APS

Arizona Public Service Company

INDEPENDENT SAFETY AND QUALITY ENGINEERING DEPARTMENT

GENERIC LETTER 89-10 MOTOR OPERATED VALVE PROGRAMMATIC ASSESSMENT

TQE ASSESSMENT NO. 93-02

PALO VERDE
NUCLEAR GENERATING
STATION

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EXECUTIVE SUMMARY

The objective of this assessment was to evaluate the implementation and overall effectiveness of the PVNGS Motor Operated Valve (MOV) program in accordance with the requirements and guidelines of NRC Generic Letter (GL) 89-10, *Safety-Related Motor Operated Valve Testing and Surveillance*.

A multi-discipline team comprised of engineers from Nuclear Engineering Department (NED), Valve Services Engineering (VSE), Technical Quality Engineering (TQE), Nuclear Regulatory Affairs (NRA), and an inspector from Quality Control (QC) was assembled to perform this assessment. A MOV System Engineer from Washington Public Power Supply System (WPPSS) and two outside engineering consultants (Sargent & Lundy and OGDEN) joined the team on a limited basis to provide an independent perspective.

The assessment included a review of program adequacy and implementation. The MOV program was evaluated against the program elements delineated in Generic Letter 89-10 as clarified in industry and NRC correspondence. A sample of 11 MOVs was selected to evaluate GL 89-10 program implementation. Selected design basis calculations, motor operator sizing and switch setting calculations, diagnostic test traces, and dynamic test data evaluations were reviewed for this sample of MOVs.

Conclusions:

The MOV Program has significantly improved since the first NRC inspection in 1991. Most of the programmatic issues identified during that inspection have been resolved, resulting in a much stronger program. MOV personnel have been reorganized to improve coordination and effectiveness by combining maintenance and engineering resources under a single manager. Continued strong involvement by program personnel in industry groups and with program vendors has resulted in keeping the program current with day-to-day changes and advancements in technology. Improvements have reduced Palo Verde's reliance on contract personnel.

Performance of actuator refurbishment prior to static baseline and dynamic testing is a strength in the testing program. The program includes diverse measurements of critical parameters including stem torque. Procedures have been created to control evaluation of dynamic test data and to formalize MOV retest requirements. The initial static testing of MOVs is nearly complete, and approximately 60 percent of the valves have been dynamically tested, as a result of an aggressive test program being established and followed.

Despite the anticipated conclusion of dynamic testing in accordance with the existing schedule, the scope of the GL 89-10 program needed to achieve completion of the program is not clearly defined. Substantial additional work in the form of calculation revisions, valve modifications, and additional testing or a combination of these, remains to be completed. The program does not delineate which of these activities needs to be completed in order to determine program completion. In addition, the completion of the design bases reviews and the resolution of a number of technical issues (e.g., degraded voltage, thermal binding and pressure locking, ambient temperature effects, diagnostic uncertainties, etc.) also need to be considered in the definition of program scope. Regulatory documents defining the MOV Program requirements do not contain clear guidance as to what is required to consider the program complete. The development of a detailed program scope document and schedule are necessary for determining if the committed schedule can be met.

Based on the scope of activities reviewed during this assessment, it is concluded that the technical elements and programmatic controls of the MOV Program are adequate to satisfy the requirements of GL 89-10. The deficiencies identified need to be corrected and, to further strengthen the program, the recommendations and suggestions should be addressed and implemented, as appropriate.

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MOTOR OPERATED VALVE PROGRAM ASSESSMENT

I. PURPOSE

The objective of this assessment was to evaluate the implementation and overall effectiveness of the PVNGS Motor Operated Valve (MOV) program in accordance with the requirements and guidelines of NRC Generic Letter 89-10, *Safety-Related Motor Operated Valve Testing and Surveillance*.

II. ACTIVITIES / DOCUMENTS REVIEWED

A. Assessment Scope

An assessment plan was developed to determine the scope and completion schedule for this assessment. A copy of the plan is contained in Attachment A.

Due to the timing of this assessment, field observations of dynamic testing was not practicable since these tests are typically performed during scheduled refueling outages. TQE will perform an independent follow-up observation of dynamic testing methodology during the Unit 1 (R4) outage.

The assessment was modeled after NRC Temporary Instruction 2515/109, *Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance*, Revision 1, and NRC Inspection Module 92701. Reviews were conducted in each of the following areas:

1) Design Basis Review 04.05
2) MOV Sizing and Switch Setting 04.06
3) Design Basis Capability 04.07
4) Periodic Verification 04.08
5) MOV Failure Trending 04.09
6) GL 89-10 Program Schedule 04.10
7) MOV Design Control and Testing 04.11

The assessment included an evaluation of program adequacy against the program elements delineated in Generic Letter 89-10, as clarified in industry and NRC correspondence. The assessment also was used to assist the Valve Service Department (VSD) in preparing for the upcoming Part 2 NRC Inspection. The

programmatic issues identified in NRC Inspection Report 91-25 were also evaluated, and inspection reports from other licensees were factored into the assessment. Attachment B contains a summary of issues identified from the review of other licensees inspection reports and includes an assessment of PVNGS's MOV program with respect to these issues.

A sample of 11 MOVs (a vertical slice representation of approximately 10%) was selected, to evaluate program implementation. Selected design basis calculations, motor operator sizing and switch setting calculations, diagnostic test traces and dynamic test data evaluations were reviewed for the selected MOVs.

Issues identified during the assessment were captured and categorized in a database to ensure each issue was adequately evaluated. The database is provided as Attachment C. Three levels of issues were identified in the database as follows:

- Category I - Deficiency (requires corrective action)
- Category II - Recommendations and Issues for Additional Review (require a response)
- Category III - Suggestions for Improvement

NOTE:

Category II items include programmatic issues of interest identified by the Assessment Team, the NRC Part 2 Inspection Guidelines, NRC inspection reports of other utilities, and NUMARC. Because of time and resource constraints, all of these issues could not be reviewed during this assessment. These issues are included to assist VSE in preparation for the Part 2 inspection.

B. Assessment Team

A multi-discipline team, comprised of engineers from Nuclear Engineering, Valve Services Engineering, Technical Quality Engineering, Nuclear Regulatory Affairs, and an inspector from Quality Control, was assembled to perform this assessment. A MOV System Engineer from Washington Public Power Supply System (WPPSS) and two outside engineering consultants (Sargent & Lundy and OGDEN) joined the team on a limited basis to provide an independent perspective.

C. MOV Sample Selection

The following valves were selected for the assessment:

EQ ID	FUNCTION	ACTUATOR	CLOSURE CONTROL	VLV. TYPE/SIZE
1JAFBUV0034	AFW ISOLATION	SMB-1 *	TORQUE	GATE / 6"
3JAFAUV0037	AFW ISOLATION	SMB-1 *	TORQUE	GATE / 6"
3JNCNUV0099	NCWS ISOLATION	MG00X **	LIMIT	BUTTERFLY / 14"
2JSGNHV1144	AFW ISOLATION	16A ***	TORQUE	GATE / 6"
3JSGAUV0134	STM TO AFW TURB	SB-0 *	TORQUE	GATE / 6"
1JSIBUV0626	HPSI FLOW CONT	SMC-04 *	TORQUE	GLOBE / 2"
1JSIDHV0331	HPSI L/T COOLING	SMB-00 *	TORQUE	GLOBE / 3"
2JSIAHV0657	S/D TEMP CONTROL	SMB-00 *	LIMIT	BUTTERFLY / 16"
2JSIAUV0666	HPSI TO RWT ISOL	SMC-04 *	TORQUE	GLOBE / 2"
2JSIAHV0672	CONT CS ISOL	SB-0 *	TORQUE	GATE / 8"
3JSIAHV0604	HPSI L/T COOLING	SMB-00 *	TORQUE	GATE / 3"

NOTE: * = Limitorque, ** = EIM, and *** = Rotork actuators.

Selection of the above valves was based primarily on marginal actuator capability. Other criteria used for the selection included valve type/size, safety significance, Probabilistic Risk Assessment (PRA) evaluation, failure reports, and test results. A spreadsheet containing data for the selected valves is provided in Attachment D.

D. Evaluation

1.0 Design Basis Review (04.05)

1.1 Summary

The design basis calculations originally provided by Combustion Engineering or generated by APS are currently being used in the GL 89-10 program. These calculations will be superseded by a revised analysis now under review by the Nuclear Engineering Department to validate the analyses, incorporate the changes from the recently revised emergency operating procedures, and remove the excessive conservatism.

Procedure 81DP-4DC10, Rev. 04, *Motor Operated Valve Design Basis Review and Thrust/Torque Calculation*, documents the methods to be used during design basis review and calculation of minimum and maximum allowable thrust/torque values for program MOVs. This procedure does not provide specific controls to ensure that emergent, potential operability impacts are identified and resolved in a timely manner. Additional procedural controls are recommended to ensure that revisions to design basis and thrust/torque calculations are reviewed for impacts on completed dynamic test evaluations.

Calculation 13-MC-AF-401, Rev. 01 design basis calculation for 13JAFBUV0034 and 13JAFBUV0035 was randomly selected for detailed review, which confirmed that assumed variables are conservative and that justification is documented for each assumption. The design basis calculation was verified to comply with the requirements of 81DP-4DC10.

The program was reviewed to determine if the potential for pressure locking and thermal binding of gate valves was being considered, and it was found that the existing design basis calculations do not address these effects. Although an initial evaluation of the thermal/pressure locking effect was performed

for all program MOVs on EER 90-XM-024, NED considers additional evaluation warranted because of the continuing occurrences of gate valve locking recently documented by the NRC in *Special Study - Pressure Locking and Thermal Binding of Gate Valves*. Identification and evaluation of the flex-wedge gate valves most susceptible to thermal/pressure locking will be performed concurrently with the design basis review (CRDR 9-3-0561.01).

13-EC-MA-221, *AC Distribution Calculation*, issued on 07/30/93, was performed to replace out of date loading, voltage regulation, and short circuit calculations. This calculation has not yet been incorporated into 13-JC-ZZ-201. The results of this calculation were compared with 13-JC-ZZ-201 for six of the valves in the assessment sample. The degraded voltage assumptions of the thrust/torque calculation for three MOVs (1JSIBUV0626, 2JSIAUV0672, 2JSIAUV0666) do not envelop the degraded voltages predicted by 13-EC-MA-221, and may not be conservative. Action to incorporate the AC Distribution Calculation into 13-JC-ZZ-201 is being tracked by CRDR 910070.03.

The degraded voltage calculation for randomly selected DC MOV 3JAFAUV0037 was reviewed to identify the methodology used to determine the worst case MCC voltage and motor terminal voltage. The assumed battery voltage was confirmed to agree with the minimum voltage at the last minute of Station Blackout, derated for aging, as calculated in 13-EC-PK-161, *Class 1E Battery Minimum Terminal Voltage Calculation*. The minimum MCC voltage was conservatively calculated on the basis of connecting cable resistance and the maximum load of the battery load profile. The resistance for the connecting cable from the MCC to the motor terminal was confirmed to agree with that calculated in 13-EC-PK-A03, *Class 1E DC Cable Sizing*. This resistance was calculated on the basis of characteristic resistance per foot of conductor plus two times the thermal overload resistance, corrected to 90°C. The temperature correction applied to cable

resistance based on 90°C was found to be conservative with respect to the design basis temperature of 120°F for the main steam support structure below 100 ft elevation shown in UFSAR Table 3E-1, *Environmental Qualification Parameters*. The effective motor resistance was calculated on the basis of rated motor voltage and stall current obtained from motor performance curves. The minimum voltage was determined based on the minimum MCC voltage, the loop resistance, and the effective motor resistance. The methodology reviewed was considered to be conservative and acceptable.

1.2 Conclusions

The design basis calculations of record will be superseded by new calculations which ensure GL 89-10 issues are adequately addressed. Completion of the revised calculations in accordance with the current program schedule will result in compliance with GL 89-10.

The program does not yet address thermal binding and pressure locking of gate valves. Identification and evaluation of the flex-wedge gate valves most susceptible to these phenomena will be performed concurrently with the design basis review.

The degraded voltage assumptions of the thrust/torque calculation do not envelop the degraded voltages predicted by 13-EC-MA-221, and may not be conservative. Action to incorporate the AC Distribution Calculation into 13-JC-ZZ-201 is being tracked by CRDR 910070.03.

1.3 Deficiencies

None

1.4 Recommendations

Revise procedure 81DP-4DC10, *Motor Operated Valve Design Basis Review and Thrust/Torque Calculation*, to include specific controls to ensure that emergent operability impacts are identified and resolved in a timely manner.

Revise 81DP-4DC10 to include specific controls to ensure that revisions to design basis calculations and thrust/torque calculations are reviewed for impact on completed dynamic test procedures and evaluations.

Additional recommendations are included in Attachment C.

2.0 MOV Sizing and Switch Setting Calculations (04.06)

2.1 Summary

Calculation 13-JC-ZZ-201, *MOV Thrust, Torque, and Actuator Sizing Calculation*, includes a computerized spreadsheet template designed to perform actuator sizing and calculate stem thrust/torque requirements on the basis of given process and configuration variables. The template is used to calculate the minimum required and maximum allowable stem thrust/torque for program MOVs. This calculation was reviewed, and validations of the algorithms used in the template were found documented in the form of hand calculations. For gate valves, the algorithms were confirmed to relate packing friction load, piston effect, differential pressure load and seating load to calculate a net required stem thrust. Differential pressure loads are determined using the assumed valve factor methodology. This methodology is common within the industry and similar to that published in the *EPRI Application Guide for Motor Operated Valves in Nuclear Power Plants*. Although the relationship used is not the same as that published by EPRI, it is considered to be conservative and acceptable.

The algorithms used to model Limitorque actuator performance are in agreement with the standard vendor equations. Adjustments to the minimum and maximum design thrust/torque values to compensate for running load, diagnostic equipment inaccuracy, and torque switch repeatability are documented in Appendix K of the calculation.

Calculation 13-JC-ZZ-201 Appendix K adjustments for torque switch repeatability and diagnostic inaccuracy were reviewed in an attempt to confirm consistency with ER-5.0, *ITI MOVATS Incorporated Equipment Accuracy Summary and Limitorque Maintenance Update 92-2*. However, the *Instrument Inaccuracy & Torque Switch Repeatability Table* shown in Calculation Change Notice (CCN) 9 to 13-JC-ZZ-201, Revision 1, is not provided with supporting calculations and assumptions. Therefore, the values in this table were not verified. Appendix K includes ER-5.0, Revision 4, which has been superseded by Revision 5 issued February 5, 1993. The inclusion of the superseded report has no impact on the calculation results, because the later revision made no changes to the individual component accuracy claims. Instructions have been added to the *Unit 1 Interim Controlled Motor Operated Data Bases* (ICMODBs) and are scheduled to be added to the Unit 2 and Unit 3 ICMODBs (CRDR 9-2-0071.08 and .09) requiring the field personnel to inform Engineering of any MOV with an as-left torque switch setting of "1". These instructions are provided so that setpoints can be recalculated using the appropriate torque switch repeatability identified by Limitorque Maintenance Update 92-2. The methodology used to ensure that switch settings incorporate diagnostic inaccuracy and torque switch repeatability margin was considered adequate.

Appendix K of Calculation 13-JC-ZZ-201 does not address adjustment of thrust/torque setpoints to compensate for ambient temperature effects on motor torque output, lubrication degradation effects, or simultaneous seismic effects. An action is assigned under the MOV Program to account for ambient temperature effects on motor torque output (CRDR 930431.04). Lubrication

degradation is addressed by an existing field instruction which requires the switch settings to be adjusted high in the acceptable range. The calculation includes an assumption that an adjustment to compensate for seismic loading simultaneous with MOV actuation is not required.

The review of Calculation 13-JC-ZZ-201 identified the calculation of a "D/P Test Correction Factor" applied to some MOVs to compensate for additional thrust/torque loading and load sensitive behavior effects observed during dynamic testing. This factor includes an adjustment based on the difference between maximum thrust/torque measured during dynamic testing extrapolated to the design basis condition, and the minimum calculated thrust/torque. This factor also includes an adjustment for load sensitive behavior based on dynamic test measurements. The load sensitive behavior adjustment is not extrapolated to design basis conditions. Incorporation of the D/P Correction Factor into the calculated setpoint range is the chosen method to ensure that dynamic test results are conservatively incorporated in the switch settings. This method is an interim measure until additional test data can be accumulated to support evaluation and possible revision of thrust/torque calculation assumptions using "type" comparisons and statistical techniques. This method is considered conservative because it increases the minimum thrust/torque setpoints to equal the as-left setpoints of successfully tested MOVs. It is suggested that NED provide procedural guidance on the determination of D/P Test Correction Factors.

Thrust/torque calculations for the eleven MOVs in the assessment sample were reviewed for consistency, and were verified to the requirements of 81DP-4DC10. Two of the calculations (1JSIDHV0331, 3JSIAHV0604) determine maximum allowable thrust values on the basis of an assumed stem friction coefficient of 0.12. This value is slightly more conservative than the value of 0.1 typically assumed in the maximum thrust calculation. One calculation (2JSGAUV0134) determined a minimum close thrust on the basis of an assumed application factor of 0.92. This value

is slightly less conservative than the value of 0.9 typically assumed in 13-JC-ZZ-201, but the difference is not considered to be significant. The application factor of 0.9 assumed for the other MOVs was confirmed to agree with Limitorque Technical Update 92-02.

The review of the thrust/torque calculation for 1JAFBUV0034 confirmed that worst-case conditions from the design basis calculation are used as input and that a justification is provided for each assumed variable. The assumed value for pullout efficiency of 0.40 and application factor of 0.9 were confirmed to agree with vendor information recently published in Limitorque Technical Update 92-02. Reference 7.54 on input sheet GAAF-34 refers to a superseded revision of the design basis calculation 13-MC-AF-401. This later revision does not impact the existing calculation results.

Appendix K, Note 9, of thrust/torque calculation for 2JSGNHV1144 indicates that the minimum required open/close setpoint cannot be achieved without exceeding the actuator published torque/thrust rating as well as the motor torque requirements. The note states that the setpoints cannot ensure full operability of the MOV under design basis conditions, and adds that although the MOV is not safety related, it is "important to safety" and may have to be operated in accordance with plant emergency operating procedures. CRDR 230551 was initiated to evaluate the impact of Appendix K Note 9 on the Auxiliary Feedwater operability requirements of Technical Specification 3.7.1.2.

During recent dynamic testing, the sister valve, 2JSGNHV1142 failed to fully close. The evaluation of the test failure (CRDR 0230455) determined that the impact on system operation is minimal and initiated actions to revise emergency and normal operating procedures to reduce the worst case design basis differential pressure conditions. Actions have been assigned (CRDR 0230455.04 & .05) to revise the design basis calculation

and thrust/torque calculation after the procedure revisions are completed.

The Design Maximum Closing Thrust and the Adjusted Maximum Total Closing Thrust values specified by the ICMODBs (i.e., EERs 93-MO-017, 93-MO-005, 92-MO-175) for the five Limitorque gate MOVs in the selected sample were compared with published actuator thrust ratings. The comparison indicated that the specified maximum closing thrusts are within published actuator thrust ratings. Increased thrust ratings based on Kalsi data were not used. In addition, the 13-JC-ZZ-201 gate valve template was reviewed to confirm that the stall torque equation published in Limitorque Maintenance Update 92-1 is not used in the calculation of maximum thrust/torque values. The review confirmed that motor torque limit determinations are properly based on a calculation involving motor starting torque, gear factor, overall gear ratio, pullout efficiency, application factor, and minimum voltage. However, review of maximum open and close thrust calculations showed that determination of the "motor torque limited," "actuator torque limited," and "valve torque limited" conditions are based on an assumed stem friction coefficient of 0.1. This assumption is potentially nonconservative, and a technical justification for its use was not found.

Review of assumptions contained in 13-EC-MA-221, *AC Distribution Calculation*, showed that the degraded voltage calculations properly consider effects of sequenced operations during both the Loss of Offsite Power/Forced Shutdown (LOP/FS) and Loss of Offsite Power/Loss of Coolant Accident (LOP/LOCA). The insulated cable resistances used as input to Calculation 13-EC-MA-221 are based on 90°C rather than the temperatures identified in UFSAR Table 3E-1, *Environmental Qualification Parameters*. No justification could be found for this engineering assumption (Per VSE the 90° C is an industry standard engineering assumption).

2.2 Conclusions

Ambient temperature effects on motor torque output must be incorporated into the calculations or otherwise resolved.

The methodology used to ensure that switch settings incorporate diagnostic inaccuracy and torque switch repeatability margin was considered adequate. The algorithms used to model Limitorque actuator performance are in agreement with the standard vendor equations. Adjustments to the minimum and maximum design thrust/torque values to compensate for running load, diagnostic equipment inaccuracy, and torque switch repeatability are documented. The calculation includes a "D/P Test Correction Factor" that is applied to some MOVs to compensate for additional thrust/torque loading and load sensitive behavior effects observed during dynamic testing. The degraded voltage calculations properly consider effects of sequenced operations.

2.3 Deficiencies

The insulated cable resistances used as input to Calculation 13-EC-MA-221 are based on 90°C rather than the temperatures identified in UFSAR Table 3E-1, *Environmental Qualification Parameters*. No justification could be found for this engineering assumption. CRDR # 9-3-0709 was initiated to evaluate the adequacy of the assumption.

CRDR # 2-3-0551 was initiated to evaluate the impact of Appendix K Note 9 on the Auxiliary Feedwater operability requirements of Technical Specification 3.7.1.2.

2.4 Recommendations

Revise calculation 13-JC-ZZ-201, Appendix K, to delete reference to the superseded ER-5.0, Revision 4, and to include supporting calculations and assumptions for the *Instrument Inaccuracy & Torque Switch Repeatability Table*.

Determination of the "motor torque limited," "actuator torque limited," and "valve torque limited" conditions in the calculation of maximum thrust for rising stem valves is based on a potentially nonconservative stem friction coefficient assumption of 0.1. A technical justification for its use should be documented.

The methodology used to calculate and apply the "D/P Test Correction Factor" should be explained in 13-JC-ZZ-201.

Additional recommendations are included in Attachment C.

3.0 Design Basis Capability (04.07)

3.1 Summary

The review focused on the aspects of the MOV Program which demonstrate the capability of MOVs to perform their intended functions at or near design basis conditions. The scope of the MOVs in the GL 89-10 program is defined and documented. The valves have been prioritized for testing according to their functional importance. Documented explanation was not found for those MOVs where testing at design basis differential pressure or flow is not practicable.

Out of the eleven (11) actuators selected for the assessment sample, ten (10) had been tested. The results of these tests are described in Attachment E. VSE's review of the ten (10) test results packages determined eight (8) of the actuators either did not meet acceptance criteria, and/or were disqualified due to test or equipment methods. In the cases where the MOV did not satisfy the preestablished acceptance criteria, further documentation (CRDR) had been initiated to evaluate operability. CRDR evaluations determined that component operability was not impacted by the unacceptable/disqualified test results. Refer to Attachment F for a flow chart representation of the process. The majority of the MOVs evaluated were not tested at design basis conditions. By procedure (39DP-9ZZ01), in situ testing will be

considered complete when a test is performed at or as close as practicable to design basis conditions, or by a Phase 1 evaluation and justification for not performing additional testing. CRDR actions evaluated the need to perform additional testing of 4 valves from the assessment teams list. This selection was based on valves in which Phase 1 testing had been performed. Alternate methodologies had been used where testing at design basis was not practicable. 39AC-9ZZ01, Section 2.3.7.1, states
VSE is responsible for defining alternate evaluation methods where testing at design basis is not practicable.

Three (3) MOVs were chosen for an in-depth review, including test results, Test Instructions, engineering data evaluations, and follow-up responses. These included 1JAFBUV0034 (tested 2/91), 3JAFAUV0037 (tested 5/91) and 2JSGNHV1144 (tested 6/93). In each case, the MOVs did not pass their acceptance criteria. MOVs 1JAFBUV0034 and 3JAFAUV0037 were disqualified as a result of the type of test equipment used. CRDRs # 1-3-0220 and 3-3-0183 were dispositioned for actuators 1JAFBUV0034 and 3JAFAUV0037, respectively to support continued operability.

Test data reviewed for valve 2JSGNHV1144 showed this actuator had passed only part of the required acceptance criteria. Research found an outstanding open EER # 91-SG-170 (dispositioned 11/91), stating that the actuator may not operate at design basis DP conditions. Sister actuator 2JSGNHV1142 failed to perform its intended function at design DP during testing, supporting the disposition of EER 91-SG-170. CRDR 2-3-0455 was initiated for the failure of 2JSGNHV1142 and was dispositioned (8/93) to revise the operating procedures to lower the design system differential pressures. The EER and associated Plant Change Request were held open due to departmental engineering differences which were settled with the disposition of CRDR 2-3-0455.

Test Instructions did not provide sufficient guidance to the personnel performing the tests to ensure design DP and flow will

be met. The tests that were reviewed focused on the differential pressure obtainable, without consideration as to flow. Flow, where used, (e.g. not a concern during hydro testing) is a natural outcome of the differential pressure across the valve.

The process used to evaluate the test data consists of taking the resulting variables obtained from diagnostic testing and performing an evaluation (Evaluation Data Sheets) for each of the parameters that are important in meeting an established testing criteria (one Evaluation Data Sheet for each parameter). The sheets contain the formulas required to assess the parameter being evaluated and the result of this manipulation for comparison to the published design values. Those parameters that do not pass the test, are evaluated for operability impact using the CRDR process.

Procedural controls have been established to ensure that dynamic test data is evaluated in a timely fashion. Some of these evaluations determined that the MOVs did not pass the acceptance criteria established in the data sheets on some of the parameters. CRDRs were written to assess valve operability and have determined that further evaluation would be required.
Dynamic tests performed at less than design basis differential pressure require an engineering evaluation involving extrapolation to demonstrate design basis capability. These extrapolations should be considered as the first stage of a two stage approach, and technical justification for the method of extrapolation used should be considered as part of the second stage. 39DP-9ZZ01 does not require extrapolation adjustments for evaluation of dynamic test data collected at less than design basis conditions. Operability evaluations of "Unacceptable" test results include extrapolation adjustments to design basis conditions. "Acceptable" test results collected at less than design basis conditions do not receive extrapolation adjustments. It is recommended that VSE review 39DP-9ZZ01 to determine if extrapolation adjustments are required during evaluation of test data collected at less than design differential pressure.

Procedure 39DP-9ZZ01 does not include an evaluation of thermal overload sizing based on test amperage data nor does it specify a maximum allowable inaccuracy for the dynamic test evaluations. Some evaluations have been completed with overall system inaccuracies as high as 80 percent. The recorded uncertainties are the result of using the best available test methods at the time the test was performed. VSE has indicated that these high uncertainties are included in the evaluation process. It is recommended that VSE review the testing methodologies used to reduce test result uncertainty.

Procedure 39DP-9ZZ01 specifies that, for gate and globe valves, the evaluated open peak cracking stem torque not exceed the "Required Stem Torque" value specified in 13-JC-ZZ-201.

The open peak cracking torque evaluation for 3JSIAHV0604 incorrectly compared the measured peak cracking torque of 27.4 ft-lbs against the "Unit Rated Torque" of 250 ft-lbs. The Required Stem Torque as shown in 13-JC-ZZ-201 is 130 ft-lbs. The error may have been the result of table look-up error or a misinterpretation of the form's line item description. The numerical comparisons performed in the dynamic test evaluations are not currently required to be independently reviewed. For a limited number of gate and globe MOVs, the calculated "Required Stem Torque" exceeds the valve open weak link torque limit. Therefore, the existing evaluation methodology should be revised to include a comparison of measured peak cracking torque with the lesser of valve "Weak Link Torque," "Valve Seismic Torque," and "Unit Rated Torque."

Review of 3JSIAHV0604 dynamic test data evaluation, noted that the MOVATS NOR files had to be corrected to reflect proper pressure transducer span number input. The open and close thrust NOR files also required correction. 39DP-9ZZ01 includes a verification of correct transducer conversion factors. CRDR # 9-3-0691 was initiated to address the correction and administrative control of MOVATS diagnostic NOR files.

Lack of a document trail between WOs, VSE Data Evaluations, and the resultant CRDRs, were identified as a program weakness.

Procedure 39DP-9ZZ01, *PVNGS Guidelines for Evaluation of Motor Operated Valve Dynamic Test Data*, specifies that a CRDR be initiated when the acceptance criteria has not been met. However, when a MOV did not meet acceptance criteria, there was no provision for placing that actuator back into the Program Schedule. Presently the CATS action process tracks further actions for retest, but in the cases reviewed, the retests fall outside of the GL 89-10 response date (CRDR 1-3-0216).

Procedure 39DP-9ZZ01 Section 3.5.5 requires that the responsible engineer select the evaluation criteria and methods depending on design basis requirements, MOV configuration, and dynamic test methods used. Section 3.5.6.3 requires the evaluation criteria "Open Stem Factor" to be applicable to flow over-the-seat (OTS) globe valves. An evaluation was not performed for Opening Stem Factor for the OTS globe valve 1JSIDHV0331.

3.2 Conclusions

Even though there were some minor weak areas identified, over all, the program as proceduralized adequately addresses the intent of GL 89-10. Test methods, equipment, and current technologies combined with the follow-up evaluations indicate the competency and dedication that PVNGS has to the MOV program.

3.3 Deficiencies

CRDR # 9-3-0691 was initiated to address the correction and administrative control of MOVATS diagnostic NOR files.

Opening Stem Factor for the over the seat globe valve 1JSIDHV0331 was not performed. CRDR 1-3-0453 was initiated to perform the required evaluation.

3.4 Recommendations

Review 39DP-9ZZ01 methodology used to evaluate open peak cracking torque for globe and gate MOVs. Consider the need for an independent review of dynamic test evaluation numerical comparisons.

Review the testing methodologies used to reduce test result uncertainty.

Review 39DP-9ZZ01 to determine if extrapolation adjustments are required during evaluation of test data collected at less than design differential pressure.

Provide documented explanation for those MOVs where testing at design basis differential pressure or flow is not practicable. Develop a formal plan to ensure that Phase 1 MOVs are capable of functioning at maximum design basis parameters.

Revise 39DP-9ZZ01 to document thermal overload sizing and test amperage (FLA & LRA) parameters.

Revise 39DP-9ZZ01 under static testing to include the requirement that dynamic test data evaluated as "acceptable" be forwarded to NED for thrust/torque calculation impact review.

Revise 32MT-9ZZ56 to include measurements of torque to evaluate performance with respect to motor, valve, and actuator torque limits.

Additional recommendations are included in Attachment C.

4.0 Periodic Verification (04.08)

4.1 Summary

The NRC has recommended that the surveillance interval be based on the safety importance of the MOV as well as its maintenance history, but that the interval should not exceed 5 years or 3 refueling outages. Computerized work order tasks are automatically generated on a refueling outage frequency. Computerized work order tasks from Model Work Orders are being developed to completely refurbish the GL 89-10 operators on a frequency of every fourth refueling (CRDR 910064.05, 06 & 07). GL 89-10 MOVs are to be refurbished on an "as needed" basis prior to performance of a dynamic test.

Procedures have been established which will identify grease degradation in MOVs. The inspection of the grease is thorough in that the internal cavity areas are viewed by removing the motor and the limit switch assembly. This inspection is performed by PM Tasks generated automatically on a refueling outage schedule. This is viewed as a strength in the program.
The Generic Letter requires licensees to ensure correct switch settings are maintained during the life of the plant. Statements found in recent NRC Part 2 Inspection Reports indicate that those licensees intending to satisfy this commitment on the basis of periodic static testing will be required to provide documented justification supporting a reliable correlation between MOV static and dynamic capability. This justification will be required within the schedule requirements of GL 89-10. Review of the existing implementation plan and program documents failed to identify the justified methods to be used to ensure that correct switch settings are maintained during the life of the plant.

39AC-9ZZ02, *Valve Services Maintenance*, Appendix G, provides a matrix for determining the post maintenance testing required depending on the maintenance performed. The matrix further establishes requirements for "as found" and "as left" testing. All

MOV maintenance activities have been included within this matrix.

The 39TI series procedures are used by VSE engineers to perform dynamic tests. The data is transferred from the 32MT-9ZZ56 procedure to the Test data evaluation forms controlled by the 39DP-9ZZ01 procedure. Engineering then performs a detailed analysis of the data to ascertain if the valve will function per design. The results of the engineering evaluation are not controlled and do not receive an independent review to ensure accuracy. However this data is governed by the requirements of a quality assurance record and based on recent problems in the area of data evaluation control (CRDR 1-3-0453) found during this assessmeat, the QA organization feels that this falls under Section 4.2.1.2 of the Operations QA Plan and the data should be controlled.

4.2 Conclusions

Existing procedures and programs result in performance of preventive maintenance tasks on a regular frequency. Although the interval has not been adjusted to compensate for component safety significance or maintenance history, it does satisfy NRC requirements.

Existing procedures adequately identify retest requirements for specific corrective maintenance performed on MOVs.

Existing implementation plan and program documents do not identify and/or justify methods to be used to ensure that the required dynamic capability of program MOVs is maintained during the life of the plant.

4.3 Deficiencies Identified

Dynamic test data is not being controlled as a quality assurance record as required by the Operations QA Plan. CRDR 1-3-0426 was initiated.

4.4 Recommendations

Preventive Maintenance Equipment Qualification (PM EQ) Maintenance Work Tasks #047415 (Valve #037) and #048565 (Valve #0604) all reference Maintenance per 32MT-9ZZ48. This procedure has been cancelled according to DDC. The tasks referenced require updating to reflect the correct procedure.

Investigate the possible correlation between static and dynamic capability to justify the periodic verification of dynamic capability on the basis of static testing.

Additional recommendations are included in Attachment C.

5.0 MOV Failure Trending (04.09)

5.1 Summary

A review of MOV failure data for the 11 valves in the assessment sample was conducted to determine the adequacy of the Failure Data Trending (FDT) program (NPRDS). The data was reviewed to determine if root cause of failure was being evaluated when appropriate, and to ensure these failures were being trended. Root cause of failure is being evaluated when appropriate and the valves are being properly trended by the FDT program. The review also determined that there was consistency between the NPRDS database and the SIMS database.

Procedures need to be established by VSD to programmatically capture the GL 89-10 commitments to failure trending. The NRC recommends that procedures be established to analyze as-found deteriorated conditions, malfunctions, tests, inspections, and repairs or alterations on MOVs. This data is required to be periodically reviewed (every 2 years of after each refueling outage). Procedures need to define the necessary parameters to be obtained from the FDT Coordinator. The procedures should also specify the various departmental responsibilities. The FDT program was queried using valve identification numbers to produce information on valve type and function of a specific valve using the valve identification number only. The information obtained indicated that the data could be retrieved in such a manner as to indicate function and type of valve, if so requested.

Performance Engineering is responsible for MOV performance trending as delineated in Section 3.5 of Procedure 39PR-9ZZ01. A database is currently being developed by Performance Engineering for trending historical data, and is scheduled to be on-line on or before the currently committed completion date for the GL 89-10 program. The database will trend limit switch settings, running/inrush current, stroke time, lubrication, spring pack displacement, and torque/thrust values. The process of

obtaining data for the performance monitoring database is not programmatically controlled and not all relevant data is being captured. The conclusions reached by the use of this data may not be accurate. It is recommended that the accuracy of the information be verified either before or after data is entered.

GL 89-10 indicates that "Each MOV failure and corrective action taken, including repair, alteration, analysis, test, and surveillance, should be analyzed or justified and documented." Data from dynamic tests are evaluated and classified as "acceptable," "unacceptable," or "disqualified;" however, "unacceptable" data are not included in the performance trending program.

ITI MOVATS ER 5.2, Limitorque Actuator Open vs. Close TMD Data Analysis Procedure has been used in various calculations (EER 92-MO-179) but is not controlled. This ER has not been incorporated into VTM M459-001.

5.2 Conclusions

Trending through NPRDS has resulted in significant improvements since 1991. The FDT data base can be queried to search for a variety of subjects. This program meets the requirements of GL 89-10.

Historical data trending is weak. The process of obtaining data for the performance monitoring database is not programmatically controlled and not all relevant data is being captured. The conclusions reached by the use of this data may not be accurate. It is recommended that the accuracy of the information be verified either before or after data is entered.

5.3 Deficiencies

The process of data gathering for MOV performance should be programmatically controlled to ensure all relevant data is captured in a complete and accurate database. CRDR 9-3-0689 was initiated.

ITI MOVATS ER 5.2, Limitorque Actuator Open vs. Close TMD Data Analysis Procedure has been used in various calculations (EER 92-MO-179) but is not controlled. This ER has not been incorporated into VTM M459-001. CRDR 9-3-0690 was initiated.

5.4 Recommendations

Verify performance trending data before and/or after data entry.

Consider "unacceptable" data from dynamic tests for inclusion in the performance trending program.

Procedures need to be established by VSD to programmatically capture GL 89-10 commitments to failure trending. Procedures need to define the necessary parameters to be obtained from the FDT Coordinator. The procedures should also specify the various departmental responsibilities.

Additional recommendations are included in Attachment C.

6.0 GL 89-10 Program Schedule (04.10)

6.1 Summary

APS committed to comply with the program schedule suggested in GL 89-10, *Motor-Operated Valve Testing and Surveillance*, with one exception. This commitment requires APS to complete the program for each unit within five years or three refueling outages of June 28, 1989. The one exception was described in a January

10, 1992 letter to the NRC wherein APS informed the NRC that the schedule for Unit 2 would be extended through the 5th refueling outage or approximately 90 days beyond the five year time frame delineated in the generic letter.

The APS MOV program schedule tracks the completion of motor operator rewiring and initial static and dynamic testing. The rewiring of MOV actuators is complete. Attachment G depicts the current schedule for completion of the remaining initial static and dynamic tests and includes some valves designated for retesting. The schedule will result in the completion of the remaining initial static and dynamic tests by the committed end date of the program.

Initial static testing is 99 percent complete in Units 1 and 2 and 96 percent complete in Unit 3. As shown in Attachment H, initial dynamic testing is currently 41 percent complete in Unit 1 (and is scheduled to be 73 percent complete following refueling outage 1R4), 74 percent complete in Unit 2, and 53 percent complete in Unit 3.

Extensive evaluation and corrective actions (i.e., revision of MOV calculations, valve modifications, and/or valve retesting) may be required following dynamic testing as depicted in Attachment F. These activities are not included in the program schedule. From discussions with Valve Services Department personnel it has been concluded that the scope of the program required to be complete to satisfy GL 89-10 has not been clearly defined. The generic letter requires that the NRC be informed, if the program schedule cannot be met.

NUMARC and the NRC were contacted regarding the scope of activities required to be complete in order to consider the GL 89-10 program complete. Both organizations indicated this has not been clearly defined. The NRC indicated an internal workshop was going to be conducted to address this issue. In general, the representatives of these organizations indicated that to achieve closure, MOVs within the program need to be set up based on

dynamic test data and valve operability needs to be demonstrated.

The NRC recommended the development of a detailed plan and corresponding schedule which describe the activities which APS intends to conduct by the completion date of the program. This schedule should be available on site for NRC review. If this schedule changes the current commitment to the NRC, then it should be submitted to the NRC in accordance with the requirements of GL 89-10.

The design basis review process represents a significant program activity with potential impact on thrust/torque calculations. The status of the design basis calculation review process, however, is not periodically updated.

6.2 Conclusions

The entire scope and schedule of the program to satisfy the requirements of GL 89-10 have not been clearly defined.

6.3 Deficiencies

None

6.4 Recommendations

The GL 89-10 Implementation Plan should be revised to more thoroughly define the scope of the program. A revised program schedule should be developed and, if necessary to meet the requirements of GL 89-10, submitted to the NRC prior to the upcoming MOV team inspection.

The design basis calculations status should be updated periodically.

7.0 MOV Design Control & Testing (04.11)

7.1 Summary

Design Control

The *Operations Quality Assurance Plan* states that controls must be in place for the establishment of design changes. The QA Plan also states that the design bases, safety analysis, design criteria, codes and standards, and Plant Technical Specifications, including all amendments, shall be translated into design documents and reviewed during the design process. The following procedures were reviewed to ensure that they meet the requirements of the QA Plan:

- 83PR-0CC01, Rev. 00.03, *Configuration Management Program*
- 81DP-0TR01, Rev. 1.05, *Nuclear Engineering Division Qualification and Training*
- 81PR-0DC02, Rev. 3, *Plant Change Program*
- 81AC-0DC01, Rev. 4.03, *Procedure for Design Change*

These procedures meet the requirements set forth in Section 3.2, *Design Control*, of the *Operations Quality Assurance Plan*. The procedures provide the programmatic requirements to ensure that design change documents are controlled and will include all the areas outlined in the QA plan. 81DP-0TR01 requires that only qualified individuals initiate design change documents and that those individuals meet the requirements of Section 2.7 of the *Operations Quality Assurance Plan*.

Testing

Procedure 39PR-9ZZ01 requires the valves in the MOV program to be dynamically tested prior to the closure date of the GL 89-10 commitment. Test failures are documented via the CRDR process for dynamic tests and on EERs for static tests. The static and dynamic test parameters are set per ICMODBs which have been established for interim control of the torque and thrust settings. Testing failures caused by hardware failures are captured under the NPRDS (FDT) for trending.

The assessment team reviewed the procedures used for diagnostic testing. Maintenance procedure 32MT-9ZZ56 has undergone extensive review and modifications, and is now easier to read and more comprehensive. The 39TI series procedures are used by VSE engineers to perform dynamic tests. The data is transferred from the 32MT-9ZZ56 procedure to the Test data evaluation forms controlled by the 39DP-9ZZ01 procedure. Engineering then performs a detailed analysis of the data to ascertain if the valve will function per design.

QA Involvement

To ensure compliance with applicable regulations and requirements, PVNGS oversight groups conducted audits and assessments of the MOV Program in accordance with the *PVNGS Operations Quality Assurance Plan*.

The following is a list of significant PVNGS oversight activities related to the MOV program:

- 03/91 *U-3 Outage Modification Evaluation* (TQE)
- 07/91 CAR 91-0021, *EERs Improperly Used* (TQE)
- 11/91 FE 91-34, *Safety-Related MOV Switch* Setting (ISE)
- 08/92 QDR 92-013? *Control and Maintenance of Computer Sof are* (QA&M)

The NRC has noted a la[illegible]chnical monitoring to determine overall adequacy of the MOV activities. Subsequently, NRC Inspection Report 93-17 stated that QA involvement in the initiation and closure of CAR 91-0021 was strong. QA has displayed an aggressive role in broadening the scope of concerns and elevating problems to appropriate levels of management.

The assessment team also looked at Quality Control activities pertaining to MOVs. QC has implemented a plan to cross-train individuals in valve service maintenance, including diagnostic evolutions. Quality Control has recently scheduled maintenance training on various MOVs (the same training technicians receive) and has assigned inspectors to Valve Services Maintenance to obtain first-hand experience on the disassembly/reassembly of MOV actuators. Plans to include inspectors in the MOVATS diagnostic training in the future will add to the technical expertise of QC inspectors. The involvement of Quality Assurance in the MOV Program has been limited and needs to be strengthened.

Training

Training and personnel qualifications of the Valve Service Department were reviewed. Two engineers in VSE were not current on their required training.

Training Procedure 15DP-0TR66 was reviewed and it was noted that Sections 3.4.2 and 3.5.5 of the procedure reference appendices in procedure 15AC-0TR01 which do not exist. 15DP-0TR66 needs to be revised to reference the correct procedure.

Appendix M, of 15DP-0TR66 applies only to the Valve Service Maintenance Personnel. The training requirements for the MOVATS 3000/3386 series training is specified in Appendix M under course numbers NVM06, NVM07, and NVM10. These numbers could not be cross-referenced to Section 4 of the procedure which lists the prerequisites as well as the retraining intervals. 15DP-0TR66, Section 3.5.2, states that the *Site Maintenance and Modification Training Program* is organized into courses and these courses are implemented in settings that may consist of classroom, training laboratory, computer-based, self-study, on-the-job and vendor presented training. Section 3.5.3 states that courses shall be successfully completed to establish and maintain qualifications, however, training necessary to obtain and continue to maintain qualifications for MOVATS is not defined. The initial selected training courses (Section 4.0) are required to have the retraining intervals listed for the Valve Service Technicians who are qualified for MOVATS Testing.

PVNGS has committed to INPO to provide 16 hours of training in MOV Industry Events and 16 hours of position specific training. A review of records indicate that members of VSE have received more hours of training than was committed. In addition, several members of VSE are active members of the MOV Users Group (MUG). The knowledge level and experience of program personnel is considered to be a program strength.

7.2 Conclusions

Programmatic controls have been established in the area of design control which meet the requirements of the Operation Quality Assurance Plan.

Quality Assurances involvement in the MOV Program is limited. Although QA has taken a strong position on certain issues, QA's overall involvement should be increased.

Appendix M and Section 4.0, of 15DP-9TJ.66, need to reference the requirements for MOVATS qualification for initial and continuing training, with retraining intervals delineated.

7.3 Deficiencies

None

7.4 Recommendations

Increase overall QA involvement in the MOV Program.

Revise 15DP-0TR66 to reference the correct procedure.

Additional recommendations are included in Attachment C.

III. CONCLUSION

The MOV Program has significantly improved since the first NRC inspection in 1991. Most of the programmatic issues identified during that inspection have been resolved, resulting in a much stronger program. MOV personnel have been reorganized to improve coordination and effectiveness by combining maintenance and engineering resources under a single manager. Continued strong involvement by program personnel in industry groups and with program vendors has resulted in keeping the program current with day-to-day changes and advancements in technology. Improvements have reduced Palo Verde's reliance on contract personnel. Performance of actuator refurbishment prior to static baseline and dynamic testing is a strength in the testing program. The program includes diverse measurements of critical parameters including stem torque. Procedures have been created to control evaluation of dynamic test data and to formalize MOV retest requirements. The initial static testing of MOVs is nearly complete, and approximately 60 percent of the valves have been dynamically tested, as a result of an aggressive test program being established and followed.

Despite the anticipated conclusion of dynamic testing in accordance with the existing schedule, the scope of the GL 89-10 program needed to achieve completion of the program is not clearly defined. Substantial additional work in the form of calculation revisions, valve modifications, and additional testing or a combination of these, remains to be completed. The program does not delineate which of these activities needs to be completed in order to determine program completion. In addition, the completion of the design bases reviews and the resolution of a number of technical issues (e.g., degraded voltage, thermal binding and pressure locking, ambient temperature effects, diagnostic uncertainties, etc.) also need to be considered in the definition of program scope. Regulatory documents defining the MOV Program requirements do not contain clear guidance as to what is required to consider the program complete. The development of a detailed program scope document and schedule are necessary for determining if the committed schedule can be met.

Based on the scope of activities reviewed during this assessment, it is concluded that the technical elements and programmatic controls of the MOV Program are adequate to satisfy the requirements of GL 89-10. The deficiencies identified need to be corrected and, to further strengthen the program, the recommendations and suggestions should be addressed and implemented, as appropriate.

IV. DEFICIENCIES

During the assessment several deficiencies were identified and CRDRs were written. These deficiencies are categorized by assessment topic and presented below:

4.05 Design Basis Review

None identified.

4.06 MOV Sizing and Switch Setting Calculations

The insulated cable resistances used as input to Calculation 13-EC-MA-221 are based on 90°C rather than the UFSAR design basis accident temperatures No justification could be found for this engineering assumption (Per VSE, the 90° C is an industry standard engineering assumption). (CRDR # 9-3-0709)

The impact of Appendix K, Note 9 needs to be evaluated with respect to the Auxiliary Feedwater operability requirements of Technical Specification 3.7.1.2. (CRDR # 2-3-00551).

4.07 Design Basis Capability

MOVATS diagnostic NOR files have a potential to be incorrect and are not properly controlled. (CRDR # 9-3-0691)

An evaluation was not performed for Opening Stem Factor for the over the seat globe valve 1JSIDHV0331. (CRDR # 1-3-0453)

4.08 Periodic Verification

Dynamic test data is not being controlled as a quality assurance record as required by the Operations QA Program. (CRDR #9-3-0710)

4.09 MOV Failure Trending

The process of capturing data for the MOV performance database needs to be programmatically controlled to ensure all relevant data is captured. (CRDR # 9-3-0689)

A vendor document has been used to perform engineering evaluations though it is not controlled. (CRDR # 9-3-0690)

4.10 GL 89-10 Program Schedule

None identified.

4.11 MOV Design Control & Testing

None identified.

V. RECOMMENDATIONS

In the course of the assessment a number of issues were identified which the assessment team determined required a response from the responsible organization but which did not constitute a deficiency. Some of the more significant recommendations are delineated in the body of this report. An entire list of the recommendations is contained in Attachment C and can be identified in the database by their Category II designation.

VI ATTACHMENTS

Attachment A - Assessment Plan

Attachment B - Cross-Utility Review of GL 89-10 Inspection Reports

Attachment C - Assessment Database

Attachment D - Assessment Sample MOV Spreadsheet

Attachment E - Assessment Sample MOV Test Evaluation Status

Attachment F - PVNGS GL 89-10 MOV Test, Evaluation, and Rework Process

Attachment G - PVNGS GL 89-10 Implementation Schedule

Attachment H - MOV Dynamic Testing Completion Status

TQE ASSESSMENT NO 93-02
GENERIC LETTER 89-10
MOTOR OPERATED VALVE PROGRAM ASSESSMENT

ATTACHMENT A

ASSESSMENT PLAN

PVNGS MOTOR OPERATED VALVE PROGRAMMATIC ASSESSMENT

Independent Safety & Quality Engineering
Assessment Plan
July 1993

I. OBJECTIVE

The objective of this assessment is to evaluate the implementation and determine the effectiveness of the PVNGS Motor Operated Valve (MOV) program with respect to Generic Letter 89-10, "Safety-Related Motor Operated Valve Testing and Surveillance," to ensure that MOVs are capable of performing their intended safety functions.

II. SCOPE

This assessment will include a review of the MOV program for safety-related systems in accordance with Generic Letter 89-10 and evaluate the implementation of the generic letter by sampling MOVs for a detailed review.

III. ASSESSMENT TEAM

The assessment team will be comprised of individuals from the following organizations:

Organization	Projected Support
ISQE	2 Engineers (including the Team Lead), 1 Specialist
Engineering (MOV Group)	1 Engineer
Engineering (Design)	1 Engineer
NRA	1 Consultant
QC	1 Inspector
Other Utilities (SONGS, Diablo Canyon)	1 to 2 Engineers / Consultants

IV. SCHEDULE

Assessment Milestones	Est. Duration	Forecast
Draft Assessment Plan		7/7/93
Identify Assessment Team		
Assessment Team Kick-off Meeting		
Finalize Assessment Plan		
Management Notification		
Perform Assessment	4 Weeks	
Evaluate Results / Develop Conclusions	4 Days	
Draft Final Report	1 Week	
Review Issues with Impacted Organizations		
Incorporate Comments / Suggestions		
Approve and Issue Final Report		
Exit Meeting		9/1/93

Assessment Lead: Stuart Scow Date 7/8/93

Assessment Approval: Ram Prabhakar Date 7/9/93

TQE ASSESSMENT NO 93-02
GENERIC LETTER 89-10
MOTOR OPERATED VALVE PROGRAM ASSESSMENT

ATTACHMENT B

CROSS UTILITY REVIEW OF GL 89-10 INSPECTION REPORTS

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
The inspectors noted that the methods used to evaluate data from design basis testing did not ensure that MOVs could perform their safety function under design basis conditions. "The inspectors explained that since most of the dp tests were performed at less than full dp, an engineering evaluation of the test results was required in order to demonstrate design basis capability of each MOV." Inspectors considered these extrapolations to be the first stage of a two-stage approach, and stated the licensee is expected to justify the method of extrapolation by GL 89-10 schedule completion date. One licensee agreed to change procedures and program as required to provide a short term evaluation of dynamic test results prior to return of an MOV to service, including extrapolations to design basis conditions. Similar changes would be made for a long term evaluation of dynamic test results, including such considerations as valve factor, stem friction coefficient, and available margin.	1, 5, 8, 11	PVNGS 39DP-9ZZ01 does not extrapolate test results to design basis conditions where applicable. VSE to review the need to perform extrapolation adjustments during evaluation of dynamic test data obtained at less than design basis conditions.	RFI 04.07.01
The licensee indicated that static testing would be used for periodic verification to assure that proper switch settings are maintained during the life of the plant. However, the licensee had no objective evidence to establish a reliable correlation between static and dynamic tests. The inspectors indicated the licensee must establish such a correlation before static tests can be used for this purpose.	1, 2, 5	PVNGS has not established correlation between static and dynamic tests.	Weakness RFI 04.08.04
Licensee did not plan periodic refurbishment.	1	PVNGS program requires periodic refurbishment.	Strength

PVNGS GL 89-10 MOV ASSESSMENT ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Licensee did not plan to dynamically test MOVs if at least 80% of design basis dp and flow could not be achieved. NRR to review. Inspectors were concerned that dynamic tests conducted at d/p and flow significantly less than design basis indicate characteristics of static tests and may be invalid.	1, 5	PVNGS intends to perform a dynamic test on all program valves, as practicable. No minimum test conditions criteria has been established. However, PVNGS could save resource by not dynamically testing MOVs if at least 80% of design basis dp and flow cannot not be obtained.	RFI 04.07.10
The licensee's MOV coordinator's close involvement in planned maintenance testing, static and dp testing was noted by the NRC as a program strength.	1	PVNGS uses an MOV coordinator in support of outage scheduling, refurbishment, rework, and retest activities.	Strength
The licensee's program for processing and control of operating experience and vendor notifications reviewed and found to be acceptable.	1, 4	Open Item.	RFI 04.03.09
The licensee's self assessment was performed with appropriate depth and objectivity, but was limited in scope to just MOV setpoint control.	1	PVNGS self assessment scope was opened to include all of the activities of GL 89-10.	Strength
The licensees use of PRA to prioritize MOV testing was noted by the NRC as a program strength.	2	PVNGS uses PRA to prioritize MOV testing.	Strength
The licensee could not produce a schedule outlining dynamic testing. This was noted by the NRC as a program weakness.	2	PVNGS has a GL89-10 schedule summarized in a memorandum from M.R.Hooshmand to M.S.Coppock dated January 22, 1993 (320-00236-MSC/MRH). The schedule should be revised to reflect present status, and also should be revised to address the additional retesting specified in the dynamic test CRDR evaluations.	Weakness RFI 04.02.01
Licensee's increased management attention and staff coordination in the area of MOVs was noted by the NRC as a program strength. For a different utility, the inspector noted that the licensee had a designated group assigned to MOV maintenance. This was considered by the NRC as a program strength.	2, 11	PVNGS has reorganized the Valve Services group to improve coordination and effectiveness.	Strength

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Licensee calculated that some of his MOVs have the capability to support a valve factor of 0.5 and a stem friction coefficient of 0.2, and licensee decided that because of this substantial capability those MOVs would not be subjected to design basis testing. Inspectors were concerned that this approach may not be bounding. Licensee agreed to refine the approach and include grouping to demonstrate that the methodology would be bounding for each group.	2	PVNGS has not tried to justify elimination of dp testing on the basis of actuator capability. However, PVNGS may potentially save resource by performing similar calculations to identify those MOVs with sufficient capability to justify deletion of design basis testing.	RFI 04.06.03
The licensee's trending program covered an expansive range of data and appeared to trend all the known trendable parameters. This was noted by the NRC as a program strength.	2	Open Item.	RFI 04.02.17 RFI 04.02.21
Licensee did not evaluate valve factors and motor capability in the open direction.	2	PVNGS evaluates valve factor in both directions.	Strength
Licensee did not apply appropriate accuracy adjustments data outside the calibration range.	2	PVNGS disqualifies test evaluations that involve test data recorded outside of correctable calibration limits.	Strength
Licensee calculated valve factor based on thrust measured at seat contact. This point was not always the highest thrust recorded in the stroke of the valve. Licensee calculated the stem factor based on CST instead of flow cutoff.	2, 5	PVNGS determines valve factor and stem factor based on thrust measured at point of maximum dynamic force.	Strength
Licensee uses a Potential Condition Adverse to Quality Report review process to ensure thorough root cause evaluations and corrective actions. This was noted by the NRC as a program strength.	3	PVNGS uses the CRDR program to ensure proper root cause analysis and corrective actions.	Strength

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Licensee's design basis calculations of flowrate and differential pressure were not complete. This was noted by the NRC as a program weakness.	3	PVNGS design basis calculations require review to remove excessive conservatism, and compare calculations with the operating procedures to ensure that the worst case operating conditions are enveloped by the design basis flowrates and differential pressures. The review process id rigorous and detailed.	Strength & Weakness RFI 04.06.09
Licensee's thrust calculations to support the program were not complete. This was noted by the NRC as a program weakness.	3	PVNGS thrust and dp calcs require incorporation of revised degraded voltages and revised design basis flow and dp requirements.	Weakness RFI 04.06.24
Licensee did not provide guidance for setting open torque switch settings. This was noted by the NRC as a program weakness.	3	PVNGS does establish and provide guidance for the adjustment of open torque switch setpoints.	Strength
Licensee had not completed significant number of dp tests. This was noted by the NRC as a program weakness.	3	PVNGS has completed a significant number of dp tests.	Strength
Licensee's MOVs that were dynamically tested greater than five years ago had not been retested in accordance with the recommendations for periodic verification contained in the GL. Inspectors considered the failure to complete the required periodic verification testing within a timeframe consistent with the GL to be a program weakness.	3	PVNGS has not addressed the issue of periodic dp testing.	Weakness RFI 04.08.04
Licensee did not formalize the post maintenance testing requirements into procedures. This was noted by the NRC as a program weakness.	3	PVNGS has formalized retest requirements into plant procedures.	Strength

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
The licensee's degraded voltage cable resistances were based on 90 Celsius. Inspectors determined that this assumption was non-conservative because cable temperatures inside containment may be as high as 128 Celsius during design basis event (LOCA). Cables in other parts of the plant may be exposed to temperatures as high as 223 Celsius during some high energy line breaks.	3	PVNGS degraded voltage calculation includes the assumption of 90 Celsius cable temperature. Open Item.	RFI 04.06.10
Inspectors noted the licensee's degraded voltage calcs did not assume the worst case grid voltage as starting point per GL.	3	Open Item.	RFI 04.06.12 RFI 04.06.13
Inspectors noted that margin to account for MOV degradation was not included in the thrust calculations.	3, 5	PVNGS thrust/torque calculations do not include a margin factor to compensate for lubrication degradation over the maintenance interval. This issue is addressed by field instructions to adjust settings to the middle of the allowable band.	RFI 04.02.05
Inspectors noted that margin to account for rate-of-loading effect was not included in the thrust calculations.	3	PVNGS thrust/torque calculations include a d/p correction factor to compensate for load sensitive behavior for some, but not all MOVs in the GL 89-10 program.	RFI 04.06.06
The inspectors considered the licensee's lack of a formal trending program to be a program weakness. Trending parameters such as thrust, torque switch setting, valve factor, and stem factor were recommended. Licensee did not have a formal program in place to trend MOV degradation through use of as-found data.	3, 4	PVNGS trending program not yet in place to record measured valve factor, stem factor.	Weakness RFI 04.09.03
Inspectors noted that a program to specifically evaluate MOV test data was not in place at the time of the inspection, and lack of an evaluation program was considered a program weakness. Acceptance Criteria needs to be clear, precise, concise and complete.	3	PVNGS uses procedure 39DP-9ZZ01 to specifically evaluate MOV dp test data.	Strength

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Inspectors noted the program description was not current and did not stand alone as documentation of GL 89-10 activities.	4	PVNGS Implementation Plan is not current.	Weakness RFI 04.02.01
Inspectors were concerned that overly conservative values specified as design basis operating conditions did not clearly establish conditions for required MOV operability. Also, inspectors found that settings had been adjusted based on unreviewed contractor design basis calculations. Inspectors concluded the licensee's program had not yet adequately established the design basis for each MOV. During an inspection of a different utility, inspectors noted that all design basis reviews and initial calculations for valves considered necessary for Unit 1 operation had been completed. This was considered by the NRC as a program strength.	4, 11	PVNGS is currently reviewing revised design basis calculations to remove excessive conservatism, and identify potential changes to operating procedures that would reduce the design basis requirements. The revised design basis calculations have not been entered as input into the thrust calculations.	Weakness RFI 04.06.09
Licensee imposed margins (0.5 valve factor, 20-25% stem factor degradation, 20% rate of loading, 10% diagnostic inaccuracy and switch repeatability) to support operability. Licensee also required that dp test results be analyzed to validate valve factor. This was noted by the NRC as a program strength.	4	PVNGS setpoints do not include margins for stem factor degradation. Setpoints are being adjusted to include a margin for rate of loading effects. Setpoints already include adjustments to compensate for diagnostic inaccuracy and switch repeatability. Only failed dp test criteria are reviewed against calculation assumptions.	Strength & Weakness RFI 04.06.37
Licensee had not considered the effects of seismic dynamic loads in their calculations to determine required valve stem thrust.	4	PVNGS calculations include the assumption that minimum thrust/torque setpoints do not require an adjustment to compensate for the effects of a seismic event simultaneous with MOV actuation.	RFI 04.06.08
Licensee was unaware that Limitorque selection criteria required motor starting torque for certain DC motors to be derated for ambient temperature exceeding 340F.	4	Open Item.	RFI 04.06.25

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Inspectors emphasized the need to obtain test data from design basis testing to verify that the TOL sizing assumptions are appropriate for operation under both normal and design basis conditions.	4	PVNGS does not currently review design basis test data to confirm adequate TOL sizing.	Weakness RFI 04.07.04
Inspectors noted that licensee used motor starting current or five times motor full load amps instead of locked rotor current for degraded voltage conditions. Inspectors consider the use of any current less than locked rotor to be nonconservative. However the licensee used power factors of 0.8 and 0.9 for 1800 rpm and 3600 rpm motors respectively compared with the les conservative industry value of 0.6. The licensee's use of conservative power factors and non-conservative motor starting current was identified as a follow up item. Inspectors stated licensee needs to review the power factors assumed in the degraded voltage calculation relative to the information provided by Limitorque in its Update Letter 92-02. This was identified in the report as a concern. Inspectors noted that licensee did not include a margin to account for tolerances in the bus undervoltage relay setpoints in the degraded voltage calculations	4, 12	Open Item.	RFI 04.06.20 RFI 04.06.21 RFI 04.06.23
Although the work control process administratively ensured that the dynamic test data was reviewed before the equipment was returned to service, the inspector was concerned that there was no specific timeframe for the engineering review of the test data. Reliance on administrative work controls to ensure data evaluation complete prior to return to service was considered a program weakness.	4	PVNGS evaluates dynamic test data within the schedule requirements identified in 39DP-9ZZ01. However, evaluations and operability impact determinations are not necessarily complete prior to restoration of operability.	Weakness RFI 04.06.09

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Inspectors noted that licensee did not consider valve structural limits in the evaluation of MOV capability.	5	PVNGS thrust calculations include valve weak link values.	Strength
Inspectors noted that licensee measured strain gage thrust, springpack displacement, motor current and switch actuations, and considered the licensee's diverse measurements to be a program strength.	5	PVNGS measures stem thrust and torque using strain gages where possible, and springpack displacement, switches, and motor current. In addition, upstream and downstream pressure transducers are used where possible.	Strength
Inspectors noted that additional training may be warranted to minimize errors in the marking and evaluation of diagnostic traces, and in the recognition of trace anomalies. Inspectors noted that no provisions had been established for refresher training on actuator maintenance or diagnostics. This was identified in the report as a concern.	5, 12	Open Item.	RFI 04.11.10
Inspectors noted that methods used of zeroing diagnostic traces were not consistently applied.	5	PVNGS procedure 39DP-9ZZ01 provides some guidance in the determination of trace zeroes, and 32MT-9ZZ56 provides direction for application of the "absolute zero" methodology with Movats equipment.	Strength & Weakness RFI 04.07.06
Inspectors noted that the valves were not verified fully closed prior to the open stroke dp test.	5	PVNGS performs static strokes prior to dp strokes to ensure diagnostics are functioning properly, and to verify proper position before dynamic testing.	Strength
Inspectors noted that the torque switch repeatability evaluation was either delayed or not addressed.	5	PVNGS setpoint adjustments and dynamic test evaluations include torque switch repeatability limitations as defined by Limitorque.	Strength
Inspectors noted thrust calculations using running efficiency in the open direction, contrary to the recomendations of Limitorque.	5	PVNGS typically uses pullout efficiency for open direction thrust calculations, but there are some exceptions.	RFI 04.05.07

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Inspectors noted that the observed packing load was not factored into the licensee's thrust equation.	5	Because PVNGS uses "Min Available" setpoints, variations in non-rotating stem packing load are not a critical factor in the thrust calculation. For rising rotating stem MOVs, packing load is torque and is compared with allowable values specified in the ICMODB to ensure that calculation assumptions are not violated. However, static data sheets for butterfly valves should be revised to ensure that running load torque is verified within the limits identified in the ICMODB notes.	Strength & Weakness RFI 04.06.05
Inspectors informed the licensee that the assumptions used to account for MOV degradation need to be justified before the scheduled completion date of the GL 89-10 program. NRC stated that stem lubrication degradation will be generically inspected at each site during closeout of GL 89-10 Phase 2 inspection.	6, 8	PVNGS has not justified the assumptions used to account for MOV degradation.	Weakness RFI 04.06.11
For evaluations of test data obtained at 80% of design basis conditions, the licensee used straight line extrapolation to determine output thrust at design basis dp. The linear extrapolation method was not verified by test data. To address this concern, licensee planned to perform multi-point dp tests on two valves, and the results of these tests will be applied to the rest of the MOVs, in conjunction with EPRI test results if available. Licensee was informed that the assumptions used in the linear extrapolation methodology must be justified within the time limitations of GL 89-10.	6, 7	PVNGS has not addressed the need to perform multi-point testing to collect data required to justify extrapolation methods.	Weakness RFI 04.07.01

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Inspectors noted as a program strength the establishment of a rigorous testing sequence for each MOV, including as-found static test, actuator refurbishment, dynamic test at reduced voltage, baseline static test, and an as-left static test. Inspectors considered the refurbishment of MOVs prior to baseline and dp testing to be a program strength.	7, 11	PVNGS has established a similar testing sequence including static as-found test, actuator refurbishment, static as-left test, and dynamic tests.	Strength
The licensee was requested to identify all MOVs which could be categorized as marginal and to reevaluate the capability of those MOVs using supportable assumptions and factors that account for all known sources of inaccuracy. The licensee identified 69 MOVs that did not have at least a 15% design margin available above minimum thrust requirements. The 69 MOVs were reevaluated using less conservative criteria and were found to have sufficient capability to perform their safety function. The licensee subsequently identified modifications or other actions required to permit the marginal MOVs to meet the standard design criteria. Implementation was scheduled to occur over the next two refueling outages.	8	PVNGS has performed similar kinds of screens to determine marginal valves, but has not yet initiated design changes to improve MOV capability.	RFI 04.06.04
Inspectors considered the inability to generate a work history sorted by valve tag number for the GL89-10 MOV valves and the manual retrieval of work histories to be a weakness.	9	PVNGS SIMS system allows computerized retrieval of MOV work histories.	Strength
Inspectors noted that the licensee revised plant hydrostatic test procedures to require post-test venting of the bonnets of any flex-wedge or double disc gate valves used as hydrostatic test boundaries.	11	PVNGS dynamic test procedures that involve the use of a hydro pump need to be revised to include post-test venting of the bonnets of any flex wedge or double disc gate valves used as test boundaries.	Weakness RFI 04.07.08

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "B"
CROSS UTILITY REVIEW OF NRC GL 89-10 INSPECTION REPORTS

NRC Inspection Report Comments	Utility	MOV Assessment Remarks	MOV Assessment
Licensee agreed to include a general definition and description of the two-stage approach in the MOV program by April 1, 1993.	11	PVNGS implementation plan and procedures do not include a clear description of the two-stage approach that is in use.	Weakness RFI 04.07.11
Licensee committed to evaluate impact of degraded voltage conditions on DC powered stroke MOV stroke times.	11	PVNGS DC degraded voltage recalculation is not complete.	Weakness RFI 04.06.22
Licensee agreed to develop a system to effectively track completion of all MOV program elements.	11	PVNGS formerly used the Business Plan as a method for prioritizing and tracking completion of GL 89-10 activities. Use of the business plan has been discontinued, and a replacement method of prioritizing and tracking activity has not formally been implemented.	Weakness RFI 04.02.01
The inspectors noted that the dynamic test procedures did not identify a differential pressure target value that the testers should expect at the time the dynamic testing was performed. Since the principal intent of the testing is to demonstrate MOV operability at design basis dp, the inspectors consider that it is important to verify that acceptable pressures are achieved prior to testing. This was identified by the NRC as a concern.	11	PVNGS dynamic test procedures are being revised to include target differential pressure values.	Strength
1. Zion, Insp. 12/14/92. 2. Clinton, Insp. 1/14/93. 3. Davis Besse, Insp 7/29/92 4. Trojan, Insp. 5/22/92 5. MUG Report of Region IV Part 2 Insp Results 6. Monticello, Insp. 6/11/93 7. Wolf Creek, Insp. 5/7/93 8. Arkansas Nuclear One, Insp. 5/21/93 9. Comanche Peak, Insp. 3/19/93 10. South Texas, Insp. 3/26/93 11. Fitzpatrick, Insp. 2/5/93 12. Watts Bar, Insp. 3/10/93			

TQE ASSESSMENT NO 93-02
GENERIC LETTER 89-10
MOTOR OPERATED VALVE PROGRAM ASSESSMENT

ATTACHMENT C

ASSESSMENT DATABASE

GL 89-10 PROGRAMIC ASSESSMENT
MOV SUBJECT INDEX

SCHEDULE	LUBRI-CATION	DESIGN BASIS REVIEW	THERMAL OVER LOADS	TRENDING	TRAINING	DEGRADED VOLTAGE	POST-MAINT-ENANCE TESTING	DESIGN BASES TESTING	MOV SIZING & SWITCH SETTING
04-02-01	04-02-02 (C)	04-02-03	04-02-15	04-02-17 (C)	04-03-03 (C)	04-02-06 (C)	04-02-12 (C)	04-02-10 (C)	04-02-04
04-02-09 (C)	04-02-05	04-05-05	04-05-03	04-02-18	04-03-04 (C)	04-03-10 (C)	04-02-13 (C)	04-02-11 (C)	04-02-07
04-02-23 (C)	04-06-11 (C)	04-05-06	04-07-04	04-02-19	04-11-04	04-06-10 (C)	04-02-14 (C)	04-06-03	04-02-08 (C)
04-08-01 (C)	04-07-17 (C)	04-06-09		04-02-20 (C)	04-11-07	04-06-12 (C)	04-03-07	04-06-04	04-03-01
04-10-02	04-03-11 (C)	04-07-28		04-02-21 (C)	04-11-08	04-06-13 (C)	04-03-08 (C)	04-06-05	04-03-02
04-10-03 (C)		04-07-33		04-02-22 (C)	04-11-10	04-06-14 (C)	04-11-12	04-07-01	04-05-07
04-08-04		04-07-34		04-07-03	04-11-17	04-06-19	04-07-30	04-07-15	04-06-06
04-07-14		04-07-41		04-09-01	04-11-19	04-06-20	04-07-31	04-07-16	04-06-08 (C)
		04-06-07 (C)		04-09-03 (C)		04-06-21	04-07-32	04-07-19	04-06-15 (C)
				04-09-04		04-06-22	04-07-35	04-07-20 (C)	04-06-16 (C)
				04-09-05		04-06-23	04-07-36	04-07-21	04-06-17 (C)
						04-06-24	04-07-37	04-07-22	04-06-18 (C)
						04-06-26	04-07-39 (C)	04-07-23	04-06-25
						04-07-09	04-07-40	04-07-24 (C)	04-06-29
							04-03-06 (C)	04-07-26	04-06-30
STRAIN GAGES	VENDOR INFO	PRESSURE LOCKING/ THERMAL BINDING	GL 89-10 PROGRAM	LIMITER PLATES	CONFIG. CONTROL			04-11-05 (C)	04-06-31 (C)
								04-11-11	04-06-32
								04-07-10	04-06-33 (C)
								04-07-27 (C)	04-06-34
04-03-05 (C)	04-03-09 (C)	04-05-01 (C)	04-05-02	04-06-27	04-06-28			04-07-29	04-06-35 (C)
04-06-02 (C)	04-09-02 (C)		04-05-04		04-07-18 (C)			04-07-42 (C)	04-06-36 (C)
04-07-02	04-11-09		04-06-01		04-08-02				04-06-37
04-07-25	04-02-16 (C)		04-08-03		04-11-02				04-06-38 (C)
			04-08-05 (C)		04-11-03				04-06-39
			04-08-06		04-11-06				04-06-40
QA	SCOPE		04-08-07		04-11-13				04-07-25 (C)
OVERSITE			04-10-01		04-11-14 (C)				
04-11-15	04-02-24		04-07-11		04-11-18				
04-11-16	04-11-01 (C)				04-07-38				
	04-02-25								

(C)= Closed as of 09/17/93

MOV ASSESSMENT TEAM
GENERIC LETTER 89-10 PROGRAMMATIC ASSESSMENT
September 24, 1993 @ 2:06 pm

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Chuck Rath	04.02.01	The APS Business Plan was originally used to identify, assign, prioritize, coordinate, and monitor progress of GL 89-10 activities. The Business Plan has been discontinued and a replacement system has not formally been implemented. Current MOV program schedule only addresses dynamic testing. Need to add to the schedule evaluation and resolution of test data including revision of MOV calculations, modifications of MOVs, etc. **Action Category II** The MOV Assessment Team recommends the following: 1) Install and maintain a PC/SUN based schedule management system solely for the use of Valve Services Group under the direct control of the MOV program manager to identify, prioritize, coordinate, and monitor progress of all GL 89-10 activities. 2) Evaluate overall schedule to determine if commitments to the NRC will be met. If not, provide revised schedule with justification to NRA for submittal to the NRC. **NOTE: PART 1 MOV INSPECTION ITEM**				
N/A	Ron Spencer	04.02.02	Page 5, Section 4.3.b of Part 1 Inspection (GL 89-10) the NRC recommends that APS formally accounts for lubrication degradation in setpoint controls and methodology. APS has no formal control over lubrication degradation. **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** Duplicate of 04.02.05	S. Scow	N/A	09/01/93
Mike Radoccia	Scott Bauer	04.02.03	Review of Design Basis - CE performed design basis evaluation. APS developed design basis review procedure (81DP-4DC10) afterwards. APS committed to review the CE pressure, flow, and differential pressure design input for all MOVs to verify compliance with procedure. APS committed to review the CE pressure, flow, and differential pressure design input for all MOVs to verify compliance with the design basis review Procedure 81DP-4DC10. **Action Category II** **NOTE: PART 1 MOV INSPECTION ITEM**				
Terry Lui	Scott Bauer	04.02.04	Sizing MOVs and calculating Switch Settings - NRC found weaknesses in the method for sizing MOVs and calculating switch settings. Revised program issued during the inspection to address weaknesses. **Action Category II** **NOTE: PART 1 MOV INSPECTION ITEM**				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Scott Bauer	04.02.05	Stem Friction Coefficient - NRC recommended that APS consider the need to more formally account for lubrication degradation in the setpoint controls and methodology. 1) VSE to develop methodology and revise diagnostic test procedures to include recording of as-found and as-left stem factor, where possible, to establish justification for lubrication degradation assumptions to be made; and 2) NED to consider the options suggested below to address NRC concerns and to identify a lubrication degradation margin in the thrust calculation. Option #1) for rising stem valves, the minimum required thrust valves can be calculated first on the basis of 0.15 friction factor and then on the basis of 0.18 friction factor. The difference between the calculated values would represent the reduction in output thrust due to a 20% degradation in step friction coefficient. This difference could be used as a calculated lubrication degradation factor that could be formally included into the 13-JC-ZZ-201 calculation. A statistical analysis of as-found and as-left data could be performed to justify the percent degradation used in the calculation (i.e., the 20% figure used here is only hypothetical and may or may not be conservative). Option #2) Take credit for the calculation's conservative use of 0.2 friction coefficient in its determination of minimum required thrust, and assume that use of 0.2 includes sufficient margin to compensate for lubrication degradation between maintenance intervals. Revise procedures to explicitly require that stems be lubricated prior to any as-left static diagnostic test. A statistical analysis of as-found and as-left data would be required to justify the percent degradation used in the calculation. **Action Category II** The current 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation does not include a margin factor to compensate for component degradation over the maintenance interval. Margin for lubrication degradation is presently addressed by the note in the ICMODB that calls for settings to be adjusted high in the band. **NOTE: PART 1 MOV INSPECTION ITEM**				

MOV ASSESSMENT TEAM
GENERIC LETTER 89-10 PROGRAMMATIC ASSESSMENT
September 24, 1993 @ 2:06 pm

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Chuck Rath	04.02.01	The APS Business Plan was originally used to identify, assign, prioritize, coordinate, and monitor progress of GL 89-10 activities. The Business Plan has been discontinued and a replacement system has not formally been implemented. Current MOV program schedule only addresses dynamic testing. Need to add to the schedule evaluation and resolution of test data including revision of MOV calculations, modifications of MOVs, etc. Action Category II The MOV Assessment Team recommends the following: 1) Install and maintain a PC/SUN based schedule management system solely for the use of Valve Services Group under the direct control of the MOV program manager to identify, prioritize, coordinate, and monitor progress of all GL 89-10 activities. 2) Evaluate overall schedule to determine if commitments to the NRC will be met. If not, provide revised schedule with justification to NRA for submittal to the NRC. **NOTE: PART 1 MOV INSPECTION ITEM**				
N/A	Ron Spencer	04.02.02	Page 5, Section 4.3.b of Part 1 inspection (GL 89-10) the NRC recommends that APS formally accounts for lubrication degradation in setpoint controls and methodology. APS has no formal control over lubrication degradation. **NOTE: PART 1 MOV INSPECTION ITEM**	Closed: Duplicate of 04.02.05	S. Scow	N/A	09/01/93
Mike Radoccia	Scott Bauer	04.02.03	Review of Design Basis - CE performed design basis evaluation. APS developed design basis review procedure (81DP-4DC10) afterwards. APS committed to review the CE pressure, flow, and differential pressure design input for all MOVs to verify compliance with procedure. APS committed to review the CE pressure, flow, and differential pressure design input for all MOV: ω verify compliance with the design basis review Procedure 81DP-4DC10. Action Category II **NOTE: PART 1 MOV INSPECTION ITEM**				
Terry Lui	Scott Bauer	04.02.04	Sizing MOVs and calculating Switch Settings - NRC found weaknesses in the method for sizing MOVs and calculating switch settings. Revised program issued during the inspection to address weaknesses. Action Category II **NOTE: PART 1 MOV INSPECTION ITEM**				

MOV ASSESSMENT TEAM
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PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Scott Bauer	04.02.05	Stem Friction Coefficient - NRC recommended that APS consider the need to more formally account for lubrication degradation in the setpoint controls and methodology. 1) VSE to develop methodology and revise diagnostic test procedures to include recording of as-found and as-left stem factor, where possible, to establish justification for lubrication degradation assumptions to be made; and 2) NED to consider the options suggested below to address NRC concerns and to identify a lubrication degradation margin in the thrust calculation. Option #1) for rising stem valves, the minimum required thrust valves can be calculated first on the basis of 0.15 friction factor and then on the basis of 0.18 friction factor. The difference between the calculated values would represent the reduction in output thrust due to a 20% degradation in stem friction coefficient. This difference could be used as a calculated lubrication degradation factor that could be formally included into the 13-JC-ZZ-201 calculation. A statistical analysis of as-found and as-left data could be performed to justify the percent degradation used in the calculation (i.e., the 20% figure used here is only hypothetical and may or may not be conservative). Option #2) Take credit for the calculation's conservative use of 0.2 friction coefficient in its determination of minimum required thrust, and assume that use of 0.2 includes sufficient margin to compensate for lubrication degradation between maintenance intervals. Revise procedures to explicitly require that stems be lubricated prior to any as-left static diagnostic test. A statistical analysis of as-found and as-left data would be required to justify the percent degradation used in the calculation. **Action Category II** The current 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation does not include a margin factor to compensate for component degradation over the maintenance interval. Margin for lubrication degradation is presently addressed by the note in the ICMODB that calls for settings to be adjusted high in the band. **NOTE: PART 1 MOV INSPECTION ITEM**				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. SY	DATE DUE	CLOSE DATE
Terry Lui	Scott Bauer	04.02.06	NRC inspectors observed that certain MOVs with class 1E motors were shown by calculation to be inadequate to perform under worst case design conditions at 75% degraded voltage and expressed concerns that established design margins were being reduced. UFSAR Section 8.3.1.1.9(D) originally imposed a generic requirement on Class 1E motors based upon the original design specifications for the plant. No allowance was provided for the as-built conditions which could provide relief for certain installed MOVs. A UFSAR Change Request was initiated per 93AC-0LC01 to allow some Class 1E motors to be exempt from the criteria of UFSAR Section 8.3.1.1.9(D) under certain controlled conditions. This action was tracked by CATS CRDR 910070.06. The change was incorporated as a result of CRDR 910070 that responded to NRC finding of a potential FSAR deviation. No further action required. **NOTE: PART 1 MOV INSPECTION ITEM**	Closed: Duplicate of 04.06.12.	S. Scow	N/A	09/01/93
Steve Coppock	Scott Bauer	04.02.07	The inspectors considered the use of an increased valve factor as corrective action on a case-by-case basis in lieu of an identifiable root cause to be a weakness in the development of the program. NRC indicated there was a need for a more timely evaluation of the generic applicability of the test results to ensure program was conservatively established. Action Category II Ref. 04.11.05 **NOTE: PART 1 MOV INSPECTION ITEM**				
Chuck Rath		04.02.08	Conclusion concerning MOV sizing and switch setting - the inspectors determined APS had not yet adequately established procedures for performing calculations to verify proper sizing of MOVs and setting of their switches. **NOTE: PART 1 MOV INSPECTION ITEM**	Closed: 81DP-4DC10 documents the methods used to calculate thrust/torque setpoints.	Chuck Rath	N/A	09/15/93
N/A	Scott Bauer	04.02.09	Design Basis DP and Flow Testing Strengths. The NRC identified the following strengths: 1) Aggressive plan for full flow DP testing and had completed 31 tests at the time of the inspection. 2) MOV test schedule was being prioritized by safety significance of the MOVs based on PRA. **NOTE: PART 1 MOV INSPECTION ITEM**	Closed: Program Strength	N/A	N/A	N/A
Steve Coppock	Scott Bauer	04.02.10	Design Basis Testing - the test procedures had no acceptance criteria for the design basis test data, nor did they use the test data as feedback into their calculations. Test acceptance criteria needs to verify the available margin. Reviews of test results were not timely. Ref. 04.02.07, 04.06.03 **NOTE: PART 1 MOV INSPECTION ITEM**	Closed: Procedure 39DP-9ZZ01 was issued providing acceptance criteria and time frames for completing data review. Unacceptable data is evaluated by CRDR. See 04.06.03.	S. Bauer	N/A	09/01/93

MOV ASSESSMENT TEAM
GENERIC LETTER 89-10 PROGRAMMATIC ASSESSMENT
September 24, 1993 @ 2:06 pm

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	CONSP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Scott Bauer	04.02.11	The NRC will review the DP test acceptance criteria and the test data during a future inspection. Ref. 04.02.10 **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** See 04.02.10	S. Scow	N/A	09/01/93
Bob Whiting	Scott Bauer	04.02.12	APS post-maintenance test procedures do not clarify when the use of diagnostic thrust tests are required to verify MOV capability for maintenance activities other than packing adjustments. APS committed to revise the post maintenance procedures to provide this clarification. **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** Procedure 39AC-9ZZ02 Issued, (see Appendix G)	Bob Whiting	08/26/93	08/26/93
Steve Coppock	Scott Bauer	04.02.13	NRC will review APS' plans and procedures for periodic verification of MOV capability. NOTE: Justification for static testing alone to periodically verify MOV operability. **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** Refer to RFI 04.08.04.	S. Scow	N/A	09/01/93
Steve Coppock	Scott Bauer	04.02.14	Valve over-thrusting-Modifications to MOV 3JSGAUV134 (auxiliary feedwater) resulted in the actuator thrust exceeding the rating in the open direction during static valve testing. APS prepared test notes to inform test personnel of the need to lower the torque switch setting prior to static testing. The NRC plans to review the adequacy of these test notes to preclude over-thrusting the actuator. **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** Refer to 04.07.21	S. Scow	N/A	09/10/93
Steve Coppock	Ron Spencer	04.02.15	Torque Switch Chatter - APS committed to the NRC that a review would be performed to determine if the thermal overload device settings were adequate to protect the actuator motor when subjected to chattering conditions. Has the evaluation been performed **Action Category II** **NOTE: PART 1 MOV INSPECTION ITEM**				
Ron Spencer	Scott Bauer	04.02.16	Torque Switch Chatter - APS did not adequately evaluate conditions for Part 21 reportability. **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** This item was closed by Ltr. 102-02077, from the NRC dated 02/26/92. IR #91-25-06, RCTS #040729.	Ron Spencer	08/16/93	08/25/93
Ron Spencer	Scott Bauer	04.02.17	MOV Failures, Corrective Actions, and Trending - While APS had established a data base, it did not appear that the program was trending failures by valve, operator and component type (gate, globe and/or butterfly) as well as service application. **NOTE: PART 1 MOV INSPECTION ITEM**	**Closed:** Request of NPRDS (FDT) to provide a sort of the valve failures by operator and component type and service application was initiated - the report obtained showed that NPRDS does track by Comp. type, operator and service application.	Ron Spencer	08/16/93	08/16/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	CONFIRM. BY	DATE DUE	CLOSE DATE
Ron Spencer	Scott Bauer	04.02.18	MOV Failures, Corrective Actions, and Trending. APS committed to the NRC that a review of the last three years of MOV work order activity was in progress or would be performed to ensure that all MOV failures had been captured by the Failure Data Trending (FDT) system. Has this review been performed? Action Category II NOTE: PART 1 MOV INSPECTION ITEM				
Ron Spencer	Scott Bauer	04.02.19	MOV Failures, Corrective Actions, and Trending -A review of all the identified MOV failure data generated over the last three years would be performed to ensure the actual root cause for each failure was clearly identified. Action Category II NOTE: PART 1 MOV INSPECTION ITEM				
Ron Spencer	Scott Bauer	04.02.20	MOV Failures, Corrective Actions, and Trending - The inspectors emphasized the importance of trending accelerated wear and degradation of MOV components in addition to failures. NOTE: PART 1 MOV INSPECTION ITEM	Closed: Refer to 04.09.03	Ron Spencer	N/A	09/02/93
Ron Spencer	Scott Bauer	04.02.21	MOV Failures, Corrective Actions, and Trending Conclusion - MOV failure corrective actions and trending are an area of weakness in the APS program. NOTE: PART 1 MOV INSPECTION ITEM	Closed: Based on review of the trending program, weaknesses are identified under 04.09.03 which was issued to Performance Engineering to programmatically capture the data that they use. This appears to be the only weakness in the program.	Ron Spencer	N/A	09/01/93
J. Zaghoul	Scott Bauer	04.02.22	MOV Failures, Corrective Actions, and Trending - APS needs to determine root cause of MOV failing to open and root cause of incorrect design documentation for four MOVs. NOTE: PART 1 MOV INSPECTION ITEM	Closed: This item was reviewed and a summary issued. The RCF for the failure to open was addressed, along with the incorrect design documentation. CRDR 9-3-129 is being tracked under RCTS #041370. These items are scheduled to be complete after 9/1/93. A review was performed on the actions taken and the responses seem to be positive and are heading in the proper direction.	Ron Spencer	09/01/93	08/26/93
Scott Bauer	Scott Bauer	04.02.23	Schedule - The inspectors were concerned that other identified weaknesses in the program could result in schedule slippage. NOTE: PART 1 MOV INSPECTION ITEM	Closed: Refer to 04.02.01	S. Bauer	N/A	09/01/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	CONSP. SY	DATE DUE	CLOSE DATE
Terry Lui	Jon Sears	04.02.24	In support of the MOV Assessment team, EER 90-XE-037 was reviewed to verify technical adequacy and sound basis were used in the disposition. This EER requested NED to review the preliminary lists of actuators to be included and excluded from the scope of Generic Letter 89-10. After their review, NED was to concur with or revise the lists accordingly. Conclusions: 1) No Discrepancies were noted between the Tables presented in the EER and the Appendices listed in the current Valve Services Maintenance procedure (39AC-9ZZ02, Rev. 00.00). All the valves determined to be within the scope of GL 89-10 were included in Appendix A. 2) A statement was made in the disposition section of the EER, which states, "...If the MOV is classified as non-safety related, as well as its associated piping, it will not be included as part of the 89-10 Program unless the MOV is deemed to be important to safety." No further reference was made as to if a review was performed to determine if any of these such valves were important to safety or not. In addition, no reference was made to any future study or review that was to be performed. 3) Cross-Org. review was requested of Ops. Standards. A letter was sent to Chuck Rath, Ref. I.D. #294-00333-JWD, which documented their review and evaluation. It then went on to say, "There are other non-safety related valves specified in the Functional Recovery Procedure, 4XRO-XZZ10 to be used in the event of failure of safety related systems. Do these valves fit criteria 4 of EER 90-XER-037?" Procedure 4XRO-XZZ10 has been cancelled and superseded by 41EP-1RC08. A detailed review of this procedure was not performed due to its size (720 pages), however, a follow-up review could be performed, if deemed necessary. After reviewing the EER, it does not appear that this question was addressed. **Action Category II** A review of EER 90-XE-037 indicates that a review and evaluation of the preliminary lists were made by both NED and Ops. Standards. However, there were two areas that were not addressed or answered. These are referenced in 2 and 3 above. It appears that different groups assumed that other groups were to follow-up on, however, there is no tie to any continuing investigation or that a review was indeed performed.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Jon Sears	04.02.25	In support of the MOV Assessment Team, EER 90-XE-045 was reviewed to verify technical adequacy and sound basis were used in the disposition. This EER requested the Probability Risk Assessment Group to review the list of 89-10 scoped valves (based on preliminary disposition to EER 90-XE-037) to develop a numeric index to be used for ranking the valves based on their potential impact to overall plant safety in the event of their failure. Also to identify any valves that had an acceptability low impact to overall plant safety in the event of their failure. Conclusions: 1. Valve JAFNHV0095 was placed in category 1-AFW, which is the highest ranked system that could contribute to core damage. This valve is currently in the PVNGS MOV program, however, it is in Appendix B, of procedure 39AC-9ZZ02, not required to be within the scope of GL 89-10 program. 2. Valves JNCNUV0103 and JRCNHV0446 through JRCNHV0453 were placed in the open items category. Per the disposition, "The Open Items category was not envisioned at the start of the evaluation - it is a result of questions or lack of information concerning specific valves." Under conclusions, "The valves in the Open Items category are lower in risk than the proceeding categories and may be deleted based on further study." No evidence or information exists within the EER to suggest that any further study was conducted. These valves are currently in Appendix B to procedure 39AC-9ZZ02, not required to be within the scope of GL 89-10. 3. The following valves were placed in the category Deletion, however, they all appear in Appendix A to procedure 39AC-9ZZ02, valves within the scope of GL 89-10. JCHAHV0524, JSGEHV0041 thru JSGEHV0044, JSIAHV0306, 0683, 0891, 0898, JSIAUV0834, 0844, JISBHV0307, 0890, 0892, 0899, JISBUV0814, 0824, JSPAHV0049A, 0049B, 0050A, and 0050B. 4. Valve WCNHV0103 is not listed in Appendix A or C in the EER. It is identified in Appendix B, however, no reference is made as to which category is belongs in. It is in Appendix B to procedure 39AC-9ZZ02, not within the scope of GL 89-10. 5. In addition to the above concerns, some editorial errors were noted. The are as follows: Appendix A; Valve RCNHV0450 not listed, Valve SIBHV0890 listed as SIAHV0890, and Valve SPAHV0050B listed as SPAHV0049B, Appendix B; Valve RCNHV0450 listed as RCNHV0454 and Valve SPAHV0050B listed as SPAHV0049B, Appendix C; Valve SIBHV0890 listed as SIAHV0890, Valve SPAHV0050B listed as SPAHV0049B. **Action Category II** EER 90-XE-045 was reviewed against the existing 89-10 program. The valves were rated, as requested, by the Probability Risk Assessment Group and placed into one of six categories. The valves in the Open Items category were listed as possible deletions based on further study, however, no reference is made to any study or document to be followed-up on. Ref. Item 2 above. The valves placed in the Deletion category				

MOV ASSESSMENT TEAM
GENERIC LETTER 89-10 PROGRAMMATIC ASSESSMENT
September 24, 1993 @ 2:06 pm

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Stuart Scow	Scott Bauer	04.03.01	Control of MOV Switch Settings - CAR 91-0021 identified potential problems with keeping torque switch settings in an interim data base and not using the intended drawing 13-J-ZZI-004. Action Category II NOTE: PART 1 MOV INSPECTION ITEM				
Stuart Scow	Scott Bauer	04.03.02	Control of MOV Switch Settings - Ensure program controls embody quality assurance measures equivalent to those within established plant procedures. Action Category II Ref. CAR 91-0021 NOTE: PART 1 MOV INSPECTION ITEM				
Jim Young	Scott Bauer	04.03.03	Training - Refresher training for maintenance and testing technicians appeared to be a weakness in the program. NOTE: PART 1 INSPECTION ITEM	Closed: 15DP-0TR86	Ron Spencer	08/22/93	08/22/93
Jim Young	Scott Bauer	04.03.04	Training - NRC had following concerns with control of vendors: 1) APS relies heavily on contract personnel for MOV program. 2) APS had not verified MOVATS personnel certifications were in compliance with APS requirements. 3) MOVATS software was being used which had not been verified to be in compliance with APS standards. NOTE: PART 1 INSPECTION ITEM	Closed: 3) PFI # 04.11.13 1,2) White Letter 13 issued 3) QDR #92-0133 Ref: PFI 04.11.13	Ron Spencer	08/24/93	08/24/93
Bob Whiting	Scott Bauer	04.03.05	Diagnostics (strain gages) - Strain gages are being used in an informal manner. Use of data collected from these gages should not be used to verify torque switch settings until the accuracy of the data has been determined and the data obtained under appropriate test control measures. NOTE: PART 1 INSPECTION ITEM	Closed: Ref. PFI 04.07.02	Bob Whiting	08/24/93	08/24/93
Terry Lui	Scott Bauer	04.03.06	Diagnostics - APS needs to evaluate the following MOVATS issues: 1) Consideration must be given to a Notice of Nonconformance issued to MOVATS regarding inadequate verification of equipment accuracy. 2) APS needs to consider MOVATS Engineering Report 5.0, Revision 0, January 1991, which provides guidance for the consideration of rate-of-loading effects that might reduce the available thrust delivered by the motor operator under high DP conditions. NOTE: PART 1 INSPECTION ITEM	Closed: Reviewed - Concerns incorporated into 39DP-9ZZ01.	Bob Whiting	08/24/93	08/24/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Scott Coppock	Scott Bauer	04.03.07	Maintenance - A weakness in the program exists in that preventative maintenance activities do not verify engineering assumptions. Action Category II NOTE: PART 1 INSPECTION ITEM				
Bob Whiting	Scott Bauer	04.03.08	Maintenance - APS does not have a specific refurbishment schedule for MOVs. Ref. CRDR 910064.05, 06, & 07 NOTE: PART 1 INSPECTION ITEM	Closed: Refer to 04.07.12	Bob Whiting	09/24/93	09/24/93
Jim Young	Scott Bauer	04.03.09	Industry Experience and Vendor Information - Lack of control of vendor information was a significant weakness in the MOV program. NOTE: PART 1 INSPECTION ITEM	Closed: Summary issued 1) RFI #4.09.02	Ron Spencer	09/24/93	09/24/93
Bob Whiting	Scott Bauer	04.03.10	Inservice Testing (Valve Stroke Times) - Valve stroke times were getting close to FSAR limits and degraded voltage concerns had not been considered.	Closed: Duplicate of 04.07.09	Stuart Scow		09/15/93
Scott Bauer	Scott Bauer	04.03.11	APS has committed to review limitorque grease requirements and evaluate defining more specific minimum acceptability requirements.	Closed: NRC reviewed and closed this itme in IR 91-50.	S. Bauer	N/A	09/01/93
Chuck Rath	Chuck Rath	04.05.01	The NRC Temporary Instruction 2515/109 Rev. 1 inspection requirements direct the inspector to verify that the licensee has adequately addressed the potential for pressure locking and thermal binding of gate valves, and to assess the quality and validity of the licensee's inspection. Determine status of PVNGS evaluation of 89-10 gate valves for potential susceptibility to pressure locking and thermal binding, including basis used to determine applicability and basis used to eliminate types of valves.	Closed: The current MOV Thrust, Torque and Actuator Sizing Calculation does not include adjustment for thermal binding or bonnet pressurization effects. Refer to memo from E. Smith to B. Ecklund dated 07/27/93 for discussion. The pressure locking and thermal binding evaluation will be performed concurrent with the MOV design basis review which is scheduled for completion January, 1994.	Chuck Rath	N/A	09/01/93
Terry Lui	Chuck Rath	04.05.02	VSE/NED is requested to identify methods used to ensure that 13-JC-ZZ-201 calculation assumptions are compared with dynamic test data results, including transportability, revisions to ICMODB setpoints, and initiation of corrective measures. Action Category II				
Terry Lui	Chuck Rath	04.05.03	NED Electrical is requested to clarify the methods used for TOL sizing and design control circuit review (i.e. TOL bypassed during safety actuation, new sizing criteria, etc.) Action Category II				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Chuck Rath	04.05.04	Sample effectiveness of the new procedural requirement for VSE/NED cross organizational review of operating procedure revisions. **Action Category II**				
Mike Radoccia	Chuck Rath	04.05.05	Verify that the design basis review includes a calculation of worst case flow and differential pressure for the normal conditions and the accident scenarios described in applicable operating procedures. **Action Category II**				
Steve Coppock	Chuck Rath	04.05.06	The design basis review process may introduce excessive conservatism by not distinguishing between valve capabilities that are required to accomplish a safety related function and any other functional requirements that are identified in operating procedures. This may be the result of our interpretation of "operability" to envelope all functions of the component, in addition to the safety related functions. Is the intent of the program to demonstrate safety related capability, or component operability? Calculation 13-JC-ZZ-201 states in its criteria "1.1 that "as a minimum, the valve must be shown to be operable under its worst case safety related functional requirement." **Action Category III** Valve Services is requested to compare the existing PVNGS design basis review process with the requirements of the Generic Letter 89-10 and determine if the process introduces excessive conservatism.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Chuck Rath	04.05.07	During an earlier NRC GL 89-10 inspection of a different utility, inspectors noted thrust calculations using running efficiency in the open direction, contrary to the recommendations of Limitorque. NRC Memorandum dated April 30, 1993 "Guidance for Inspections of Programs in Response to Generic Letter 89-10" refers to a letter to Cleveland Electric dated September 17, 1992, wherein Limitorque states that "run efficiency can be substituted for pull out efficiency where the application involves a close safety function with no potential of the actuator stopping at any point during the close stroke." 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation Assumption 4.2.9 states that pull out gear efficiencies are typically assumed in actuator output determinations. The assumption also states that if a hammerblow device is used, or for closing thrust determinations, the running efficiency may be assumed. This assumption is in agreement with the Limitorque Update 92-02 and the letter to Cleveland Electric. **Action Category III** NED is requested to review 13-JC-ZZ-201 to identify any open thrust calculations that assume running efficiency involving Limitorque actuators with "no lost motion" drive sleeves. If any are found, NED is requested to justify the use of that assumption.				
Jim Minnicks	Chuck Rath	04.05.08	Revise 81DP-4DC10 to include specific controls to ensure that revisions to design basis calculations and thrust/torque calculations are reviewed for impact on completed dynamic test procedures and evaluations. **Action Category II**				
Jim Minnicks	Chuck Rath	04.05.09	Revise procedure 81DP-4DC10, Motor Operated Valve Design Basis Review and Thrust/Torque Calculation, to include specific controls to ensure that emergent operability impacts are identified and resolved in a timely manner. **Action Category II**				
Terry Lui	Bob Whiting	04.06.01	NRC "Advance Information" for Part 2 MOV Inspection for GL 89-10 requires spreadsheet data to include: Valve ID, type, size actuator type, size, control (torque/limit), motor size, motor temp., plus several factors, assumptions, and design parameters. Information is available, but on several data bases, both Controlled and Non-controlled. **Action Category III** A common data sheet needs to be established to summarize and document valve information on to one format. The data sheet needs to cite reference sources. Spread sheet is presently in the formulation stage with NED/VSE supplying data for input.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Ron Spencer	04.06.02	Strain gages from teledyne are attached to threaded stems in manners that may give inaccurate data. Strain gages need a smooth stem surface to be attached to, to enhance accuracy and reliability of data. Find alternate methods of attaching gages. Consider the machining of spots on the stem to remove the threads.	Closed: Ref: CRDR 930804	Jim Minnicks		09/10/93
Steve Coppock	Chuck Rath	04.06.03	During an earlier NRC GL 89-10 inspection of Commonwealth Edison Clinton Station, Inspectors noted that the licensee calculated that some of MOVs have the capability to support a valve factor of 0.5 and a stem friction coefficient of 0.2, and licensee decided that because of this substantial capability those MOVs would not be subjected to design basis testing. Inspectors were concerned that this approach may not be bounding. Licensee agreed to refine the approach and include grouping to demonstrate that the methodology would be bounding for each group. If the NRC is in agreement with the Commonwealth Edison position, then PVNGS may potentially save resource by performing similar calculations to identify MOVs with sufficient capability to justify deletion of design basis testing. **Action Category III** VSE to follow-up on the NRC review of Commonwealth Edison Clinton Station's position to not dynamically test those MOV's with large capability.				
Terry Lui	Chuck Rath	04.06.04	During its NRC GL 89-10 Part 2 inspection, the licensee (ANO) was requested to identify all MOVs which could be categorized as marginal. The licensee was asked to reevaluate the capability of those MOVs using supportable assumptions and factors that account for all known sources of inaccuracy. The licensee identified 89 MOVs that did not have at least a 15% design margin available above minimum thrust requirements. The 89 MOVs were reevaluated using less conservative criteria and were found to have sufficient capability to perform their safety function. The licensee subsequently identified modifications or other actions required to permit the marginal MOVs to meet the standard design criteria. Implementation was scheduled to occur over the next two refueling outages. Although NED has performed similar informal screens, no actions have been initiated for the marginal MOVs. **Action Category III** 1. NED to formally identify marginal MOVs using a screen methodology similar to that used at ANO; 2) identify corrective options to improve the capability for those MOVs, and 3) initiate the design change process using the most attractive options.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Chuck Rath	04.06.05	During a recent NRC inspection report involving another utility, inspectors noted that the observed packing load was not factored back into the licensee's thrust equation. Because PVNGS uses "Min Available" setpoints, comparison of the dynamic test measured stem packing load with the value assumed in the thrust calculation is not required. Similarly, for rising rotating stem MOVs, packing load is torque and static test measurements of running load are compared with allowable values specified in the ICMODB to ensure that calculation assumptions are not violated. For these valves also, comparison of the dynamic test measured stem packing load with the value assumed in the thrust calculation is not required. However, butterfly valve running loads may indicate an abnormal bearing load that exists only during dynamic conditions. Therefore, static and dynamic test data sheets for butterfly valves should be revised to ensure that running load torques are compared with the limits identified in the ICMODB. **Action Category II** VSE to revise static and dynamic test data sheets to ensure that running load torques of butterfly valves are compared with the limits identified in the ICMODB.				
Terry Lui	Chuck Rath	04.06.06	During an earlier NRC GL 89-10 inspection of a different utility, inspectors noted that the margin to account for load sensitive behavior was not included in the thrust calculations. Also, NRC Memorandum dated April 30, 1993, "Guidance for Inspections of Programs in Response to Generic Letter 89-10" states that "Based on test data from INEL and other sources, it appears reasonable at this time for licensees to use the load sensitive behavior (in terms of percent) observed under partial design basis testing for design basis capability evaluations. Licensees will be expected to justify the extrapolation of load sensitive behavior." The MOV Thrust, Torque and Actuator Sizing Calculation 13-JC-ZZ-201 includes a factor to compensate for load sensitive behavior for some, but not all MOVs in the GL 89-10 program. The assumed factor is determined by NED on the basis of dynamic test results, but is expressed in terms of pounds thrust or foot-pounds torque, and not percent. The LSB margins are not extrapolated. **Action Category II** NED is requested to clarify how 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation compensates for load sensitive behavior in its determination of minimum thrust requirements, including how the factor is determined and the issues of transportability and extrapolation.				

MOV ASSESSMENT TEAM
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September 24, 1993 @ 2:06 pm

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Chuck Rath	04.08.07	During an earlier NRC GL 89-10 inspection of a different utility, inspectors noted that the margin to account for load sensitive behavior was not included in the thrust calculations. The current 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation does include a factor to compensate for load sensitive behavior for some, but not all MOVs in the GL 89-10 program. Also, NRC Memorandum dated April 30, 1993, "Guidance for Inspectors of Programs in Response to Generic Letter 89-10, states that "Based on test data from LNEL and other sources, it appears reasonable at this time for licensees to use the load sensitive behavior (in terms of percent) observed under partial design basis testing for design basis capability evaluations. Licensees will be expected to justify the extrapolation of load sensitive behavior.) In order to complete the MOV assessment and to prepare for the NRC Phase 2 Inspection, NED is requested to clarify how 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation compensates for load sensitive behavior in its determination of minimum thrust requirements, including the issues of transportability and extrapolation.	Closed: Duplicate with 04.08.06	Stuart Scow	N/A	08/24/93
Terry Lui	Chuck Rath	04.08.08	13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation does not include an adjustment in minimum required thrust calculation for seismic effects simultaneous with valve actuation. Prior NRC inspection reports involving other utilities have noted that licensees are expected to address seismic effects in thrust calculations. NED is requested to clarify/justify how 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation does or does not compensate for seismic effects in determination of minimum thrust requirements.	Closed: CCN #9 to 13-JC-ZZ-201 includes clarification of seismic loading assumption.	Chuch Rath	N/A	09/15/93
Terry Lui	Chuck Rath	04.08.09	The design basis calculations require further review to remove excessive conservatism, and compare calculations with the operating procedures to ensure that the worst case operating conditions are enveloped by the design basis flowrates and differential pressures. Although this review process is in progress, the 1) status of its completion and 2) the administrative methods used to ensure that emergent operability impacts are identified and resolved in a timely manner are not clear. Action Category II NED is requested to clarify present status of the design basis review, and to clarify the methods used to ensure that emergent operability concerns are addressed and documented in a timely manner. Also, NED is requested to create a CATS action item tracking the incorporation of the revised design basis calculations as input into 13-JC-ZZ-201 Thrust, Torque, and Actuator Sizing Calculation.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Chuck Rath	04.06.10	PVNGS degraded voltage calculation 13-EC-MA-221 AC Distribution calculates insulated cable resistances based on 90 °C operating temperatures. NED Electrical is requested to confirm that this assumption is conservative with respect to temperatures postulated to exist inside containment during various design basis event (i.e., LOCA), and temperatures postulated to exist in other parts of the plant during postulated high energy line breaks.	Closed: Ref., CRDR 9-3-0709	R. Spencer	N/A	09/10/93
Terry Lui/Steve Coppock	Chuck Rath	04.06.11	During the NRC Part 1 inspection, inspectors found that PVNGS had not included any margin in the calculation of the minimum required target thrust settings to account for potential degradation of valve stem lubrication between maintenance/lubrication intervals. The inspectors recommended that the licensee consider the need to more formally account for lubrication degradation within their setpoint methodology and controls. The current 13-JC-ZZ-201 MOV Thrust, Torque and Actuator Sizing Calculation does not include a margin factor to compensate for component degradation over the maintanance interval. Margin for lubrication degradation is presently addressed by the note in the ICMODB that calls for settings to be adjusted high in the band. (Duplicate of 04.02.05)	Closed: Duplicate of 04.02.05	S. Scow	N/A	06/01/93
Chuck Rath	Chuck Rath	04.06.12	Determine status of UFSAR degraded minimum voltage revision from 75 percent to minimum calculated voltage based on as-built configurstion.	Closed: UFSAR Section 8.3.1.1.9 (D) originally imposed a generic requirement on Class 1E motors based upon the original design specifications for the plant. No allowance was provided for the as-built conditions which could provide relief for certain installed MOVs. A UFSAR Change Request was initiated per 93AC-0LC01 to allow some Class 1E motors to be exempt from the criteria of UFSAR Section 8.3.1.1.9 (D) under certain controlled conditions. UFSAR Design Criteria for Class 1E Equipment has been revised to allow that MOV performance evaluations be based on the as-built minimum voltage determined. The change was incorporated as a result of CRDR 910070 that responded to NRC finding of a potential FSAR deviation. A degraded voltage calculation has been performed and is being incorporated in the MOV calculations. This action is being tracked by RCTS 040797, 040006 and CRDR 910070.	Bob Whiting	N/A	06/26/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Chuck Rath	Chuck Rath	04.08.13	Determine if the degraded voltage calculations include effects of station blackout and sequential loading.	Closed: 13-EC-MA-221 does include the effects of station blackout and sequential loading. Calculation Input Data Section 4.3 "Modes of Operation" Subsection 4.3.2 states that "For sequenced conditions, three basic modes are considered in accordance with the operation of the sequencer: Loss of Offsite Power/Forced Shutdown (LOP/FS), Loss of Offsite Power/Lose of Coolant Accident (LOP/LOCA), and Loss of Coolant Accident with offsite power available (LOCA). For each of these modes, each sequencer step is analyzed as well as steady state condition after all sequencing is completed and discretionary loads are energized." No further action required.	Chuck Rath	06/18/93	06/18/93
Chuck Rath	Chuck Rath	04.08.14	For AC motors with degraded voltage factor less than 0.70, review how motor performance is justified. (Limitorque has approved this method only for motor voltages over 70%)	Closed: Calc Input Sheets of the current MOV Thrust, Torque and Actuator Sizing Calculation were reviewed and no calculations were found involving AC motors with a degraded voltage factor less than 0.70. No further action required.	Chuck Rath	06/18/93	06/18/93
Chuck Rath	Chuck Rath	04.08.15	Determine how the thrust/torque calculations compensate for high ambient temperature effects on AC motor output.	Closed: The current MOV Thrust, Torque and Actuator Sizing Calculation 13-JC-ZZ-201 does not compensate for effects on motor torque output and current draw due to increased ambient temperature. CPDR #930431 was initiated June 18, 1993 to evaluate the recent Limitorque Part 21 notification concerning the effects of ambient temperature on actuator motor performance. The notification states that locked rotor torque and locked rotor current of Reliance AC motors used in SMB/SB/SBD-000 through-5 size actuators are affected by ambient temperature, and that all AC Reliance motors used on Limitorque actuators, excluding the SMC-04 model are affected. 13-JC-ZZ-201 will be revised to compensate for temperature effects on motor performance, following determination of design basis temperatures for the GL 89-10 actuator motors. Recalculation of the affected thrust and torque setpoints is scheduled for completion by October 30, 1993 (CPDR #930431.04).	Chuck Rath	06/17/93	06/17/93
Terry Lui	Chuck Rath	04.08.16	Compare the assumed valve factor with EPRI valve factors for the particular configuration and service conditions.	Closed: Duplicate of 04.08.17	S. Scow	N/A	06/01/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Chuck Rath	Chuck Rath	04.06.17	What documented justification supports the use of stem friction factors and valve factors initially assumed in the gate valve thrust/torque calculations.	Closed Justifications for the stem friction factors and valve factors initially assumed in the thrust/torque calculations are documented in 13-JC-ZZ-201, assumptions 4.2.1 and 4.2.2. The use of a 0.4 valve factor for all motor operated gate valves is reasonable when compared with recent positions taken by EPRI. (Ref: EPRI Motor-Operated Valve Margin Improvement Guide, Section 4.2.1.) The justification for friction coefficient does refer to special testing performed by Kalsi Engineering. The calculations used a stem friction coefficient of 0.2 for minimum settings and 0.1 for maximum thrusts which is reasonable when compared with statements published by EPRI. (Ref: EPRI Motor-Operated Valve Margin Improvement Guide, Section 4.4.3).	Chuck Rath	N/A	08/16/93
Chuck Rath	Chuck Rath	04.06.18	Confirm that we consistently apply a valve disk dimension (i.e either the mean seat diameter or outside diameter) when calculating a valve factor.	Closed The MOV Thrust, Torque and Actuator Sizing Calculation includes a Calc. Input Sheet that specifies "Seat Diameter" with supporting references to vendor data sheets and transmittals. Review of Anchor Darling and Borg Warner gate valve data sheets confirms that "Diameter of Seat (mean)" is consistently used. No further action required.	Chuck Rath	N/A	08/16/93
Terry Lui	Chuck Rath	04.06.19	NED Electrical is requested to clarify if the worst case MCC voltage of the AC Distribution degraded voltage calculation is based on the lower of diesel generator or offsite supplied voltage. If the offsite supply is the limiting case, clarify if the calculations use the degraded grid relay setpoint as the starting point for developing the minimum available motor voltage. Action Category II				
Terry Lui	Chuck Rath	04.06.20	NED Electrical is requested to clarify which of the following methods is used to calculate the expected motor terminal voltage at degraded bus voltage conditions: Method 1) a motor circuit one line diagram relating motor impedance, cable impedance and TOL impedance is used with a voltage divider calculation; or Method 2) a worst case motor current value is then subtracted from the worst case bus voltage. If Method 2 is used, then verify that justification is provided if less than locked rotor current is assumed. Action Category II				
Terry Lui	Chuck Rath	04.06.21	NED Electrical is requested to identify what value was assumed for motor power factor in the degraded voltage calculations, and to verify that the assumed value is conservative with respect to the "recent motor information" provided by Limitorque in Maintenance Update 92-2. Action Category II				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Chuck Rath	04.06.22	NED Electrical is requested to demonstrate that degraded voltage calculations for DC motors assume the worst case battery voltage profile, including aging and temperature factors, and describe how the calculations account for voltage drops from the battery to the MCC. Also, NED Electrical is requested to provide a status of the DC degraded voltage calculation. **Action Category II**				
Terry Lui	Chuck Rath	04.06.23	Determine if degraded voltage operability of control relays has been addressed. **Action Category II**				
Terry Lui	Chuck Rath	04.06.24	The inspection requirements specified by NRC Temporary Instruction 2515/109, Rev. 1 direct the inspector to ensure, as a minimum, that the licensee has calculated the lowest motor terminal voltage commensurate with design basis conditions and has factored this information into the MOV program. Determine what degraded voltage factor is used in the thrust/torque calculation. Verify the thrust/torque calculations apply the degraded voltage factor in accordance with the Limitorque Technical Update 92-02. **Action Category II**				
Terry Lui	Chuck Rath	04.06.25	Determine if the thrust/torque calculations determine the minimum allowable motor terminal voltage (i.e. the voltage at which the motor torque at the highest motor temperature is always greater than the minimum required for valve actuation) **Action Category II**				
Terry Lui	Chuck Rath	04.06.26	Verify that the degraded voltage calculations document justification for each assumed variable. Verify that design input references are current. **Action Category III**				
Steve Coppock	Chuck Rath	04.06.27	Review procedural controls on the use of limiter plates to control maximum thrust. What calculations are performed to specify limiter plate size? Where is it documented? How do we know what is actually installed? **Action Category II**				
Steve Coppock	Chuck Rath	04.06.28	Compare as-left torque switch settings with current ICMODB allowable settings. If any are found to be out of the allowable band, identify actions that have been initiated. (Ref: 1NC-401,402) Determine if administrative controls address MOV operability following changes to the ICMODB adequately and in a timely manner. **Action Category II**				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Chuck Rath	04.06.29	Identify those MOVs that bypass the torque switch for more than peak cracking thrust, and ensure that calculations and setpoints have been handled correctly. Action Category II				
Terry Lui	Chuck Rath	04.06.30	NED requested to identify if thrust/torque calculations based on existing design basis reviews predict capability problems for any MOVs. If so, what action has been taken? Action Category II				
Terry Lui	Chuck Rath	04.06.31	NED requested to clarify if MOV setpoint calculations include assumptions based on Kalsi data. Action Category II				
Terry Lui	Chuck Rath	04.06.32	NED requested to clarify for those MOVs with the torque switch set higher than the Limitorque maximum setting, if an engineering evaluation in accordance with Criteria III of 10CFR50, Appendix B was performed. Action Category II				
Terry Lui	Chuck Rath	04.06.33	Confirm that stall event evaluations remove the application factor from stall calculations.	Closed: Duplicate of 04.06.34	S. Scow	N/A	09/01/93
Terry Lui	Chuck Rath	04.06.34	NED requested to confirm that stall event evaluations consider the potential for Limitorque actuators to deliver greater than 100% of their nominal motor torque under static stall conditions and that stall evaluations remove the application factor from stall calculations. Action Category II				
Terry Lui	Chuck Rath	04.06.35	NED requested to confirm that the Limitorque stall torque equation is used only for overload analysis and not for MOV Setpoint Calculations. Ref: Maintenance Update 92-1, and EPRI application guide NP-6660D.	Closed: Review of 13-JC-ZZ-201 template shows that stall torque evaluation is not used for setpoint calculations.	Chuck Rath	N/A	09/15/93
Terry Lui	Chuck Rath	04.06.36	Confirm that actuator output torque capability is calculated using the standard Limitorque equation.	Closed: 13-JC-ZZ-201 Template uses standard limitorque relationships to calculate output torque.	Chuck Rath	N/A	09/15/93
Terry Lui	Chuck Rath	04.06.37	Determine what margin has been included in the minimum thrust/torque calculation for measurement inaccuracy, stem factor variations, and actuator/torque switch repeatability. Action Category II				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Chuck Rath	Chuck Rath	04.06.38	Review the equations/assumptions used for d/p load, stem load, and packing load, and compare with the standard industry equations.	Closed: Equations used agree with those typically used, and are similar to EPRI.	Chuck Rath	N/A	09/15/93
Terry Lui	Chuck Rath	04.06.39	NED requested to clarify how the minimum switch setpoint calculations ensure that the minimum design basis required thrust is [illegible] 1, including torque switch repeatability, test equipment accu[illegible]OIL, seismic loads, and stem factor degradation over the maintenance interval. Action Category II				
Terry Lui	Chuck Rath	04.06.40	NED requested to clarify how the maximum switch setpoint calculations ensures that structural and degraded voltage operating capabilities, including test equipment uncertainties, inertia effects and torque switch repeatability are not exceeded. Action Category II				
Terry Lui	Chuck Rath	04.06.41	The methodology used to calculate and apply the "D/P" Test Correction Factor" should be explained in 13-JC-ZZ-201. Action Category II				
Jim Minnicks	Ron Spencer	04.06.42	During the MOV Assessment, a review was performed on WO 00553081 and WO 00539026. The following surfaced as a result if this review. On 03/26/92, WO 00539026 was performed which implemented DCP #1PM-NC-041. This DCP removed and installed various replacement parts. One of the parts was the spring pack #80-800-0[illegible]8-01, 0101-88, C/I #4592-881 which was called for under 13-J-ZZS-2[illegible] DCN #19. The WO also called for the removed spring pack to be MRS'd into the warehouse if it wasn't damaged. The WO step (step 4.19) that stated to MRS the spring pack back into the whse. was N/A'd with the explanation that the explanation that the spring back was damaged. A subsequent diagnostic test was performed on 04/27/93 on the operator and the test failed. EER #92-MO-118 was written to address the problem. The disposition stated to replace the existing spring pack (P/N 80-800-0090-1) with a new spring pack P/N 80-800-023-1, 0101-91 C/I #4592-000863. This step (4.7) in the WO was N/A'd with a notation to see step 4.7.1. This step added the following instructions: "Install original Spring Pack that was removed under WO 539026. Perform spring pack calibration test prior to installation. Document work performed in a work order continuation sheet. This step w[illegible] added by the WGS Walden Bruce and signed complete on 04/30/92. This brings up the following questions: 1. If the spring pack was damaged, why was it put back into the operator? 2. Why wasn't the appropriate corrective action document written?	Closed: Reference CRDR 130428	Ron Spencer	N/A	09/24/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Terry Lui	Chuck Rath	04.06.42	Determination of the "motor torque limited," "actuator torque limited," and "valve torque limited" conditions in the calculation of maximum thrust for rising stem valves is based on a potentially non-conservative stem friction coefficient assumption of 0.1. A technical justification for its use should be documented. Action Category II				
Terry Lui	Chuck Rath	04.06.42	Determination of the "motor torque limited," "actuator torque limited," and "valve torque limited" conditions in the calculation of maximum thrust for rising stem valves is based on a potentially non-conservative stem friction coefficient assumption of 0.1. A technical justification for its use should be documented. Action Category II				
Jim Minnicks	Ron Spencer	04.06.42	The MOV Assessment Team reviewed 13-JC-ZZ-201, thrust/torque calculation for 2JSGNHV1144. Since November 1991, this calculation has included the note "...setpoints cannot ensure full operability of the MOV under design basis condition." This is a result of EER 91-SG-170. In August 1993, CRDR 2-3-0455 was initiated to change existing operating procedures system alignments to reduce the differential pressure across the MOV to ensure full operability of the MOV under design basis conditions. Although the MOV is not safety related, it is located in the discharge flowpath of the Non-Class Auxiliary Feedpump. Technical Specification 3.7.1.2 requires at least three independent steam generator auxiliary feedwater pumps and associated flowpaths to be operable in Modes 1,2,3 and 4. The SIMS Equipment Summary screen shows the actuator to be NC/F, but, the valve is QAG with function codes to be 01 (maintain pressure) and 04 (to close, isolate). The Q function mode is "Active". The valves normal operating position is open but, the valves Q function is to close/isolate and the determination that this valve could not perform it's intended function needs to be evaluated. Response: Determine if the flowpath was impacted during the period from November 1991 August 1993. Does this inoperable valve made the system inoperable? Why couldn't Engineering make a determination if the valve would or would not perform it's intended function.	Closed: Reference CRDR 2-3-0551	Ron Spencer	N/A	09/24/93

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Steve Coppock/T. Lui	Chuck Rath	04.07.01	39DP-9ZZ01 Guidelines for Evaluation of Dynamic Test Data does not require performance of extrapolation adjustments for partial design basis tests. Therefore, the existing program does not ensure that all tested MOVs can perform their safety function under design basis conditions. NRC inspectors have indicated that for those dynamic tests performed at less than design basis differential pressure, an engineering evaluation involving extrapolation is required to demonstrate design basis capability. Inspectors consider these extrapolations to be the first stage of a two-stage approach. Also, the licensee is expected to justify the method of extrapolation by GL 89-10 schedule completion date. Action Category II 1) Revise 39DP-9ZZ01 to include extrapolation methodology; 2) Revise completed partial pressure "acceptable" dynamic test evaluations to include the extrapolation adjustments; 3) Initiate CRDR's to evaluate operability impact for any of the evaluation criteria that are found to be less than "acceptable", and 4) develop and implement a plan to collect the data required and/or analyze existing data to establish a basis for those extrapolations prior to the GL 89-10 schedule completion date.				
Steve Coppock	Chuck Rath	04.07.02	Strain gages have been installed as permanent plant components on some GL 89-10 valve stems and are initially calibrated, but are not identified as Plant M&TE. The existing MOV program does not address the need for recalibration, recalibration frequency, and recalibration documentation for subsequent use of the strain gages over the life of the plant. Action Category II 1) Collect as-found calibration data on a select groups of a) smooth stem gage installations and b) thread filled epoxy gage installations over several refueling cycles to statistically determine if the need for recalibration exists, and if so, determine a basis for recalibration frequency.				
Steve Coppock	Chuck Rath	04.07.03	The Generic Letter requires that "Each MOV failure and corrective action taken, including repair, alteration, analysis, test, and surveillance, should be analyzed or justified and documented. ...It is suggested that these MOV data be periodically examined (at least every 2 years or after each refueling outage after program implementation) as part of a monitoring and feedback effort to establish trends of MOV operability." Action Category II Dynamic test data is evaluated in accordance with 39DP-0ZZ01 and classified as "acceptable", "unacceptable" or "disqualified". VSE needs to clarify if dynamic test evaluations that identify "unacceptable" results are to be included by Performance Engineering Department into the MOV failure trending requirements of the Generic Letter.				

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Steve Coppock	Chuck Rath	04.07.04	Prior NRC inspection reports involving other utilities have noted that licensees are expected to obtain test data from design basis testing to verify that the TOL sizing assumptions are appropriate for operation under both normal and design basis conditions. 39DP-9ZZ01 Guidelines for Evaluation of Motor Operated Valve Dynamic Test Data does not include an evaluation of thermal overload sizing based on test amperage data. **Action Category II** VSE to review and determine if 1) revision of 39DP-9ZZ01 to include an evaluation of thermal overload sizing based on test amperage data; and 2) revision of completed dynamic test evaluations to include the thermal overload evaluation is required.				
Steve Coppock	Chuck Rath	04.07.05	39DP-9ZZ01 Guidelines for Evaluation of Motor Operated Valve Dynamic Test Data does not specify a maximum tolerable inaccuracy for the evaluations. Some evaluations have been completed with inaccuracies as high as 80%. **Action Category III** VSE to 1) review the inaccuracy calculation methodology used in 39DP-9ZZ01 for consistency in application; 2) review the necessity of the percent of reading error used in evaluations of some criteria; and 3) establish a maximum tolerable inaccuracy, beyond which the data is disqualified form evaluation.				
Steve Coppock	Chuck Rath	04.07.06	During a recent inspection report involving another utility, inspectors noted that the methods of zeroing diagnostic traces were not consistently applied. **Action Category II** Based on lessons learned during evaluations of dynamic test data, VSE to revise procedures 32MT-9ZZ56 and 39DP-9ZZ01 to improve the consistency and accuracy of the methods used to identify diagnostic "zero".				
Steve Coppock	Chuck Rath	04.07.07	During a recent NRC GL 89-10 Part 2 inspection, inspectors noted that the dynamic test procedures did not identify a differential pressure target value that the testers should expect at the time the dynamic testing was performed. This was identified by the NRC as a concern. Some of the PVNGS dynamic test procedures do not contain a target value for differential pressure. **Action Category II** VSE to revise dynamic test procedures as required to include a target differential pressure value.				

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Steve Coppock	Chuck Rath	04.07.08	During a recent NRC GL 89-10 Part 2 inspection, inspectors noted that the licensee revised plant hydrostatic test procedures to require post-test venting of the bonnets of any flex-wedge or double disc gate valves used as hydrostatic test boundaries. **Action Category II** As part of the PVNGS response to the Pressure Locking and Thermal Binding issue, VSE should consider a revision of dynamic test procedures involving the use of a hydro pump to include post-test venting of the bonnets of any flex wedge or double disc gate valves used as test boundaries.				
Steve Coppock	Bob Whiting	04.07.09	Procedure 39DP-9ZZ01, Appendix G provides a data sheet to evaluate valve stroke times against Section XI/UFSAR stroke time, concern addressed from the Part 1 inspection that DC volts powered MOVs do not take into consideration degraded voltages and the impact it would have on the stroke times. **Action Category II** Establish A DC degraded voltage factor based upon the actual/rated volts to apply to the stroke time.				
Steve Coppock	Chuck Rath	04.07.10	During an earlier NRC GL 89-10 inspection of Commonwealth Edison Zion Station, inspectors noted that the licensee did not plan to dynamically test MOVs if at least 80% of design basis dp and flow could not be achieved. The inspectors indicated that the NRR would review the position. Recently, the "Inspection Results in Region IV" summary of July 1993 identified that dynamic tests where the percentage of design flowrate was significantly below percentage of MEDP showed characteristics of a static test. The summary states that the use of this data for similarity studies may be invalid, and the summary suggests the importance of flow simulation commensurate to d/p simulation. Because of plant configuration and practicability limitations, a significant number of PVNGS MOVs with design basis d/p and flow requirements are tested under design basis d/p but zero flow conditions (i.e., hydro pump). If the test results will be considered questionable, or if the NRC is in agreement with the Commonwealth Edison position, then PVNGS may choose to save resource by not dynamically testing MOVs if at least 80% of design basis dp and flow cannot be obtained. **Action Category III** VSE to follow-up on the NRR review of Commonwealth Edison Zion Station's position to not dynamically test MOVs with less than 80% of design basis dp and flow.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Bob Whiting	04.07.11	Where Design Basis in-situ testing on any of the MOVs within the scope of GL 89-10 is not practicable, the NRC allows the use of the "two stage" approach, or prototype testing, as an alternate to the test at design basis parameters. Per the recommendations of GL 89-10, this alternative to testing at less than design basis conditions and the follow-up actions to be taken to adequately demonstrate that the MOVs are capable of performing their design basis function, must be documented. Currently, no such program exists for those valves where testing at design basis parameters is not practicable. Action Category II				
Steve Coppock	Bob Whiting	04.07.12	A review was made of MOV procedures to determine whether there is a requirement to refurbish the MOVs prior to conducting baseline testing. Refurbishing the MOVs prior to performing baseline testing, ensure that the best possible or reference data is available for future MOV evaluation. A review of the following procedures determined that guidance is not provided to ensure that the MOVs are refurbished prior to baseline testing. 1. [illegible]PR-9ZZ01 entitled "Motor Operated Valve Monitoring and Testing Program" paragraph 3.3.2. states that "All PVNGS MOVs shall be static baseline diagnostically tested." Also paragraph 3.3.3, states that the valves included in the GL 89-10 shall be dynamically tested and that the tests shall be performed in accordance with test instructions developed by the VSE. In either paragraph, no caution is stated to ensure that prior to the baseline testing, that the valves be refurbished. Also, no mention is made of baseline dynamic testing, only baseline static testing is mentioned in the procedure. 2. Procedure 39AC-9ZZ01 entitled "Valve Services Engineering paragraph 3.5.2 discusses the initial performance test but no guidance is given to ensure that the MOVs should be refurbished prior to the performance of this test. 3. Procedure 39AC-9ZZ02 entitled "Valve Services Maintenance" paragraphs 3.2.4.1, 3.3, and 3.4 pertaining to static and dynamic testing including baseline testing, make no mention of refurbishment of the MOVs prior to baseline testing. Action Category II CRDR 91-0084 was written to address periodic refurbishment of MOVs. However the need to refurbish the MOVs prior to "baselining" is not addressed in the MOV program procedures. The MOV Assessment Team recommends that 39PR-9ZZ01 incorporate controls to establish a schedule for the refurbishment of MOVs prior to diagnostic testing.				

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Steve Coppock	Chuck Rath	04.07.13	39DP-9ZZ01 Guidelines for Evaluation of Motor Operated Valve Dynamic Test Data includes requirements unacceptable, marginal and disqualified data to be reviewed for impact and disposition by NED/VSE, but does not specify requirement that acceptable data be reviewed by NED also. **Action Category III** VSE to revise 39DP-9ZZ01 to include statement that "Evaluated data that satisfy applicable acceptance criteria with a margin greater than 15 percent, will be reviewed by Nuclear Engineering Department in accordance with the requirements of 81DP-4DC10 Motor Operated Valve Design Basis Review and Thrust/Torque Calculation.				
Steve Coppock	Bob Whiting	04.07.14	Procedure 39PR-9ZZ01, Appendix B, specify that there are 117 valves per unit (351 total) per Letter 320-00236-MSC/MPH that notifies management of the status of MOV testing identifies 109 per unit (327 total). Appendix B, of 39PR-9ZZ01 should reference those MOV not required for DP testing and the support source document to clarify the discrepancy. Note: Sec. 3.3.3 of 39PR-9ZZ01 states that all valves listed in Appendix B shall be dynamically tested.	**Closed:** Transfer to 04.10	Bob Whiting	08/12/93	08/12/93
Steve Coppock	Steve Berry	04.07.15	Valve 3JSIAHV0804 - Peak cracking torque of 27.4 ft.-lbs. was evaluated against 250 ft-lbs while the valve weak link is 124 ft-lbs. "open". For this valve the motor pullout capacity is also less than 250 ft.-lbs. The pressure transmitter data appears to be distorted because of improper grounding. (noise due to motor current). **Action Category II**				
Steve Coppock	Steve Berry	04.07.16	Evaluation of torque and stem factor: The baseline test only evaluates the thrust setpoints. The torque limits are not verified even though torque is measured. The following torque limits are of concern: motor capacity, valve torque limit and actuator torque limit. Evaluation should be considered at unseating, CST & total. **Action Category II**				
Terry Lui	Steve Berry	04.07.17	Stem factor degradation - programmatically handled by guidance to the technicians to set the CST at midrange. This practice is not consistent with other utilities. Many of these utilities are adding margin in the setpoint calcs. The following needs to be considered; loss of thrust of CST and increased torque required to unseat the valve.	**Closed:** Duplicate of 04.02.05.	S. Scow	N/A	09/01/93
Steve Coppock	Steve Berry	04.07.18	Valve 3JSIAHV0804 - The NOR files had to be corrected for correct span at the pressure transmitters. The open torque and thrust NOR files also had to be changed. Is this a common problem? There is a potential of valve inoperability due to the wrong span number entered into the system.	**Closed:** Moved to 04.11.06, See also CRDR 9-3-0691	Ron Spencer	N/A	09/02/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Steve Berry	04.07.19	Valve 3JSIAHV0604 - The DP test was performed without flow. Valve friction was observed. APS's program does not require valve factor calculation when a DP test is performed w/o flow. The valve factor needs to be evaluated for these cases even though it may not bound the design basis with flow. If the valve factor fails w/o flow then it will fail with flow. Action Category II				
Steve Coppock	Bob Whiting	04.07.20	Process time and evaluation of the data is found to be a very cumbersome process. Procedurally, from the time of the test performance to initial draft of failed criteria data evaluation can take up to a max of 14 days. Compounding, there is a minimum of 4 groups involved. Evaluate the process to reduce time and response to expedite MOV operability issues.	Closed: Moved to 04.06.03	S. Scow	N/A	09/01/93
Steve Coppock	Bob Whiting	04.07.21	Review of RCTS 040800, (closed) Observation 91-25-05 identified exceeding actuator thrust rating in the open direction during static testing could result in valve damage. The EER ICMODBs identify this condition as reference on Note 23. Review of 32MT-9Z256 provides no caution step or acknowledgement back to the ICMODBs. This condition is left to the field technician for corrective action. Review of WO 549538, performed found that the field has misinterpreted the instruction of Note 23, thus initiating an EER evaluation. Action Category III Reference procedure 32MT-9ZZ56 back to the ICMODB notes and provide caution notes accordingly.				
Gary Shanker	Bob Whiting	04.07.22	Research/review of Valve 3JAFAUV0037 and associated CRDR 3-3-0183 initiated as a result of unacceptable test acceptance criteria found: a) CRDR control desk does not have a copy of justification for operation initiated from the 15 day draft. They did have a copy of NRA Response. b) Correspondence (Letter 320-00270-MSC/EHS) found on file at NRA justification of valve operability associated with numerous CRDRs. Except for two valves, operability is justified by statement "results of our evaluations to date indicate the MOVs in these CRDRs to be fully operable." If operability of a valve is to be justified where is the traceability back to the justification (for referenced valve, a copy of screening was obtained from NED dispositioning Engr.) and for NRA to verify/justify operability, is more than a statement required?" Action Category II				
Steve Coppock	Steve Berry	04.07.23	Baseline tests do not receive the same level of review as the DP tests, (i.e., unseating, stem factor - torque limits). The MOV Assessment team concerned that not all valves are DP tested. Action Category II				

MOV ASSESSMENT TEAM
GENERIC LETTER 89-10 PROGRAMMATIC ASSESSMENT
September 24, 1993 @ 2:06 pm

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Steve Berry	04.07.24	2JSGNHV1144 - DP test - Concern the GA% = 2.81% for "Min. Open Thrust" evaluation. Why does this not include torque switch repeatability?	Closed: Min. open thrust measurement is taken at maximum dynamic force point, prior to TST. The repeatability adjustment is not applicable to this measurement.	Chuck Rath	N/A	09/15/93
N/A	Steve Berry	04.07.25	APS uses the SSR accuracy (conservative for other transducers) in calculating MOV setpoints. This is considered a positive aspect of the APS program.	Program Strength	Stuart Scow	N/A	08/23/93
Steve Coppock	Steve Berry	04.07.26	1JSIAUV0826 - DP test T206, T211, etc. Torque data shows anomalies. No evaluation is provided. 2JSIAUV0872 - Zero load is picked differently between static and dynamic traces. Action Category II				
Steve Coppock	Chuck Rath	04.07.27	VSE is requested to clarify how actuator repeatability effects are included into the evaluation of dynamic test data.	Closed: Evaluations involving measurements at torque switch trip include an uncertainty adjustment based on published vendor repeatability statements.	Chuck Rath	N/A	09/17/93
Steve Coppock	Chuck Rath	04.07.28	GL 89-10 - Requires documentation of MOVs that will not be practicable to test with justification. Currently, no documentation has been developed to satisfy this requirement. Action Category II VSE to document those MOV's where design basis testing is not practicable.				
Terry Lui	Chuck Rath	04.07.29	Calculation 13-JC-ZZ-201 Appendix K should be revised to delete the inclusion of the superceded MOVATS ER-5.0, Rev. 4, and to include supporting calculations and assumptions for the "Instrument Inaccuracy and torque switch repeatability table." Action Category II				
Jim Minnicks	Bob Whiting	04.07.30	There were instances where as a result of test data not being taken, equipment and testing methodology used for testing that is inconsistent with the results desired, and wrong assumptions made as to MOV design parameters, several MOV dynamic tests had to be disqualified. It is possible that if an independent review of the details of the procedures had been made, taking into consideration the requirements of GL 89-10, some of these issues may have been avoided and the test may not have been disqualified. Action Category III				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Jim Minnicks	Bob Whiting	04.07.31	There were instances where as a result of test data not being taken, equipment and testing methodology used for testing that is inconsistent with the results desired, and wrong assumptions made as to MOV design parameters, several MOV dynamic tests had to be disqualified. It is possible that if an independent review of the details of the procedures had been made, taking into consideration the requirements of GL 89-10, some of these issues may have been avoided and the test may not have been disqualified.	Closed: Duplicate of 04.07.30.	Chuck Rath	N/A	09/15/93
Jim Minnicks	Bob Whiting	04.07.32	Flow is not being considered by procedure, system flow rate is a critical test parameter only for evaluations involving dynamic stroke time of DC MOVs and rate of loading effects. However, flow should be considered a critical parameter especially for those valves that are not capable of being tested as maximum design basis conditions. Action Category II				
Mike Radoccia	Ron Spencer	04.07.33	A review needs to be performed on the operability calls on CRDRs written for valves that have failed criteria or have disqualified test methods. This review should be technical in nature to ensure the adequacy of operability review. Action Category II				
	Bob Whiting	04.07.34	The intent of the 89-10 DP tests is to determine valve performance at Max DP and flow. The test was performed at a flow rate that exceeds the design basis max flow rate; the actual flow rate was at 141% of calculated design basis flow rate whereas the DP was at 97.9% of were performed to determine whether the design basis assumptions should be corrected to reflect the values obtained in the actual test? Action Category III				
	Bob Whiting	04.07.35	What is the purpose and the basis for the assumed 1% Static Head Effects Uncertainty. Action Category III				
Jim Minnicks	Bob Whiting	04.07.36	2.2.1.2 - The differential pressure uncertainty for the "open stroke" is calculated as 4.12% whereas becasuse of the range of the gauge used the uncertainty is calculated as 97.78% for the "close stroke". A gauge with a smaller range should be used for the close stroke to provide a much greater degree of certainty. Action Category III				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Jim Minnicks	Bob Whiting	04.07.37	1JSIBUV828 - Initially failed to close at 80% DP. An evaluation was performed that allowed the "Adjusted Maximum Total Thrust" to be increased on the Unit 1 Cold Leg MOVs. A review of the ICMODB determined that although the Unit 1 values were increased, the Unit 2 and 3 valves performing the same function have lower values. What justification exists to allow the non Unit 1 valves, to continue operating at the lower thrust values in light of the fact that the valves are all experiencing similar operating parameters? Action Category II				
Jim Minnicks	Bob Whiting	04.07.38	Torque is measured in ft-lbs. The parameter under item 3. on the data sheet "Torque Strain Gage Zero Offset Adjustment, lbs" should be in ft.-lbs. Similarly, "Adjusted Stem Torque, lbs." should be in ft.-lbs. Action Category III				
Jim Minnicks	Bob Whiting	04.07.39	Under item 3. of the Evaluation Data Sheet, "Torque Reading Uncertainty, is calculated to be 78.3%. Similarly, the Evaluated Torque Uncertainty and the Stem Thread Friction Coefficient, uncertainty is calculated to be 81.47%. Since these uncertainties are used the calculations to determine "pass" or "fail" why are these high uncertainty values considered acceptable.	Closed: Duplicate of 04.07.05	Chuck Rath	N/A	09/15/93
	Bob Whiting	04.07.40	Testing procedures used for MOV testing do not provide sufficient guidance to the personnel performing the tests. This is especially true for those tests that will be used as "baseline" dynamic tests to ensure that the valves will operate at design basis conditions. Action Category II				
Jim Minnicks	Jim Young	04.07.41	GL 89-10 requires that an explanation be documented for any cases where testing with the design basis differential pressure or flow cannot practicably be performed. Action Category II				
Steve Coppock	Ron Spencer	04.07.42	39DP-9ZZ01 Rev. 00.02 Section 3.5.5 requires that the Responsible Engineer select the Evaluation Criteria Applicability and Analytical Evaluation Methods when evaluating MOV dynamic test data. Section 3.5.6.3 requires the evaluation criteria "Opening Stem Factor", to be applicable to Flow-Over-Seat (OTS) globe valves. Contrary to the above, an evaluation was not performed for Opening Stem Factor for the OTS globe valve 1JSIDHV0331. This omission has left the evaluation performed by CRDR 1-3-0251 in question. CRDR 1-3-0453 initiated.	Closed: CRDR 1-3-0453	R. Spencer	N/A	09/21/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Mike Radoccia	Jim Young	04.07.43	Due to the timing of this assessment, field observations of dynamic testing was not practicable since these tests are typically performed during scheduled refueling outages. It is recommended that an independent follow-up observation of dynamic testing methodology and results evaluation (i.e., CRDR evaluation process) be performed during the Unit 1 (R4) outage. In addition, field observations should be performed in the areas of periodic maintenance and personnel training activities. A sufficient appraisal of program effectiveness in these areas are not achieved during the assessment since limited team resources were dedicated to these areas of review. Action Category II				
Steve Coppock	Bob Whiting	04.08.01	MOV 3JSGAUV0134 has reference to CRDR 3-2-0548. Action 3 & 4 recommends that valve be retested/reevaluated based upon previous inconclusive data. Question arises, has the valve been placed back into the 89-10 schedule as incomplete or has testing been satisfied? At present any followup testing is tracked by initiation of a CATS action to perform at an unspecified later date.	Closed: Duplicate of 04.08.02	S. Scow	N/A	09/01/93
Mike Powell	Bob Whiting	04.08.02	PM EQ Maintenance Work Tasks 047415 (Valve #037) and 048565 (Valve #0904) all reference Maintenance per 32MT-9ZZ48. Referenced procedure according to DDC index has been cancelled. Action Category II A review of all 89-10 MOVs tasks should be made to verify procedure reference.				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Bob Whiting	04.08.03	Dynamic Test Evaluations performed as much as 24 months after initial WO Test Performance where evaluation resulted in disqualified or unacceptable margin. Neither the W.O. or the Engineering Evaluation reference operability between test and evaluation, suggested corrective actions. It was also noted that the various documents, i.e., test evaluation, W.O. did not provide a loop to allow action/recommendation trail. **Action Category II** Problems: (1) Excessive time period between test and evaluation (2) Operability not justified. (3) Lack of documentation trail. VALVE / TEST DATE / EVAL. DATE (1) 034 2/8/91 4/21/93 (3),(2),(1) 037 5/25/91 4/21/93 099 N/A N/A (2), (3) 1144 6/13/93 7/9/93 (1) 134 11/21/92 11/25/92 (1) 826 4/23/92 4/21/93 (3), (1) 331 4/14/92 4/21/93 657 5/17/93 5/29/93 (2), (1) 866 11/29/91 4/21/93 (3) 872 5/24/93 6/3/93 (3), (1) 804 11/13/92 11/25/93				
Steve Coppock	Chuck Rath	04.08.04	The Generic Letter requires licensees "to ensure that correct switch settings are determined and maintained throughout the life of the plant." However, statements found in recent GL 89-10 Part 2 inspections indicate that those licensees intending to satisfy this commitment on the basis of periodic static testing will be required by the NRC to provide documented objective evidence supporting a reliable correlation between MOV static and dynamic capability. **Action Category II** Valve Services Group should 1) collect additional data as required and/or analyze existing data to determine if such a justification can be developed within the GL 89-10 schedule requirement; or 2) address the option of performing dynamic tests on a repetitive basis; or 3) investigate the feasibility/adequacy of an alternate less invasive methodology (i.e., the hydro pump) that could be performed on a repetitive basis to provide the thrust measurements required to ensure design basis capability of program MOVs.				
Steve Coppock	Ron Spencer	04.08.05	The MOV Assessment Team has determined that data obtained, recorded, and evaluated per 38DP-9ZZ01 is governed by the PVNGS Operations QA Plan. Therefore, an independent review is required to assure accuracy in test results that are used to make operability determinations.	Closed: Ref. CRDR 9-3-0710	R. Spencer	N/A	09/10/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Bob Whiting	04.08.06	A "Practicality Review Plan" including methodology is currently not available to provide guidance as to the advisability and practicability of performing an in-situ test on MOVs within the scope of GL 89-10 at design basis conditions. A documented practicality review should be available for each valve in the GL 89-10 program. Action Category II This practicability review plan should assess the advisability of performing an in-situ test on an MOV based on items such as: 1. The potential for risk to plant equipment, 2. The potential for increased risk to the public health and safety, 3. Accessibility of the MOV and related equipment during the test, 4. Reduction in safety system margin, 5. etc.				
Steve Coppock	Bob Whiting	04.08.07	NRC Inspection Report 91-25 contained an open item 91-25-04 regarding periodic verification of MOV capability. The NRC indicated that if APS was going to rely on static testing only for periodic verification of MOV capability, then adequate justification would be necessary. Procedure 39DP-9ZZ01 appears to rely on static testing only for periodic verification of MOV capability. The justification for this position needs to be provided.	Closed: Duplicate of 04.08.04	Chuck Reth	N/A	09/15/93
Steve Coppock	Ron Spencer	04.09.01	MOV assessment team recommends that CRDR's written for MOV problems be captured in the NPRDS data base. Action Category III CRDR's concerning MOV failure and trending need to be included in the NPRDS data base to fully capture problem areas and solutions.				
Steve Coppock	Ron Spencer	04.09.02	ER 5.2 limitorque actuator open vs. close TMD Data Analysis Procedure has been used in various calculations (Ref. EER 92-MO-179) but is not controlled. This ER has not been incorporated into the VTM M459-001. The MOV Assessment Team recommends that a review be performed on all evaluations that used the ER 5.2 methodology to ensure the correct revision was used of ER 5.2. A check with ITI MOVATS will verify the correct/current revision. It is also suggested that a training session be held with all responsible departments on the requirements of control of vendor documentation.	Closed: Ref. CRDR 9-3-0890	J. Minnicks	N/A	09/10/93
Craig Clapper	Ron Spencer	04.09.03	The trending and capturing of MOV data by Performance Engineering does not appear to capture all relevant data for consideration.	Closed: Ref. CRDR #9-3-0886	R. Spencer	N/A	09/10/93

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Chuck Rath	04.09.04	During earlier inspections of GL 89-10 at other utilities, the NRC identified licensee's lack of formal trending program to be a program weakness. Trending parameters such as thrust, torque switch setting, valve factor, and stem factor were identified. The NRC also took note of licensee's that did not have a formal program in place to trend MOV degradation through use of as-found data. **Action Category II** Performance Engineering Group is requested to provide a summary of the MOV trending program present status, including identification of parameters monitored, if and how as-found and as-left data are going to be compared, and if failed as-found MOV LLRT's are trended. The MOV assessment team recommends that the MOV data obtained for trending by Performance Engineering be programmatically captured, (i.e., through w/o closure to ensure complete and accurate data. This is to include information from CRDR's if necessary).				
Steve Coppock	Ron Spencer	04.09.05	Procedures need to be established by the VSD to programmatically capture the 89-10 commitments to failure trending. The NRC recommends that procedures be established for analyzing as-found deteriorated conditions, malfunctions, tests, Inspection and Repairs or alterations on MOVs. This data is required to be periodically reviewed (every 2 years or after each refueling outage after program implementation). Procedures need to be established for defining the parameters needed for the FDT coordinator to obtain the necessary data to comply with the 89-10 commitment. The procedures need to specify the departmental responsibilities. **Action Category II**				
Steve Coppock	Chuck Rath	04.10.01	Implementation plan for NRC Generic Letter 89-10 Revision 1 dated July 5, 1991, needs to be revised to 1) incorporate organizational changes, 2) refer to our use of the CRDR instead of the MNCR when evaluating dynamic test data, 3) more accurately address our trending activities, 4) delete the reference to our use of the Business Plan as a method for tracking and prioritizing program activities, and 4) to further define Phase 1/Phase 2 test requirements **Action Category II**				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Chuck Rath	04.10.02	PVNGS GL 89-10 schedule for dynamic testing summarized in a memorandum for M. R. Hooshmand to M. S. Coppock dated January 22, 1993 (320-00236-MSC/MRH is not current and does not reflect the additional retesting requirements initiated by dynamic test CRDR evaluations and disqualified data. Procedure 39PR-9ZZ01, Appendix B, specify that there are 117 valves per unit (351 total) per Letter 320-00236-MSC/MRH which notifies management of the status of MOV testing identifies 109 per unit (327 total). Appendix B, of 39PR-9ZZ01 should reference those MOVs not required for DP testing and the support source document to clarify the discrepancy. Note: Sec. 3.3.3 of 39PR-9ZZ01 states that all valves listed in Appendix B shall be dynamically tested. **Action Category II** Revise the testing schedule to reflect present status, and also to address the additional retesting requirements initiated by dynamic test CRDR evaluations and disqualified data.				
Steve Coppock	Scott Bauer	04.10.03	Current MOV program schedule only addresses dynamic testing. Need to add to the schedule evaluation and resolution of test data including revision of MOV calculations, modifications of MOVs etc.	**Closed:** Incorporated into 04.02.01	S. Scow	N/A	09/01/93
Mike Radoccia	Jim Young	04.11.01	EER 90-XE-037 and 90-XE-045 performed a review of the PVNGS GL 89-10 program to assure the program scope is adequate. The MOV Assessment team requires that an individual be assigned to independently 'QA' this EER.	**Closed:** Refer to 04.02.24 & 04.02.25	Jon Sears	N/A	08/27/93
Steve Coppock	Bob Whiting	04.11.02	MOV DP and static tests for the 89-10 program are performed and evaluated utilizing several documents. The documents include the work order, test instructions, data evaluation, and hard copies of MOV signatures. This entire package should be assembled, closed and archived within the W.O. to maintain historical information and consistency with other Plant and Engineering documents. Test instruction engineering evaluation originals are presently stored in VSE files. **Action Category II** Work Order packages should include the DP test evaluation @ time of closure and should reference test data deviation document.				
Steve Coppock	Bob Whiting	04.11.03	Initial review of the NRA files for the RCTS/CATS actions associated to the NRC Part 1 MOV program reference procedure 73PR-9ZZ04 as the closure document. As a result of VSE reorganization from Plant Engineering to Maintenance, Procedure 73PR-9ZZ04 was cancelled, generating 4 associated Maintenance procedures. To close the NRA tracking loop, their files should detail specifically what 39 series procedure(s) completed the RCTS/CATS action. Maintenance procedures are 39DP-9ZZ01, 39AL-9ZZ01 & 02 and 39PR-9ZZ01. **Action Category II**				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Jim Young	04.11.04	Two VSE personnel have not completed initial training requirements. **Action Category II**				
Steve Coppock	Jim Young	04.11.05	Valves that do not meet the test criteria in dynamic testing are not being evaluated in a timely fashion. We recommend that Engineering evaluations of test data for acceptance criteria and MOV operability justifications when applicable, be completed in a fixed, reasonable time. This will allow time to take corrective action when necessary, and may prevent avoidable impact to plant operation.	Closed: Moved to 04.08.03	Jim Young	N/A	09/13/93
Steve Coppock	Chuck Rath	04.11.06	During evaluation of dynamic test data, the Movats NOR file constants are reviewed for accuracy, and have been changed as required by VSE or VSM to correct field errors that were made while inputting transducer sensitivities into the diagnostic software. Although the dynamic test evaluations were performed using the corrected Bernoulli data files located in the VSE work area, the VSM Bernoulli data files and backups were not formally updated. The potential exists for the VSM Bernoullis to contain incorrect NOR file constants, and for those files to be overwritten back onto the VSE Bernoulli files during a future update. This would result in incorrect data displayed on the VSE system and in use by VSE/NED during engineering evaluations. Valve 3JSIAHV0804 - The NOR files had to be corrected for correct span at the pressure transmitters. The open torque and thrust NOR files also had to be changed. Is this a common problem? There is a potential of valve inoperability due to the wrong span number entered into the system. **Action Category II** 1) Revise program procedures as required to ensure that NOR file constants are verified accurate prior to analyzing static Movats diagnostic traces; 2) develop and implement procedural controls to ensure that all NOR file corrections are written onto the VSE and both VSM data files; 3) for those valves that were changed during the evaluation process, review VSM and VSE Bernoulli files to ensure that all data sets use the same NOR file constants; and 4) consider the use of a network to establish a common accessible database, eliminate our reliance on Bernoulli disks, eliminate the potential for error between data sets, and eliminate the shuffle of diskettes between VSM and VSE during dynamic testing.	Closed: Ref. CRDR 9-3-0891 - closes the items for valve 3JSIAHV804 only.			
Steve Coppock	Jim Young	04.11.07	Two VSE personnel have incomplete qualification cards. A review of quality related work those individuals participated in should be performed. Anything that either individual signed should be co-signed by a qualified individual from Valve Services Engineering. **Action Category II**				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY		CLOSE DATE
Steve Coppock	Jim Young	04.11.08	In preparation for the NRC 89-10 inspection, a suggested improvement would be to develop a training package for all individuals within Valve Services Maintenance and Engineering. The package could include the following for each individual: - Qualification Cards - Completed 15AC-0TR01, Appendix C form with years of MOV experience - Training profile industry - All 1993 continuing/selected training - (include titles, hours, dates) - One copy of 15DP-0TR66, "Site Maintenance and Modifications Qualification Requirements and Training Program Description", could be included with the Valve Services Maintenance completed package. - One copy of 15DP-0TR49, "Engineering Support Personnel Qualification Requirements and Training Program Descriptions", could be included with the Valve Services Engineering completed package. Action Category III				
Steve Coppock	Jim Young	04.11.09	MOV assessment group request that a review be performed to identify how vendor technical information and maintenance reminders, related to MOV testing, is handled by PVNGS. Review should determine if such information is being properly evaluated, included in technical manuals and programs, and that required reviews are tracked to completion. Action Category II				
Steve Coppock	Chuck Rath	04.11.10	During an earlier NRC GL 89-10 inspection of a different utility, inspectors noted that additional training may be warranted to minimize errors in the marking and evaluation of diagnostic traces, and in the recognition of trace anomalies. During a similar inspection of another utility, inspectors noted that no provisions had been established for refresher training on actuator maintenance or diagnostics. This was identified in the report as a concern. Action Category II Valve Services Engineering and Valve Services Maintenance are requested to address the issue of refresher training on actuator maintenance, diagnostics systems, and diagnostic trace interpretations.				
Steve Coppock	Ron Spencer	04.11.11	MOV Assessment Team Suggests that 32MT-9ZZ56 procedure have technician sign off steps included for transfer of data to VSE for evaluation per 39DP-9ZZ01. Having a step in the model to notify VSE does not appear to programmatically ensure that VSE will obtain Diagnostic Test Data for evaluation. Action Category III				

PVNGS RESPONDENT	REQUESTOR	TASK/ACTION #	QUESTION/ACTION	CLOSED BY DOCUMENT (#/NAME)	COMP. BY	DATE DUE	CLOSE DATE
Steve Coppock	Bob Whiting	04.11.12	Procedure 39MT-9ZZ02 (PM/EQ maintenance of SMB/SB MOVs). Adequately address grease and lubrication evaluation of condition performed by the field technician. Problem arises that consistency is not established by the field. Grease Quality (particle, moisture, color) and consistency (hardness will be dependent upon who performs anal;;sis). PVNGS plant monitoring has a lub analysis program which could trend, document, and analyze . This will help to establish consistency in the method of evaluation. Suggest EQPM procedures incorporate the lub analysis program. **Action Category III**				
Jim Parker	Ron Spencer	04.11.13	The MOV assessment team requests that Configuration Management review the current data control techniques of the MOV signature data to see if it falls under App. G of the Operations QA Plan and procedures 83PR-0CC01, Revision 00.03, Sections 3.1.11 thru 3.1.13 & 01PR-0CQ02 Revision 00.00. **Action Category II** If this is found, a possible fix is identified in 04.11.06 with a common database. Limited access/update capabilities would control it.				
Jim Parker	Ron Spencer	04.11.14	MOV Assessment team request an evaluation be performed of the Design Control & Design Program in relation to MOVs.	**Closed:** Review of 83PR-0CC01 Conf. Management Program, 81PR-9DC02 Plant Change Program, 81AC-0DC01 procedures for plant change and EER #92-MO-152 was performed.	Ron Spencer	N/A	09/01/93
Rose Fullmer	Ron Spencer	04.11.15	The MOV assessment team has evaluated NRCs IR 93-17, Pg. 10 & 11 - Conclusion #C-1 and has determined that the Technical Depth of QA's involvement in the MOV area is still weak. The assessment team suggests that TQE or ISE take a more aggressive approach in determining overall adequacy of the MOV activities. **Action Category II**				
Mike Radoccia	Jim Young	04.11.16	IR 93-17, Pg. 11 - identified 9 weaknesses in the technical depth of QA monitoring of the MOV Program. The reorganization of TQE and ISE and the performance of this assessment addresses part of this problem. However, the report cited fourteen QM Monitoring reports that where compliance and performance based only. It is suggested that the QA division develop the necessary programs and training to rectify this apparent weakness. It is important that technical reviews be performed by QA groups in addition to TQE due to the relatively small staff of this department. **Act. n Category II**				

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George Baumann	Ron Spencer	04.11.17	15DP-0TR98 references appendixes in 15AC-0TR01 which do not exist. See Sec. 3.4.2 & 3.5.5. A review of 15DP-0TR98 is requested to ensure no other references do not exist. A pt change to Rev. 00.01 of 15DP-0TR98 is required to remove all ref. the 15AC-0TR01 Appendix 'C'. Add correct procedure to 15DP-0TR98 which controls the "Appendix C". Att. - Robin Ditty, Maintenance Training Action Category II				
Steve Coppock	Ron Spencer	04.11.18	Dynamic test data evaluations packages developed in accordance with 39DP-9ZZ01 and 73TIs that are used in evaluating DP testing on safety related valves are QA records and fall under the Operations QA Manual, Section 6.4. QA records. VSE is not controlling the test instruction and evaluation packages as required by the Ops. QA Manual.	Closed: CROR 930710 initiated to address/track this issue. See also 04.08.05.	Ron Spencer	N/A	09/13/93
Jim Minnicks	Ron Spencer	04.11.19	Appendix M of 15DP-0TR98, Page 2 of 2, Section 3.3 states that the MOVATS Data Acquisition, signature and analysis and accessories courses have course #'s NVM06, NVM07, NVM11. Yet, these courses are not explained under Section 4, Training course description. Also, Sec. 3.5 of Appendix M states that continued selected training consists of MOVATS 3000/3386 data acquisition, signature analysis and accessories but, doesn't list course #'s. It is not known what the qualification intervals for continued training are and what they consist of. Action Category II				

ATTACHMENT D

ASSESSMENT SAMPLE MOV SPREADSHEET

MOV SELF ASSESSMENT EVALUATION, Rev 1

VALVE ID	ACTUATOR		VALVE		VLV	OVER	CONTROL		MTR	TEMP. (6)		%					MAXIMUM		DESIGN ADJUSTED RANGE				AS LEFT					GL8910		
	MAN	TYPE/ SIZE	MAN	TYPE/ SIZE	FCTR (VF)	ALL RATIO (OAR)	OPN	CLS	NP TRQ	AMB	DB Degrees F	DGR VOLT (1)	MEDP (2) OPN	MEDP (2) CLS	MEF (3) OPN	MEF (3) CLS	% DP (13)	% FLW (14)	OPEN MATS (4)	OPEN MTOTS (5)	CLOSE MATS	CLOSE MTOTS	OPEN MATS	OPEN MTOTS	CLOSE MATS	CLOSE MTOTS	DIAG SYS (8)	TEST STATUS (7)	MODS COMP (9)	MODS PLN (9)
1JAFBUV0034	LMTQ	SMB-1	A-D	GATE/6"	0.50	45.29	L	T	60	104	125	85.20	1740	1740	1600	1600	99.4	62.5	22480	28382	35481	43408	27146	37761	30664	35056	TL-CAL	DQ,UA	a	c
3JAFAUV0037	LMTQ	SMB-1	A-D	GATE/6"	0.50	40.18	L	T	40	104	125	81.50	1810	1810	1600	1600	34.8	62.5	17609	21606	25983	39425	19100	26839	35233	37640	SG/U/S	DQ,UA	a	
3JNCNUV0099	EIM	EB-30	PRAT	BFLY/14"	N/A	96	L	L	2	104	124	89.60	90.9	90.9					443	684	443	684	n/a	n/a	n/a	n/a	n/a	U3R4		
2JSGNHV1144	ROTK	16A-43	PAC	GATE/6"	0.40	80	L	T	7.3	124	300	88.50	1572	1572	2100	1600	98.3	62.5	12682	17207	(10)	17207	13807	15887	13575	16700	TTC	UA		
3JSGAUV0134	LMTQ	SB-0	A-D	GATE/6"	0.40	14.82	L	T	40	124	300	84.70	1355	1355	15000	15000	48.9	n/a	15190	18640	16324	17300	15584	26669	16480	18631	TTC	UA		d,h
1JSIBUV0626	LMTQ	SMC-04	B-W	UTS-GLB/2"	1.10	67.23	L	T	7.5	104	218	90.00	1924	1924	283	283	97.9	n/a	1187	10175	8535	10175	9006	9822	7995	9404	OSS/C/T	DQ,UA		
1JSIDHV0331	LMTQ	SMB-0	B-W	OTS-GLB/3"	1.10	46.3	L	T	25	104	216	83.80	1924	1924	565	565	96.4	n.a	12694	24684	662	22964	12994	19667	14086	20439	VOTES	DQ,UA	c	g
2JSIAHV0657	LMTQ	SMB-00	POSI	BFLY/16"	N/A	109	L	L	10	104	104	91.10	292	292	8500	8500	90.5	94.1	1921	2160	1921	2160	1947	2164	1958	2184	OSS/C/S	UA	a	
2JSIAUV0666	LMTQ	SMC-04	B-W	UTS-GLB/2"	1.10	67.23	L	T	7.5	104	112	87.40	n/a	1966	300	300	95.6	146.7	1319	8596	5993	8596	8596	8477	9587	9191	SG/C/T	DQ,UA	b	e
2JSIAUV0672	LMTQ	SB-0	B-W	GATE/8"	0.40	27.97	L	T	25	104	216	86.50	341	341	4750	4750	102	(12)	8287	24684	9038	22964	8440	24337	16332	20631	TTC	PASS	b,d,e	d
3JSIAHV0604	LMTQ	SMB-00	B-W	GATE/3"	0.50	36.4	L	T	15	104	112	90.40	1945	1400	0	0	89.9	n/a	5776	14353	6377	13229	10097	13557	12131	14358	OSS/C/T	PASS	b,c,d,f	

Common Assumptions To All The Calculations; Seating Load = 0, except 2JSGNHV1144=166 and Butterfly Valves; Stem Coefficient of Friction, minimum = 0.2 to a maximum = 0.12; Gear Rating =1.0; Application Factor = 0.9.

The Spread Sheet supplied to the NRC will include the same information with additional parameters included from the Design Basis Documentation applicable to a specific MOV as determined by per-selection for their review.

(1) Rated Voltages; 460 AC, 115 DC; References, 13-EC-MA-221 & 13-EC-PK-161 for minimum voltages

(2) Maximum Expected Differential Pressure (MEDP); Reference System Design Basis Calculations, i.e. 13-MC-CT-304, 13-MC-AF-401

(3) Maximum Expected Flow (MEF); Reference, System Design Basis Calculations

(4) Minimum Available Thrust Setpoint (MATS); Reference, ICMODB EERs 93-MO-070, 93-MO-005, 92-MO-175

(5) Maximum Total Thrust Setpoint (MTOTS), Electric, plus Inertia; Reference; ICMODBs

(6) Equipment Qualification Manual, Revision 1 and Draft of Revision 2.

(7) UXRY= Test Schedule by Unit No. (X) & Refueling Cycle (Y); PASS=Indication of Passing all the Acceptance Criteria; DQ= Disqualified Data; UA = Not Passing One or more of the Acceptance Criteria.

(8) TL-CAL-MOVATS System; SG-Strain Gage; TTC-Torque/Thrust Cell; OSS-Quick Stem Sensor; U-Uncalibrated; C, Calibrated; S-Smooth Stem; T-Thread Fit Attachment.

(9) (a) Actuator Change out; (b) Spring Pack Configuration Change; (c) Gear Ratio Change; (d) Roll Pin Rework; (e) Limitor Plate; (f) Motor, (g) Rotate Actuator, (h) Drive Sleeve rework.

(10) Note 27 of EER 93-MO-005.

(11) Note 1 of EER 93-MO-005.

(12) Hydrostatic test, steady state flow not achievable.

(13) Actual Differential Pressure Tested / Designed Differential Pressure

(14) Actual Flow where Tested / Design Flow

ATTACHMENT E

ASSESSMENT SAMPLE MOV TEST EVALUATION STATUS

PVNGS GL 89-10 ASSESSMENT
SAMPLE MOV TEST EVALUATION STATUS

Evaluation Criteria	1JAFBUV0034	3JAFAUV0037	3JNCNUV0099	2JSGNHV1144	3JSGAUV0134	1JSGBUV0626	1JSIDHV0331	2JSIAHV0657	2JSIAUV0668	2JSIAHV0872	3JSIAHV0804
Opening Valve Factor	Disqualified	Acceptable	(Not Tested)	Unacceptable	Acceptable, M < 15%	NA	Disqualified	NA	NA	NP	NA
Closing Valve Factor	Disqualified	Unacceptable	(Not Tested)	Unacceptable	Acceptable	Acceptable	NA	NA	Acceptable	NP	NA
Opening Stem Factor	Disqualified	Disqualified	(Not Tested)	Unacceptable	Unacceptable	NA	CRDR 1-3-0453 Issued	NA	NA	NP	NA
Closing Stem Factor	Disqualified	Disqualified	(Not Tested)	Acceptable	Unacceptable	Disqualified	NA	NA	Disqualified	NP	NA
Opening Rate of Loading Effect	Unacceptable	Acceptable	(Not Tested)	Acceptable	Unacceptable	NA	Disqualified	Acceptable	NA	NP	NA
Closing Rate of Loading Effect	Disqualified	Acceptable	(Not Tested)	Acceptable	Unacceptable	Unacceptable	NA	Acceptable	Unacceptable	NP	NA
Design Min. Opening Thrust	Disqualified	Acceptable	(Not Tested)	Unacceptable	Acceptable	NA	Disqualified	NA	NA	NP	NA
Design Min. Opening Torque	Disqualified	Disqualified	(Not Tested)	Acceptable, M < 15%	Acceptable	NA	Disqualified	Unacceptable	NA	NP	NA
Design Min. Closing Thrust	Disqualified	Acceptable	(Not Tested)	Unacceptable	Acceptable	Acceptable	NA	NA	Acceptable, M < 15%	NP	NA
Design Min. Closing Torque	NA	NA	(Not Tested)	Acceptable, M < 15%	NA	NA	NA	Acceptable, M < 15	NA	NA	NA
Open Peak Cracking Thrust	Disqualified	Acceptable	(Not Tested)	Acceptable, M < 15%	Acceptable	NA	Disqualified	NA	NA	Acceptable	Acceptable
Open Peak Cracking Torque	Disqualified	Disqualified	(Not Tested)	Acceptable, M < 15%	Acceptable	NA	Disqualified	Acceptable	NA	Acceptable	Acceptable
Opening Dynamic Stroke Time	Acceptable	Acceptable	(Not Tested)	NA	Acceptable	Acceptable	Acceptable	Acceptable	NA	NP	NA
Closing Dynamic Stroke Time	Acceptable	Acceptable	(Not Tested)	NA	Acceptable	NA	NA	Acceptable	Acceptable	NA	NA
Open Torque Bypass Switch Setpoint	Acceptable	Acceptable	(Not Tested)	Acceptable	Acceptable	Acceptable	Unacceptable	Acceptable	Acceptable	Acceptable	Acceptable
Open Diagnostic Trace Profile	Acceptable	Disqualified	(Not Tested)	Acceptable	Acceptable	Disqualified	Disqualified	Acceptable	Disqualified	Acceptable	Acceptable
Closing Diagnostic Trace Profile	Acceptable	Disqualified	(Not Tested)	Acceptable	Acceptable	Disqualified	Disqualified	Acceptable	Disqualified	Acceptable	Acceptable

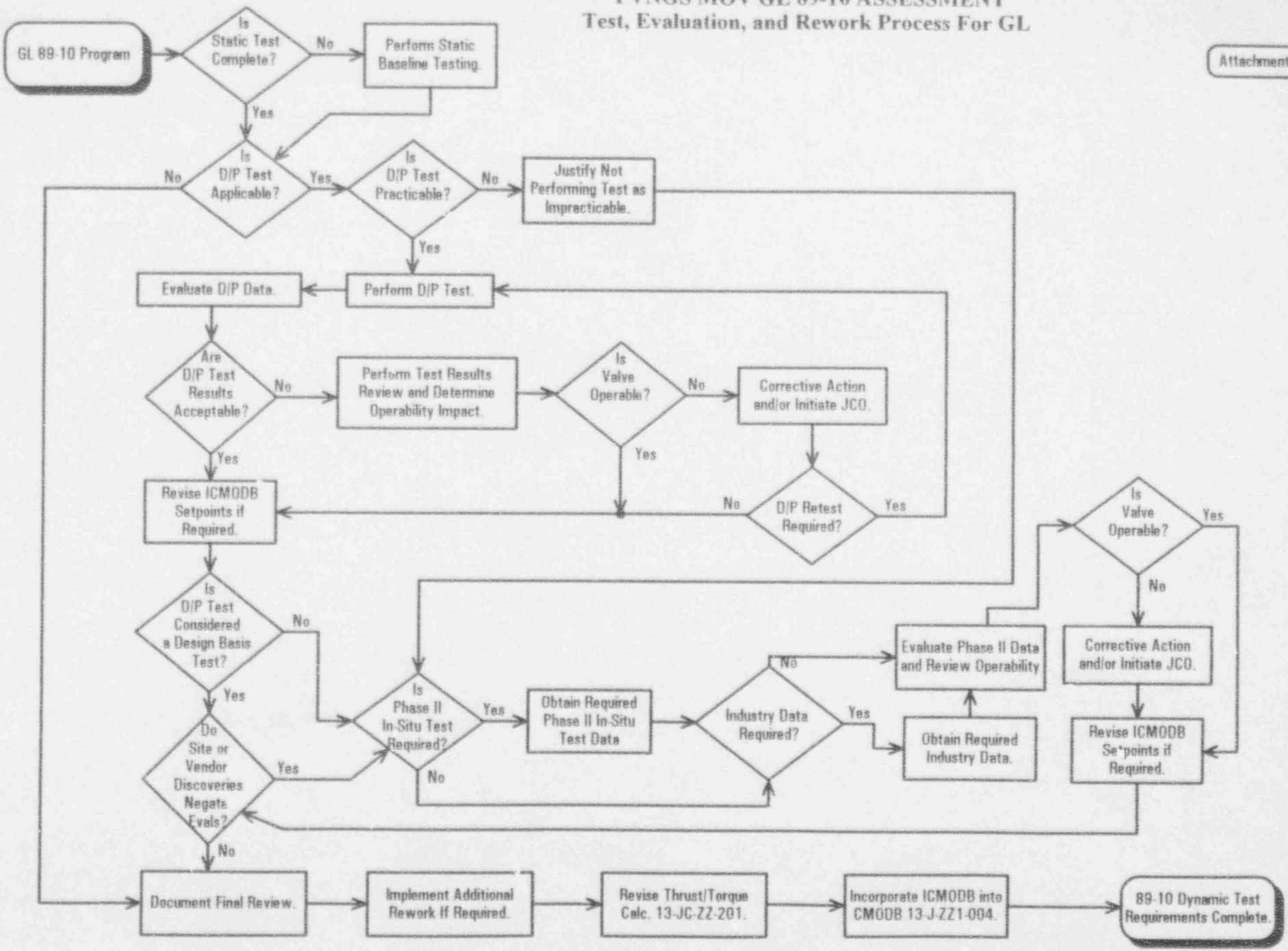
NA: Not Applicable NP: Not Practicable

ATTACHMENT F

PVNGS GL 89-10 MOV TEST, EVALUATION, and REWORK PROCESS

PVNGS MOV GL 89-10 ASSESSMENT
Test, Evaluation, and Rework Process For GL

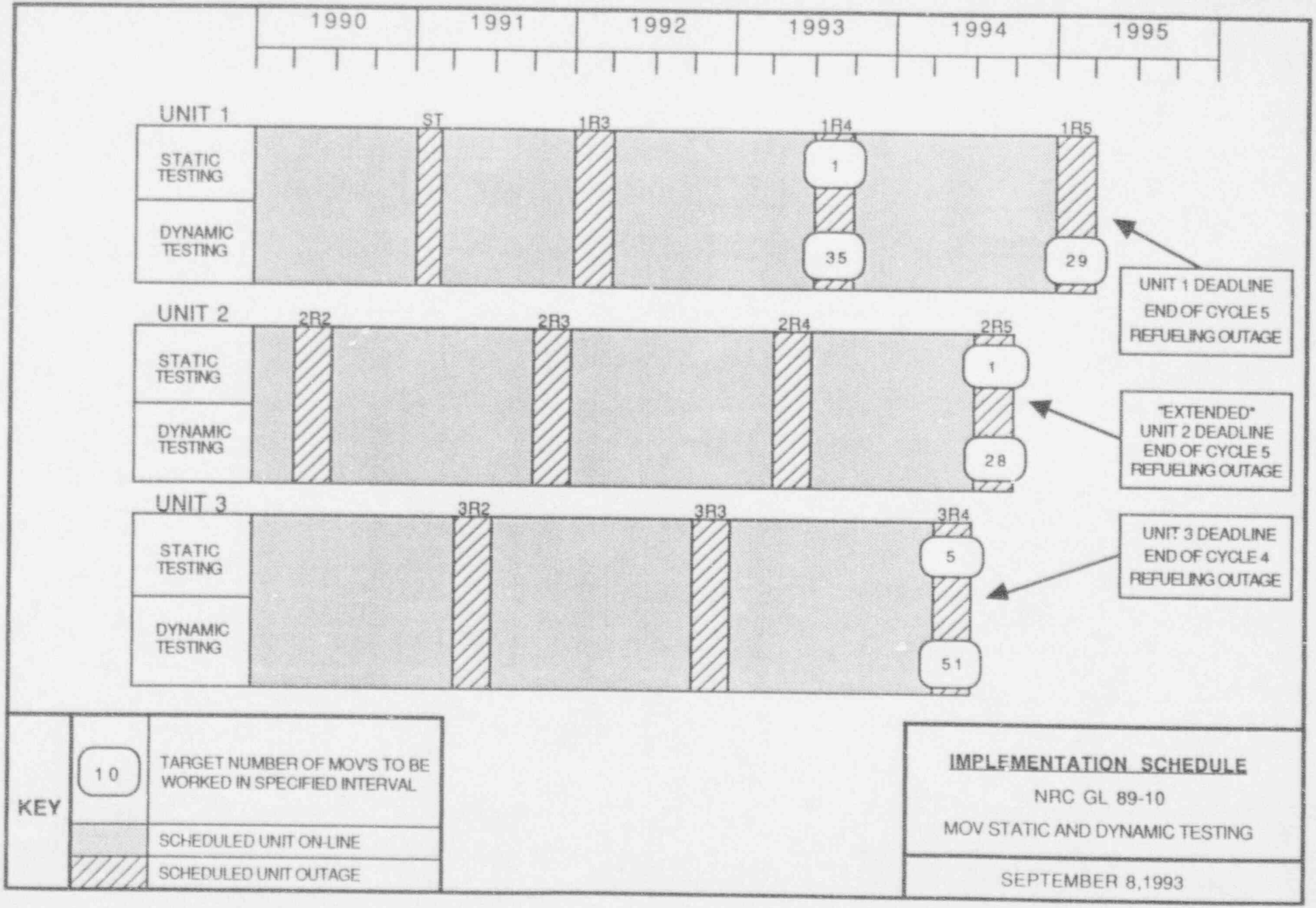
Attachment F



ATTACHMENT G

PVNGS GL 89-10 IMPLEMENTATION SCHEDULE

PVNGS GL 89-10 MOV ASSESSMENT - ATTACHMENT "G"

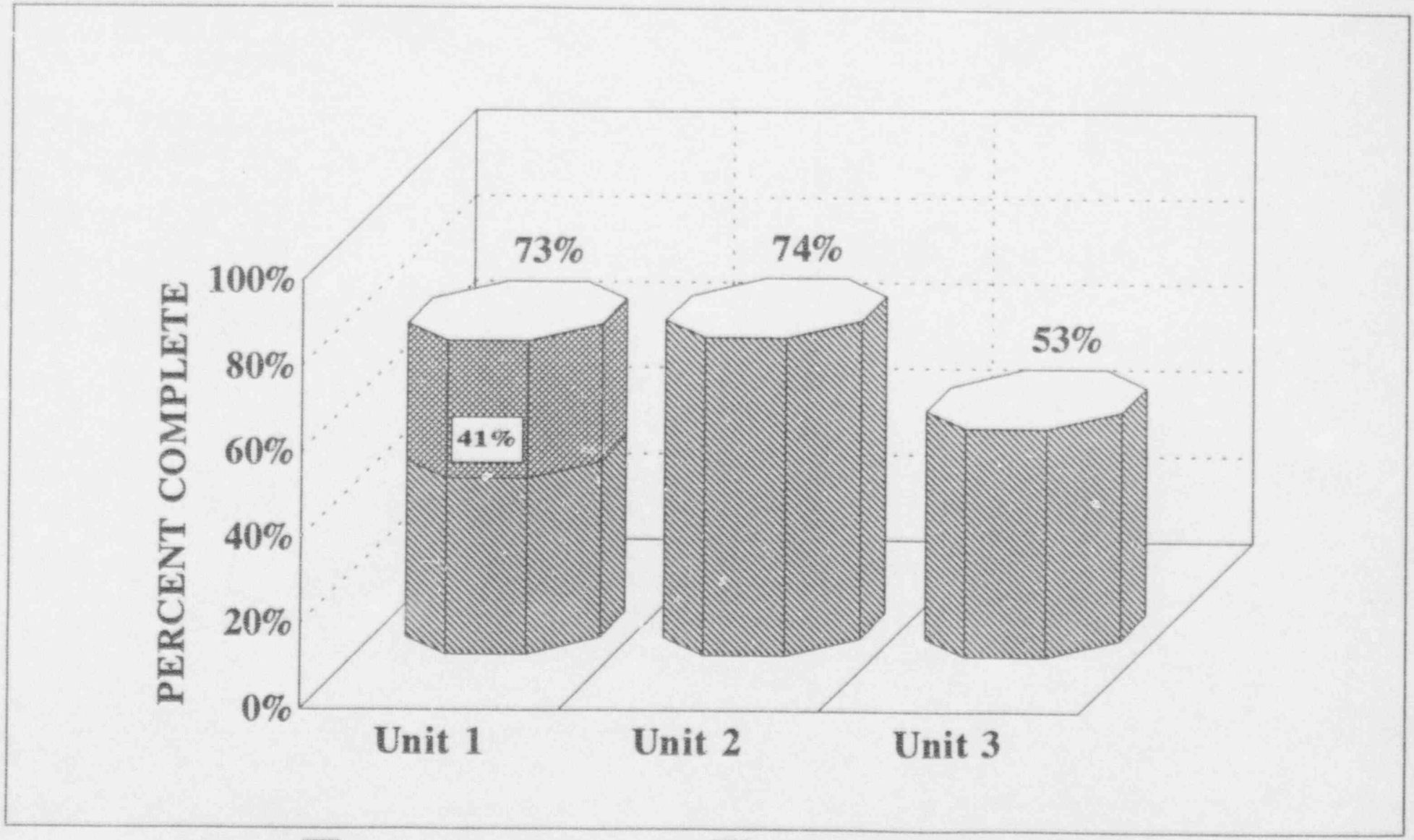


ATTACHMENT H

MOV DYNAMIC TESTING COMPLETION STATUS

PVNGS MOV GL-10 ASSESSMENT

MOV DYNAMIC TESTING PERCENT COMPLETED



Attachment H