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July 30, 1991
BVY 91-71

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

References: [See Attachment A]

Subject: Response to Request for Additional Information Regarding Generic Letter 89-10, Supplement 3: "Consideration of the Results of NRC-Sponsored Tests of Motor-Operated Valves"

Dear Sir:

By References (j) and (k), Vermont Yankee responded to the requirements of Generic Letter 89-10, Supplement 3 [Reference (i)]. By Reference (l), USNRC transmitted to Vermont Yankee a request for additional information deemed necessary for the Staff to make a safety determination regarding the subject motor-operated valves. Reference (l) was received by Vermont Yankee on July 1, 1991 and requested a response within 30 days from letter receipt.

Enclosed please find Attachment B which contains Vermont Yankee's response to Reference (l). We trust that this information is sufficient for you to complete your review; however, should you have additional questions or require additional information, please contact this office.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Leonard A. Tremblay, Jr.

Leonard A. Tremblay, Jr.
Senior Licensing Engineer

cc: USNRC Region I Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS

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Attachment A

References:

a. License No. DPR-28 (Docket No. 50-271)
b. Letter, USNRC to [All Licensees], NVY 85-250, dated November 15, 1985 (Bulletin 85-03).
c. Letter, VYNPC to USNRC, BVY 89-050, dated June 8, 1989.
d. Letter, USNRC to [All Licensees], NVY 89-144, dated June 28, 1989 (Generic Letter 89-10).
e. Letter, VYNPC to USNRC, BVY 89-116, dated December 28, 1989.
f. Letter, USNRC to VYNPC, NVY 90-109, dated June 11, 1990.
g. Letter, USNRC to [All Licensees], NVY 90-123, dated June 13, 1990 (Supplement 1 to Generic Letter 89-10).
h. Letter, USNRC to [All Licensees], NVY 90-148, dated August 3, 1990 (Supplement 2 to Generic Letter 89-10).
i. Letter, USNRC to [All Licensees], NVY 90-198, dated October 25, 1990 (Supplement 3 to Generic Letter 89-10).
j. Letter, VYNPC to USNRC, BVY 90-122, dated December 14, 1990.
k. Letter, VYNPC to USNRC, BVY 91-26, dated March 14, 1991.
l. Letter, USNRC to VYNPC, NVY 91-113, dated June 25, 1991.

Attachment B
Additional Information Regarding Supplement 3 to Generic Letter 89-10

1. Provide a description of the "Recirc" valves" discussed in your Determination of Deficiencies.

   The Recirc valves discussed are in the Recirculation System. The 2-53 A and B valves are the Recirc Pump Discharge valves in loop A and B respectively. The 2-54 A and B valves are the Recirc Pump Discharge Valve Bypass valves in loop A and B respectively. The 2-53 A and B valves are 28" Darling Double Disc gate valves. The 2-54 A and B valves are 4" Darling Double Disc gate valves.

   The present Vermont Yankee LOCA analysis assumes that these four valves close following a break in the suction side of the recirculation loop. The valves are powered from the Uninterruptible Power Supply (UPS) system.

2. Identify any modifications (e.g., torque switch setting adjustments, gearing changes, or motor/actuator replacement) for each MOV within the scope of Supplement 3 to GL 89-10 since June 1990 or planned for the future.

   The Reactor Water Clean-up (RWCU) Valves, 12-15 and 12-18, had the torque switch bypassed 99% to ensure port closure.

   The Recirculation System Valves, 2-53 A,B and 2-54 A,B, had the torque switch bypassed 99% to ensure port closure.

   The Reactor Core Isolation Cooling (RCIC) Valve, 13-15, had the torque switch bypassed 99% to ensure port closure.

   At this time, there are no modifications planned for the future.

3. Provide the actuator and motor sizes, and information necessary to confirm motor adequacy for each MOV within the scope of Supplement 3 to GL 89-10.

Valve ID	23-15	System	HPCI
Manufacturer	Walworth	Actuator	SMB-0/40 460 V AC
Diameter	1.875	Orifice	8.25
Pitch	1/3	dP	1080
Lead	1/3		
Unit Ratio	46.25	Stall Eff.	.5
Motor RPM	1700		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 52448.5 lbs.
This is for the undervoltage condition up to 10% undervoltage.
The motor output is above the close thrust at torque switch trip of 28135 lbs.
The close thrust at torque switch trip yields an effective valve factor of 0.40.

Valve ID	23-16	System	HPCI
Manufacturer	Walworth	Actuator	SMB-1/40 115 V DC
Diameter	1.875	Orifice	8.25
Pitch	1/3	dP	1080
Lead	1/3		
Unit Ratio	53.41	Stall Eff.	.5
Motor RPM	1900		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 60568.0 lbs.
This is for the undervoltage condition up to 10% undervoltage.
The motor output is above the close thrust at torque switch trip of 28339 lbs.
The close thrust at torque switch trip yields an effective valve factor of 0.41.

Valve ID	13-15	System	RCIC
Manufacturer	Walworth	Actuator	SMB-000/5 460 V AC
Diameter	1.0	Orifice	2.624
Pitch	1/4	dP	1080
Lead	1/4		
Unit Ratio	36.5	Stall Eff.	.5
Motor RPM	1700		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 9042.8 lbs.
This is for the undervoltage condition up to 10% undervoltage.
The motor output is above the close thrust at torque switch trip of 8000 lbs.
The close thrust at torque switch trip yields an effective valve factor of 1.05.

Valve ID	13-16	System	RCIC
Manufacturer	Walworth	Actuator	SMB-000/5 115 V DC
Diameter	1.0	Orifice	2.624
Pitch	1/4	dP	1080
Lead	1/4		
Unit Ratio	40	Stall Eff.	.5
Motor RPM	1900		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 9909.9 lbs.
This is for the undervoltage condition up to 10% undervoltage.
The motor output is above the close thrust at torque switch trip of 7780 lbs.
The close thrust at torque switch trip yields an effective valve factor of 1.02.

Valve ID	12-15	System	RWCU
Manufacturer	Wm. Powell	Actuator	SMB-000/5 460 V AC
Diameter	1.25	Orifice	3.693
Pitch	1/5	dP	1089
Lead	2/5		
Unit Ratio	62.5	Stall Eff.	.5
Motor RPM	1700		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 11017.6 lbs.
This is for the undervoltage condition up to 10% undervoltage.
Because the TS is bypassed 99%, the motor output is equal to the close thrust.
The close thrust (max motor output) yields an effective valve factor of 0.70.

Valve ID	12-18	System	RWCU
Manufacturer	Wm. Powell	Actuator	SMB-000/5 125 V DC
Diameter	1.25	Ori.	3.693
Pitch	1/5	dP	1089
Lead	2/5		
Unit Ratio	75.0	Stall Eff.	.5
Motor RPM	1900		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 13221.2 lbs.
This is for the undervoltage condition up to 10% undervoltage.
Because the TS is bypassed 99%, the motor output is equal to the close thrust.
The close thrust (max motor output) yields an effective valve factor of 0.89.

Valve ID	2-53 A,B	System	Recirculation
Manufacturer	Darling	Actuator	SMB-2/60 460 V AC
Diameter	2.75	Orifice	19.375
Pitch	1/2	dP	280
Lead	1/2		
Unit Ratio	43.99	Stall Eff.	.55
Motor RPM	3405		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 56029.4 lbs.
This is for the undervoltage condition up to 10% undervoltage.
Because the TS is bypassed 99%, the motor output is equal to the close thrust.
The close thrust (max motor output) yields an effective valve factor of 0.61.

Valve ID	2-54 A,B	System	Recirculation
Manufacturer	Darling	Actuator	SMB-000/5 460 V AC
Diameter	1.375	Orifice	4.0625
Pitch	1/3	dP	280
Lead	1/3		
Unit Ratio	48.0	Stall Eff.	.5
Motor RPM	1700		

The stem factor is based upon a μ=0.20
Using SEL 3 from Limitorque the max motor output at stall is 8741.7 lbs.
This is for the undervoltage condition up to 10% undervoltage.
Because the TS is bypassed 99%, the motor output is equal to the close thrust.
The close thrust (max motor output) yields an effective valve factor of 1.88.

4. Has the leakage rate with an MOV closed 99% been determined? Does the leakage rate exceed the limits in Appendix J or the ASME Code?

The leakag· ate of an MOV closed 99% has not been determined. However, this has no bearing on the testing requirements of Appendix J. The Appendix J leak rate test requires the valve to be closed by normal operation. These valves are normally closed using the torque switch. The 99% closed torque switch bypass is effectively used as a close limit switch and only comes into play during a HELB. The purpose of this valve under line break conditions is to limit the energy release. Closing the valve 99%, which covers the port of the valve, limits the gross flow through the valve. Slight leakage would not significantly influence the EQ analysis. In addition, with two valves in series, the differential pressure across the valve is reduced such that one valve may close completely, becoming leak tight. The ASME Code (as it pertains to leakage passed the seat) does not apply to the Vermont Yankee valves within the scope of GL 89-10 Supplement 3.

5. Are thermal overload protection devices installed and used?

Thermal overload protection devices are installed and used in all GL 89-10 Supplement 3 valves. The thermal overloads are in both the open and close circuit regardless of initiating event (manual or automatic actuation).

Two different methods are used to size thermal overload devices at Vermont Yankee. Method 1 sizes the thermal overloads to 300% full load current. Method 2 sizes the thermal overloads to a minimum of 3 times the stroke time and, when possible, to 10 seconds locked rotor current for AC powered valves or 8 seconds locked rotor current for DC powered valves. Vermont Yankee originally sized thermal overloads to Method 1.

The following table shows the method used to size thermal overloads for the valves within the scope of GL 89-10 Supplement 3:

Valve	Method	
12-15	2	
12-18	2	
13-15	2	
13-16	1	
23-15	1	
23-16	1	
2-53 A,B	1	Will be resized to Method 2 during the next refueling outage.
2-54 A,B	1	

6. Provide justification for the use of the MOVATS database.

The justification for the use of the MOVATS database is currently ongoing. A comparison of the thrusts derived from the database against the INEL sponsored tests shows that the MOVATS database provides a higher effective valve factor for Walworth valves. The MOVATS database uses actual test data from valves tested in their true configuration (in situ).

The MOVATS database is inherently conservative since it contains valves from several manufacturers. It has been shown via NRC sponsored testing that these valves generally require more thrust for a given differential pressure than do Walworth valves. Walworth valves comprise the majority of Vermont Yankee valves.

A differential pressure test was performed at Vermont Yankee on a Walworth valve, identical in size and model to the HPCI 15 and 16 isolation valves, and in the same steam line downstream of these valves. The thrust required to close this valve during the differential pressure test was less than that called for by using the MOVATS database. This demonstrates the conservative nature of the MOVATS database when compared to the standard industry equations.

At this time, the MOVATS database appears to be the best data available.

7. How have you addressed the rate of loading phenomenon in MOV sizing and torque switch settings?

Vermont Yankee has not addressed the rate of loading phenomenon directly. At this time there is no method to accurately address this issue or determine which valves may be subject to this phenomenon. However, by using the MOVATS database, part of the effect of rate of loading is indirectly included, since the MOVATS database is comprised of actual in situ test data of valves that actually close fully under test conditions. As industry experience and more data becomes available, especially from EPRI, Vermont Yankee will incorporate this information.