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SUBJECT: Forwards response to NRC 990412 RAI re util 180-day response to GL 96-05 re MOV program. Commitments stated in ltr are restatements of commitments that have already been made in other correspondence.

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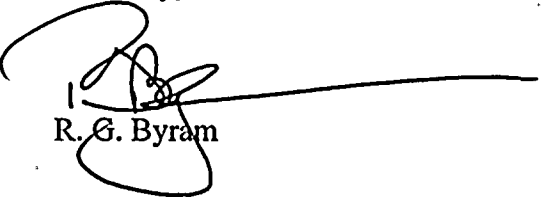
**SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO REQUEST FOR ADDITIONAL
INFORMATION REGARDING
GENERIC LETTER 96-05 PROGRAM
PLA-5077**

Docket Nos. 50-387
and 50-388

This letter provides PP&L, Inc.'s response to the NRC Staff's request (dated April 12, 1999) for additional information regarding the Generic Letter 96-05 program at Susquehanna SES. The commitments stated in this letter are restatements of commitments that have already been made in other correspondence.

If you have any question, please contact Mr. C. T. Coddington at (610) 774-4019.

Sincerely,


R. G. Byram

Attachment

copy: NRC Region I
Mr. S. Hansell, NRC Sr. Resident Inspector
Mr. V. Nerses, NRC Sr. Project Manager

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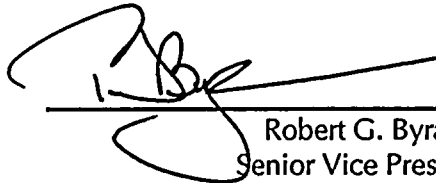
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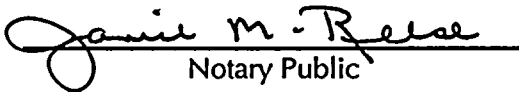
COUNTY OF LEHIGH)

I, ROBERT G. BYRAM, being duly sworn according to law, state that I am Senior Vice President - Generation and Chief Nuclear Officer of PP&L, Inc. and that the facts set forth on the attached request for additional information regarding Generic Letter 96-05 program, are true and correct to the best of my knowledge, information and belief.



Robert G. Byram
Senior Vice President
Generation and Chief Nuclear Officer

Sworn to and subscribed
before me this 15th day
of July, 1999.


Notary Public

NOTARIAL SEAL
JANICE M. REESE, Notary Public
City of Allentown, Lehigh County, PA
My Commission Expires June 11, 2001



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**PP&L, Inc.'s Response
to the
NRC's Request for Additional
Information Regarding GL 96-05
180 Day Response**

PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response

Item 1:

In NRC Inspection Report No. 50-387 & 388/96-13, the Nuclear Regulatory Commission (NRC) staff closed its review of the motor-operated valve (MOV) program implemented at Susquehanna Steam Electric Station (Susquehanna) in response to Generic Letter (GL) 89-10, "Safety Related Motor Operated Valve Testing and Surveillance." In the inspection report, the NRC staff discussed certain aspects of the licensee's MOV program to be addressed over the long term. For example, the inspectors noted that (1) use of the Electric Power Research Institute (EPRI) MOV Performance Prediction Model (PPM) for 28" Lunkenheimer gate valves needed to be validated; (2) the licensee was expected to obtain the necessary internal dimensions for all valves that the EPRI MOV PPM had identified as having "unpredictable" performance characteristics; and (3) valves with less than 10% design margin were to be modified to increase their available margins. In addition, the inspectors noted two general areas that needed improvement, including the valve factor justification for 42 Anchor/Darling flex-wedge gate valves and the statistical methods used to address load sensitive behavior performance. The licensee should address the long-term aspects of the MOV program at Susquehanna noted in the NRC inspection report.

PP&L Response:

In Section E8.4.2.2 (Page 28) of its closure inspection report, the NRC raised concerns regarding the use of the PPM for Lunkenheimer valves. The PPM was not specifically validated by EPRI for use on Lunkenheimer valves; however, EPRI has documented that the gate valve model would be expected to adequately predict valve performance regardless of manufacturer provided the model applicability criteria were satisfied. PP&L, Inc. (PP&L) used the PPM because it represented the best available data upon which to base MOV functionality, and it satisfied the model applicability criteria from the "Performance Prediction Methodology Implementation Guide - Revision 2". In Revision 2 of the implementation guide EPRI added the following statement:

"The NRC has indicated in the SE that if a licensee uses the EPRI Methodology to predict thrust for a valve of a design not tested in the EPRI Program, the licensee will be expected to show, by comparison of model predictions to in-house or other test data, that the Methodology provides bounding predictions for that gate valve design."

PP&L has not performed dynamic testing on any Lunkenheimer gate valves and a survey performed by PP&L identified no available industry test data on Lunkenheimer valves. The PPM runs on these valves produced results equivalent to those using a valve factor of approximately .69, which is conservative. In addition, Revision 2 of the EPRI "Topical Report" makes the following statement regarding Lunkenheimer valves: "Although test data were not obtained for gate valves from these manufacturers, it is believed that the design features and materials of these valves are similar to those of manufacturers whose valves were tested. Accordingly, it is expected that the gate valve model could be successfully applied to these valves." Thus PP&L has no immediate plans for any additional activities associated with this issue; however, PP&L will consider industry test data which is applicable to these valves when it becomes available

In Section E8.4.2.2 (Page 29) of its closure inspection report, the NRC concluded PP&L's actions concerning unpredictable valves "to be acceptable (in the short term) based upon the high available valve factors and the fact that the valve torque switches are bypassed during 97% of the valve's stroke". A total of twelve valves were identified at the time of the closure inspection as having "unpredictable" performance. The four HPCI steam supply isolation valves were reworked in 1996 and 1997 to insure that adequate disk chamfers and body guide rib clearances exist. Our deficiency management documentation addresses the requirements to meet critical valve internal chamfer dimensions in order to

**PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)**

restore margins for the affected valves in the RWCU and RHR system, specifically, HV-1/244F001, HV-1/244F004, HV-1/251F008, and HV-1/251F009. The HV-244F001 and HV-244F004 valves have been disassembled, inspected and machined during the Spring 1999 Unit 2 9th Refueling Outage to insure adequate chamfers and guide clearances. The Unit 1 RWCU counterparts are currently scheduled for disassembly and inspection during the Spring 2000 Unit 1 11th Refueling Outage. This will fully address all concerns associated with High Energy Line Break (HELB) isolation valves. The RHR Shutdown Cooling isolation valves (HV1/251F008 and HV1/251F009) are not required to isolate under HELB conditions but rather under a Moderate Energy Line crack scenario; therefore, the previous use of the EPRI blowdown model is very conservative. Until the RHR valve disk and seats are chamfered, the potential for unpredictable behavior is dispositioned as follows:

- the valves are not subject to true blowdown conditions as modeled via the PPM since it is a Moderate Energy Line and thus is not postulated to experience a guillotine break but rather a crack.
- the valves have a nominal 0.06" chamfer on both the disk and body seats. Based upon the results of the EPRI valve design effects analysis, a nominal chamfer of this dimension should not result in sharp edge contact during a blowdown closure.
- even under blowdown conditions, none of the EPRI or INEL valves experienced a valve factor in excess of 1.0.
- all of the valves currently have motor capabilities in excess of that required to accommodate a valve factor of 1.7. This, combined with the fact that each of the valves have a nominal 97% torque switch bypass setting, insures the valves will be capable of isolating under design basis conditions.

The RAI states that "valves with less than 10% design margin were to be modified to increase their available margins". However, Sections E8.4.2.1 (Page 25) and E8.4.2.3 (Page 31) of the NRC closure inspection report state that "MOVs that had less than a 10 percent margin required increased monitoring or modification." Unless otherwise justified, all MOVs with low margins are assigned a one-cycle retest frequency. This is consistent with PP&L's commitments made in PLA-4973, "Generic Letter 96-05: Revised 180-Day Response" (dated 9/17/98). While PP&L periodically evaluates MOVs for potential modifications to improve margin, there has been no commitment made to modify every MOV that is categorized as marginal. PP&L has evaluated selected MOVs for potential modifications to improve margin, and a total of twenty (20) modifications have been initiated over the last eighteen months to increase margin. Six of these modifications have already been installed with others scheduled for upcoming refueling outages and work windows.

In Section E8.4.2.2 (Page 26) of its closure inspection report, the NRC stated that the EPRI flow loop test data does not represent a statistically valid population because some of the valves were not properly preconditioned. Therefore, the NRC did not agree with PP&L's statistical approach to valve factor calculation or the method used to develop a required thrust for 42 MOVs that rely upon the statistical approach. PP&L still stands behind its approach to evaluate certain non-testable gate valves using our statistical approach. PP&L evaluated the EPRI test data in great detail prior to determining the applicability to SSES MOVs. PP&L Calculation EC-VALV-1054, "Documentation of the Basis for the Use of the Statistical Approach for Evaluating the Functionality of Certain Non-Testable MOVs at SSES" concludes the statistical method for verification of MOV functionality is technically justified and the results predicted by this method are conservative. This approach has been employed by other utilities and EPRI has recently issued a Thrust Uncertainty Method (Addendum 2 to EPRI TR-103237-R2) which provides details of a statistical approach to be used in conjunction with the PPM code.



**PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)**

In Section E8.4.2.3 (Page 31) of its closure inspection report, the NRC raised concerns regarding PP&L's treatment of load sensitive behavior (LSB), particularly:

- (1) the applicability of EPRI flow loop test data to the PP&L statistical evaluation because "the environmental test conditions may not be identical to those at SSES", and
- (2) the treatment of LSB as a random variable rather than a bias or bias/random error,

PP&L's position (documented in PP&L Calculation EC-VALV-1054) remains that EPRI flow loop/in-situ test data is directly applicable to its LSB study since:

- the tested valves are typical of those installed throughout the nuclear industry (some of the valves in the test program were actually supplied by PP&L),
- EPRI did perform pre-conditioning strokes which would also have acted to break in the stem/stem nut interface,
- the in-situ tested valves were installed in actual operating nuclear facilities, and
- the lubricant and packing used during the EPRI flow loop test program is the same as that used at SSES (SWEPCO Moly 101 and ARGO graphite).

The NRC also identified that the bias LSB term was excluded in PP&L's overall uncertainty evaluation. The exclusion of the bias LSB term was a judgement made by PP&L in an attempt to simplify the overall approach. This assumption has insignificant impact on the overall results of the application technique since the bias portion of the LSB term is less than 1%. As part of the methodology to be used for periodic performance assessments (Referencé PP&L Design Standard MDS-08), MOV capability margins are now calculated considering both the LSB bias and uncertainty terms.

PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)

Item 2:

In a letter dated September 17, 1998, the licensee updated its commitment to implement the Joint Owners Group (JOG) MOV Periodic Verification Program. After review of the licensee's letter, it was unclear if the Susquehanna interim MOV static diagnostic test program was consistent with the program described in the Boiling Water Reactor Owners' Group (BWROG) Topical Report NEDC-32719, "BWR Owners' Group Program on Motor-Operated Valve (MOV) Periodic Verification," (Revision 2, dated July 30, 1997). For example, the licensee noted differences in the manner that margins are calculated and used to establish MOV static diagnostic test frequencies. Where a licensee that has committed to implement the JOG program proposes to implement a different approach, the licensee will be expected to provide justification for the proposed alternative approach. The Susquehanna licensee should provide its static test matrix and justify any differences between its MOV interim static diagnostic test program and the program contained in the BWROG Topical Report, including consideration of the methods used to determine the MOV risk-ranking and margin criteria applied to the static test matrix.

PP&L Response:

As stated in PLA-4973, "Generic Letter 96-05: Revised 180-Day Response" (dated 9/17/98) PP&L's approach to MOV risk-ranking is in agreement with the methods described in NEDC-32264-A, Class 2, Revision 2, "Application of Probabilistic Safety Assessment to GL 89-10 Implementation". PP&L's risk ranking for GL 96-05 is documented in EC-RISK-0528. MOV risk is classified as:

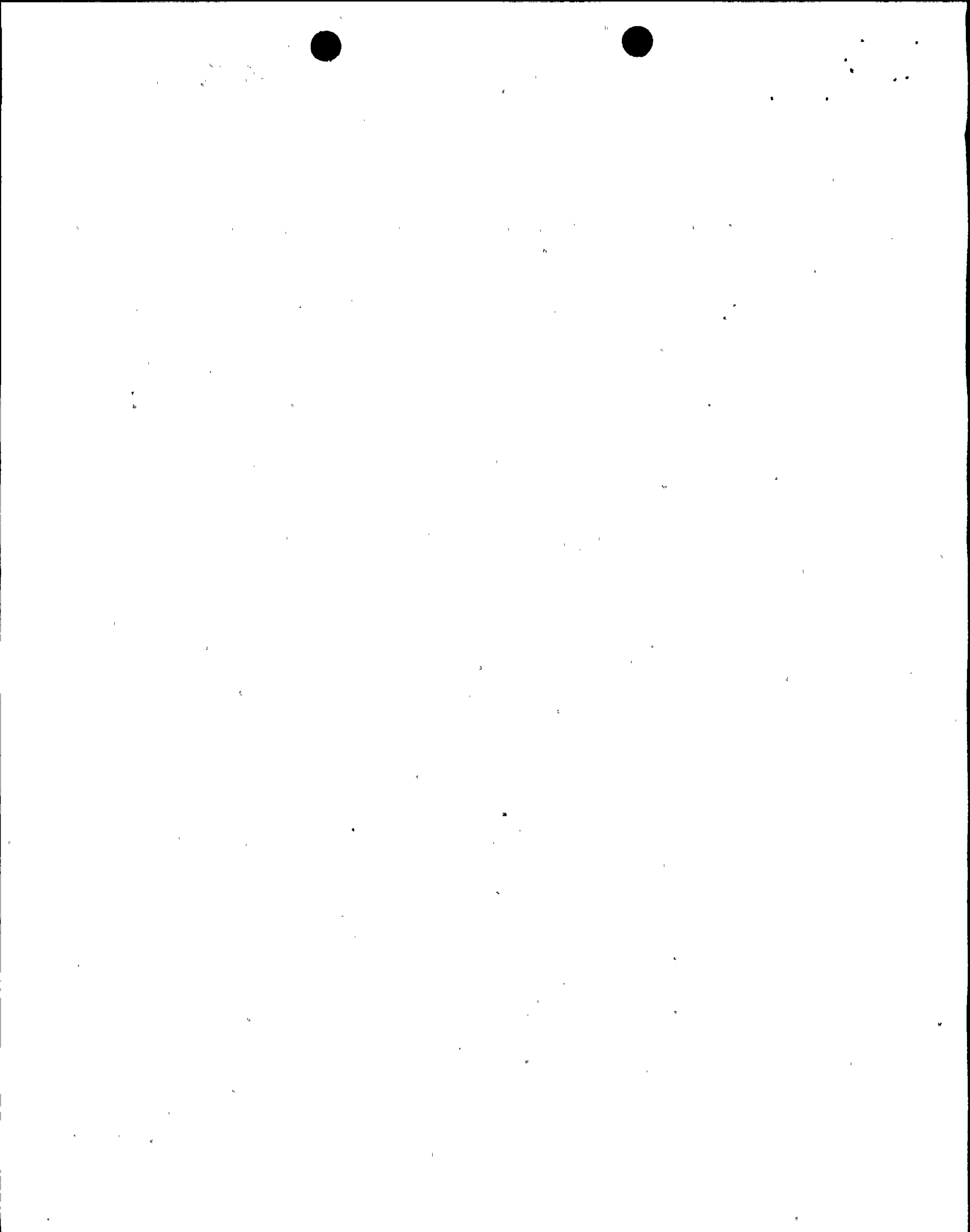
- Priority 1: Valves having a high risk reduction worth or whose failure causes the loss of a safety function
- Priority 2: Valves whose failure cause the loss of redundancy or diversity in a safety function; but not the complete loss of a safety function
- Priority 3: Not Priority 1 or 2

PP&L's static retest frequency determination for rising stem valves considers the following:

- as-left margin with respect to safety function,
- valve priority (risk ranking),
- potential for aging (analysis based on potential for valve deterioration considering valve cycle frequency, normal valve position, system cleanliness, etc.), and
- whether the valve is categorized as requiring greater scrutiny (scope includes GL 89-10 Supplement 3 and other blowdown valves, RHR F015 valves with Deloro disks, rising/rotating valves, RHR F024 valves due to high measured rate of load)

The resulting rising stem valve static test matrix can be summarized as follows:

- PP&L's standard retest frequency for rising stem valves is three cycles (six years) as allowed in GL 89-10 Recommendation J and GL 96-05 Attachment 1. The JOG standard frequencies range from two cycles to six cycles depending upon the MOV risk significance. Most of PP&L's MOV population would fall within the four to six cycle retest frequency if the JOG criteria were applied. Therefore, in general, PP&L's approach is conservative when compared to the JOG.



**PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)**

- low margin MOVs (typically defined as having less than 5% or 10% margin dependent upon the inherent conservatism in the method used to determine required operating thrust) are placed on a one cycle retest frequency regardless of MOV risk ranking. This is conservative when compared to the JOG which bases its 1 to 3 cycle retest frequency for low margin valves on the risk category of the valve.
- PP&L considers any margin greater than 0% to be high margin for valves using the EPRI PPM, for valves with zero DP, or for valves categorized as having excess margin designed into the required operating thrust. This is considered consistent with the JOG approach specified for valves which make use of the PPM for determining required thrust.
- PP&L will only extend MOV retest frequencies to ten (10) years for MOVs with low or medium risk significance. In addition, this can only be done if valve and actuator degradation data is available and considered, or if the MOV has significant margin to accommodate unknown degradation (25% each for valve, actuator and stem factor for a maximum total of 75%).
- MOVs with a high risk significance and MOVs categorized as "requiring greater scrutiny" have a maximum allowed retest frequency of six (6) years. Again this is conservative when compared to the JOG criteria.

PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)

Item 3:

The licensee's MOV periodic verification program states that static diagnostic tests for rising-stem valves are typically performed every three to five refueling outages (with 2-year operating cycles) dependent on available margin, known degradation, valve safety significance, and potential for aging. In the NRC safety evaluation dated October 30, 1997, on BWROG Topical Report NEDC-32719 describing the JOG program, the NRC staff stated that MOVs with scheduled test frequencies beyond 5 years will need to be grouped with other MOVs that will be tested on frequencies less than 5 years in order to validate assumptions for the longer test intervals. The NRC staff stated that this review must include both valve thrust (or torque) requirements and actuator output capability. The licensee should describe how its MOV static diagnostic testing program will satisfy the condition of the NRC safety evaluation.

PP&L Response:

As stated previously, PP&L's standard retest frequency for rising stem valves is three cycles (six years) as allowed in GL 89-10 Recommendation J and GL 96-05 Attachment 1. The criteria for MOVs that are tested beyond PP&L's standard six year retest frequency is that valve specific data for stem factor degradation, actuator (i.e., spring pack) degradation and valve degradation data be available and assessed to insure adequate capability over the retest interval or alternatively, the MOV set-up must have adequate margin to accommodate such degradation. "Adequate margin" is defined as 25% for each unknown degradation type (valve, actuator, stem factor) for a total of 75% if no degradation data exists.

Since each MOV can have a different valve factor, stem factor, setup, torque capability, and weak link capability, PP&L does not plan on grouping MOVs on a ten year retest frequencies with others on a shorter cycle. Each MOV is evaluated independently to determine a retest frequency. The PP&L Program does require that any degradation that is identified be evaluated for generic applicability to other MOVs within the program (including those on longer retest frequencies). PP&L believes the conservative definition of adequate margin along with the requirement to evaluate degradation for generic ramifications satisfies the condition of the NRC safety evaluation that assumptions regarding longer test intervals be substantiated.

PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)

Item 4:

The licensee reported that all butterfly valves (with the exception of the "E" Diesel Generator butterfly valves) at Susquehanna will use a periodic verification program developed by the licensee instead of using the JOG MOV periodic verification program. The licensee should provide additional details regarding its butterfly valve periodic verification program, including (1) the grouping to establish specific static and dynamic test frequencies for the program's butterfly valves; (2) the instrumentation used to identify butterfly valve degradations; and (3) the process to feed back test data into the established torque requirements.

PP&L Response:

As stated in its commitment letter to GL 96-05 (PLA-4973), PP&L has committed to baseline dynamically test all GL 89-10 butterfly valves (with the exception of the E Diesel Generator valves) with diagnostics by 12/31/99 in order to establish initial margins. A total of eighteen valves will be dynamically tested with diagnostics (PP&L currently uses VOTES VTCs). Thereafter, periodic verification will be by static diagnostic testing in order to identify degradation such as torque switch trip torque, seat torque, and packing torque. Static test frequencies will be a maximum of 3 cycles (six years) for all butterfly valves (excluding the E Diesel valves) unless the valve is identified as "marginal" and thus would require testing in one cycle unless otherwise justified. The retest frequency of three cycles is consistent with GL 89-10 Recommendation J and GL 96-05 Attachment 1.

Additionally, five butterfly MOVs will be dynamically tested with torque diagnostics on a three-cycle frequency in order to obtain degradation data on bearing torque. The grouping criteria for the butterfly valve program are contained in Table 1 below.

Table 1						
Group	Valve Tag Numbers	Vendor	Valve Size	Safety Function	Design Basis DP (PSID)	Flow Rate (GPM)
1	HV01222A/B	Jamesbury	36"	O/C	65 / 35	6848 / 10657
	HV01224A1/B1	Jamesbury	30"	O/C	30 / 30	15000 / 15000
	HV01224A2/B2	Jamesbury	24"	O/C	30 / 30	11194 / 11194
2	HV11210A/B	Jamesbury	20"	O/C	168 / 159.2	0 / 9000
	HV21210A/B	Jamesbury	20"	O/C	168 / 159.2	0 / 9000
	HV11215A/B	Jamesbury	20"	O/C	129 / 129	0 / 0
	HV21215A/B	Jamesbury	20"	O/C	129 / 129	0 / 0
3	HV08693A/B	Anchor Darling (Contromatics)	8"	O	139	1277
4	HV21144A/B	Anchor Darling (Contromatics)	4"	O	158	165

**PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)**

Two periodic verification dynamic test candidates (HV01222A/B) have been selected from Group 1 while one each shall be selected from Groups 2 through 4 after completion of the baseline dynamic testing.

The evaluation of the static and dynamic test results will be performed in accordance with PP&L Design Standards. Valve specific degradation data will be considered in margins associated with required operating torque or output torque, as appropriate. Impacts to other valves will also be considered. Where applicable, the degradation results from JOG or other industry testing will also be considered in the valve specific margins.

PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)

Item 5:

The JOG program focuses on the potential age-related increase in the thrust or torque required to operate valves under their design-basis conditions. In the NRC safety evaluation dated October 30, 1997, on the JOG program, the NRC staff specified that licensees are responsible for addressing the thrust or torque delivered by the MOV motor actuator and its potential degradation. The licensee should describe the plan at Susquehanna for ensuring adequate ac and dc actuator output capability, including consideration of recent guidance in Limitorque Technical Update 98-01 and its Supplement 1.

PP&L Response:

AC actuator output capability concerns are addressed in PP&L Condition Reports 97-3684 and 98-2574. PP&L's approach for AC MOVs is similar to that provided by Limitorque Technical Update (TU) 98-01 guidelines. The differences between the PP&L method and that published by Limitorque in TU 98-01 are mainly due to the fact that PP&L's revised method was developed prior to the issuance of the Technical Update. The PP&L methodology has been reviewed by and accepted by Limitorque Corporation. The PP&L approach is similar to TU 98-01 guidelines in that motor nameplate torque, the voltage square law, and pullout efficiencies are used to determine reduced voltage run torque capability. The methods were established based on a comparison of either the ComEd motor test data or data from the generic motor curves.

The differences between the PP&L approach and TU 98-01 are:

- Continued use of an application factor of 1.0 for certain MOVs based on available motor start torque in excess of nominal start torque.
- Use of an application factor of 0.85 for voltages $\geq 90\%$ for MOVs with motor curve M1480.

Per TU 98-01, categories that require Limitorque actuator configuration review are:

- SMB-1 units with a 66:1 worm ratio,
- units with 25 ft-lb, 3600 RPM, 56 frame motors,
- units with 60 ft-lb, 1800 RPM, 56 frame motors,
- units with voltage levels below 70%

PP&L has obtained Limitorque concurrence to use a design application factor of 0.8 for SMB-1 actuators with a 66:1 worm ratio. PP&L currently has one MOV with a 60 ft-lbs, 56 frame motor and two MOVs with voltage levels less than 70%. These MOVs have been identified under Condition Report 98-2574 and corrective actions currently being designed include a motor replacement for the 60 ft-lbs motor and overload heater replacements to increase voltage levels above 70% for the other two MOVs. Regarding the last three categories, PP&L's design program has been revised to preclude future use of any of these configurations without unique evaluations being performed in accordance with TU 98-01 guidance.

Similar to AC MOVs, the PP&L approach for DC actuator output capability in MOV sizing is based on the use of available motor torque no greater than nameplate and pullout efficiency. PP&L has revised its guidelines to require a 0.9 application factor be used. Additionally, a 10% motor curve uncertainty is still maintained in the determination of available motor start torque. PP&L is aware of ongoing efforts in this area and will evaluate any future recommendations made by the NRC, Limitorque or the BWROG Valve TRG for applicability to Susquehanna.

**PP&L, Inc.'s Response to the NRC's Request for Additional Information Regarding
Generic Letter 96-05 180-Day Response (Continued)**

Implementation of the new motor capability methodology discussed above resulted in significantly reduced available MOV motor capability margins for many GL 89-10 MOVs. These concerns have prompted proactive steps towards restoring and even increasing original margins to ensure GL 89-10 MOVs are setup to perform their design basis function for the long term. The organizations involved with the MOV Program are making coordinated and aggressive efforts to recover and improve MOV margins as follows:

- Approximately fifteen modifications are being designed and implemented to improve margins on valves currently classified as marginal.
- Improvements are being implemented in the program design aspects to make it more precise and responsive to any future programmatic changes such as those resulting from TU 98-01.