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U. S. Nuclear Regulatory Commission
Att: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: Oyster Creek Nuclear Generating Station (OCNGS)
Operating License No. DPR-16
Docket No. 50-219
Generic Letter (GL) 89-10, Supplement 3 Additional Information

This letter transmits additional information regarding the GL 89-10 design basis capability of the OCNGS Isolation Condenser System (ICS) and Reactor Water Cleanup System (RWCU) containment isolation valves. This information supersedes the GL 89-10, Supplement 3 reassessment for the ICS and RWCU valves submitted to NRC on February 15, 1992 (C321-92-2037) as revised on February 19, 1994 (C321-92-2064).

Attachment I summarizes the assessment methodology utilized for the OCNGS GL 89-10 Supplement 3 valves. Attachments II and III provide a revised description of the design basis conditions established for the ICS and RWCU containment isolation valves, respectively. Modifications to both the ICS and RWCU valves during the 15R refueling outage have significantly increased the available margins for these valves under design basis conditions. These modifications also provide sufficient motor actuator torque to enable the ICS isolation valves to close under full system pressure of 1020 psid which is not associated with any design basis scenario. This added capability provides assurance of valve closure independent of any potential early operator action to initiate closure and therefore, resolves the previous open item regarding the possibility of operator action to close the ICS valves within the 35-second isolation signal delay time (NRC Inspection Report 50-219/94-11, Items 91-81-01, Part 5). As described in Attachment II, the BWR Owners Group Letter No. OG-910-112, dated August 21, 1992 has been considered in the evaluation of the design basis for the RWCU valves. This also addresses the above referenced inspection report open item.

Sincerely,

J. J. Barton
Vice President and Director
Oyster Creek

/plp
Attachments
c: Administrator, Region I
Oyster Creek NRC Project Manager
Sr. Resident Inspector, OC
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ATTACHMENT I

ASSESSMENT METHODOLOGY

A design basis review was conducted to determine the worst case differential pressure and voltage conditions for each valve. Attachments II and III provide this basis for each specific valve.

Degraded AC voltages at the motor control center buses are calculated for the design basis scenarios for valve operation conservatively assuming off-site power is available. The regulated power from the on-site emergency diesel generators (EDG) provides a substantially higher voltage than the assumed degraded grid. The starting source voltage at the MCC bus is derived from the voltage transient study which models the grid at the current minimum degraded grid undervoltage relay setting (3634 volts) with LOCA loads, and considers a large motor starting, resulting in a low transient voltage at the MCC's. Voltage drop from the MCC/supply bus to the motor terminals is calculated based on the following data:

1. Operator motor locked rotor current.
2. Locked rotor power factor for the high starting torque motors.
3. Effect of ambient temperature on the cable impedance.
4. Motor circuit thermal overload heater resistance.
5. Effect of elevated motor temperature under accident conditions.

Based on these calculated motor terminal voltages, running efficiency is used to calculate closing operator torque. Since the grid transients are different (non-bounding) than the EDGs, the motors need to also be evaluated considering EDG operation. A voltage study considering EDG operation and LOCA loading, provided steady state voltages at the buses. At these voltages, motor terminal voltages are calculated as described above and the operator torque was calculated with pullout efficiency. The minimum operator output torque based on these two methods is then used to verify MOV closing capability.

Technical Specification Change Request (TSCR) No. 219, submitted to NRC on July 8, 1994, proposed a revised minimum undervoltage setpoint of 3800 volts which will provide additional design margin for these valves. An interim administrative control is in place to monitor in-plant bus voltages to ensure voltages do not drop below 4100 volts. Implementation of this administrative control will remain in effect until NRC approval and implementation of the revised undervoltage setpoint.

DC voltages during normal plant operation on the MCC bus are based on the battery float voltage as the source voltage. During design basis operation the appropriate voltage is used considering plant conditions as listed below:

1. End of battery life voltage.
2. Battery voltage based on lowest plant battery service test data. These station batteries are AT&T round cells installed in 14R, and the discharge capability of these cells increases with time.
3. Battery charger voltage (float).

DC motor output is calculated by utilizing the effect of the following:

1. Operator motor locked rotor current.
2. Consider the drop in four lengths of cable run between the motor and its starter.
3. Effect of ambient temperature on the cable and motor winding resistance during the valve operation scenario.
4. Motor circuit thermal overload heater resistance
5. Motor circuit starting resistors, if utilized.

The motor terminal voltage was then compared with the nominal motor ratings. For AC motor operators, the torque varies with the square of the voltage for the full range of applied voltage. For DC motor operators, voltage versus torque is a linear relationship at voltages greater than 10% of rated value based on recent industry test data.

Since the MOV torque switch is bypassed to flow isolation for these MOVs the capability is assessed based on available motor torque. This torque is converted to stem torque by multiplying by the unit ratio and actuator efficiency (pullout or running). The available stem thrust is then determined by dividing the output torque by the assumed stem factor adjusted for rate-of-loading. The available effective valve factor is then calculated applying the standard industry equation using the valve mean seat area rather than the valve orifice area.

Available effective valve factors are then compared with the values obtained from Reference 1. For the Anchor Darling Double Disc MOVs, the available thrust margin above that required to achieve flow isolation using Reference 2 is also reviewed.

REFERENCES

1. EPRI Performance Prediction Program Update of Results and Specifications and Drawings for Flow Loop Test Valves dated December 14, 1993.

2. EPRI TR-103232, "Stem Thrust Prediction Method for Anchor/Darling Double Disc Gate Valves", Final Draft, August 1994.

Attachment II
ISOLATION CONDENSER SYSTEM

The Isolation Condenser System (ICS) is a standby, high pressure system for removal of fission product decay heat when the reactor vessel is isolated from the main condenser, and provides alternate shutdown capability in the event of damage from a fire or natural phenomenon, as stated in FSAR Section 6.3.1.1.1.

The following modifications to the ICS isolation valves are being completed in the 15R refueling outage:

1. Actuator gear ratio change to increase actuator torque output.

2. Bypass torque switch in closing direction to beyond flow isolation.

3. Replace isolation signal time delay relay with reduced tolerance relay and revised setpoint.

4. Short stroke valves V-14-36, 37 to 70-80% open to ensure adequate core cooling criteria is met following a postulated ICS high energy line break (HELB).

As a result of the actuator gear ratio changes, valve stroke times combined with the isolation signal delay time will exceed the existing containment isolation design basis of 60 seconds. Reanalysis of the ICS steam line break with the system in standby mode and the condensate line break with the ICS initiated has confirmed that the revised isolation times under the postulated design basis scenario conditions do not impact the existing criteria for containment isolation. Evaluated offsite releases remain bounded by the main steam line break analysis, reactor building environmental conditions remain acceptable, and adequate core cooling is maintained. The OCNGS Technical Specification Section 4.5 Bases will be clarified to identify that the maximum allowable stroke times for the ICS valves are scenario dependent and are less than the 60 seconds specified in Section 4.5.J. in order to satisfy the above containment isolation criteria.

These modifications provide increased design margins, utilizing defendable valve factors, to account for rate of loading effects and potential degradation. Although the dynamic conditions associated with the ICS steam and condensate line valve closure are scenario dependent, the above modifications provide increased capability so that all Supplement 3 ICS isolation valves could perform their safety-function at a full system pressure of 1020 psid, which is not associated with any design basis scenario. Less conservative assumptions for other valve/actuator effects are acceptable when evaluating capability at this elevated pressure for accidents occurring while the ICS is in operation.

A. Steam Supply Isolation Valves

V-14-31, 33 (DC outside containment)
V-14-30, 32 (AC outside containment)

The Isolation Condenser System (ICS) is assumed to be in the standby mode (i.e., the ICS condensate return line is isolated by normally closed DC powered valves V-14-34, 35), which is the condition of the ICS during normal plant operating conditions. The most probable required isolation conditions for the normally open ICS steam line isolation valves is the postulated high energy line break (HELB) of the ICS piping outside containment during normal plant operation at 100% power. An additional single failure of the redundant containment isolation valve in the open position is assumed, which produces a ΔP across the remaining isolation valve of 1020 psi due to full reactor pressure conditions. For the break with the system in-service, the reactor pressure will be reduced to below 1020 psi due to the vessel blowdown into the reactor building. For this scenario, valve capability is confirmed at a design basis differential pressure of 820 psi (assumes the valves begin to close 17 seconds after the high flow signal is sensed). Valve capability is also reviewed at 1020 psi for additional conservatism.

V-14-31, 33 (DC outside containment)

Two cases are considered for V-14-31, 33. The postulated HELB of the ICS steam line piping outside containment during normal plant operations at 100% power, which corresponds to an assumed valve differential pressure of 1020 psi and a motor terminal voltage based on only the steam valve closing since the DC condensate return MOV is normally closed. An additional single failure of the corresponding AC powered isolation valves (V-14-30, 32) in the open position is assumed coincident with a loss of offsite power (LOOP). This is conservative as reactor trip or feedwater pump trip was not included to minimize RCS pressure decay during the 27 second delay from time of the HELB to the high flow isolation signal. Piping friction loss, which reduces the effective pressure differential at the valve during blowdown was also not considered.

The second case considered for these MOVs is the postulated HELB of the ICS piping outside containment as the ICS is placed into operation. This scenario is different from above because the differential pressure will be less and the available motor torque is reduced since both the steam and condensate DC MOVs are powered from the same MCC and will be stroking together. The differential pressures used in the evaluation of MOV capability are 820 psi and 1020 psid. The design basis differential pressure of 820 psi for this case is based on the reactor depressurizing during a 17 second time delay (actual minimum delay is 25 seconds) and the fastest valve stroke time. MOV capability is also reviewed at 1020 psi for additional conservatism.

For V-14-31, a battery voltage of 113V is bounding. This voltage is the lowest battery voltage recorded utilizing OCNGS plant battery service test data. This produces a terminal voltage of 92.9 volts.

Normal DC voltage of 132V is available to V-14-33, with or without a loss of offsite power since the battery chargers are powered from an alternate AC bus independent from the redundant AC powered MOV. This produces an actual bus voltage of 132 volts and a motor terminal voltage of 89.4 volts for V-14-33.

During the 13R refueling outage, these valves were replaced with 10 inch, 900 lb. parallel disc stainless steel gate valves. Valve friction coefficients consistent with those utilized in the draft EPRI Performance Prediction Program (PPP) Model for Double Disc gate valves are utilized to assess valve requirements to achieve flow isolation. The effective valve factors calculated exceed those documented in EPRI PPP Update dated December 14, 1993 and manufacturer test results for a similar valve (Reference - Anchor Darling Valve Blowdown Test Report #CTS-27). A conservative stem friction coefficient (μ) of 0.20 is assumed for the capability evaluation and is further adjusted to account for an assumed 10% rate-of-loading. Sample as-found testing performed on 20% of the 89-10 MOV population at OCNGS indicates the stem friction does not degrade to above 0.15 over one cycle. The ratio of stem factors calculated at friction coefficients of 0.15 and 0.20 then represents additional minimum operator capability margin. **Refer to Table 1 for MOV design margins.**

V-14-30, 32 (AC outside containment)

The worst case operating condition for V-14-30, 32 is the postulated HELB of the ICS steam line piping outside containment during normal plant operation at 100% power. An additional single failure of the corresponding DC powered isolation valves (V-14-31, 33) in the open position is assumed, which produces a continuous ΔP across V-14-30, 32 of 1020 psi. A containment isolation signal is initiated 27 seconds after the HELB in the ICS piping due to high flow through the line. A reactor trip is conservatively not assumed and no credit for RCS pressure decay over the 27 second delay period or valve stroke is taken. Piping friction loss, which reduces the effective pressure differential at the valve during blowdown was also not considered.

Degraded AC power conditions from the offsite power distribution system (i.e., just above the undervoltage protection setpoint) is assumed to be available to V-14-30, 32, as this produces a lower voltage available to the valve actuator motor than if a LOOP was assumed and V-14-30, 32 were to be powered from the emergency diesel generators. This results in motor terminal voltages of 327.0 volts for V-14-30, and 344.2 volts for V-14-32.

During the 13R refueling outage, these valves were replaced with 10 inch, 900 lb. parallel disc stainless steel gate valves. Valve friction coefficients consistent with those utilized in the draft EPRI Performance Prediction Program (PPP) Model for Double Disc gate valves are utilized to assess valve requirements to achieve flow isolation. The effective valve factors calculated exceed those documented in EPRI PPP Update dated

December 14, 1993 and manufacturer test results for a similar valve (Reference - Anchor Darling Valve Blowdown Test Report #CTS-27). A conservative stem friction coefficient (u) of 0.20 is assumed for the capability evaluation and is further adjusted to account for an assumed 10% rate-of-loading. Sample as-found testing performed on 20% of the 89-10 MOV population at OCNGS indicates the stem friction does not degrade to above 0.15 over one cycle. The ratio of stem factors calculated at friction coefficients of 0.15 and 0.20 then represents additional minimum operator capability margin.

Refer to Table 1 for MOV design margins.

B. <u>Condensate Return Line Isolation Valves</u>

V-14-34, 35 (DC outside containment)
V-14-36, 37 (AC inside containment)

During normal plant operation, the ICS outboard, DC powered condensate return line isolation valves are normally closed. The ICS . automatically initiated by a persistent signal of either high reactor vessel pressure or low-low reactor water level, causing the normally closed condensate return outboard isolation valves to open. The reactor will also have scrammed prior to these signal inputs. Coincident with the signal for ICS initiation, is a signal to trip all five reactor recirculation pumps.

The ICS is automatically isolated from the reactor vessel in the event of high flow lasting over 27 seconds in either the steam or condensate line indicative of a line break. This analysis conservatively assumes the HELB occurs at the approximate time of ICS initiation which produces the highest initial reactor coolant pressure for the transient. The licensing basis for the ICS high flow trip isolation setpoints (FSAR 6.3.2.5) assumes the HELB occurs after the ICS has been fully initiated which results in a lower reactor coolant pressure. Reactor coolant system depressurization over a 17 second isolation signal delay (actual minimum delay is 25 seconds) and the fastest valve stroke time is accounted for. Therefore, the design basis for closure of the condensate return line isolation valves is the following: (1) the plant is at normal operating conditions, (2) a postulated transient occurs which initiates the ICS due to loss of the main condenser (i.e. MSIV closure), and (3) a high energy line break (HELB) of an ICS loop requiring reactor vessel isolation of the ICS system resulting from high flow in the steam or condensate return lines. This scenario results in a maximum differential pressure condition for either condensate return line isolation valve of approximately 820 psi.

The capability of the condensate return line valves is also reviewed at full system pressure of 1020 psid independent of any potential early operator action to initiate closure based on a line break signal or reactor depressurization due to the system being in service.

V-14-34,35 (LC outside containment)

DC voltage to V-14-34, 35 is based on assuming the corresponding DC powered valve in the steam line (V-14-33 and V-14-31) is closing simultaneously. For V-14-35 nominal battery voltage from the battery chargers powered by the EDG would be available in the event of a LOOP. This produces an actual bus voltage of 132 volts and a motor terminal voltage of 73.3 volts for V-14-35. Similar to V-14-31 a battery voltage of 113V was used resulting in motor terminal voltage of 90.1 volts for V-14-34. Under the above conditions V-14-33 and 31 would have 78.2 and 90.9 volts respectively, at their motor terminals.

Valves V-14-34, 35 were replaced during the 13R refueling outage with 10 inch, 900 lb. parallel disc stainless steel gate valves. Valve friction coefficients consistent with those utilized in the draft EPRI PPP Model for Double Disc gate valves are utilized to assess valve requirements to achieve flow isolation. The effective valve factors calculated exceed those documented in EPRI PPP Update dated December 14, 1993 and manufacturer test results for a similar valve (Reference - Anchor Darling Valve Blowdown Test Report #CTS-27). A conservative stem friction coefficient (u) of 0.20 is assumed for the capability evaluation and is further adjusted to account for an assumed 10% rate-of-loading. Both of these valves were as-found tested in 15R and the stem friction coefficient did not degrade to above 0.12 for either of these MOVs over one cycle. Sample as-found testing performed on 20% of the 89-10 MOV population at OCNGS indicates the stem friction does not degrade to above 0.15 over one cycle. The ratio of stem factors calculated at friction coefficients of 0.15 and 0.20 then represents additional minimum operator capability margin. **Refer to Table 1 for MOV design margins**.

V-14-36, 37 (AC inside containment)

Offsite power is considered to be in a degraded condition (i.e., just above the undervoltage protection setpoint) for the AC powered valves. This produces a bus voltage of 366 volts and 379 volts for V-14-36, 37, respectively; and a motor terminal voltage of 321.9 volts for V-14-36 and 304.8 volts for V-14-37.

In determining a valve disc factor to use in the evaluation available industry data was reviewed. Valve V-14-36 and 37 are Anchor/Darling 10" 600 lb stainless steel flexible wedge gate valves with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valves were manufactured in the mid to late 60's at the Hayward, California plant of Anchor Valve.

The most similar of the EPRI test valves is an Anchor/Darling 6" 900 lb carbon steel flexible wedge gate valve with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valve was manufactured in 1985. This valve is labelled as Valve 3 in EPRI Performance Prediction Program Testing Reports.

The EPRI report identifies an apparent disc friction coefficient for hot water blowdown flow in test Valve 3 of 0.453 at a differential pressure of 1210 psi. Based on the valve seat angle of 5° this equates to a closing valve factor of 0.473.

Two cases are used to evaluate these MOVs. The design basis case considers some reactor depressurization before the MOV isolates flow (820 psi) whereas the second confirms the MOV capability assuming the reactor does not depressurize before or during the accident (maintained at 1020 psi).

The diameter used is the mean seat diameter which is 9.44" as provided by Anchor/Darling. This is larger than the nominal bore diameter of 8.75" and is just larger than the nominal I.D. of 9.250" of the stellite hard facing on the valve body seat. A conservative stem friction coefficient (u) of 0.20 is assumed for the capability evaluation and is further adjusted to account for an assumed 10% rate-of-loading. V-14-37 was as-found tested in 15R and the stem friction coefficient did not degrade to above 0.10 in one cycle. Furthermore, sample as-found testing performed on 20% of the 89-10 MOV population at OCNGS indicates the stem friction does not degrade to above 0.15 over one cycle. The ratio of stem factors calculated at friction coefficients of 0.15 and 0.20 then represents additional minimum operator capability margin.

Refer to Table 1 for MOV design margins.

ATTACHMENT III

REACTOR WATER CLEANUP SYSTEM SUPPLY LINE

The Reactor Water Cleanup System (RWCU) is a filtration and demineralization system for maintaining the purity of the water in the Reactor Coolant System (RCS). The RWCU System is in operation during normal plant conditions and thus the system isolation valves are normally open. Reactor coolant flows under reactor pressure from the suction of the reactor Recirculation Pump B, is cooled, depressurized, filtered and demineralized, and then pumped to the discharge of Recirculation Pump B. The system supply line has an AC powered motor operated isolation valve (V-16-1) inside the drywell and two parallel DC powered motor operated isolation valves (V-16-14 and V-16-2) outside the drywell. The one parallel valve V-16-2, is normally closed and is utilized at RCS system pressures less than 125 psig. Therefore, V-16-2 is not evaluated as a Supplement 3 valve. The isolation valves will close, and the cleanup pumps will stop automatically under conditions of high drywell pressure or low-low reactor water level, as well as certain fault conditions within the RWCU system specified in FSAR Section 5.4.8.2.

The following modifications to the RWCU isolation valves are being completed in the 15R refueling outage:

1. Actuator gear ratio change to increase actuator torque output.
2. Bypass torque switch in closing direction to beyond flow isolation.

These modifications provide increased design margins, utilizing a defendable valve factor, to account for rate of loading effects and potential degradation. Valve stroke times remain within the existing containment isolation design basis of 60 seconds.

In determining the valve disc factor to employ in the evaluation, available industry data was reviewed. Valves V-16-1 and 14 are Anchor/Darling 6" 600 lb stainless steel flexible wedge gate valves with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valves were manufactured in the mid to late 60's at the Hayward, California plant of Anchor Valve.

The most similar of the EPRI test valves is an Anchor/Darling 6" 900 lb carbon steel flexible wedge gate valve with machined guide slots in the disc, cast guide rails in the body and stellite hard facing on the disc and seat faces. The valve was manufactured in 1985. This is labeled as Valve 3 in EPRI Performance Prediction Program Testing Reports.

The EPRI Reports derived an apparent disc friction coefficient for hot water blowdown flow in test Valve 3 of 0.453 at a differential pressure of 1210 psi. Based on the valve seat angle of 5°, this equates to a closing valve factor of 0.473.

V-16-1/14 are in the Reactor Water Cleanup system supply lines. Their flow medium for blowdown isolation is 1030 psig water. BWR Owners Group Letter No. OG-910-112, dated August 21, 1992, identifies a concern of the RWCU system pressure to rise above the design basis value of 1030 psi. Evaluation of the BWR Owners Group letter confirms that this concern is only applicable to plants with high pressure injection systems such as HPCI or RCIC systems. Therefore, the appropriate design pressure for the OCNGS RWCU isolation valves is 1030 psid.

A dynamic seat friction coefficient of 0.6 was used for these valves in determining the required stem thrust to achieve valve sealing (4000 psi seat stress). This value bounds the result of the EPRI Reports described above. The diameter to be used is the valve mean seat diameter which is 5.94" as provided by Anchor/Darling.

By bypassing the MOV close torque switch until after flow isolation is achieved, full motor operator capability is available. For the RWCU line break outside the drywell, once the MOV has isolated the HELB (achieved at flow isolation), the MOV has completed its design safety function. For the events where the MOV must isolate containment (10 CFR 50 Appendix J) the valve differential pressure will be much lower and the MOV torque switch is set up adequately to ensure a good metal-to-metal contact seal is achieved. Valve capability to achieve flow isolation is compared with a conservative 0.6 valve factor assumption.

V-16-1 (AC inside containment)

The worst case operating condition for V-16-1 is the postulated high energy line break (HELB) of the RWCU piping outside containment during normal plant operation at 100% power. An additional single failure of valve V-16-14 in the open position is assumed, which produces a ΔP across V-16-1 of 1030 psi. A postulated HELB of the RWCU piping inside containment would result in an insignificant ΔP across V-16-1. A containment isolation signal on reactor low-low water level would require V-16-1 to close. Some RCS pressure decay will occur due to the time required to generate the containment isolation signal on reactor low-low water level; however, valve capability is reviewed at 1030 psi.

Degraded AC power conditions from the offsite power distribution system (i.e, just above the undervoltage protection setpoint) is assumed to be available to V-16-1, as this produces a lower voltage to the valve actuator motor than if a LOOP was assumed and V-16-1 were to be powered from the emergency diesel generators. This produces a motor terminal voltage of 341.7 volts.

A conservative stem friction (u) factor of 0.20 is assumed for the capability evaluation and is further adjusted to account for an assumed 10% rate-of-loading. As-found test data on this MOV indicates the stem friction does not degrade to above 0.11 over one cycle. Furthermore, sample as-found testing performed on 20% of the GL 89-10 MOV population at OCNGS indicates it does not degrade to above 0.15 over one cycle. The ratio of stem factors calculated at friction coefficients of 0.15 and 0.20 then represents additional minimum operator capability margin.

Refer to Table 1 for MOV design margins.

<u>V-16-14 (DC outside containment)</u>

The worst case operating condition for V-16-14 is the postulated high energy line break (HELB) of the RWCU piping outside containment during normal plant operation at 100% power. An additional single failure of V-16-1 in the open position is assumed which produces a ΔP across V-16-14 of 1030 psi. A postulated HELB of the RWCU piping inside containment would result in an insignificant ΔP across V-16-14. A containment isolation signal on reactor low-low water level would require V-16-14 to close. Some RCS pressure decay will occur due to the time required to generate the containment isolation signal on reactor low-low water level; however, valve capability is reviewed at 1030 psi.

For V-16-14, a battery voltage of 113 volts is bounding. This voltage is the lowest battery voltage recorded utilizing OCNGS plant battery service test data. This produces a motor terminal voltage of 91.7 volts.

A conservative stem friction coefficient (u) of 0.20 is assumed for the capability evaluation and is further adjusted to account for an assumed 10% rate-of-loading. Sample as-found testing performed on 20% of the 89-10 MOV population at OCNGS indicates the stem friction does not degrade to above 0.15 over one cycle. The ratio of stem factors calculated at friction coefficients of 0.15 and 0.20 then represents additional minimum operator capability margin.

Refer to Table 1 for MOV design margins.

TABLE 1

VALVE CAPABILITY

Given: Stem factor based on 0.20 stem COF (μ)
Rate-of-loading margin = 10% (Applied to calculated Stem Factor)
Limitorque Application Factor = 1.0
Torque switch bypassed to flow isolation
Torque proportional to Voltage (DC); Voltage² (AC)
Degradation Margin = Stem Factor @ (μ=0.15) versus Evaluated Stem Factor @ (μ=0.20)

ISO COND Valves

VALVE	EFFICIENCY	MOTOR TERMINAL VOLTS	PSID	Available Effective VALVE FACTOR	EPRI Flow Iso MARGIN	DEGRADATION MARGIN
V-14-30	Running	327.0 VAC	1020	0.586	25.7%	19%
V-14-31	Pullout	92.9 VDC	1020S	0.520	12.6%	16%
	Pullout	90.9 VDC	820C	0.641	33.3%	16%
	Pullout	90.9 VDC	1020C	0.509	10.3%	16%
V-14-32	Running	344.2 VAC	1020	0.655	39.0%	19%
V-14-33	Pullout	89.4 VDC	1020S	0.499	8.5%	16%
	Pullout	78.2 VDC	820C	0.540	14.7%	16%
	Pullout	78.2 VDC	1020C	0.427	(5.1%)*	16%
V-14-34	Pullout	90.1 VDC	820C	0.635	32.1%	16%
	Pullout	90.1 VDC	1020C	0.503	9.3%	16%
V-14-35	Pullout	73.3 VDC	820C	0.684	41.2%	16%
	Pullout	73.3 VDC	1020C	0.543	16.8%	16%
V-14-36	Running	321.9 VAC	1020	0.603	N / A	21%
	Running	321.9 VAC	820	0.760	N / A	21%
V-14-37	Running	304.8 VAC	1020	0.533	N / A	21%
	Running	304.8 VAC	820	0.672	N / A	21%

DP- "S" - IC break while in Standby - only Steam valves close - higher Voltage available, reactor does not depressurize since IC is not in service.
"C" - IC break while in service - both Steam AND Cond Valves close - lower voltage due to higher current draw to MCC when both DC valves close.

* Margin appears negative for this case (DP=1020 psid AND normally closed DC condensate valve also stroking closed); however, operator capability was calculated with an assumed stem friction coefficient of 0.20. In order to be acceptable under the assumed conservative accident conditions, the stem friction coefficient must be 0.18 or less. As-found testing on two identical MOVs (V-14-34 and V-14-35) confirmed that 0.15 stem friction is conservative and as-found testing of this valve during cycle 14 (≈14 months after lubrication) also indicates 0.15 is conservative. The degradation margin of 16% more than compensates for the apparent lack of margin under these conditions.

RWCU Valves

VALVE	EFFICIENCY	MOTOR TERMINAL VOLTS	PSID	VALVE FACTOR	DEGRADATION MARGIN
V-16-1	Running	341.7 VAC	1030	0.755	20%
V-16-14	Pullout	91.7 VDC	1030	0.628	20%

Station Support Department

10CFR50.90

PECO ENERGY

PECO Energy Company
Nuclear Group Headquarters
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

November 15, 1994

Docket Nos. 50-352
50-353

License Nos. NPF-39
NPF-85

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Limerick Generating Station, Units 1 and 2
Response to Request for Additional Information Regarding
Power Rerate Program dated October 28, 1994 (RAI-4)

Gentlemen:

Attached is our response to your Request for Additional Information (RAI), discussed in our telephone conversation on October 28, 1994, regarding the planned implementation of the Power Rerate Program at Limerick Generating Station (LGS), Units 1 and 2. The Power Rerate Program is the subject of Operating License Change Request No. 93-24-0 which was forwarded to you by letter dated December 9, 1993.

If you have any questions, please do not hesitate to contact us.

Very truly yours,

G. A. Hunger, Jr.

G. A. Hunger, Jr.,
Director - Licensing

Attachment

A001
|||

cc: T. T. Martin, Administrator, Region I, USNRC w/ attachment
N. S. Perry, USNRC Senior Resident Inspector, LGS w/attachment
R. R. Janati, Director, PA Bureau of Radiological Protection w/attachment