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U. S. Nuclear Regulatory Commission
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Perry Nuclear Power Plant
Docket No. 50-440
Response to Generic Letter 89-10,
Supplement 6, Information on Schedule and
Grouping, and Staff Responses
To additional Public Questions

References: 1. December 28, 1989 letter from A. Kaplan to Nuclear Regulatory Commission, Generic Letter 89-10 Safety-Related Motor Operated Valve Testing and Surveillance (PY-CEI/NRR-1115 L)

2. September 30, 1993 letter from R. A. Stratman to Nuclear Regulatory Commission, Response to Generic Letter 89-10, Supplement 5, "Inaccuracy of Motor-Operated Valve Diagnostic Equipment" (PY-CEI/NRR-1707 L)

Gentlemen:

The purpose of this correspondence is to provide notification of changes to three (3) commitments involving Generic Letter (GL) 89-10 and its supplements. Specifically, these changes involve (1) the schedule for completion of the motor operated valve (MOV) initial testing program, (2) changes to the planned scope of individual MOV testing and (3) a modification to a previous commitment regarding additional testing to confirm the effects of maximum diagnostic testing inaccuracies with respect to performance of two (2) MOVs.

Supplement 6 to GL 89-10, dated March 8, 1994 required addressees that intend to modify their current commitments to GL 89-10 and extend their schedule for responding to the generic letter to provide certain information specified in the supplement. The specified information is provided in the enclosure, Generic Letter 89-10 MOV Testing Program Schedule Extension & Application of Grouping Methodology, Bases and Justification.

Regarding the change in schedule, reference 1 previously committed to completing the initial MOV testing program within the schedule recommended by the GL (5 years or 3 Refueling outages, whichever is greater). This commitment required completion of the initial Perry Nuclear Power Plant (PNPP) MOV testing program by June 28, 1994. This commitment for completion is herein revised to specify the initial MOV testing program will be completed by the end of refueling outage (RFO) 5 currently scheduled to begin in September, 1995. By June 28, 1994, reasonable assurance will be demonstrated that the GL 89-10 MOVs will perform their intended safety function under design basis conditions. The bases for making this determination are included in section III of the enclosure.

Reference 1 previously committed to testing each MOV within the program scope under static conditions and testing each MOV within the program under dynamic conditions (at or near design basis conditions), unless dynamic testing was determined to be impractical. The commitment for testing each MOV is herein revised to provide for (1) exempting some MOVs within the program scope from both static and dynamic testing, (2) excluding some MOVs from dynamic testing and (3) combining the remaining MOV test population into appropriate groups for the purpose of testing (both static and dynamic) of a representative sample of MOVs within the groups.

MOVs were exempted from the program in accordance with the guidance provided in NRC's response to question 6 of supplement 1 to GL 89-10. MOVs were excluded from dynamic testing requirements if the MOV either is not required to change position or is exposed to a zero differential pressure when changing position.

Prioritization and grouping methodologies have been utilized to sequence testing and combine the remaining MOV test population into appropriate groups for the purpose of testing (both static and dynamic) of a representative sample of MOVs within the groups. The methodology and bases for the prioritization and grouping are provided in the enclosure.

Regarding the commitment for additional testing to confirm the effects of maximum diagnostic inaccuracies with respect to MOV performance, reference 2 indicated that the 19 affected MOVs would be retested during RF04. Subsequent review has determined that two of the affected MOVs could be exempted from the program as mentioned above. Consequently these two MOVs (1B21F0068 and 1E12F0074A) will not be retested. Additional information regarding the status of retesting MOVs due to GL 89-10, Supplement 5 is provided in section II.C of the enclosure.

If you have questions or require additional information, please contact Henry Hegrat - Regulatory Affairs, at (216) 280-5606.

Very truly yours,

Rw Schrauder

for R. A. Stratman

RAS:TEC

Enclosure

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

I, Robert W. Schrauder, being duly sworn state that (1) I am Director, Perry Nuclear Services Department of the Cleveland Electric Illuminating Company, and (2) I am duly authorized to execute and file this certification and (3) the statements set forth herein are true and correct to the best of my knowledge, information and belief.

Robert W. Schrauder

Sworn and subscribed before me, this 8th day of April, 1994

JANE E. MOTT
Notary Public, State of Ohio
My Commission expires Feb. 20, 1995
(Recorded in Lake County)

Generic Letter 89-10 MOV Testing Program
Schedule Extension & Application of Grouping Methodology, Bases and Justification

EXECUTIVE SUMMARY

By correspondence dated December 28, 1989, the PNPP response to GL 89-10 was submitted. This response committed, with limited exceptions, to the diagnostic testing of MOVs, where testing was determined to be practical. In addition, a commitment to the completion of the initial program scope within the schedule recommended in the GL (5 years or three refueling outages) was made.

In responding to GL 89-10, Supplement 2, in December of 1990, the NRC was notified that the program plan and schedule were complete and available onsite for review. In 1992, the NRC conducted an initial inspection of the program. This inspection resulted in 2 violations and several specific concerns regarding the design basis reviews for the program. Responses to the violations and concerns were provided to the NRC in December of 1992.

Following a series of reviews in 1993, increased management attention and resources have been dedicated to the GL 89-10 MOV program. Assessments of the program approach and design bases have been performed and actions have been taken to further insure that, as intended, the program satisfies NRC guidelines. Administratively, an MOV Program Plan has been developed to document the scope of the program and to provide guidance in the implementation of program activities. The program plan also documents positions on key issues relating to MOV performance, establishes personnel responsibilities, and sets forth the requirements for program activities. Additionally, an MOV Action Plan has been developed, which captures specific activities from the reviews and the program plan, that must be completed. Prescriptive procedures are in place for performing calculations, analyzing test results and tracking and trending.

Prioritization and grouping methodologies have been employed to refine the order and the scope of static and dynamic testing. The prioritization scheme includes the results of a Probabilistic Risk Assessment as well as consideration for capability margins and performance history. The grouping aids in the evaluation of testing results from a representative sample of MOVs and application to the remainder in a group. Testing results will be utilized in the evaluation of untested MOVs to validate design assumptions and to provide additional assurance that these untested MOVs are adequately set. This approach is intended both for those MOVs which are not practical to test, as well as to further limit the population of MOVs being dynamically tested. This change in approach to limit MOV testing, modifies the earlier commitment to dynamically test all MOVs which are practical to test.

By June 28, 1994 testing is scheduled to be complete for over 70% of the static test group and over 30% of the dynamic test group. In conjunction with testing, numerous modifications are being made to MOVs during the current outage to both improve margins and resolve pressure lock issues. The gate and globe MOVs, within the scope of the program, will have been statically tested by this date. The meaningfulness of static testing of butterfly MOVs (which are limit switch operated at PNPP) is being evaluated and at present, static testing of each butterfly valve is not planned. Rather, dynamic testing of a representative sample in each group will be performed.

The design function capability of the non-tested MOVs will be established by evaluation and analysis. Comparative analysis utilizing the test results from RF04 will be used to further confirm this evaluation. Diagnostic test data from similarly grouped MOVs will be used to validate the design basis assumptions and provide additional assurance that they are set up to perform their intended functions at design basis conditions. The testing associated with the GL 89-10 MOV program will not be completed by June 28, 1994 as previously committed. The completion date is herein revised to the end of RF05, which is presently scheduled to start in September of 1995.

I. CURRENT PROGRAM SCOPE

A. Program Administration

The Perry Nuclear Power Plant (PNPP) Motor Operated Valve (MOV) program is implemented in accordance with Plant Administrative Procedure (PAP)-1116, Motor Operated Valve Testing and Surveillance Program, and the Motor Operated Valve Program Plan for Generic Letter (GL) 89-10. These document the current program description and responsibilities and are included in the PNPP Operations Manual. Calculations and evaluations associated with the program are documented in accordance with Nuclear Engineering Instructions (NEI). Actual testing and related maintenance activities are performed in accordance with approved instructions.

B. GL 89-10 MOV Population

The criteria for inclusion of MOVs in the GL 89-10 program is outlined in the MOV Program Plan and in design bases calculations. The criteria are based on the recommendations of GL 89-10 and its supplements, Nuclear Regulatory Commission (NRC) inspection criteria for GL 89-10 and guidance from the Boiling Water Reactor Owners Group (BWROG) documents. Certain MOVs were determined to be exempt from testing in accordance with the criteria contained in the response to question 6 of Supplement 1 to GL 89-10.

Total Candidate MOVs	236
Exempt	52
Resulting Test (dynamic and static) Candidates	184
Not Practical to Dynamically Test	44
Static Test Only (No dp and/or No Position Change)	44
Practical to Dynamically Test	96

C. Design Basis Review

The design basis reviews establish the worst case differential pressure and flow under which MOVs must change position. MOV mispositioning has been deleted from consideration in the maximum differential pressure evaluations as permitted in supplement 4 of GL 89-10. The design basis reviews are based on the information in GL 89-10 and its supplements, NRC inspection criteria for GL 89-10 and guidance from BWROG documents where appropriate. The Updated Safety Analysis Report (USAR), Technical Specifications, Operating Procedures, Design Specifications and Design Drawings were utilized in this review. An independent technical assessment of the design bases differential pressure calculations was performed in late 1993.

During the review process, consideration was given to beyond design basis events, including required MOV position changes to mitigate consequences of an accident or transient and system design control logic to determine component operating sequences.

To assess the capability of an MOV to operate as intended at worst case design basis conditions, the maximum thrust available from the actuator is compared to the thrust required. The assessment includes consideration of factors such as diagnostic equipment inaccuracy, stem factor, reduced voltage, valve factor, rate of loading effects, stem lubrication degradation, etc.

D. Torque Switch Setting Methodology

The MOV switch settings are established by determination of a minimum/maximum target thrust and torque window. These settings are used in verifying the torque switch setpoints during diagnostic testing. The determination of the thrust and torque windows and the recommended torque switch settings are documented in engineering calculations.

E. Prioritization and Grouping

The criteria for prioritizing MOV testing during refueling outage (RFO) 4 was established based on an evaluation of capability margins, performance history, Supplement 5 retesting requirements, PRA considerations and Siemens Power Corporation testing recommendations. The evaluation also considered issues such as higher rate of loading, temperature effects on motors and higher valve factors.

Further, the MOVs included in the program have been evaluated to determine their relative priority. The prioritization establishes MOV relative order of importance, thus allowing future dynamic testing activities and design upgrades to be sequenced appropriately.

The Probabilistic Risk Assessment (PRA) was used as the basis for evaluating the relative risk for motor operated valves in the 89-10 program. The PRA was performed for reactor operation at 100% power with normal system alignments and accounted for unavailability due to maintenance. The relative importance of the MOVs was determined using the Fussel-Vesely importance measure. The evaluation examined the impact of three different failure rates:

- Base Case - 2.93x10-3/Demand (Perry PRA Base Case)

- Sensitivity Study A - 9.00x10-3 (From NUREG/CR-4550, Table 8.2-5)

- Sensitivity Study B - 8.70x10-2 (From NUMARC Guideline 93-05)

The event tree equations in the sensitivity studies were requantified. The function equations in Sensitivity Study B were also requantified prior to event tree quantification. Following requantification, a core damage frequency (CDF) equation was generated which was used to calculate the Fussel-Vesely importance measures for each of the basic events in the core damage frequency equation. The Fussel-Vesely importance measures were used to rank the motor operated valves by their relative importance to the CDF.

Grouping aligns MOVs by similarity of physical and operating characteristics. Grouping is then used to establish a basis to determine if the dynamic testing of a representative sample of MOVs within a group provides sufficient information relative to performance, to apply to other MOVs in the group. The Siemens Power Corporation thrust and function verification methodology and similarity analysis has been applied to aid in establishing MOV grouping and refining testing priority determination. The methodology considers PRA results, valve actuator margins, valve type, manufacturer, safety function, expected fluid conditions and valve performance history. NPRDS reports were also examined to determine if a pattern of MOV failures exists within the industry.

Phase I of the Siemens study provides preliminary family (similarity) groupings for each valve type and recommended bounding test candidates. A Phase II technical evaluation associated with the family grouping effort will provide technical justification for possible reduction in testing scope. Along with the Phase II effort, key valve dimensional data has been obtained for plant assessment and use.

The final MOV priority categories have been established by utilizing the attributes of both the PRA and the Siemens methodology. Relative safety significance is highlighted by the PRA and reinforced by the variety of inputs in the Siemens approach which include functional design capability, design margins and failure history patterns. The prioritization selection criteria developed from this approach is as follows:

PRIORITY 1

MOVs which meet one or both of the following:

- MOVs from the PRA evaluation which contribute approximately 1% or greater to the overall core damage frequency.

- MOVs that have a high ranking for testing as identified by the Siemens evaluation.

PRIORITY 2

MOVs which do not meet the priority 1 criteria and which meet one or both of the following:

- MOVs from the PRA evaluation which contribute approximately 0.1 to 1% to the overall core damage frequency.

- MOVs that have a medium ranking for testing as identified by the Siemens evaluation.

PRIORITY 3

MOVs which do not meet the priority 1 or 2 criteria and which meet one or both of the following:

- MOVs from the PRA evaluation which contribute less than 0.1% to the overall core damage frequency.

- MOVs that have a low ranking for testing as identified by the Siemens evaluation.

PRIORITY 4

MOVs which are not included in the PRA model and are not identified as either a high, medium or low priority for testing as identified by the Siemens evaluation. These MOVs are considered to be of lower safety significance.

The priority 1, 2, and 3 MOVs comprise 78 of the 184 MOVs in the GL 89-10 program. The remaining MOVs in the program are priority 4.

II. COMPLETION STATUS

A. Extent of Static Testing Completed

Gate and globe valves within the GL 89-10 program are scheduled to be diagnostically tested under static conditions tested by 6/28/94. Diagnostic static testing scheduled in RF04 includes 62 gate and globe valves as a result of design modifications, maintenance activities, and/or re-evaluation of the switch settings based on the current torque/thrust window calculations.

The 65 butterfly valves within the GL 89-10 program have not previously been statically tested using diagnostic equipment. Diagnostic testing under static conditions is scheduled for 14 of these valves in RF04. The remaining 51 butterfly valves will be evaluated to determine the necessity of static testing.

B. Extent of Dynamic Testing Completed

Ninety six (96) of the MOVs are practical to dynamically test. Eight (8) of the previous tests are acceptable and credible. Seven (7) other previously tested MOVs will be retested as a result of design modifications, and re-evaluation of the switch settings based on the current torque/thrust window calculations. Four (4) other previously tested MOVs have been reclassified the design basis calculations (no dp, no flow) and are no longer included in the dynamic test population.

Twenty four (24) dynamic flow tests are scheduled in RF04 which will bring the total of completed, credible tests to 32. For the remaining 64 MOVs that are practical to dynamically test (see Attachment 1), appropriate test candidates will be identified from the family groupings. The selection of future dynamic flow test candidates, will be based on priority, in-house dynamic flow test results, industry test information, the EPRI performance prediction program and consideration of the final valve family grouping.

C. Valves to be Retested Due to GL 89-10, Supplement 5

Gate and globe MOVs in the GL 89-10 program which were previously tested statically and/or dynamically using the MOVATS open versus close methodology, have been re-evaluated to account for uncertainties described in GL 89-10 Supplement 5 and its references. The results of this evaluation were previously provided by correspondence dated September 30, 1993 (PY-CEI/NRR-1707 L). This evaluation concluded that while the affected MOVs remained capable of performing their intended functions, there were 19 MOVs identified, which required additional testing to confirm the effects of maximum diagnostic inaccuracies with respect to performance. Subsequent to the previous response, 2 of the 19 MOVs identified for retesting have been exempted from the GL 89-10 program in accordance with the exemption criteria contained in the response to question 6 of supplement 1 to GL 89-10. Consequently, these 2 MOVs (1B21-F0068 and 1E12F0074A) are no longer scheduled for retest. Four (4) of the affected GL 89-10 MOVs were retested during the October 1993 maintenance outage. The remaining 13 MOVs are scheduled for retest during RF04 utilizing the torque/thrust window calculation methodology.

D. Valve Modifications

Prior to RF04, eight GL 89-10 MOVs were modified to improve capability. The modifications included valve replacements, actuator gear changes, motor changes, and an internal valve modification to resolve pressure locking.

During RF04, twenty nine (29) GL 89-10 MOVs are scheduled to be modified to improve capability and reliability. The modifications include actuator changes, actuator gear changes, motor changes, internal valve changes, and cable changes. In addition, modifications are scheduled for 8 valves during RF04 to resolve pressure locking concerns.

III. BASES FOR ESTABLISHING DESIGN BASIS CAPABILITY OF REMAINING MOVS

The MOVs in the GL 89-10 program have been evaluated to ensure that by the end of the June 28, 1994, there will be reasonable assurance that each MOV will operate properly under design basis conditions. The MOVs tested and modified during the 1993 Fall outage and RF04 were determined by evaluation to be of higher safety significance. The prioritization scheme enacted earlier this year has affirmed the evaluation results. For those MOVs that will not be tested with diagnostic equipment by 6/28/94, an evaluation has been performed relative to the design basis capabilities for each MOV. The results of this evaluation are provided in Attachments 1, 2 and 3. Each attachment provides MOV specific information including identification number, valve type, valve size, safety function(s), design basis flow rate and differential pressure, valve priority and available margin(s). The valve priorities are those discussed in section I.E and encompass the PRA based safety significance. The margin provided is the difference between the MOV reduced voltage capability (thrust for gate and globe valves and torque for butterfly valves) and the calculated required thrust/torque for each MOV expressed as a percentage of the required thrust/torque.

Attachment 1 provides the evaluation of MOV capabilities for those MOVs, practical to dynamically test, which will not be tested by 6/28/94, the

original commitment date. For gate and globe valves the evaluation is provided as these valves will not be dynamically tested by the original commitment date. Attachment 2 provides the evaluation of MOV capabilities for those MOVs which are not practical to dynamically test. Also included in Attachments 1 and 2 are 46 butterfly valves which will not be diagnostically tested under static conditions by the original commitment date. Attachment 3 provides the evaluation of MOV capabilities for 5 additional butterfly MOVs which will not be statically tested by 6/28/94 and for which no dynamic testing is necessary.

Torque switch settings for GL 89-10 gate and globe MOVs scheduled for testing during RFO4 will be set per the current torque/thrust window calculations, which account for higher valve factor, diagnostic uncertainties, torque switch repeatability, stem lubrication degradation, and rate of loading. Torque switch settings for the balance of the GL 89-10 gate and globe MOVs have been evaluated against the current torque/thrust window calculations to ensure the MOVs are capable of performing their intended safety functions. Switch settings are maintained and verified in accordance with Plant Administrative Procedures whenever maintenance activities which affect switch settings are performed.

For gate and globe MOVs tested using the open versus closed Thrust Measuring Device (TMD) methodology, switch setting evaluations were performed in engineering calculations using the most conservative bounding analysis approach per MOVATS instruction 5.2. MOVs tested with a torque thrust cell or strain gauge were evaluated using a torque\thrust window calculation. In either evaluation the allowances due to diagnostic equipment accuracy, torque switch repeatability, rate of loading and stem lubrication degradation were considered. Conservative valve factors based on vendor information, testing results and industry data were used. A conservative stem friction coefficient was also used.

Butterfly MOVs within the GL 89-10 program are set such that there is reasonable assurance that they will operate properly under design basis conditions. Switch settings have been verified in accordance with approved instructions. Butterfly MOVs are position seated in the open and close directions by limit switch actuation. The torque switches are used as a backup mechanical protection device and are not normally actuated during MOV stroking. The torque switches are set appropriately so that they do not open during design basis events and normal operation. Diagnostic testing of selected butterfly valves under static and dynamic conditions during RFO4 is expected to provide additional assurance that the switch settings are appropriate.

Future dynamic testing is being prioritized as noted above. The grouping methodology refines the bases for verifying the capability of the MOVs in the dynamic flow test population that are not practical to dynamically test. The grouping methodology will also be applied to identify performance bounding candidates in each family (similarity) group. These will be a factor in determining the additional test candidates.

Dynamic flow testing during RF04 will provide additional assurance the remaining GL 89-10 dynamic test population MOVs will perform their intended safety function. The MOV capability margins are evaluated following testing and as appropriate, results are applied within the groups. The post test evaluation process will continue to validate and verify the established design considerations and will require application of additional conservatisms and evaluation where appropriate.

Industry, vendor and EPRI flow test performance evaluations are applied where practical and appropriate to provide additional assurance that the GL 89-10 MOVs will perform their design basis functions.

IV. SCHEDULE FOR PROGRAM COMPLETION

The initial GL 89-10 test program will be completed by the end of the next scheduled refueling outage, RF05. The final population of MOV tests and modifications will be based on the results of RF04 testing, industry test results, the EPRI Performance Prediction Program and final implementation of the family groupings following acceptance of Phases II and III of the Siemens graded approach study.

Attachment 1

Perry Nuclear Power Plant

MOVs That Are Practical To Dynamically Test After RFO4

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

The priorities used in the attachments are defined as follows:

Priority 1 — MOVs which contribute approximately 1% or greater to the overall core damage frequency or have a high ranking for testing as identified by the Siemens evaluation.

Priority 2 — MOVs which do not meet the priority 1 criteria and contribute approximately 0.1% to 1% to the overall core damage frequency or have a medium ranking for testing as identified by the Siemens evaluation.

Priority 3 — MOVs which do not meet the priority 1 or 2 criteria and contribute less than 0.1% to the overall core damage frequency or have a low ranking for testing as identified by the Siemens evaluation.

Priority 4 — MOVs which are not included in the PRA model and are not identified by the Siemens evaluation. These MOVs are considered to be of lower safety significance.

The information presented in this attachment encompasses ten globe valves, eleven gate valves and forty three butterfly valves. One of the gate valves (1E51F0031) and one of the butterfly valves (0P42F0150B), which have not been tested are designated Priority 1 based on PRA significance.

- 1E51F0031 is a 6" Borg-Warner gate valve which has been grouped with six similar valves. Five of the seven valves will have been dynamically tested by the end of RFO4. The margin for 1E51F0031 is over 400% and includes a higher valve factor which was determined by testing.

- 0P42F0150B is a 10" Contromatics butterfly valve which has been grouped with twenty three similar valves. Three of the valves will have been dynamically tested by the end of RFO4. The margin for this valve is over 300%.

Nine of the valves are designated Priority 1 based solely on a Siemens ranking of high for testing (enveloping candidate).

- 1C41F0001A and 1B are 4" Rockwell globe valves. The valves are required to open under a dp of only 18.5 psid and have margins of 40% and 39% respectively. Testing is recommended for one of the two valves.

- 1E12F0042A and C, the Low Pressure Cooling Injection shutoff valves, are 12" Borg Warner gate valves. Testing is recommended for either 1E12F0042A, B or C. The operators for these valves are also being modified in RFO4. This will result in a capability margin of 24% in the open direction and 30% in the close direction for 1E12F0042A. For 1E12F0042C the resulting margin in the open direction will be 20%. 1E12F0042B will be tested in RFO4. The results of this testing will be used to further confirm the adequacy of these MOVs.

- 0G41F0280, 285, 290 and 295 are 12" Contromatics butterfly valves. These valves are normally operated at values close to design basis conditions. Margins are 10-11% and testing is recommended for one of the four valves. MOVs 1G41F0140, 145, 1P45F0014A and 68A of this group are scheduled for testing during RFO4. The results of this testing will be used to further confirm the adequacy of these MOVs.

- 1P11F0060 in the Condensate Storage and Transfer System, is a 12" Contromatics butterfly valve which is grouped with 19 other valves. Valve 0P42F0150A and 1P45F0130A of group 16 are scheduled for testing during RFO4. The results of this testing will be used to further confirm the adequacy of this valve.

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

GLOBE VALVES

1. **1C41F0001A and 1C41F0001B**

These valves are in the C41 (Standby Liquid Control) system, are 4" globe valves which are normally closed and are required to open to perform their design basis function. These valves have been designated as Priority 1, based on a Siemens ranking of high for testing one of the two valves. This priority designation is not a function of PRA-based safety significance. The valves are required to open under a design basis differential pressure (DBdP) of 18.5 psid which is the result of the combination of static heads on the upstream and downstream side. The valve is limit switch operated in the open direction. By analysis, the margin for valve opening has been conservatively determined to be at least 39%. Valves 1A and 1B have been previously satisfactorily tested statically. Valve 1A will be retested statically (GL 89-10, Suppl. 5) during RFO4. These two valves comprise group 12 of the similarity grouping. These valves are judged to be acceptable based on satisfactory performance during static testing, and the low DBdP and flow with reasonable margin.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	Margin %
					OPEN	CLOSE		
1C41F0001A	GLOBE	4	OPEN	1	18.5	NA	43 gpm	40
1C41F0001B	GLOBE	4	OPEN	1	18.5	NA	43 gpm	39

2. **1P22F0015**

This valve in the P22 (Mixed Bed Demineralizer) system, is a unique 1.25" globe valve, which is required to close to perform its design basis function. This is the only valve in group 14. The valve has been designated as Priority 3, based on a Siemens ranking of low for testing. This priority designation is not a function of PRA-based safety significance. The valve uses a torque switch for the close direction. The torque switch is bypassed by the limit switch during approximately 95% of the closing stroke. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. By analysis, the margin between the DBdP required thrust and the reduced voltage capability has been conservatively determined to be 84%. This is judged to be acceptable based on reasonable margin.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1P22F0015	GLOBE	1.25	CLOSE	3	NA	152.5	3700 cc/min	84

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

3. **1M51F0020A, 1M51F0020B, 1N27F0737, 1N27F0740, 1P51F0652, 1P52F0200, and 1P52F0646**

These valves are similar 1.5" and 2" globe valves which have been grouped in family 13 according to the similarity grouping. These valves are designated Priority 4 as they have no PRA-based safety significance and are not testing candidates based on the Siemens ranking criteria. These valves do not use torque switches in the open direction. 1M51F0020A and 20B, in the M51 (Combustible Gas Control) system, have margins which have been conservatively calculated to be in excess of 140%. 1N27F0737 and 740 in the N27 (Feedwater) system have margins in excess of 175%. 1P51F0652 in the P51 (Service Air) system and 1P52F0200 and 1P52F0646 in the P52 (Instrument Air) system are installed in pressurized air systems and have margins which have been conservatively calculated to be in excess of 60%. The capability of these valves has been determined to be acceptable based on reasonable margin.

Valve 1E51F0019 of group 13 will be dynamically tested during RFO4. The results of this testing will be used to further confirm the adequacy of these valves.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1M51F0020A	GLOBE	2	OPEN	4	160	NA	120 gpm	141
1M51F0020B	GLOBE	2	OPEN	4	160	NA	120 gpm	141
1N27F0737	GLOBE	1.5	OPEN	4	32.1	NA	30 gpm	182
1N27F0740	GLOBE	1.5	OPEN	4	25	NA	30 gpm	179
1P51F0652	GLOBE	1.5	CLOSE	4	NA	120	1751 acfm	61
1P52F0200	GLOBE	2	CLOSE	4	NA	120	500 acfm	197
1P52F0646	GLOBE	2	CLOSE	4	NA	120	500 acfm	177

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

GATE VALVES

4. **1E51F0010 and 1E51F0031**

These valves are 6" gate valves, which have been grouped in family 6 in accordance with the similarity grouping. They are in the E51 (Reactor Core Isolation Cooling) system. 1E51F0031 has been designated as Priority 1 based on its PRA safety significance. 1E51F0010 has been designated Priority 4 as it has no PRA-based safety significance and is not a testing candidate based on the Siemens ranking criteria. Each of these valves is required to operate against a low DBdP and has a capability margin which is in excess of 360%. These valves are limit switch operated in the open direction. The torque switch is bypassed by the limit switch for 95% of the stroke in the close direction. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. Five other valves in this family (1E12F0609, 610, 64A, 64B and 64C) have been dynamically tested. The results of these tests indicate higher valve factors for these valves. Valves 1E51F0010 and 1E51F0031 are judged to be acceptable based on the very high margin for capability which includes application of the most conservative valve factor determined from testing.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1E51F0010	GATE	6	CLOSE	4	NA	22.2	700 gpm	362
1E51F0031	GATE	6	OPEN	1	22.2	NA	700 gpm	407

5. **1G61F0030, 1G61F0035 and 1P22F0010**

These gate valves have been grouped in family 4 in accordance with the similarity grouping. Each of these valves are required to close to perform their design basis function. 1P22F0010 in the P22 (Mixed Bed Demineralizer) system has been designated as Priority 2 based on a Siemens ranking of medium for testing. This priority designation is not a function of PRA-based safety significance. Both 1G61F0030 and 1G61F0035 in the G61 (Liquid Radwaste) system are designated as Priority 4 as they do not have a PRA-based safety significance and are not Siemens candidates for testing. Each of these valves is torque switch operated in the close direction. The torque switch is bypassed by the limit switch during approximately 95% of the stroke in the closing direction. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. The capability margin for 1P22F0010 is in excess of 110% and for 1G61F0030 and 35, the margin is in excess of 345%. These valves have been judged to be acceptable based on their high margin for capability.

Four other valves in this family (1G61F00150, 1G61F0155, 1G61F0075 and 1G61F0080) have been dynamically tested. The results of these tests indicate higher valve factors. These valves are judged to be acceptable based on the very high margin for capability which includes application of the most conservative valve factor determined from testing.

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1G61F0030	GATE	2.5	CLOSE	4	NA	34.4	100 gpm	348
1G61F0035	GATE	2.5	CLOSE	4	NA	34.4	100 gpm	347
1P22F0010	GATE	3	CLOSE	2	NA	161.8	380 gpm	118

6. **1E22F0001**

This 16" gate valve is one of two valves grouped in family 1 in accordance with the similarity grouping. This valve is in the E22 (High Pressure Core Spray) system and has been designated as Priority 3 based on a Siemens ranking of low for testing. This priority designation is not a function of PRA-based safety significance. This valve is torque switch operated in the close direction only. The torque switch is bypassed by the limit switch during approximately 95% of the stroke in the closing direction. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. The capability margin has been conservatively determined to be in excess of 370% and the DBdP is low. The capability of this valve has been determined to be acceptable based on its very high margin and low DBdp. The other valve in this family, 1E22F0015, will be flow tested during RFO4. The results of this testing will be used to further confirm the adequacy of this valve.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1E22F0001	GATE	16	CLOSE	3	NA	22.2	6110	376

7. **1G50F0272, and 1G50F0277**

These valves are gate valves which have been grouped in family 5 based on the similarity grouping. 1G50F0272 and 277 in the G50 (Liquid Radwaste) system are designated Priority 4 as they have no PRA-based safety significance and are not testing candidates based on the Siemens ranking criteria. A similar 12" valve was removed from the unused Perry Unit 2 and shipped to EPRI for testing (EPRI Valve #10). Preliminary EPRI test results indicated a higher valve factor than originally assumed. Valve 1E21F0011 is a 4" valve which is similar and therefore also grouped with these valves. It was previously tested under dynamic conditions and a valve factor higher than that from the EPRI testing was determined. These valves are limit switch operated in the open direction. The torque switch is bypassed by the limit switch for 95% of the stroke in the close direction. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. The margin calculations for 1G50F0272 and 277 using the highest valve factor (from testing 1E21F0011) show margins in excess of 350%, therefore no modifications will be made. These valves are judged to be acceptable based on the large capability margins which include application of the high valve factor from the testing of 1E21F0011.

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MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1G50F0272	GATE	4	CLOSE	4	NA	5.2	350 gpm	354
1G50F0277	GATE	4	CLOSE	4	NA	5.2	350 gpm	371

8. **1C11F0083, 1E12F0042A and 1E12F0042C**

1C11F0083, a 2.5" gate valve in the C11 (Control Rod Drive) system, has been grouped in family 8 in accordance with the similarity criteria. 1C11F0083 is designated as Priority 4 as it does not have a PRA-based safety significance and is not a Siemens candidate for testing. It is required to close to perform its design basis function. This valve is torque switch operated in the close direction. The torque switch is bypassed by the limit switch during approximately 95% of the stroke in the closing direction. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. The capability margin has been conservatively determined to be in excess of 670% and the DBdP is approximately 30 psid.

EPRI test valve #7 is similar to 1C11F0083 and has been tested at significantly higher dp and flow than experienced by 1C11F0083. The preliminary results of this testing confirm that the valve factor used in the PNPP margin calculation was not conservative. However, the capability of this valve has been determined to be acceptable based on its very high margin which includes application of the higher valve factor.

1E12F0042A and 1E12F0042C have been designated Priority 1 as a result of Siemens ranking of high for testing either 42A, B or C. They also have a PRA-based safety significance of 2. These valves are the RHR low pressure coolant injection, injection and shutoff valves. The valves are normally closed and are required to open during a design basis event. 1E12F0042A is then required to close in preparation for containment spray initiation. Testing of these valves requires complex test preparation and analysis. Additionally, the DBdP includes check valve leakage, and this cannot be simulated for testing. However, valve 1E12F0042B is scheduled for dynamic testing during RFO4 with the reactor defueled. The test will approximate DBdP using pump head. It is not intended that testing will be performed on 1E12F0042A and C due to the significance of injection to the vessel.

EPRI test valve #7 is also similar to these valves. The preliminary test results indicated that the valve factor used in the margin calculations for these valves was not conservative. As a result, modifications to the operators for 1E12F0042A and 42C are scheduled in RFO4 to improve margin. Setting of the torque switches by static testing is also scheduled and the resultant margin between the DBdP required thrust and reduced voltage capability have been conservatively determined to be at least 20%. These valves are judged to be adequate based on the reasonable margin following the scheduled modifications. The results of the testing on 1E12F0042B will also be used to confirm these margins.

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MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1C11F0083	GATE	2.5	CLOSE	4	NA	30.6	180 gpm	679
1E12F0042A	GATE	12	OPEN/CLOSE	1	530	305	7100	24/30
1E12F0042C	GATE	12	OPEN	1	530	NA	7100	20

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

BUTTERFLY VALVES

9. **1M17F0015, 1M17F0025, 1M17F0035, and 1M17F0045**

These 24" butterfly valves in the M17 (Containment Vacuum Relief) system are required to cycle open and close to perform their intended function during a design basis event. They comprise family group 18 of the similarity grouping. The valves have been designated as Priority 3 based on a Siemens ranking of low for testing at least one of the four valves. This priority designation is not a function of PRA-based safety significance. These butterfly valves are limit switch operated in both open and close directions. Torque switches are provided as a backup in the open and close directions. By analysis, the margin between the DBdP required torque and the reduced voltage capability for each of these valves has been conservatively determined to be greater than 50%. The DBdP of the air which passes through these valves is only 0.2 psid. These valves have been satisfactorily tested during routine surveillance testing.

These valves have been judged to be adequate based on the reasonable margin for capability in comparison to the low DBdP.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1M17F0015	BUTT	24	OPEN/CLOSE	3	0.2	0	NA	54
1M17F0025	BUTT	24	OPEN/CLOSE	3	0.2	0	NA	67
1M17F0035	BUTT	24	OPEN/CLOSE	3	0.2	0	NA	54
1M17F0045	BUTT	24	OPEN/CLOSE	3	0.2	0	NA	66

10. **0G41F0280, 0G41F0285, 0G41F0290, 0G41F0295, 0G41F0100 and 1P45F0140.**

These butterfly valves have been placed in family group 15 based on the similarity grouping. 0G41F0280, 0G41F0285, 0G41F0290 and 0G41F0295 in the G41 (Fuel Pool Cooling and Cleanup) system have been designated as Priority 1 based on a Siemens ranking of high for testing at least one of the four valves. 0G41F0100 has been designated Priority 3 based on a Seimens ranking of low for testing. These priority 1 & 3 designations are not a function of PRA-based safety significance. 1P45F0140 in the P45 (Emergency Service Water) system has been designated as a Priority 4 as it does not have a PRA-based safety significance and is not a Siemens candidate for testing. These butterfly valves are limit switch operated in both open and close directions. Torque switches are provided as a backup in the open and close directions.

0G41F0280, 285, 290 and 295 are normally open and are required to close during a design basis event. The normal system operating flow through these valves is approximately 1000 gpm, with a dp of 123 psid. This is close to the design basis flow and dp. These valves have been stroked close with normal flow and dP in accordance with system operating procedures. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be 10% or greater. This is judged to be adequate based on the margin and satisfactory performance of these valves during normal operation.

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MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

0G41F0100 is normally open and required to close during a design basis event. The normal system operating flow through this valve is 300 gpm, with a dp of 56 psid. This flow is close to design basis flow and the dp is approximately 50% of design basis dp. The valve has been stroked close with flow and dp in accordance with system operating procedures. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be over 250%. This valve is judged to be adequate based on the very high margin and the satisfactory performance during operation.

1P45F0140 is required to open to perform its design basis function. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be greater than 260%. This valve is judged to be adequate based on the very high margin.

Valves 1G41F0140, 1G41F0145, 1P45F0014A and 1P45F0068A of group 15 are scheduled for testing during RFO4. The results of this testing will be used to further confirm the adequacy of the above valves.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
0G41F0280	BUTT	12	CLOSE	1	NA	128.1	1000 gpm	10
0G41F0285	BUTT	12	CLOSE	1	NA	128.1	1000 gpm	11
0G41F0290	BUTT	12	CLOSE	1	NA	128.1	1000 gpm	11
0G41F0295	BUTT	12	CLOSE	1	NA	128.1	1000 gpm	10
1G41F0100	BUTT	8	CLOSE	3	NA	115.6	300 gpm	277
1P45F0140	BUTT	8	OPEN	4	23.2	NA	900 gpm	266

11. **0P42F0150B, 0P42F0255A, 0P42F0255B, 0P42F0260A, 0P42F0260B, 0P42F0265A, 0P42F0265B, 0P42F0295A, 0P42F0295B, 0P42F0300B, 0P42F0325A, 0P42F0325B, 0P42F0330A, 0P42F0330B, 0P42F0380A, 0P42F0380B, 0P42F0390A, 0P42F0390B, 0P42F0440, and 0P42F0445**

These valves in the P42 (Emergency Closed Cooling) system are 20 of the 23, 10" butterfly valves which have been placed in group 17 in accordance with the family grouping. 0P42F0150B, which is required to close to perform its safety function, has been designated Priority 1, based on PRA safety significance. 0P42F0300B, 330A and 330B which are required to open to perform their safety function have been designated Priority 2, based solely on a Siemens ranking of medium for testing. The remaining valves are have been designated Priority 4, as they have no PRA-based safety significance and are not testing candidates based on the Siemens ranking criteria. These butterfly valves are limit switch operated in both open and close directions. Torque switches are provided as a backup in the open and close directions. By analysis, the margin between the DBdP required torque and the reduced voltage capability for each of these valves has been conservatively determined to be greater than 150%. (The margin for the Priority 1 valve, 0P42F0150B, is greater than 320% and for the Priority 2 valves is greater than 180%). These valves are judged to be adequate based on the high margin in comparison to reasonably low D/P.

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MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

Valves 0P42F0300A, 0P42F0290 and 0P42F0320 of group 17 are scheduled for testing during RFO4. The results of this testing will be used to further confirm the adequacy of the above valves.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
0P42F0150B	BUTT	10	CLOSE	1	NA	56	1700 gpm	329
OP42F0255A	BUTT	10	CLOSE	4	NA	63.2	2000 gpm	293
0P42F0255B	BUTT	10	CLOSE	4	NA	63.2	2000 gpm	291
0P42F0260A	BUTT	10	OPEN	4	79	NA	2000 gpm	244
0P42F0260B	BUTT	10	OPEN	4	79	NA	2000 gpm	243
0P42F0265A	BUTT	10	OPEN	4	79	NA	2000 gpm	243
0P42F0265B	BUTT	10	OPEN	4	79	NA	2000 gpm	242
0P42F0295A	BUTT	10	CLOSE	4	NA	95.3	1700 gpm	153
0P42F0295B	BUTT	10	CLOSE	4	NA	95.3	1700 gpm	154
0P42F0300B	BUTT	10	OPEN	2	103.9	NA	1700 gpm	196
0P42F0325A	BUTT	10	CLOSE	4	NA	95.3	1700 gpm	170
0P42F0325B	BUTT	10	CLOSE	4	NA	95.3	1700 gpm	172
0P42F0330A	BUTT	10	OPEN	2	105	NA	1700 gpm	185
0P42F0330B	BUTT	10	OPEN	2	105	NA	1700 gpm	194
0P42F0380A	BUTT	10	CLOSE	4	NA	95.3	1000 gpm	169
0P42F0380B	BUTT	10	CLOSE	4	NA	95.3	1000 gpm	169
0P42F0390A	BUTT	10	CLOSE	4	NA	95.3	1000 gpm	168
0P42F0390B	BUTT	10	CLOSE	4	NA	95.3	1000 gpm	168
0P42F0440	BUTT	10	CLOSE	4	NA	95.3	2000 gpm	167
0P42F0445	BUTT	10	CLOSE	4	NA	95.3	2000 gpm	167

12. **1P11F0060, 1P43F0055, 1P43F0140, 1P43F0215, 1P43F0355, 1P43F0400, 1P43F0410, 1P45F0014B, 1P45F0068B, 1P45F0130B, 1P50F0060, 1P50F0140, 1P50F0150.**

These valves are 13 of the butterfly valves which have been placed in group 16 in accordance with the family grouping. 1P11F0060, which is required to close to perform its safety function has been designated Priority 1, based on a Siemens ranking of high for testing. 1P45F0014B, which is required to open to

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

perform its safety function has been designated Priority 2, based on a Siemens ranking of medium for testing. The remaining valves are have been designated Priority 4, as they have no PRA-based safety significance and are not testing candidates based on the Siemens ranking criteria.

1P45F0014B and 1P45F0068B in the P45 (Emergency Service Water) system are normally closed and required to open during a design basis event. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be greater than 9%. These valves are judged to be adequate based on reasonable margin. These valves are scheduled for modification in the next refueling outage to change the valve material. (1P45F0014A and 1P45F0068A of the opposite train have already been modified). This change will cause these valves to shift to family group 15.

1P11F0060 in the P11 (Condensate Storage and Transfer) system is required to close to perform its design basis function. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be 19%. This is judged adequate based on reasonable margin.

1P43F0055, 140, 215, 355, 400 and 410 in the P43 (Nuclear Closed Cooling) system are required to close to perform their design basis function. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be greater than at least 45% for these valves. These valves are judged to be adequate based on reasonable margin and low D/P.

1P45F0130B, also of the P45 (Emergency Service Water)system is required to open to perform its design basis function. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be greater than 200%. The valve is judged to be adequate based on the high margin.

1P50F0060, 140, and 150 in the P50 (Containment Vessel Chilled Water) system are required to close to perform their design basis function. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be greater than 1200% for these valves. These valves are judged to be adequate based on very high margin and low D/P.

Valve 0P42F0150A and 1P45F0130A of group 16 are scheduled for testing during RFO4. The results of this testing will be used to further confirm the adequacy of the above valves.

ATTACHMENT 1

MOVS THAT ARE PRACTICAL TO DYNAMICALLY TEST AFTER RFO4

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1P11F0060	BUTT	12	CLOSE	1	NA	146.3	2330 gpm	19
1P43F0055	BUTT	12	CLOSE	4	NA	37.7	2451 gpm	53
1P43F0140	BUTT	12	CLOSE	4	NA	37.7	2451 gpm	174
1P43F0215	BUTT	12	CLOSE	4	NA	37.7	2451 gpm	46
1P43F0355	BUTT	10	CLOSE	4	NA	37.1	1750 gpm	92
1P43F0400	BUTT	10	CLOSE	4	NA	37.1	1750 gpm	92
1P43F0410	BUTT	10	CLOSE	4	NA	37.1	1750 gpm	53
1P45F0014B	BUTT	20	OPEN	2	133.2	NA	7300 gpm	9
1P45F0068B	BUTT	20	OPEN	4	86.1	NA	7300 gpm	53
1P45F0130B	BUTT	24	OPEN	4	22	NA	12900 gpm	207
1P50F0060	BUTT	6	CLOSE	4	NA	37	600 gpm	1288
1P50F0140	BUTT	6	CLOSE	4	NA	37	600 gpm	1256
1P50F0150	BUTT	6	CLOSE	4	NA	37	600 gpm	1288

Attachment 2

Perry Nuclear Power Plant

MOVs That Are Not Practical To Dynamically Test

ATTACHMENT 2

MOVS NOT PRACTICAL TO DYNAMICALLY TEST

GLOBE VALVES

1. **1B21F0067A, 1B21F0067B, 1B21F0067C, 1B21F0067D, 1E32F0006, 1E32F0007, 1E51F0077, 1E51F0078, 1M51F0090, and 1M51F0110**

These valves are similar 1.5" and 2" globe valves which have been placed in family group 13, based on the similarity grouping. Of the total of 18 valves in this group, these 10 are not practical to test.

1B21F0067C and 1B21F0067D in the B21 (Nuclear Boiler) system have been designated as Priority 2, based on a Siemens ranking of medium for testing one of the two valves. This priority designation is not a function of PRA-based safety significance and is countered by the impracticality of testing. 1B21F0067A and 1B21F0067B are Priority 4 as they have no PRA-based safety significance. These valves are the Main Steam (MS) line drain isolation valves and are normally open up to the point that 50% of steam flow is reached. These valves are located in the steam tunnel and are not accessible during operation due to radiation levels and temperature. The pressure and flow to support dynamic testing cannot be achieved with the plant shutdown. Static testing is scheduled for these valves during RFO4, at which time the torque switches will be set to ensure adequate capability. By analysis, the margin between the DBdP required thrust and the reduced voltage capability has been conservatively determined to be greater than 70%. The valves are judged to be adequate based on the reasonably high margin.

1E32F0006 and 1E32F0007 have been designated Priority 4 as they have no PRA-based safety significance. These valves are the MSIV Leakage Control System outboard blower, inlet isolation valves. The valves are normally closed and are required to be opened by operator action post-LOCA, to initiate operation of the leakage control outboard system. These valves are interlocked such that they cannot open if MS line pressure is greater than 0.5 psig. These valves cannot be dynamically tested as it is not practical to provide a sustained pressure source with the plant shutdown to duplicate the DBdP. The torque switches for these valves have been set by static testing. By analysis, the margin between the DBdP required thrust and the reduced voltage capability has been conservatively determined to be greater than 235%. These valves are judged to be adequate based on the very high margin with respect to the low DBdP.

1E51F0078 in the E51 (Reactor Core Isolation Cooling) system has been designated as Priority 3, based on a Siemens ranking of low for testing. This priority designation is not a function of PRA-based safety significance and is countered by the impracticality of testing. 1E51F0077 has been designated Priority 4 as it has no PRA-based safety significance. These valves are the Reactor Core Isolation Cooling turbine exhaust vacuum breaker isolation valves. They are normally open and are required to close upon receipt of concurrent signals for reactor vessel low pressure and drywell high pressure. This DPdP of 7.8 psid occurs as a result of pressure inside the containment post-LOCA and cannot be duplicated for testing. The torque switches for these valves will be set by static testing. By analysis, the margin between the DBdP required thrust and the reduced voltage capability has been conservatively determined to be greater than 100%. These valves are judged to be adequate based on the very high margin with respect to the low DBdP.

1M51F0090 and 110 in the M51 (Combustible Gas Control) system have been designated Priority 4 as they have no PRA-based safety significance. These valves are the Combustible Gas Control system drywell purge line containment isolation valves. The valves are normally closed and are cycled open during plant operation for drywell pressure control. The DBdP of 22.1 psid occurs as a result of pressure in the drywell post-LOCA and cannot be duplicated to support dynamic testing. The torque switches for these valves have been set by static testing. By analysis, the margin between the DBdP required thrust and the reduced voltage capability has been conservatively determined to be greater than 220%. These valves are judged

ATTACHMENT 2

MOVS NOT PRACTICAL TO DYNAMICALLY TEST

to be adequate based on the very high margin with respect to the low DBdP.

Valve 1E51F0019 of group 13 will be dynamically tested during RFO4. The results of this testing will be used to further confirm the adequacy of the above valves.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1B21F0067C	GLOBE	1.5	CLOSE	2	NA	978	143,000 lbs/hr	74
1B21F0067D	GLOBE	1.5	CLOSE	2	NA	978	143,000 lbs/hr	71
1B21F0067A	GLOBE	1.5	CLOSE	4	NA	978	143,000 lbs/hr	73
1B21F0067B	GLOBE	1.5	CLOSE	4	NA	978	143,000 lbs/hr	72
1E32F0006	GLOBE	2	OPEN/CLOSE	4	0.5	0.5	100 scfh	240/337
1E32F0007	GLOBE	2	OPEN/CLOSE	4	0.5	0.5	100 scfh	238/335
1E51F0078	GLOBE	2	CLOSE	3	NA	7.8	NA	312
1E51F0077	GLOBE	1.5	CLOSE	4	NA	7.8	NA	109
1M51F0090	GLOBE	2	CLOSE	4	NA	22.1	78 scfh	223
1M51F0110	GLOBE	2	CLOSE	4	NA	22.1	78 scfh	231

ATTACHMENT 2

MOVS NOT PRACTICAL TO DYNAMICALLY TEST

GATE VALVES

2. **1B21F0016, 1B21F0019, 1E21F0005, 1E51F0063, 1E51F0064, 1G33F0001, and 1G33F0004**

These valves are similar globe valves ranging in size from 3" to 12" which have been placed in family group 8, based on the similarity grouping. Of the total of 12 valves in this group, these 7 are not practical to test.

1B21F0016 and 1B21F0019 in the B21 (Nuclear Boiler) system have been designated as Priority 1, based on a Siemens ranking of high for testing one of the two valves. This priority designation is not a function of PRA-based safety significance and is countered by the impracticality of testing. These valves are the Main Steam line drain inboard and outboard isolation valves and are normally open. The valves are required to close if reactor water level 1 is reached during a LOCA. Valve F0016 is located inside the drywell and valve 1B21F0019 is located in the steam tunnel and neither are accessible during operation due to radiation levels and temperature. The pressure and flow to support dynamic testing cannot be achieved with the plant shutdown.

EPRI test valve #7 is similar to these valves. The preliminary test results indicated that the valve factor used in the margin calculations for these valves was not conservative. As a result, modifications to replace the operators for 1B21F0016 and 19 are scheduled in RFO4 to improve margin. Setting of the torque switches by static testing is scheduled and the resultant margin between the DBdP required thrust and reduced voltage capability have been conservatively determined to be greater than 100%. These valves are judged to be adequate based on the high margin following the scheduled modifications.

1E21F0005 has been designated as Priority 2, as a function of PRA-based safety significance. This valve is the Low Pressure Core Spray injection and shutoff valve. It is normally closed and required to open during a design basis event and close for containment isolation following LPCS injection. This valve cannot be tested as the system lineup would require injecting water from the suppression pool into the reactor vessel. Additionally, the DBdP includes check valve leakage, and this cannot be simulated for testing. EPRI test valve #7 is also similar to this valve. The preliminary test results indicated that the valve factor used in the margin calculations for this valve was not conservative. As a result, modifications to the operator for 1E21F0005 have been completed to improve margin. The resultant margin between the DBdP required torque and reduced voltage capability have been conservatively determined to be approximately 13% in the open direction and 60% in the close direction. This valve is judged to be adequate based on the reasonable margin following the modification. 1E12F0042B is scheduled for dynamic testing during RFO4 with the reactor defueled. The test will approximate DBdP using pump head.

1E51F0063 and 64 have been designated as Priority 2, based on a Siemens ranking of medium for testing for 1 of the 2 valves. This priority designation is not a function of PRA-based safety significance and is countered by the impracticality of testing. These valves are the Reactor Core Isolation Cooling turbine steam supply isolation valves. They are normally open and are required to close during a design basis event. The calculated DBdP considers the effects of a high energy line break. Since the high DBdP due to line break considerations can not be achieved, dynamic testing is not possible. EPRI test valve #9 is similar to these valves. The preliminary test results indicated that the valve factor used in the margin calculations for these valves was not conservative. As a result, modifications to replace the operators for 1E51F0063 and 1E51F0064 are scheduled in RFO4 to improve margin. Setting of the torque switches by static testing is scheduled and the resultant margin between the DBdP required thrust and reduced voltage capability have been conservatively determined to be greater than 80%. These valves are judged to be adequate based on the reasonable margin following the scheduled modifications.

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1G33F0001 and 1G33F004 have been designated as Priority 1, based on a Siemens ranking of high for testing one of the two valves. This priority designation is not a function of PRA-based safety significance and is countered by the impracticality of testing. (1G33F0001 has a PRA-based safety significance of 3.) These valves are the Reactor Water Cleanup system inboard and outboard suction line containment isolation valves. They are normally open and are required to close during a design basis event. The calculated DBdP considers the effects of a high energy line break downstream of these valves. During an isolation sequence without line break, the RWCU pumps would trip and the valves would close against essentially zero flow and DP. Since the DBdP can not be achieved, dynamic testing is not possible. EPRI test valve #9 is also similar to these valves. The preliminary test results indicated that the valve factor used in the margin calculations for these valves was not conservative. As a result, modifications to replace the operators for 1G33F0001 and 0004 are scheduled in RFO4 to improve margin. Setting of the torque switches by static testing is also scheduled and the resultant margin between the DBdP required thrust and reduced voltage capability have been conservatively determined to be greater than 130%. These valves are judged to be adequate based on the reasonable margin following the scheduled modifications.

Valves 1E12F0042B of group 8 will be dynamically tested during RFO4. The results of this testing will be used to further confirm the adequacy of 1E21F005. Final EPRI test data will be used to confirm the adequacy of 1B21F0016, 1B21F0019, 1E51F0063, 1E51F0064, 1G33F0001, and 1G33F0004.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1B21F0016	GATE	3	CLOSE	1	NA	978	320 lbs/hr	113
1B21F0019	GATE	3	CLOSE	1	NA	978	320 lbs/hr	117
1E21F0005	GATE	12	OPEN/CLOSE	2	610.1	485	4100 gpm	13/60
1E51F0063	GATE	10	CLOSE	2	NA	1048.3	34,200 lbs/hr	90
1E51F0064	GATE	10	CLOSE	2	NA	1048.3	34,200 lbs/hr	81
1G33F0004	GATE	6	CLOSE	1	NA	1059	408 gpm	156
1G33F0001	GATE	6	CLOSE	1	NA	1059	408 gpm	130

3. **1E12F0028A, 1E12F0028B, 1E12F0537A, E12F0537B and 1E51F0068**

These valves are 12" gate valves which have been placed in family group 5, with 4" and 12" valves, based on the similarity grouping. Of the total of 8 valves in this group, these 5 are not practical to test.

1E12F0028A, 28B, 537A and 537B have been designated as Priority 1, as a function of PRA-based safety significance. 1E12F0028A and 28B are also Siemens ranked candidates of high for testing. These valves are the RHR containment spray shutoff valves. They are normally closed and required to open to initiate containment spray and then re-close to allow suppression pool cooling operation. These valves cannot be tested as testing would require the initiation of containment spray. A similar 12" valve was removed from the unused Perry Unit 2 and shipped to EPRI for testing (EPRI test valve #10). Preliminary EPRI test results indicated that the valve factor used in the margin calculations for these valves was not conservative. As a result, modifications to the operators for 1E12F0028A, 28B, 537A and 537B are scheduled in RFO4 to

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improve actuator capability. Setting of the torque switches by static testing is also scheduled. For 1E12F0537A and 537B the resultant margin between the DBdP required thrust and reduced voltage capability have been conservatively determined to be greater than 130% in the open stroke and 95% in the close stroke. For 1E12F0028A and 28B the resultant margin between the DBdP required thrust and reduced voltage capability have been conservatively determined to be greater than 39% in the open stroke and 29% in the close stroke. These valves are judged to be adequate based on the margin following the scheduled modifications.

1E51F0068 has been designated Priority 4 as it has no PRA-based safety significance. This valve is the RCIC turbine exhaust isolation valve and is normally open. The valve is required to close upon receipt of concurrent high drywell pressure and low reactor water level signals. The DBdP of 7.8 psid occurs as a result of pressure in the containment post-LOCA and cannot be duplicated to support dynamic testing. The margin between the DBdP required thrust and the reduced voltage capability for this valve has been conservatively determined to be greater than 220%. This valve is judged to be adequate based on the very high margin with respect to the low DBdP.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1E12F0537A	GATE	12	OPEN/CLOSE	1	131	256.9	5250 gpm	135/95
1E12F0537B	GATE	12	OPEN/CLOSE	1	131	256.9	5250 gpm	157/114
1E12F0028A	GATE	12	OPEN/CLOSE	1	151	256.9	5250 gpm	39/29
1E12F0028B	GATE	12	OPEN/CLOSE	1	151	256.9	5250 gpm	52/42
1E51F0068	GATE	12	CLOSE	4	NA	7.8	34,200 lbs/hr	221

4. **1E32F0001A, 1E32F0001E, 1E32F0001J, 1E32F0001N, 1E32F0002A, 1E32F0002E, 1E32F0002J, 1E32F0002N, 1E32F0003A, 1E32F0003E, 1E32F0003J, 1E32F0003N, 1E32F0008, and 1E32F0009.**

These 14, 2.5" gate valves comprise group 9 based on the similarity grouping. Valves 1E32F0001A, 1E, 1J and 1N have been designated Priority 3, based on Siemens ranking of low for testing one of the four valves. Valves 1E32F0008 and 9 have been designated Priority 2 based on a Siemens ranking of medium for testing one of the two valves. This priority designation is not a function of PRA-based safety significance and is countered by the impracticality of testing. The remaining valves are Priority 4 as they have no PRA-based safety significance. These valves are in the MSIV leakage control system and are normally closed. They are opened by operator action post-LOCA to initiate operation of the leakage control system. The valves have a pressure permissive to open which is set at 20 psig and will reclose once this pressure is exceeded. Therefore, during normal operation these valves cannot be operated nor can dynamic test conditions be established with the plant off line. The margin between the DBdP required thrust and the reduced voltage capability for these valves has been conservatively determined to be greater than 350% for the open stroke and 460% for the close stroke. These valves are judged to be adequate based on the very high margin with respect to the low DBdP.

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VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1E32F0001A	GATE	2.5	OPEN/CLOSE	3	20.1	20.1	25 scfh	356/464
1E32F0001E	GATE	2.5	OPEN/CLOSE	3	20.1	20.1	25 scfh	355/463
1E32F0001J	GATE	2.5	OPEN/CLOSE	3	20.1	20.1	25 scfh	354/461
1E32F0001N	GATE	2.5	OPEN/CLOSE	3	20.1	20.1	25 scfh	356/464
1E32F0008	GATE	2.5	OPEN/CLOSE	2	20.6	20.6	100 scfh	367/477
1E32F0009	GATE	2.5	OPEN/CLOSE	2	20.6	20.6	100 scfh	364/473
1E32F0002A	GATE	2.5	OPEN/CLOSE	4	20.1	20.1	25 scfh	357/465
1E32F0002E	GATE	2.5	OPEN/CLOSE	4	20.1	20.1	25 scfh	356/464
1E32F0002J	GATE	2.5	OPEN/CLOSE	4	20.1	20.1	25 scfh	360/468
1E32F0002N	GATE	2.5	OPEN/CLOSE	4	20.1	20.1	25 scfh	358/466
1E32F003A	GATE	2.5	OPEN/CLOSE	4	20.4	20.4	25 scfh	359/466
1E32F003E	GATE	2.5	OPEN/CLOSE	4	20.4	20.4	25 scfh	359/466
1E32F003J	GATE	2.5	OPEN/CLOSE	4	20.4	20.4	25 scfh	359/466
1E32F003N	GATE	2.5	OPEN/CLOSE	4	20.4	20.4	25 scfh	359/466

5. **1E12F0008 and 1E12F0009**

These 20" gate valves comprise family 7 in accordance with the similarity grouping. Each of these valves are required to close to perform their design basis function. 1E12F0009 has been designated as Priority 3 based on a Siemens ranking of low for testing. This priority designation is not a function of PRA-based safety significance. 1E12F0008 is designated as Priority 4 as it does not have a PRA-based safety significance and is not a Siemens candidate for testing.

These valves are the shutdown cooling inboard and outboard suction isolation valves. Testing under flow would require shutting the valves with RHR pumps running and could result in pump damage. An alternate test method using reactor water level as the head, does not develop sufficient flow and/or dp for a meaningful test.

ATTACHMENT 2

MOVS NOT PRACTICAL TO DYNAMICALLY TEST

Each of these valves is torque switch operated in the close direction. The torque switch is bypassed by the limit switch during approximately 95% of the stroke in the closing direction. The torque switch has been appropriately set within the torque/thrust window for the remaining 5% of the stroke. The capability margin for each has been conservatively determined to be in excess of 175%.

These valves have been judged to be acceptable based on the high margin for capability.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN %
					OPEN	CLOSE		
1E12F0008	GATE	20	CLOSE	4	NA	164.8	14,200 gpm	176
1E12F0009	GATE	20	CLOSE	3	NA	169.3	14,200 gpm	196

ATTACHMENT 2

MOVS NOT PRACTICAL TO DYNAMICALLY TEST

BUTTERFLY VALVES

6. **1G43F0030A, 1G43F0030B, 1G43F0040A, and 1G43F0040B**

These valves are 24" butterfly valves which have been placed in family group 15, with 8", 10", 12", 20" and 24" valves, based on the similarity grouping. Of the total of 15 valves in this group, these 4 are not practical to test.

1G43F0040B has been designated Priority 3, based on PRA based significance and a Siemens ranking of low for testing. 1G43F0030A, 30B and 40A have been designated Priority 3 as a function of PRA-based safety significance. These valves are the suppression pool make-up valves and are normally closed. They are required to open post-LOCA to provide flow from the upper pool to the suppression pool. The margin between the DBdP required thrust and the reduced voltage capability for these valves has been conservatively determined to be greater than 130%. These valves are judged to be adequate based on the very high margin with respect to the low DBdP.

Valves 1G41F0140, 1G41F0145, 1P45F0014A, and 1P45F0068A of group 15 will be dynamically tested during RFO4. The results of this testing will be used to further confirm the adequacy of these valves.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1G43F0040B	BUTT	24	OPEN	3	17.15	NA	35,600 gpm	156
1G43F0030A	BUTT	24	OPEN	3	12.36	NA	35,600 gpm	131
1G43F0030B	BUTT	24	OPEN	3	12.36	NA	35,600 gpm	159
1G43F0040A	BUTT	24	OPEN	3	9.49	NA	35,600 gpm	142

7. **1G42F0010 and 1G42F0020**

These valves are 12" butterfly valves which have been placed in group 16 in accordance with the similarity grouping. 1G42F0010 and 1G42F0020, which are required to close to perform their safety function, have been designated Priority 2, based on PRA safety significance. These valves are the suppression pool first and second suction isolation valves. Testing under flow would require shutting the valves with the pump running and could result in pump damage. An alternative test method using suppression pool level as the head, does not develop sufficient flow and/or dp for a meaningful test. By analysis, the margin between the DBdP required torque and the reduced voltage capability has been conservatively determined to be greater than 300%. These valves have been judged to be adequate based on the very high margin and low D/P.

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MOVS NOT PRACTICAL TO DYNAMICALLY TEST

Valve 1P42F0150A and 1P45F0130A of group 16 are scheduled for testing during RFO4. The results of this testing will be used to further confirm the adequacy of these valves.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1G42F0010	BUTT	12	CLOSE	2	NA	15.5	2000 gpm	310
1G42F0020	BUTT	12	CLOSE	2	NA	15.5	1000 gpm	308

Attachment 3

Perry Nuclear Power Plant

MOVs Not Statically Tested - No Dynamic Test Required

ATTACHMENT 3

MOVS NOT STATICALLY TESTED - NO DYNAMIC TEST REQUIRED

These five butterfly valves have been designated priority 4 as they do not have a PRA-based safety significance and are not candidates for testing from the Siemens evaluation.

1G42F0080 is the demineralized water to suppression pool isolation valve, is normally open and not required to change position. It has been grouped in family 15 for evaluation. It has a capability margin in excess of 600%.

0P42F0550 and 551 are the Closed Cooling Water chiller isolation valves. They are normally open and close in response to a design basis event at 0 flow and 0 dp conditions. The valves are grouped in family 16 for evaluation and have capability margins in excess of 300%.

1M16F0010A and 10B are the Drywell vacuum relief isolation valves. They are normally open and are not required to change position. They are grouped in family 18 for evaluation and have capability margins in excess of 50%.

Motor operated butterfly valves at PNPP are limit switch operated and have torque switches in the open and close position for backup.

VALVE	VALVE TYPE	VALVE SIZE (inches)	SAFETY FUNCTION OPEN/CLOSE	VALVE PRIORITY	DESIGN BASIS dp (psid)		FLOW RATE	MARGIN (%)
					OPEN	CLOSE		
1G42F0080	BUTT	8	OPEN**	4	NA	NA	NA	609
0P42F0550	BUTT	10	CLOSE	4	NA	0	NA	306
0P42F0551	BUTT	10	CLOSE	4	NA	0	NA	307
1M16F0010A	BUTT	10	OPEN**	4	NA	NA	NA	58
1M16F0010B	BUTT	10	OPEN**	4	NA	NA	NA	58

** Note: These valves do not have to change position for a design basis event. They are required to remain open.