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REGION I

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Facility Name:	R. E. Ginna Nuclear Power Plant
Location:	1503 Lake Road Ontario, New York 14519
Inspection Period:	October 27-31 and November 5-7, 1997
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EXECUTIVE SUMMARY

R. E. Ginna Nuclear Power Plant
NRC Inspection Report 50-244/97-13

This special inspection reviewed the status of the Ginna Motor Operated Valve (MOV) program for the purpose of determining if Rochester Gas and Electric (RG&E) had met their commitments under Generic Letter (GL) 89-10 .

Substantial improvements were evident. Self assessments and independent reviews were utilized to develop significant enhancements in MOV design and testing. Program documents and procedures were rewritten, test data reexamined, revised assumptions developed and new diagnostic test equipment procured. The quality of design calculations was generally good, and degraded voltage and weak link analyses were redone. However, the NRC was unable to reach closure regarding the GL 89-10 baseline program because of the following:

- Calculations (performed by a vendor) had not been finalized and accepted under the Ginna Station Quality Assurance (QA) program and had not received formal RG&E review and approval. The failure to approve the vendor's calculations is a poor engineering practice with respect to configuration control and was a violation of 10 CFR 50 Appendix B Criterion VII, "Control of Purchased Material Equipment and Services" **(VIO 97-13-02).**

- Input assumptions were used in several instances without adequate validation, resulting in incorrect design calculations, which under-estimated the thrust requirements for three MOVs. The failure to adequately validate MOV design inputs was a violation of 10 CFR 50, Appendix B, Criterion III, "Design Control" **(VIO 97-13-03).**

The acceptability of administrative controls which govern the use of a programmable database, *SMARTBOOK*, for safety related calculational input was left unresolved **(UNR 97-13-01).**

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III. Engineering

E1 Motor-Operated Valve Program Review (TI 2515/109)

Background

On June 28, 1989, the NRC issued Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," which requested licensees to establish a program to ensure that switch settings for safety-related motor-operated valves (MOVs) were selected, set, and maintained properly. NRC inspections at Ginna have been conducted based on guidance contained in NRC Temporary Instruction (TI) 2515/109, "Inspection Requirements for Generic Letter 89-10."

During an inspection performed in July 1996, the NRC determined the MOV program could not be closed, principally because unfounded engineering assumptions were used in calculations for the Residual Heat Removal (RHR) core deluge valves, and because the tracking and trending program was not being effectively used. The inadequate verification of design assumptions for the core deluge valves was discussed during a November 1996 enforcement conference. RG&E subsequently committed to a number of corrective actions and program enhancements. These commitments were described in a January 13, 1997, letter to the NRC.

The purpose of this current inspection was to examine the actions implemented by RG&E to address the problems identified during the July 1996 inspection and to determine if the related actions were sufficient to warrant "closure" of the NRC staff's review of the Ginna GL 89-10 MOV program.

E1.1 MOV Sizing and Switch Settings

a. Inspection Scope

The inspectors reviewed the test results and engineering evaluations for the seven MOVs listed below. The review consisted of examining calculational inputs associated with: (1) valve factor, which correlates differential pressure to the stem-thrust requirement; (2) stem friction coefficient, which affects the conversion of actuator output torque to valve-stem thrust; and (3) rate of loading or load sensitive behavior, which reflects the change (usually a loss) in deliverable stem thrust under dynamic conditions as compared with the available thrust measured under static conditions.

RCS-MOV-313	Reactor Coolant Pump Seal Water Return Isolation
RCS-MOV-515/516	Pressurizer Relief Stop (Block) Valves
CCW-MOV-813	Component Cooling Water Supply
CS-MOV-860A	Train 1A Containment Spray Pump Discharge
MS-MOV-3504A	Turbine Driven Auxiliary Feedwater Steam Admission
SW-MOV-4664	Turbine Building Service Water Isolation 1A2

The inspectors also reviewed MOV program documents, Engineering Work Request (EWR) 5111, "The Motor-Operated Valve Qualification Program Plan" and Engineering Work Request (EWR) 5080, "Design Analysis Ginna Station GL 89-10 MOVs."

b. Observations and Findings

General

Following the July 1996 inspection and subsequent enforcement conference, program documents and procedures were rewritten, test data reexamined, and revised assumptions and calculations developed. Based on recent industry information contained in NRC Information Notice (IN) 96-48, "Motor-Operated Valve Performance Issues," and NUREG/CR-6478, "Motor-Operated Valve (MOV) Actuator Motor and Gearbox Testing," RG&E also revised their methods for calculating motor actuator capability in the closing direction by discontinuing the use of run efficiencies and replacing them with more conservative pullout efficiencies. This action required the adjustment of several torque switch settings during the most recent refueling outage. New dynamic test methods to require the use of on-line pressure transmitters (where possible) were implemented. This improved method provided a differential pressure (DP) measurement over the complete valve stroke and increased the accuracy and confidence level of MOV performance determinations.

However, RG&E did not adequately assess MOV design guidance or control design information in all cases. Specifically, input assumptions were used for certain double disc gate valves in unapproved applications without adequate justification, and errors were detected in several design calculations. Thrust calculations that were performed using the Electric Power Research Institute's MOV Performance Prediction Program (PPP) had not been formally approved and accepted by RG&E, as required by the Ginna Quality Assurance (QA) manual. These issues are discussed in detail in Sections E1.3, 4 and 5.

Process Controls and Guidance

Program Plan EWR 5111 is the guidance document for the Ginna MOV program, describing the assumptions and the methods used to establish and set torque switch settings. Program document EWR 5080, identified the MOVs included in the GL 89-10 program and described the maximum DP each MOV must overcome to perform its safety function.

MOV design inputs were consolidated in a computerized (Microsoft Access) database program called the *"SMARTBOOK."* The program used design inputs and valve specifications to calculate required thrust values using the standard industry equations, including adjustments for load sensitive behavior and degradation of actuator capability. These values were reproduced onto data sheets, which RG&E used to establish the MOV switch settings. A series of "lower tier" procedures, including M-64.1.2, "MOVATs Testing of Motor Operated Valves," outlined the methodology for setting the torque switch settings.

The *SMARTBOOK* program simplified the storage and retrieval of MOV data and the calculation of thrust values. However the program was not procured as safety-related and it was not apparent how RG&E verified that the outputs were correct. Ginna staff indicated they performed hand calculations to verify the correctness of the program outputs independently. However, none of these verifications or independent calculations were documented, nor was it evident how the information in the program was controlled. Finally, aside from a description of the program in EWR 5111, there was no formalized procedural guidance for how the program should be used or how its associated calculations should be checked and verified.

Load Sensitive Behavior

RG&E used a 15% margin in thrust calculations to accommodate the effects of load sensitive behavior. The margin was applied as a "bias" value and was based upon a statistical analysis of dynamic tests performed on eleven Ginna globe and gate valves of various sizes and pressure classes. The statistical analysis indicated the 15% margin was appropriate for the valve population at a 97% "confidence level."

The inspectors reviewed the load sensitive behavior study and statistical analysis and determined the 15% margin bounded the majority of the test data. Including the margin as a bias value resulted in an additional conservatism when compared with alternative methods used in the industry.

Stem Friction Coefficient

RG&E assumed a value of 0.20 for a stem friction coefficient. This value was based upon a statistical analysis of Ginna gate and globe valve dynamic and static test data. The inspectors reviewed the test data and noted only one valve, MOV 738A, had a stem friction coefficient that exceeded the assumed value under dynamic conditions and that difference was not significant. Further, there was limited variation in the data. Therefore, the inspectors determined the stem friction coefficient assumption was appropriate.

Control of Purchased Services

Following the July 1996 MOV inspection, RG&E used a contractor to assist in the enhancements to the Ginna MOV program. New MOV thrust and weak link calculations were developed using the *SMARTBOOK* program. RG&E used the revised calculations as the basis for establishing MOV operability.

Although the quality of the revised engineering calculations and program documents was good, RG&E did not follow the requirements of the Ginna Quality Assurance (QA) program and engineering procedures before using the vendor supplied engineering calculations to establish MOV design basis capability. Specifically, Engineering Procedure (EP) 3-P-154 "Review and Approval of Vendor Drawings, Design and Manufacturing Technical Documents," states that vendor-supplied calculations shall not be used to establish a basis for operability of safety-related equipment unless formal, final approval of the calculations has been obtained in accordance with EP-3-P-154. The approval shall be documented using a memorandum incorporated into each vendor calculation. However, as of the time of this inspection, RG&E had not completed its formal final approval of the calculations of record for all Ginna GL 89-10 MOVs.

c. Conclusions

Assumptions for load sensitive behavior and stem friction coefficient were technically acceptable.

RG&E used the outputs from the *SMARTBOOK* program to change or validate the switch settings of safety-related MOVs. However, RG&E had not formally controlled the data contained in the program or validated the program outputs in a documented manner. This issue was partially addressed as part of a recommendation from a QA audit of the GL 89-10 program conducted in August 1997. This would otherwise be acceptable provided that each MOV calculation receives effective independent verification and approval. The acceptability of the current administrative requirements for use of the program was unresolved at the end of the inspection. **(UNR 97-13-01)**

The inspectors considered the use of unapproved calculations to be a poor engineering practice and a potential problem for configuration control, particularly since the torque switch settings for a number of MOVs were adjusted during the recent outage based on these calculations. 10 CFR Part 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," requires, in part, that "Measures shall be established to assure that purchased . . . services conform to the procurement documents. Documentary evidence that material conforms to the procurement requirements shall be available at the nuclear power plant site . . . prior to the use of such material. This documentary evidence shall be retained at the nuclear power plant site . . . and shall be sufficient to identify the specific requirements, such as codes, standards, or specifications, met by the purchased material." The failure to review the vendor supplied calculations and document they conformed to the procurement requirements before using them as a basis to establish MOV operability was a violation **(VIO 97-13-02)** of 10 CFR 50 Appendix B Criterion VII, "Control of Purchased Material, Equipment and Services."

E1.2 Grouping Criteria

a. Inspection Scope

There are 60 valves in the Ginna GL 89-10 program population. RG&E used the standard industry (Limitorque) equation to establish MOV switch settings. The switch settings of thirty-one of the valves were verified through dynamic tests. The remaining valves that could not be dynamically tested were placed in one of fourteen valve groups based on valve type (e.g.., flex-wedge, double disc, globe etc.). If a sufficient number of valves were available using the first criteria, then valve size, type, and ANSI pressure class rating were used to subdivide the valve groups further.

b. Observations and Findings

RG&E applied the highest valve factor obtained through dynamic tests to the nondynamically tested valves in the respective group. However, using the highest valve factor (from a test), and inferring that factor would represent the performance of the remaining valves in the grouped population, may not be conservative without further analysis. Specifically, for groups in which the data are scattered, applying the highest valve factor may not encompass the statistical performance variation of the valves. This issue was discussed in NRC Information Notice (IN) 97-07, "Problems Identified During Generic Letter 89-10 Closeout Inspections," dated March 6, 1997, which noted that ". . . some licensees have selected a valve factor based on a sample of tests that does not accommodate reasonable variation in the valve factor for other MOVs in the group."

RG&E's grouping criteria contained valves with wide ranges of sizes, pressure classes, and manufacturers. The inspectors questioned the rationale for two groups: (1) Group C contained seven Crane flex-wedge gate valves and two Borg Warner flex-wedge gate valves, and (2) Group K contained seven butterfly valves from two different valve manufacturers. To assess the significance of the valve factor variation, and in response to the inspectors' questions, RG&E reassessed the valve factors using a mean plus two standard deviation statistical method for each group. The results indicated the assumed valve factor bounded the majority of the test data.

c. Conclusions

In groups B, D, and E, the assumed valve factor did not bound the upper limit of the data scatter. Although only a few valves were affected and the inspectors did not identify any operability concerns, the bounding nature of this assumption needs to be re-evaluated by RG&E (IFI 97-13-04) during the periodic verification program under their GL 96-05 commitments.

E1.3 Valve Factor Selection

a. Inspection Scope

The inspectors evaluated valve factors used in groups that had no available or meaningful in-plant test results. RG&E applied valve factors that were based on friction coefficients obtained from the Electric Power Research Institute's (EPRI's) "separate effects "friction testing performed in support of the MOV Performance Prediction Program.

b. Observations and Findings

Friction coefficients were used in the standard industry equation to develop a predicted thrust value for 21 separate valves in groups A, C, H, J, M, and N. However, this method was technically incorrect in some instances, since the EPRI friction factors were obtained under controlled conditions that do not account for changes in the performance of installed valves, and which could reasonably be expected. Specifically, unlike actual valve factors obtained from in-plant tests, the friction coefficients do not account for possible valve guide wear or bending, disc tipping, the force required to wedge certain valves or other valve-specific performance characteristics.

NRC technical concerns regarding selective use of the EPRI data were outlined on page 2 of the February 20, 1997, safety evaluation report (SER) supplement that approved use of the EPRI program. In the SER, the NRC indicated:

> "The NRC staff has reviewed the EPRI methodology as a complete package in that certain nonconservative assumptions in the models are compensated by other conservative assumptions in the analytical formulas. Selective use of test data or methods from the EPRI program may result in underpredicting the thrust or torque required to operate gate, globe or butterfly valves."

Based on a review of Ginna program documents and selected thrust calculations, the inspectors found that RG&E did not address the NRC comments in the SER regarding selective use of coefficients from the EPRI program.

c. Conclusions

Although data from the EPRI program were used in the above instances in a technically incorrect manner, this application did not appreciably impact functionality since most valves appeared to have adequate design margin. The use of EPRI coefficients in an approved methodology for the 21 MOVs associated with the groups discussed above will need to be re-evaluated by the NRC **(IFI 97-13-05)** for purposes of GL 89-10 program closure. Notable exceptions with respect to margin included the pressurizer power operated relief (PORV) block valves, and the reactor coolant seal water return valve, which are discussed in the following sections.

E1.4 PORV Block Valves

a. Inspection Scope

The inspectors reviewed Altran Calculation No. 96190-C-28, dated June 1997 for the PORV block valves. This calculation established the minimum required design basis thrust and torque limits for purposes of diagnostic setup and testing of the valves. The calculation referenced use of the EPRI Topical Report (TR)-103232, dated November 1994, associated with use of a 0.42 valve factor assumption. The inspectors also evaluated the design application of these valves, particularly with respect to leak tightness, as described below.

b. Observations and Findings

Background

The PORV block valves, (MOVs 515/516) are three-inch Anchor Darling double disc gate valves designed to achieve a leak tight seal when the upstream and downstream parallel discs are "hard seated" against their respective seat. This design is intended to force the discs apart by the sliding action of angled upper and lower disc wedges as the disc assembly strikes the bottom of the valve. This condition is called "wedging" and typically requires greater force than just achieving full seat overlap (also referred to as flow isolation or blockage) for this type of valve. The amount of flow through the valve at the full seat overlap position will depend on the DP loading, the disc area, and the contact stress. Significant additional thrust can be required to spread the disc wedges sufficiently to meet leakage limitations and can be affected by the orientation of the valve discs. Specifically, valves with the upper wedge located downstream of flow (non-preferred direction) can require much more thrust to achieve a hard seat wedged disc position.

Past calculations assumed a 0.5 valve factor, but the technical basis for this value was questioned during the July 1996 inspection. Since the block valves could not receive a dynamic test, the thrust requirements for these valves are currently based on a 0.42 disc friction coefficient obtained from the so-called EPRI "separate effects" testing. The PORV block valve thrust is controlled in the close direction by a torque switch. The switch settings were established based upon Ginna design document EWR 5080, which indicated the block valves had two safety-related functions; isolate a stuck open PORV, and open to depressurize the reactor coolant system. Chapter 5.4.10 of the Ginna Updated Final Safety Analysis Report (UFSAR) indicated the design leakage limit for the block valves was within the capacity of one charging pump (approximately 60 gpm).

Because of the relative small design margin, and the potential that the lab-developed EPRI friction coefficient (0.42) would not approximate actual valve performance characteristics, the inspectors requested RG&E to reevaluate thrust margins using the more appropriate NRC-approved EPRI "hand calculation" method. Two values were calculated: (a) thrust required to achieve full seat overlap and (b) thrust required to achieve wedging. Since the licensee was unaware of the orientation of the block valve discs, photograph X-rays were taken of both valves on October 31, 1997. The photographs revealed valve 516 was oriented in the non-preferred direction.

Prior to this inspection, the block valves were set to approximately 11,000 pounds (lbs) force. By the inspector's independent calculations, this was above the EPRI-predicted required thrust for flow isolation (10, 200 lbs) but less than what would be predicted to achieve hard seat contact or full wedging. While there are no specific design basis leakage criteria for the PORV block valves, other than being less than the charging pump's capacity, a setup to only achieve the flow blockage condition does not take full advantage of the wedging design for these particular valves. The Ginna Technical Specification Bases 3.4.11 define the licensing design basis for the PORV block valve closure as "...terminating the RCS depressurization and coolant inventory. As stated in the NRC's SER for the EPRI PPM, the inspectors did not consider torque switch setup for thrusts predicted at or near flow isolation to be sufficiently justified with respect to design function. The term isolation is more aptly described as "blockage," but does not necessarily ensure any measure of leak tightness. loss" associated with a stuck-open PORV which is, in effect, a small break LOCA.

In response to the inspectors' concerns, the torque switch setting for these valves was changed to increase thrust output to 13,843 and 14,652 lbs respectively, which was equivalent to better than 80% wedging. The analytical work to support the thrust increase was outlined in calculations 19703245 and 19703246 performed on November 3, 1997. Additional increases in thrust output were precluded by the weak link structural limits. The inspectors independently calculated a predicted thrust, using the program value for rate of loading effects, and determined the torque switch setting for the block valves was adequate. However, the inspectors noted the revised calculations contained an error in that RG&E failed to provide an allowance for rate of loading when determining MOV target thrust.

c. Conclusions

Although the past (prior to November 1997) switch settings may not have achieved complete wedging (and leak tightness) under all differential pressures, the inspectors concluded partial wedging and flow blockage would likely have occurred under design conditions. RG&E was unaware that the thrust required to achieve wedging was dependent on disc orientation. Further, the valves may not prevent flow under all differential pressure conditions when the torque switch settings are set to achieve only full seat overlap.

The current PORV block valve switch settings were established on November 3, 1997, in part, based upon incorrectly performed calculations that did not adequately consider a value for rate of loading. 10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that ". . . measures shall be established to assure that applicable regulatory requirements and design basis for structures, systems, and components are correctly translated into specifications, drawings, and procedures." The failure to apply a correct value for rate of loading in the November 3, 1997, calculations and the use of incorrect equations to calculate the required thrust for the PORV block valves was the first example of a violation **(VIO 97-13-03)** of 10 CFR 50, Appendix B, Criterion III, "Design Control."

E1.5 Reactor Coolant Pump Seal Water Return Valve

a. Inspection Scope

The inspectors reviewed the thrust calculations and design requirements for the reactor coolant pump seal water return valve, (MOV 313), a 3-inch, Aloyco split-wedge containment isolation valve. The disk assembly consists of two separable disk halves connected by a ball and socket joint. The wedging action is similar to that of the Anchor-Darling double disk gate valve in that significantly more thrust is required to wedge the valve disks than to achieve primary flow blockage. Similar to the Anchor Darling valves, thrust can be affected by orientation of the valve discs in preferred or non preferred directions. Also valve leak tightness may not be assured under all DP conditions unless the valve discs are wedged closed.

b. Observations and Findings

RG&E had previously dynamically tested MOV 313 at 62% of design basis DP, but was unable to derive a valve factor from the test data. Accordingly, a thrust was calculated using a 0.65 valve factor obtained from a friction coefficient (EPRI separate effects testing) corrected for wedge angle. The valve factor was applied in the standard industry equation, in Altran Calculation 96190-C-84 approved for release (by the vendor) on October 10, 1997. The minimum required closing thrust, including load sensitive behavior, was recorded to be 2,048 lbs. The current switch setting (based upon this aforementioned calculation of record) is 2,400 lbs. The inspectors considered the predicted thrust requirement to be low and incorrect, without proper consideration for leak tightness, and inconsistent with the EPRI methodology appropriate for the assumed valve factor.

Because of the general NRC concern that using the EPRI friction coefficients in the standard industry equation would not accurately predict the required thrust, the inspectors questioned the thrust requirements for MOV 313. Since the valve's wedge orientation was unknown, the predicted thrust values were independently calculated by the NRC assuming the valve discs were in the nonpreferred direction. Using the appropriate EPRI equations associated with the 0.65 valve factor, and including load sensitive behavior, the current design setup for MOV 313 was determined to be as follows:

Flow blockage:	2140 lbs
Current Switch Setting	2400 lbs
Wedging	6603 lbs

Although these thrust numbers indicate that the valve would achieve flow blockage with the current switch setting, the valve would apparently not achieve complete wedging. Therefore, absent further analysis, leak tightness (the design function of the valve) may not be assured. It should be noted that thrust requirements using EPRI methods for the wedged condition exceed by a factor of three those for "flow isolation." Use of the standard industry equation is essentially equivalent to the EPRI hand calculation for flow isolation, with the difference of a "torque reaction factor" that amounts to approximately 4-5% higher thrust. Using the standard equation would, therefore, significantly under-estimate the thrust for a containment isolation valve. The need to ensure that sufficient wedging is achieved to meet valve-specific leak tightness requirements was outlined in the February 20, 1997, safety evaluation report (SER) supplement which evaluated the EPRI test data for Aloyco valves. In the SER supplement, the NRC indicated "...model users will also need to justify that leakage limits are satisfied for the specific valves where only flow blockage is achieved."

Based upon an independent review of the past dynamic test results for MOV 313, and discussions with Ginna staff, the inspectors found that the "loads" under dynamic conditions were dominated by packing. Although no appreciable dynamic effects were evident (the test was done at approximately 90 psid) to derive a valve factor, the successful stroke under test coupled with low delta-P conditions and high margin form a qualitative case for functionality. Therefore, notwithstanding the incorrect design basis calculations, operability was not in question. Although the predicted thrust for a fully wedged condition would exceed weak link structural limits, the existing setup has successfully passed Appendix J containment leak rate testing. While the inspectors did not verify past leak rate test results for MOV 313, the above arguments were considered sufficient basis for operability; pending either correct use of the EPRI methodology or better technical justification for use of the 0.65 valve factor. As of the end of this inspection, the licensee disagreed with the inspectors' technical conclusions and proposed violation of Appendix B, Criterion III. RG&E staff consider the Altran calculations in question to be correct and adequate.

c. Conclusions

Since MOV 313 would only develop enough thrust to achieve primary flow blockage, additional design consideration and analysis should have been performed to ensure the valve would perform its containment isolation function under design basis leak tightness conditions. Incorrect equations were used in Altran Calculation 96190-C-84 to predict the minimum required thrust, resulting in an underestimate of thrust requirements and an incorrect design.

10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that ". . . measures shall be established to assure that applicable regulatory requirements and design basis for structures, systems, and components are correctly translated into specifications, drawings, and procedures." The failure to perform the required analysis to ensure MOV 313 would remain leak tight under design conditions was the second example of a violation **(VIO 97-13-03)** of 10 CFR 50, Appendix B, Criterion III, "Design Control."

E1.6 Tracking and Trending

a. Inspection Scope

The inspectors reviewed Attachment J, "Assessment and Feedback Criteria," of EWR 5111 which contained the guidance for the MOV tracking and trending program. Items to be monitored included MOV running load, stem friction coefficient, motor current and voltage and torque switch settings. Some of this data had been placed into the *SMARTBOOK* computerized database for analysis.

b. Observations and Conclusions

The scope of the trending program appeared to be adequate to detect meaningful trends in valve performance. At the time of the inspection. RG&E was still in the process of developing a procedure to implement the tracking and trending program. As such, the program had not been fully developed. The development of a tracking and trending procedure was scheduled to be completed by January 31, 1998. The inspector determined that date was appropriate for program closure.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) Follow-up Item 50-244/96-08-03: pressure isolation valve concerns. This item was opened to track NRC analysis of the acceptability of the RHR core deluge piping configuration. The RHR core deluge piping consists of two parallel six-inch lines that branch off the RHR cold leg return piping in the containment structure and connect into the reactor vessel head. Each deluge line contains one normally closed motor-operated deluge valve, MOV-852A/B, and an associated swing check valve, 853A/B located between the reactor vessel head and the respective MOV. When a safety injection actuator signal occurs, the core deluge valves are designed to open and allow RHR system water to discharge through swing check valves and into the reactor vessel. The design pressure of the piping between the MOV and the reactor

vessel is 2485 psi; the design pressure of the upstream piping is 600 psi. The inspectors were concerned if the swing check valve failed, the possibility of an inner system loss of coolant accident (ISLOCA) event could exist if the deluge valves were opened when reactor coolant system pressure was greater than the 600 psi piping.

Independent examination of the RHR deluge piping configuration conducted by the Office of Nuclear Reactor Regulation (NRR) concluded the current piping configuration was adequate. This conclusion was based, in part, on the fact that the upstream check valves 853A/B receive periodic leak checks to verify their integrity. The inspectors reviewed the results of recent leakage test performed on the check valves and verified the leakage test results for the past five years were consistently below the Technical Specification leakage limit of 5 gpm. Based upon the minimal check valve leakage, and the determination reached by NRR that the current configuration was acceptable, this item is closed.

E8.2 (Closed) Follow-up Item 50-244/95-06-02: margin justification for valve factor. This item was opened to identify the fact that RG&E would need to justify certain valve factor assumptions. Although the overall quality of the MOV program was improved, it was not evident that the design verification effort for the GL 89-10 program was adequately performed in all instances. Specifically, as discussed in sections E.1.3 - E.1.5 of this report, valve factors for the PORV block and reactor coolant seal water return valve MOV 313 were inadequately verified. Therefore, this item is closed and will be tracked as part of VIO 97-13-02 and 03.

E8.3 (Closed) VIO 50-244/96-08-01: design control. This violation concerned RG&E's failure to establish adequate design control measures in the GL 89-10 program. As a result, RG&E did not adequately assure the RHR core deluge valves would operate under design conditions. Corrective action included: contracting with a vendor to reanalyze existing MOV program data and verifying the remaining valves were operable, revising the design control process, reestablishing participation in industry forums, and instituting third party reviews of the MOV program.

As discussed in Section E1.1, MOV program documents appeared up-to-date and reflect the most recent industry practices. The revised design control process as outlined in Engineering Procedure (EP) 3-S-125, "Design Verification and Technical Review" appeared to improve the rigor of the design review process by instituting a design review checklist and clarifying the responsibilities of the independent reviewer. Additional oversight of the MOV program was evident. Several independent reviews of the program had been completed and the Quality Assurance department was developing a schedule to periodically audit the MOV program. The corrective action from this item was therefore considered to be adequate, and the item is closed. Specific issues associated with design control will be followed under VIO 97-13-02 and 03.

E8.4 (Closed) VIO 50-244/96-08-02: ineffective corrective action. This violation concerned RG&E's failure to ensure the RHR core deluge valves had adequate capability to operate under design basis conditions despite evidence the valves had limited design margin. The marginal performance of the valves had been previously noted in a March -April 1995 NRC MOV inspection report and during testing of the valves during the spring 1996 refuel outage. Immediate actions consisted of shutting down the Ginna Station in August 1996 and installing larger actuators on MOVs 852A/B. Additional action included revising the Commitment and Action Tracking System (CATS) to require the explicit identification and resolution of each action item contained in NRC inspection reports and other docketed correspondence. Previously, one CATS item was assigned to an inspection report. The revised CATS process appeared to adequately track commitments, observations, and issues identified in NRC correspondence. The inspectors determined RG&E has implemented adequate corrective actions. Therefore, this issue is closed.

E8.5 (Closed) Follow-up Item 50-244/95-06-06: periodic verification of design basis assumptions. This item was opened to track development of the periodic verification program. Although the periodic verification program had not been completed, Ginna MOV engineers indicated the program would generally follow the testing guidance developed by the joint owner's group. RG&E did not include a specific margin to account for valve degradation. However, Attachment G, "Switch Setting and Static Testing Criteria," of EWR 5080, did specify that it is desirable to set the torque switch to maintain a minimum 10% margin above the target thrust to account for the effects of stem lubrication degradation. If this could not be achieved, then the attachment required that the stem lubrication frequency be increased. This approach appeared to be reasonable.

To ensure MOVs are tested in their as-found condition when necessary during the periodic verification program, testing and preventive maintenance activities are currently coordinated through informal, (i.e., word-of-mouth) communications. Specifically, when as-found data on a valve is required, the MOV engineer notifies the MOV maintenance engineer not to overhaul the valve before testing is completed. This method appeared to be working appropriately, and revised procedures were under consideration to require maintenance personnel to contact the MOV engineer before working on a valve. The inspectors concluded the planned periodic verification and MOV testing programs were appropriate. Accordingly this item is closed. Final acceptance of the Ginna periodic verification program will be reviewed as part of RG&E's response to GL 96-05, "Periodic Verification of Design -Basis Capability of Safety-Related Motor-Operated Valves."

E8.7 (Closed) Follow-up Item 50-244/95-06-07: post-maintenance testing. This item was opened to document RG&E did not currently perform a valve thrust verification test (either static or dynamic), following packing adjustment, if gland nut torque remains below the original diagnostic baseline value. The inspectors considered this position to be technically indeterminate as well as contrary to industry practice since packing adjustment may effect valve performance. Following the August 1996 MOV inspection, RG&E stopped adjusting valve packing if a subsequent thrust

verification would not be performed. A study was then commenced to determine what amount of packing adjustment, if any, could be allowed before a thrust verification was necessary. The study included an analysis of Ginna valve performance characteristics before and after packing gland adjustment. Although the study had not been completed at the time of the inspection, RG&E believes the results will indicate a thrust verification is not required, if gland nut torque remains below the original diagnostic test value. The inspector concluded RG&E's approach was adequate to address this issue. Therefore, this item is closed.

E8.8 (Closed) Unresolved Item 50-244/95-06-09: Pressure Locking/Thermal Binding (PLTB) of Gate Valves. This item was opened to track the status of RG&E's corrective actions for gate valves determined to be susceptible to pressure locking. In a letter dated February 16, 1996, RG&E described the process used to evaluate valves for susceptibility to PLTB, and the results of the evaluation. Although several valves met the initial screening criteria for susceptibility to PLTB, valve operability was confirmed in a subsequent RG&E reanalysis completed in November 1996. The actions taken by RG&E to address PLTB at Ginna are currently under review by the Office of Nuclear Reactor Regulation (NRR). Therefore, this item is closed.

E9 Review of Updated Final Safety Analysis Report (UFSAR)

The inspectors verified that the PORV design criteria described in Section 5.4 of the Ginna UFSAR were consistent with design assumptions and calculational results used in the GL 89-10 program.

V. Management Meetings

X1 Exit Meeting Summary

RG&E was informed of the scope and purpose of this inspection at an entrance meeting on October 27, 1997. The findings were discussed with RG&E representatives during the inspection, and were formally presented during two meetings on October 31 and November 7, 1997 at the Ginna site. A final exit was held by telephone on November 18, 1997. RG&E disagreed with the characterization of the design control findings identified during this inspection.

PARTIAL LIST OF PERSONS CONTACTED

Rochester Gas & Electric

R. Mecredy	Vice President, Nuclear Operations
B. Flynn	Primary Systems Engineering Manager
F. Maciuska	Operations Training Manager
R. Marchionda	Production Superintendent
M. Farnan	Equipment Diagnostic Coordinator
J. Smith	Maintenance Superintendent
J. Widay	Plant Manager
G. Wrobel	Nuclear Safety & Licensing Manager
T. Marlow	Dept Manager NES
K. Muller	Mechanical Engineer
T. Alexander	Nuclear Assurance Manager
D. Kuhn	Quality Assurance Analyst
M. Lilley	Quality Assurance Manager
M. Zweille	Senior Engineer

NRC

P. Drysdale, Senior Resident Inspector
C. Osterholtz, Resident Inspector

INSPECTION PROCEDURES USED

TI 2515/109 (Part 3), Inspection Requirements for Generic Letter 89-10 "Safety-Related Motor-Operated Valve Testing and Surveillance"

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

50-244/95-06-02	UNR	Margin justification for valve factor
50-244/95-06-06	UNR	Periodic verification
50-244/95-06-07	IFI	Post-Maintenance Testing
50-244/95-06-09	UNR	Pressure Locking and Thermal Binding
50-244/96-08-01	VIO	Failure to verify design inputs for 852A/B
50-244/96-08-02	VIO	Inadequate corrective action
50-244/96-08-03	IFI	Pressure isolation valve concerns

Opened

50-244/97-13-01	UNR	Design Control for *SMARTBOOK* Program
50-244/97-13-02	VIO	Failure to approve and accept vendor calculations
50-244/97-13-03	VIO	Inadequate verification of design assumptions for MOV 313 and RCS 515/516
50-244/97-13-04	IFI	Grouping Criteria for Groups B,D,E
50-244/97-13-05	IFI	Valve factors for Groups A,C,H,J,M,N

LIST OF ACRONYMS USED

DP	differential pressure
EP	Engineering Procedure
EPRI	Electric Power Research Institute
EWR	Engineering Work Request
GL	Generic Letter
INEL	Idaho National Engineering Laboratory
IR	Inspection Report
LOCA	Loss of Coolant Accident
MOV	Motor-Operated Valve
PORV	Power Operated Relief block Valves
PLTB	pressure locking or thermal binding
QA	Quality Assurance
RCS	reactor coolant system
RSS	Reactor Safety Study
RV	relief valve
RHR	residual heat removal
RG&E	Rochester Gas and Electric
SI	safety injection
TS	technical specifications
TI	Temporary Instruction