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June 30, 1988

Document Control Desk
U.S. NUCLEAR REGULATORY COMMISSION
Mail Station P1-137
Washington, D.C. 20555

Gentlemen:

DOCKETS 50-266 AND 50-301
FINAL RESPONSE TO IE BULLETIN 85-03
MOTOR-OPERATED VALVE SWITCH SETTINGS
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

IE Bulletin no. 85-03, "Motor-Operated Valve Common Mode Failure During Plant Transients Due to Improper Switch Settings," was issued on November 15, 1985 to inform licensees of a potential problem involving the operability of motor-operated valves as a result of improper switch settings. The bulletin requested licensees to develop and implement a program to ensure that switch settings on certain safety-related motor-operated valves are selected, set and maintained correctly to accommodate the maximum differential pressures expected on these valves during both normal and abnormal events within the design basis. Our submittals to you dated May 2, 1986 and May 5, 1987 provided our response to the Bulletin Action Items a and e. The purpose of this letter is to provide our written report in response to Bulletin Action Items b, c, d, and f.

Since the issuance of the bulletin, Point Beach Nuclear Plant personnel have developed a motor-operated valve (MOV) stem thrust measurement system which accurately measures, in a direct manner, packing load, thrust at torque switch trip, over thrust, and open torque switch bypass timing. Point Beach did not pursue the conventional method of monitoring spring-pack displacement due to the inability to measure packing load, the effects of packing adjustment on spring-pack calibration, and the intrinsic assumption that open and close drive train efficiencies are equal. Attachment 1 provides a discussion of the thrust measurement results. The thrust required for a given MOV differential pressure can be set precisely at static conditions as calculated per Action Item b of the Bulletin or as obtained from differential pressure testing results.

Attachment 2 consists of a tabular listing of the data requested per Action Items a, b and c of IEB 85-03. Minimum torque switch settings are based upon

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calculated requirements for closing or opening the valves under design differential pressure conditions. Maximum torque switch settings are based upon the limiting thrust for the following three considerations:

1. Valve component failure

2. Operator component failure

3. Motor/Actuator stall under degraded voltage conditions.

Limit switch settings are based upon the following:

1. Position indication requirements

2. Open torque switch bypass requirements. Bypass requirements are determined by considering turbulent fluid flow effects through valves as unseating takes place.

3. Limiting valve open travel.

Where 2-train limit switch assemblies are applied, a compromise between position indication and bypass requirements must be achieved.

Action Item d of the bulletin requires procedures be prepared or revised to ensure that correct switch settings are determined and maintained throughout the life of the plant. The utility should ensure that applicable industry recommendations are considered in the preparation of these procedures. Point Beach has developed the following Maintenance Instructions, which comply with the requirements of Action Item d:

MI 5.1.1 "Limitorque MOV Torque and Limit Switch Adjustment for Gate and Globe Valves."

MI 5.1.2 "Limitorque MOV Torque and Limit Switch Adjustment for Butterfly Valves."

MI 5.1.4 "Limitorque Model SMB-000 Disassembly, Inspection, Repair and Reassembly."

MI 5.1.5 "Limitorque Motor Operated Valves Models SMB-0 Thru SMB-4 Disassembly and Reassembly."

MI 5.1.6 "Limitorque Model SMB-00 Disassembly, Inspection, Repair and Reassembly."

Action Item f of the bulletin requested a written report be provided at the completion of the program. This report is to include (1) a verification of completion of the test program, (2) a summary of the findings as to valve operability prior to any adjustments as a result of the bulletin, and (3) a summary of data in accordance with Table 2 of the Bulletin, Suggested Data Summary Format. This report is provided below:

Verification of Completion of Test Program

The attached table provides documentation of the initial switch settings and the valve stroke tests with the obtained Test Delta P for each of the valves. In several cases the Test Delta P is slightly greater than the Maximum Delta P. This occurred because in some cases the individuals recording the pressure did not record the differential pressure but rather the full flow upstream pressure. All valves were tested close to the maximum differential pressure expected under simulated accident conditions requiring valve operation.

The attached table also provides the recommended torque switch settings, actual settings, calculated required thrust, and actual measured thrust. From the table it can be seen that there are several differences between recommended torque switch settings and actual settings. These differences are explained in the comments section accompanying the table.

Summary of Findings of Valve Operability

All valves performed their design safety function in the as-found condition during full delta P testing. Valve 1-866A would not close; however, the direction of travel for its design safety function is to open which it did. The motor was subsequently replaced.

Summary of Data

A summary of the data is provided in the attached Valve Data Table and summary comments.

We are confident based on full DP testing and stem thrust measurements that all of the MOV's will perform their required automatic safety functions under design-basis conditions. Please contact us if you have any questions regarding this information.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Enclosures

Copy to: Regional Administrator, Region III
NRC Senior Resident Inspector

Subscribed and sworn to before me

this 30th day of June, 1988.

Notary Public, State of Wisconsin

My Commission expires 5-27-90.

June 30, 1988

Attachment 1

Discussion of MOV Stem Thrust Measurement Results
Point Beach Nuclear Plant, Units 1 and 2

Differential pressure testing by PBNP personnel concluded that there was a discrepancy between vendor calculations and valve requirements for differential pressure operation. Vendor calculations consider three items when determining thrust requirements. The three factors are:

1. Piston effect = stem cross-sectional area times differential pressure. The piston effect factor is fairly straight forward and does not account for or contribute significantly to the discrepancy.

2. Packing load as determined from standard tables. Packing loads are easily measured in the field and are typically 25 to 50% of values assumed for design-basis calculations. This is attributed to the use of newer more efficient packing materials. On occasion, packing loads as high as 70% of Design Basis have been observed. Only in isolated cases were packing loads found to be as high as the loads used for design basis calculations. These isolated cases are attributed to the existence of the older packing materials in the stuffing boxes.

3. Differential Pressure requirement as determined by disk or plug area times differential pressure times the valve coefficient of friction.

By factoring out piston effect(1) and packing load(2), it was concluded that the friction factors(3) used in performing the calculations for gate valves were non-conservatively low. The friction factors empirically determined are typically two to three times as great as the values traditionally used for the calculations. The friction values used in performing differential pressure calculations for globe valves are considered to be conservatively high. For example, 1-878 globe valve actual thrust requirement at maximum differential pressure is approximately 5,500 lb_f as compared to the calculated 10,800 lb_f.

Further investigation and analysis has determined that Limitorque has made an extremely conservative assumption in sizing motor actuators. This assumption is that the stem to stem-nut coefficient of friction is 0.2. Field testing has determined that this valve is typically in the 0.09 to 0.12 range. For example, an operator may have been originally sized and specified to operate at 10,000 lb_f. For a stem to stem-nut coefficient of friction of 0.1 the operator is most likely operating at 15,000 lb_f. If the stem to stem-nut coefficient is assumed to be 0.15, the resulting thrust output will be approximately 12,000 lb_f.

PBNP did not have all of this data compiled when the vendor was originally tasked with verifying the valve calculations and torque switch setting evaluation. A review of the vendor calculations and torque switch recommendations concluded that the only potential problem area is the 1-866A and 1-866B MOV's. If either valve is closed during an unexpected degraded voltage condition, their motor thermal overloads may actuate. This condition is being tracked internally through a Nonconformance Report (NCR). A modification of motor operators for 1-866A and 1-866B is currently being evaluated.

In conclusion, operator sizing is not considered to be a problem. The error introduced by use of the low valve friction factors is typically offset by the following factors:

1. Conservatively high packing load.

2. Conservatively high stem to stem-nut coefficient of friction.

3. Differential pressures used in the original thrust calculations are typically higher than the differential pressures attainable in practice.

The vendors have been directed to re-do the calculations and torque switch recommendations based on the following inputs:

1. Packing loads are 70% of the traditionally used values.

2. Stem to stem-nut coefficient of friction is 0.15. This is considered to be a conservatively high value.

3. Friction factors to be used in performing gate valve calculations are to be doubled. If the gate valve is used in a chromated water system, the friction factor is to be increased by 250%.

If a review of the revised calculations and recommendations yields any significant findings, a supplement to this response will be initiated.

MOTOR-OPERATED VALVE DATA SUMMARY
RESPONSE TO IEB 85-03
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2
JUNE 30,1988

Valve I.D.	0-4020	0-4021	0-4022	0-4023	1-2019	2-2019	1-2020	2-2020
Valve Mfr.	Powell	Powell	Powell	Powell	Powell	Powell	Powell	Powell
Valve Type	Gate	Gate	Gate	Gate	Globe	Globe	Globe	Globe
Valve Model	19023 WE	19023 WE	19023 WE	19023 WE	6084 WE	6084 WE	6084 WE	6084 WE
Valve Size	3"	3"	3"	3"	3"	3"	3"	3"
Rat'ng	900#	900#	900#	900#	600#	600#	600#	600#
Operator Mfr.	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque
Model	SMB-000	SMB-000	SMB-000	SMB-000	SMB-00	SMB-00	SMB-00	SMB-00
Motor RPM	1725	1725	1725	1725	1900	1900	1900	1900
Output Spd."/mn	12.25	12.25	12.25	12.25	5.375	5.375	5.375	5.375
Valve Function	Must Close to isolate Aux. Feedwater flow from Motor Driven AFWP to unaffected unit Stm. Gen.				Must open to admit steam to turbine driven Aux. Feedwater Pump.			
Design Delta P Open/Close(psid)	1560/1560	1560/1560	1560/1560	1560/1560	1085/1085	1085/1085	1085/1085	1085/1085
Maximum Delta P Open/Close(psid)	1305/1305	1305/1305	1305/1305	1305/1305	1085/1085	1085/1085	1085/1085	1085/1085
Test Delta P Open/Close(psid)	1350/1350	1330/1330	1350/1350	1340/1340	930/930	960/960	950/950	965/965
Prior Settings* (Open/Close)	4.0/4.0	3.0/3.4	1.1/2.9	3.0/3.25	1.25/1.25	2.0/2.0	1.6/1.6	1.6/1.5
Final Settings (Open/Close)	4.0/4.0	3.0/3.4	3.0/3.7	3.5/3.5	1.25/1.25	2.0/2.0	1.6/1.6	1.6/1.5
Min. Setting (Open/Close 100%)	1.75/1.75	1.75/1.75	1.75/1.75	1.75/1.75	1.875/1.875	1.875/1.875	1.875/1.875	1.875/1.875
Max. Setting (Open/Close 100%)	2.5/2.5	2.5/2.5	2.5/2.5	2.5/2.5	2.125/2.125	2.125/2.125	2.125/2.125	2.125/2.125
Max. Setting (Open/Close 80%)	2/2	2/2	2/2	2/2	2.125/2.125	2.125/2.125	2.125/2.125	2.125/2.125
Calc.Min/Max.Thrust (1000's LBS.)	4.9/8	4.9/8	4.9/8	4.9/8	12.2/14	12.2/14	12.2/14	12.2/14
Signature Thrust ** (1000's LBS.)	7.6	6.7	6.0	7.6	12.8	12.1	12.0	17.0
As Found Operable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test Method, Description and Justification ***	**** Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP

* Torque switch. Minimum and maximum required settings at 80 and 100% of rated voltage are based on calculations by a vendor.

** Signature thrust obtained by Point Beach stem thrust measurement system with no differential pressure.

*** Full DP indicates functional test for operability at indicated differential pressure per part b of 85-03.

**** Signature thrust obtained by Point Beach stem thrust measurement system with indicated differential pressure.

MOTOR-OPERATED VALVE DATA SUMMARY
RESPONSE TO IEB 85-03
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2
JUNE 30,1988

Valve I.D.	1-4006	2-4006	0-4009	0-4016	1-4000	2-4000	1-4001	2-4001
Valve Mfr.	Powell	Powell	Powell	Powell	Powell	Powell	Powell	Powell
Valve Type	Gate	Gate	Gate	Gate	Globe	Globe	Globe	Globe
Valve Model	2453 SG	2453 SG	2453 SG	2453 SG	19051 WE	19051 WE	19051 WE	19051 WE
Valve Size	6"	6"	4"	4"	3"	3"	3"	3"
Rating	150#	150#	150#	150#	900#	900#	900#	900#
Operator Mfr.	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque
Model	SMB-000	SMB-000	SMB-000	SMB-000	SMB-00	SMB-00	SMB-00	SMB-00
Motor RPM	1725	1725	1725	1725	1900	1900	1900	1900
Output Spd."/mn	13.00	14.00	8.75	8.75	7.375	7.375	7.375	7.375
Valve Function	Opens to provide service water to the suction of the Aux. Feedwater Pumps.				Normally in mid position to provide 200 gpm to each stm. gen. from Aux. Feedwater pumps.			
Design Delta P Open/Close(psid)	150/150	150/150	150/150	150/150	1560/1560	1560/1560	1560/1560	1560/1560
Maximum Delta P Open/Close(psid)	76/76	76/76	76/76	76/76	1340/1340	1340/1340	1340/1340	1340/1340
Test Delta P Open/Close(psid)	79/79	78/78	75/75	77/77	1100/1100	1075/1075	1100/1100	1075/1075
Prior Settings* (Open/Close)	5.0/1.1	2.25/2.5	6.0/1.0	4.5/1.1	1.5/1.5	1.75/1.75	1.5/1.5	1.75/1.75
Final Settings (Open/Close)	5.0/1.1	2.25/2.5	6.0/1.0	4.5/1.1	1.5/1.5	1.75/1.75	1.5/1.5	1.75/1.75
Min. Setting (Open/Close 100%)	1/1	1/1	1/1	1/1	1.625/1.625	1.625/1.625	1.625/1.625	1.625/1.625
Max. Setting (Open/Close 100%)	4/4	4/4	2.5/2.5	2.5/2.5	2.125/2.125	2.125/2.125	2.125/2.125	2.125/2.125
Max. Setting (Open/Close 80%)	2.5/2.5	3/3	1.5/1.5	1.5/1.5	2.125/2.125	2.125/2.125	2.125/2.125	2.125/2.125
Calc.Min/Max.Thrust (1000's LBS.)	1.7/8	1.7/8	1.3/8	1.3/8	10.7/14	10.7/14	10.7/14	10.7/14
Signature Thrust ** (1000's LBS.)		4.3			12.1	16.5	13.4	15.4
As Found Operable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test Method, Description and Justification ***	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP

* Torque switch. Minimum and maximum required settings at 80 and 100% of rated voltage are based on calculations by a vendor.

** Signature thrust obtained by Point Beach stem thrust measurement system with no differential pressure.

*** Full DP indicates functional test for operability at indicated differential pressure per part b of 85-03.

MOTOR-OPERATED VALVE DATA SUMMARY
RESPONSE TO IEB 85-03
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2
JUNE 30,1988

Valve I.D.	1-878A	2-878A	1-878C	2-878C	1-878B	2-878B	1-878D	2-878D
Valve Mfr.	Velan	Velan	Velan	Velan	Velan	Velan	Velan	Velan
Valve Type	Globe	Globe	Globe	Globe	Globe	Globe	Globe	Globe
Valve Model	137.116	137.116	137.116	137.116	137.116	137.116	137.116	137.116
Valve Size	2"	2"	2"	2"	2"	2"	2"	2"
Rating	1500#	1500#	1500#	1500#	1500#	1500#	1500#	1500#
Operator Mfr.	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque
Model	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00
Motor RPM	1800	1800	1800	1800	1800	1800	1800	1800
Output Spd."/mn	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Valve Function	To be opened at operator discretion if high head core deluge is deemed beneficial.				Normally open. Must remain open to allow high head safety injection to RCS cold legs.			
Design Delta P Open/Close(psid)	2485/2485	2485/2485	2485/2485	2485/2485	2485/2485	2485/2485	2485/2485	2485/2485
Maximum Delta P Open/Close(psid)	1670/1670	1670/1670	1670/1670	1670/1670	1670/1670	1670/1670	1670/1670	1670/1670
Test Delta P Open/Close(psid)	1680/1680	1700/1700	1680/1680	1700/1700	1680/1680	1700/1700	1680/1680	1700/1700
Prior Settings* (Open/Close)	2.2/2.2	1.75/2.2	1.5/1.25	1.75/1.75	1.5/1.5	1.5/1.8	1.5/1.5	1.5/2.0
Final Settings (Open/Close)	2.2/2.2	1.75/2.2	1.5/1.25	1.75/1.75	1.5/1.5	1.25/1.25	1.25/1.25	1.5/2.0
Min. Setting (Open/Close100%)	1.375/1.375	1.375/1.375	1.375/1.375	1.375/1.375	1.375/1.375	1.375/1.375	1.375/1.375	1.375/1.375
Max. Setting (Open/Close100%)	1.875/1.875	1.875/1.875	1.875/1.875	1.875/1.875	1.875/1.875	1.875/1.875	1.875/1.875	1.875/1.875
Max. Setting (Open/Close 80%)	1.5/1.5	1.5/1.5	1.5/1.5	1.5/1.5	1.5/1.5	1.5/1.5	1.5/1.5	1.5/1.5
Calc.Min/Max.Thrust (1000's LBS.)	11.5/14	11.5/14	11.5/14	11.5/14	11.5/14	11.5/14	11.5/14	11.5/14
Signature Thrust ** (1000's LBS.)			13.5	21.5	14.2	15.2	15.4	
As Found Operable	Yes	Yes	Yes	Yes	Yes	Yes ****	Yes	Yes
Test Method, Description and Justification ***	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP

* Torque switch. Minimum and maximum required settings at 80 and 100% of rated voltage are based on calculations by a vendor.

** Signature thrust obtained by Point Beach stem thrust measurement system with no differential pressure.

*** Full DP indicates functional test for operability at indicated differential pressure per part b of 85-03.

****Opened as required to perform safety function. Would not close. Motor replaced.

MOTOR-OPERATED VALVE DATA SUMMARY
RESPONSE TO IEB 85-03
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2
JUNE 30,1988

Valve I.D.	1-825A	2-825A	1-825B	2-825B	1-826B	2-826B	1-826C	2-826C
Valve Mfr.	Aloyco	Aloyco	Aloyco	Aloyco	Aloyco	Aloyco	West.	Aloyco
Valve Type	Gate	Gate	Gate	Gate	Gate	Gate	Gate	Gate
Valve Model	216-VGS-SP	216-VGS-SP	216-VGS-SP	216-VGS-SP	216-VGS-SP	216-VGS-SP	5710-99	216-VGS-SP
Valve Size	12"	12"	12"	12"	8"	8"	8"	8"
Rating	150#	150#	150#	150#	150#	150#	300#	150#
Operator Mfr.	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque
Model	SMB-1	SMB-1	SMB-1	SMB-1	SMB-00	SMB-00	SMB-00	SMB-00
Motor RPM	3600	3600	3600	3600	1800	1800	1700	1800
Output Spd."/mn	60	60	60	60	52.5	52.5	51	52.5
Valve Function	Opens to provide suction to the high head Safety Injection Pumps from the RWST.				Opens to provide suction to the high head safety injection pumps from Boric Acid Tanks.			
Design Delta P Open/Close(psid)	150/150	150/150	150/150	150/150	200/200	200/200	200/200	200/200
Maximum Delta P Open/Close(psid)	30/30	30/30	30/30	30/30	12/12	12/12	12/12	12/12
Test Delta P Open/Close(psid)	28.6/28.6	28.6/28.6	28.6/28.6	30/30	19.5/19.5	29.5/29.5	10.43/10.43	29.5/29.5
Prior Settings* (Open/Close)	2.7/2.7	2.25/2.25	2.0/1.5	3.25/3.4	1.8/1.8	2.4/2.6	3/3	2.4/2.5
Final Settings (Open/Close)	2.7/2.7	2.25/2.25	2.0/1.5	1.8/1.8	1.8/1.8	1.75/1.75	3/3	2.0/2.0
Min. Setting (Open/Close100%)	1.25/1.25	1.25/1.25	1.25/1.25	1.25/1.25	1.25/1.25	1.25/1.25	2/2	1.25/1.25
Max. Setting (Open/Close100%)	4/4	4/4	4/4	4/4	3.25/3.25	3.25/3.25	3/3	3.25/3.25
Max. Setting (Open/Close 80%)	3.25/3.25	3.25/3.25	3.25/3.25	3.25/3.25	2.25/2.25	2.25/2.25	3/3	2.25/2.25
Calc.Min/Max Thrust (1000's LBS.)	2.8/12.3	2.8/12.3	2.8/12.3	2.8/12.3	1.7/9.4	1.7/9.4	4.4/13.5	1.7/9.4
Signature Thrust ** (1000's LBS.)			11.1		6.6	6.8	9.3	6.6
As Found Operable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Test Method, Description and Justification ***	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP

* Torque switch. Minimum and maximum required settings at 80 and 100% of rated voltage are based on calculations by a vendor.

** Signature thrust obtained by Point Beach stem thrust measurement system with no differential pressure.

*** Full DP indicates functional test for operability at indicated differential pressure per part b of 85-03.

MOTOR-OPERATED VALVE DATA SUMMARY
RESPONSE TO IEB 85-03
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2
JUNE 30,1988

Valve I.D.	1-896A	2-896A	1-896B	2-896B	1-866A	2-866A	1-866B	2-866B
Valve Mfr.	Aloyco	Aloyco	Aloyco	Aloyco	Darling	Darling	Darling	Darling
Valve Type	Gate	Gate	Gate	Gate	Gate	Gate	Gate	Gate
Valve Model	216-VGS-SP	216-VGS-SP	216-VGS-SP	216-VGS-SP	11986	11986	11986	11986
Valve Size	6"	6"	6"	6"	4"	4"	4"	4"
Rating	150#	150#	150#	150#	900#	900#	900#	900#
Operator Mfr.	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque	Limitorque
Model	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00	SMB-00
Motor RPM	1800	1800	1800	1800	1800	1800	900	900
Output Spd."/mn	60	60	10	10	11.4	11.4	11.4	11.4
Valve Function	Normally Open.Must remain open to allow suction to the high head safety injection pumps.				Normally Open.Must remain open to allow high head safety injection to the RCS.			
Design Delta P Open/Close(psid)	150/150	150/150	150/150	150/150	1745/1745	1745/1745	1745/1745	1745/1745
Maximum Delta P Open/Close(psid)	30/30	30/30	30/30	30/30	1670/1670	1670/1670	1670/1670	1670/1670
Test Delta P Open/Close(psid)	31/31	28/28	31/31	28/28	1680/1680	1700/1700	1680/1680	1700/1700
Prior Settings* (Open/Close)	2.0/1.5	1.6/1.6	2.0/2.75	2.0/2.75	1.5/1.5	1.5/1.5	2/2	1.5/1.5
Final Settings (Open/Close)	1.5/1.5	1.6/1.6	1.25/1.25	2.0/2.75	1.5/1.5	1.5/1.5	2/2	1.5/1.5
Min. Setting (Open/Close100%)	1.25/1.25	1.25/1.25	1.25/1.25	1.25/1.25	1/1.375	1/1.375	1/1.375	1/1.375
Max. Setting (Open/Close100%)	1.75/1.75	1.75/1.75	1.75/1.75	1.75/1.75	2/2	2/2	2/2	2/2
Max. Setting (Open/Close 80%)	1.75/1.75	1.75/1.75	1.75/1.75	1.75/1.75	1.25/1.25	2/2	1.25/1.25	2/2
Calc.Min/Max Thrust (1000's LBS.)	1.55/4.13	1.55/4.13	1.55/4.13	1.55/4.13	8.78/14	8.78/14	8.78/14	8.78/14
Signature Thrust ** (1000's LBS.)	4.5	4.3	4.2		14.9		16.9	
As Found Operable	Yes	Yes	Yes	Yes	***** Yes	Yes	Yes	Yes
Test Method, Description and Justification ***	Full DP	Full DP	Full DP	Full DP	Full DP	Full DP	**** Full DP	Full DP

* Torque switch. Minimum and maximum required settings at 80 and 100% of rated voltage are based on calculations by a vendor.

** Signature thrust obtained by Point Beach stem thrust measurement system with no differential pressure.

*** Full DP indicates functional test for operability at indicated differential pressure per part b of 85-03.

**** Signature thrust obtained by Point Beach stem thrust measurement system with indicated differential pressure.

*****Opened as required to perform safety function. Would not close. Motor replaced.

MOTOR-OPERATED VALVE DATA SUMMARY
RESPONSE TO IEB 85-03
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2
JUNE 30,1988

Valve I.D.	1-826A	2-826A
Valve Mfr.	Aloyco	Aloyco
Valve Type	Gate	Gate
Valve Model	216-VGS-SP	216-VGS-SP
Valve Size	8"	8"
Rating	150#	150#
Operator Mfr.	Limitorque	Limitorque
Model	SMB-00	SMB-00
Motor RPM	1800	1800
Output Spd."/mn	52.5	52.5
Valve Function	Normally Open. Must remain open to supply high head safety injection pumps from RWST.	
Design Delta P Open/Close(psid)	200/200	200/200
Maximum Delta P Open/Close(psid)	12/12	12/12
Test Delta P Open/Close(psid)	10.43/10.43	26.4/26.4
Prior Settings* (Open/Close)	1.5/1.5	1.5/1.25
Final Settings (Open/Close)	1.75/1.75	1.5/1.25
Min. Setting (Open/Close100%)	1.25/1.25	1.25/1.25
Max. Setting (Open/Close100%)	3.25/3.25	3.25/3.25
Max. Setting (Open/Close 80%)	2.25/2.25	2.25/2.25
Calc.Min/Max Thrust (1000's LBS.)	1.7/9.4	1.7/9.4
Signature Thrust ** (1000's LBS.)		5.3
As Found Operable	Yes	Yes
Test Method, Description and Justification ***	Full DP	Full DP

* Torque switch. Minimum and maximum required settings at 80 and 100% of rated voltage are based on calculations by a vendor.

** Signature thrust obtained by Point Beach stem thrust measurement system with no differential pressure.

*** Full DP indicates functional test for operability at indicated differential pressure per part b of 85-03.

MOV DATA SUMMARY COMMENTS SECTION

The following section provides discussion on the Data Summary Table for IEB 85-03 Response

OPEN AND CLOSED TORQUE SWITCH SET HIGHER THAN RECOMMENDED
Valves 0-4020, 0-4021, 0-4022, and 0-4023 required setting the torque switches higher than recommended to achieve the required thrust to close the valve under maximum delta P conditions. The spring-pack curve used by Limitorque in specifying torque switch settings is in error. We are currently working with Limitorque to resolve this discrepancy. The spring-packs will most likely be replaced with the next stiffer spring-pack to allow reduction in torque switch settings.

OPEN AND CLOSED TORQUE SWITCH SET LOWER THAN RECOMMENDED
Valves 1-2019, 1-2020, 2-2020, 1-4000, 1-4001, 2-878B, 1-878C, and 1-878D required the torque switch setting be lower than recommended to provide the required thrust. Torque switch settings are lower than recommended to develop the required thrust due to the difference in stem to stem-nut friction factors. The recommended settings are based on an assumed coefficient of friction of 0.2. The actual coefficient of friction based on actual measurement is much less.

OPEN TORQUE SWITCH SET HIGHER THAN RECOMMENDED
Valves 1-4006, 0-4009, 0-4016, and 2-896B have the open torque switch set higher than recommended. The torque switch is not normally the limiting switch for valve travel in the open direction. On opening, the open limit switch stops valve travel. If the limit switch were to fail, the torque switch would operate to limit valve travel. Operators in the control room would also be alerted to the limit switch failure due to extended intermediate position indication. Analysis indicates that no valve or operator component failures would occur as a result of open limit switch failure; even during a 110% overvoltage condition.

TORQUE SWITCH SET AS RECOMMENDED, THRUST EXCEEDS RECOMMENDED
Valves 2-4000, 2-4001, 1-878B, 2-878B, 2-878C, 1-878D, 1-866A and 1-866B have the torque switches set within the recommended range but have a thrust which exceeds the recommended maximum thrust on the operators. This difference is attributable to a stem to stem-nut coefficient of friction. The recommended thrust on the operators is not based on fragility testing but rather on signature testing and experience. It has been Point Beach experience that SMB-00 operators can typically withstand more than 24,000 pounds of thrust with no degradation in function. Many operators have been set at these higher level for 17 years. There is no problem with the valves at the current thrust level setting. However, the settings will be lowered to be within the recommended thrust band at the next maintenance interval.

TORQUE SWITCH SET HIGH, THRUST EXCEEDS RECOMMENDED

Valves 1-878A, 2-878A, and 2-878D have torque switch settings which are higher than recommended and calculated thrusts which exceed the recommended maximum thrust. The recommended thrust for these valves is 14,000 pounds and is based on the operator testing mentioned above. The calculated thrust is 18,700 pounds at the current switch settings. This presents no problem for the valve itself and based on the discussion above presents no problem for the operator. However, the settings will be lowered to be within the recommended thrust band at the next maintenance interval.