of the second Altran evaluation, other observations were noted regarding the lack of thoroughness in the engineering reviews of the Altran evaluations. For example, in the Altran evaluation of core deluge MOV-852A and B, the force due to the weight of the valve internals was not considered when calculating the valve thrust requirements. A second observation, which also included MOV-852A and B, involved the lack of a hardware review of the past performance of these MOVs, which was a reasonable expectation in light of the high safety significance of these MOVs. Subsequent followup inspection with licensee personnel responsible for periodically testing these MOVs demonstrated that these valves have performed well with no known failures. It was further noted that both MOVs had operated satisfactorily during the 1982 steam generator tube rupture event.

Notwithstanding the above observations regarding the lack of thoroughness of the engineering reviews of the Altran evaluations, the inspector concluded that the licensee had satisfactorily evaluated for operability all GL 89-10 MOVs susceptible to PLTB. All GL 89-10 MOVs considered to be susceptible to PLTB conditions were demonstrated to be operable. However, the PLTB issue remains unresolved pending the issuance of generic guidance by the NRC (URI 50-244/95-06-09).

4.0 MANAGEMENT OVERSIGHT AND INVOLVEMENT

As documented in previous NRC inspection reports (IR 92-80 and 94-03), the licensee had demonstrated good management involvement in the development and implementation of the Ginna GL 89-10 MOV program. During the initial phase of this inspection, the inspectors observed a continuation of this good management involvement. Using the Ginna Level 1 probabilistic risk assessment, conservative decisions had been made in early 1994 to rank the GL 89-10 MOVs according to risk and to dynamically test all high risk valves that were practicable to test. This risk ranking information was used to provide a good technical basis for facilitating the licensee's request to the NRC for extending the MOV program completion date to June 28, 1995.

After completing the first week of inspection, the need for changing MOV field test procedures to improve the control of dynamic test acceptance criteria (see Section 2.3), and the various inconsistencies noted in several MOV program documents (see Section 2.8) provided examples of weak administrative control of the MOV program. The inspectors also observed that the licensee may have underestimated the work effort needed to complete the GL 89-10 MOV program as scheduled. Management's approach to assessing the readiness of the MOV program for closeout had not been as proactive when compared to their aggressive earlier approach toward MOV testing and refurbishment activities. Specifically Commitment Action Item #C00912 titled "Perform Closeout Review of IEB 85-03 and GL 89-10 Related Issues" had been closed in March 1995, by the Quality Assurance (QA) department primarily on the basis of the positive findings in NRC Inspection Reports 92-80 and 94-03 and QA personnel discussions with the MOV program coordinator. An independent assessment of the readiness of the MOV program for closeout was not considered necessary.

Licensee management and MOV program personnel acknowledged the inspection observations, including the additional work effort needed for GL 89-10 MOV program completion. The inspectors noted good management responsiveness to the open issues that needed resolution to assure that MOV program completion would occur as scheduled.

5.0 MANAGEMENT MEETINGS

The inspectors held daily meetings with the licensee's staff to discuss the inspection findings. An interim management briefing occurred on March 31, 1995. An exit meeting with licensee management and MOV program personnel was conducted via telephone on May 1, 1995, to summarize the preliminary inspection findings. Principals who participated in this exit meeting are listed below. During the inspection, the licensee indicated that there was no proprietary information either involved in the inspection or expected to be included as part of this report.

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