LONG ISLAND LIGHTING COMPANY
SHOREHAM NUCLEAR POWER STATION
P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

JOHN D. LEONARD, JR.
VICE PRESIDENT - NUCLEAR OPERATIONS

June 28, 1985

SNRC-1185

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Unisolated LOCA Outside Drywell
Shoreham Nuclear Power Station
Docket No. 50-322

Reference: USNRC letter (A. Schwencer) to LILCO (J. D. Leonard, Jr.) dated May 6, 1985

Dear Mr. Denton:

This letter is in response to the referenced letter from Mr. Schwencer regarding a scoping study currently being performed by the NRC staff. The study is concerned with unisolated LOCAs outside the drywell for the Shoreham reactor building. The isolation valves of concern, as identified in the referenced letter, are in the High Pressure Coolant Injection System (HPCI), Reactor Core Isolation Cooling System (RCIC), Reactor Water Cleanup System (RWCU), and the Main Steam Line (MSL) drain line. LILCO was requested to provide documentation demonstrating the capability of the valves to isolate a pipe break downstream of the valve under blowdown conditions.

To demonstrate isolation capability under these conditions, LILCO has performed an evaluation to assure that all required documentation concerning procurement and testing of the valves is in place and that it is sufficient to demonstrate, by design and test, that the valves have the capability to isolate as stated above.

A001
1/1

The evaluation performed by LILCO shows the following:

1. The correct design criteria from the purchase specification were used by the valve vendor for sizing calculations for the original selection of motor operators. The motor operator sizing calculations indicate that the valves have the capability of closing against the anticipated differential pressure in a guillotine line break. In the case of the listed valves, the maximum thrust capacity of the actuator exceeds the total stem thrust required. This is demonstrated in the documentation provided. (See Paragraph 2 below).

2. Enclosed is a copy of the calculations for the actuator design as received from the vendor. It is noted that the date of the calculation sheets is 1985. This was necessary to clarify a complicated format that had originally been used in 1975. The vendor indicated that the information provided in the new format is an accurate representation of the original calculations. The original documentation is available for audit.

3. Review of the original vendor records shows that all valves identified in the reference letter were tested for opening and closing under appropriate pressure differential conditions. The tests provide evidence of the satisfactory performance of each valve against the differential pressure. In addition, an isolated discrepancy in vendor records for valve 1E51*MOV-042 has been corrected and verified as to validity. A revised copy of the test data is enclosed.

4. Verification of identification numbers of the tested valve actuators and the operator size as shown on the test reports was accomplished during field walkthroughs to support the environmental qualification effort. This activity served to verify the design records. No motor data were found to exceed the limitorque design rating. In addition, actual voltage type and rating given in the test reports were verified against the original design records.

The above discussion confirms the adequacy of the containment isolation capability at Shoreham. The design parameters and test results demonstrate that the capability to isolate under blowdown conditions exists. Although LILCO has verified the appropriate data and included them in the above discussion, it should be noted that the three valves (1G33*MOV-F100, F106, and F102) included in the RWCU line are not classified as isolation valves. Isolation of the line containing these three valves is performed by RWCU isolation valves 1G33*MOV33 and MOV34. Although the additional information supports their ability to operate, it is not necessary to take credit for these three valves for isolation capability.

The information submitted herewith is believed to be fully responsive to the NRC concerns of the referenced letter. Should you have any questions, please contact this office.

Very truly yours,

John D. Leonard, Jr.
Vice President - Nuclear Operations

JVW:ck

Enclosure

cc: J. Berry

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/01

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 1 (TAG: 1B21*MOV031) VELAN DWG. NO.:

VALVE DESC: 3 " 900 LBS. B.B. GATE

LINE PRESS: 1337 PSI

ORIF. DIA.: 2.625 ORIF. AREA: 5.409 ΔP 1165 PSI @ TEMP. 583 °F.

STEM DIA.: 1.125 STEM AREA: 0.994 TRD: 1/5 P 2/5 L LIFT: 3 1/8 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 5.409 x 1165 x 0.3 = 1890

LINE PRESS. x S.A. = 1337 x 0.994 = 1329

Packing Friction Load = 2454

Total Stem Thrust = 5673 #

STEM TORQUE = STEM THRUST x STEM FACT. 5673 x 0.01215 = 69 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}} = \frac{1700}{\frac{12.186}{2/5}} = 55.8$

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}} = \frac{69}{0.4 \times 0.9 \times 55.8} = 3.435$ '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{3.435}{(\%\text{Volt.})^2} = \frac{3.435}{0.49} = 7.01$ '#
N.B. IF DC SUPPLY, DO NOT SQ. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =
@ 110% VOLTAGE 11 x 0.5 x 55.8 x 1.21 = 371 '#

E/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{E/W RATIO x UNIT EFF. x E/W DIA.}} = \frac{2 \times 69}{4.38 \times 0.95 \times 1} = 33$ #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 10 x 0.49 x 0.4 x 0.9 x 55.8 = 98 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{E/W RATIO x EFF.}} = \frac{375}{4.38 \times 0.95} = 90$ '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 16 SECONDS. (APPROX.)

SMB - 00 OPERATOR WITH 10 FT.# MOTOR. MAX. THRUST: 14000 #

MAX. STEM TORQUE = 250 '# O/A RATIO RANGE = 23 - 109

H/W RATIO = 1 :1 ADD GEAR -- :1 MAX. STEM DIA.: 1 3/4

CURRENT SUPPLY 460 AC VOLTS 3 PH 60 CY MUST OPERATE AT 70 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	[illegible] 8-6						
APPROVED BY:	[illegible]						
IND. REV.BY:	[illegible]						

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/02

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 2 (TAG: 1B21*MOV032) VELAN DWG. NO.: -

VALVE DESC: 3 " 900 LBS. B.B. GATE

ORIF. DIA.: 2.625 ORIF. AREA: 5.409 ΔP 1165 PSI @ LINE PRESS: 1337 PSI TEMP. 583 °F.

STEM DIA.: 1.125 STEM AREA: 0.994 TED: 1/5P 2/5 L LIFT: 3 1/8 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 5.409 x 1165 x 0.3 = 1890

LINE PRESS. x S.A. = 1337 x 0.994 = 1329

Packing Friction Load = 2454

Total Stem Thrust = 5673 #

STEM TORQUE = STEM THRUST x STEM FACT. 5673 x 0.01215 = 69 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}} = \frac{1900}{\frac{12.064}{2/5}} =$ 63.0

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}} = \frac{69}{0.4 \times 0.9 \times 63} =$ 3.04 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{3.04}{(\%\text{Volt.})^2} = \frac{3.04}{0.8} =$ 3.80 '#

N.B. IF DC SUPPLY, DO NOT SO. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 6 x 0.5 x 63 x 1.1 = 208 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO x UNIT EFF. x H/W DIA.}} = \frac{2 \times 69}{1 \times 1 \times 0.834} =$ 165 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 5 x 0.8 x 0.4 x 0.9 x 63 = 91 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO x EFF.}}$

$= \frac{375}{1 \times 1} =$ 375 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 16 SECONDS. (APPROX.)

SMB - 000 OPERATOR WITH 5 FT.# MOTOR. MAX. THRUST: 8000 #

MAX. STEM TORQUE = 90 '# O/A RATIO RANGE = 33.5 - 136

H/W RATIO = 1 :1 ADD GEAR -- :1 MAX. STEM DIA.: 1 3/8

CURRENT SUPPLY 125 DC VOLTS -- C MUST OPERATE AT 80 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	[illegible] 5.85						
APPROVED BY:	[illegible] 16.5.85						
IND. REV.BY:	[illegible] 21 5 85						

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MG/24

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 24 (Tag: 1E41*MOV041) VELAN DWG. NO.:

VALVE DESC: 10 " 900 LBS. BB GATE

LINE PRESS: 1337 PSI

ORIF. DIA.: 7.875 ORIF. AREA: 48.682 ΔP 1135 PSI @ TEMP. 583 °F.

STEM DIA.: 2 1/2 STEM AREA: 4.906 THD: 1/3P 2/3 L LIFT: 9.0 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 48.682 x 1135 x 0.3 = 16576

LINE PRESS. x S.A. = 1337 x 4.906 = 6559

Packing Friction Load = 2500

Total Stem Thrust = 25635 #

STEM TORQUE = STEM THRUST x STEM FACT. 25635 x 0.02424 = 621 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}} = \frac{3400}{\frac{31.96}{2/3}} =$ 70.93

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}} = \frac{621}{0.4 \times 0.9 \times 70.93} =$ 24.34 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = N.B. IF DC SUPPLY, DO NOT SQ. % V. $\frac{24.34}{(\%\text{Volt.})^2} = \frac{24.34}{0.49} =$ 49.66 '#

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 93 x 0.50 x 70.93 x 1:21 = 3990 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO x UNIT EFF. x H/W DIA.}} = \frac{2 \times 621}{28.37 \times 0.3 \times 2} =$ 73 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 80 x 0.49 x 0.4 x 0.9 x 70.93 = 1001 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO x EFF.}} = \frac{3100}{28.37 \times 0.3} =$ 364 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 17.0 SECONDS. (17 Sec Max)

SMB - 3 OPERATOR WITH 80 FT.# MOTOR. MAX. THRUST: 140000 #

MAX. STEM TORQUE = 4200 '# O/A RATIO RANGE = 3.9-95.5

H/W RATIO = 28.37 :1 ADD GEAR - :1 MAX. STEM DIA.: 5.0"

CURRENT SUPPLY 460 AC VOLTS 3 PH 60Cy MUST OPERATE AT 70 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	[illegible]						
APPROVED BY:	[illegible]						
IND. REV.BY:	[illegible]						

072-11-76, REV. 1

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/25

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 25 (TAG: 1E41*MOV042) VELAN DWG. NO.:

VALVE DESC: 10" 900 LBS. RB GATE

LINE PRESS: 1337 PSI

ORIF. DIA.: 7.875 ORIF. AREA: 48.682 ΔP 1135 PSI @ TEMP. 583 °F.

STEM DIA.: 2.5 STEM AREA: 4.906 THD: 1/3 P 1 L LIFT: 9.0 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 48.682 x 1135 x 0.3 = 16576

LINE PRESS. x S.A. = 1337 x 4.906 = 6559

Packing Friction Load = 2500

Total Stem Thrust = 25635 #

STEM TORQUE = STEM THRUST x STEM FACT. 25635 x 0.02893 = 742 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}} = \frac{1900}{\frac{35.58}{1/1}} =$ 53.4

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}} = \frac{742}{0.4 \times 0.9 \times 53.4} =$ 38.60 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{38.60}{(\%\text{Volt.})^2} = \frac{38.60}{0.8} =$ 48.25 '#
N.B. IF DC SUPPLY, DO NOT SQ. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 80 x 0.75 x 53.4 x 1.1 = 2350 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO x UNIT EFF. x H/W DIA.}} = \frac{2 \times 742}{25.3 \times 0.3 \times 1.5} =$ 130 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 60 x 0.8 x 0.4 x 0.9 x 53.4 = 923 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO x EFF.}} = \frac{3100}{25.3 \times 0.3} =$ 408 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 16.0 SECONDS. (17 SEC MAX)

SMB - 1 OPERATOR WITH 60 FT.# MOTOR. MAX. THRUST: 45000 #

MAX. STEM TORQUE = 850 '# O/A RATIO RANGE = 27.2 - 171.6

H/W RATIO = 25.3:1 ADD GEAR -:1 MAX. STEM DIA.: 2 7/8

CURRENT SUPPLY 125 VDC VOLTS - C MUST OPERATE AT 80 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	24.4.85						
APPROVED BY:	24.4.85						
IND. REV.BY:	30.4.85						

072-11-76, REV. 1

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/32

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 32 (TAG: 1E51*MOV041) VELAN DWG. NO.: -

VALVE DESC: 3 " 900 LBS. BB GATE

LINE PRESS: 1337 PSI

ORIF. DIA.: 2.625 ORIF. AREA: 5.409 ΔP 1135 PSI @ TEMP. 563 °F.

STEM DIA.: 1 1/8 STEM AREA: 0.994 THD: 1/5 P 2/5 L LIFT: 3.12 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 5.409 x 1135 x 0.3 = 1842 .

LINE PRESS. x S.A. = 1337 x 0.994 = 1128

Packing Friction Load = 2454

Total Stem Thrust = 5424 #

STEM TORQUE = STEM TERUST x STEM FACT. 5424 x 0.01215 = 66 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}} = \frac{1700}{\frac{12.186}{2/5}} = \frac{\quad}{\quad} =$ 55.8

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}} = \frac{66}{0.4 \times 0.9 \times 55.8} =$ 3.29 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = N.B. IF DC SUPPLY, DO NOT SQ. Z V. $\frac{3.29}{(\%\text{Volt.})^2} = \frac{3.29}{0.49} =$ 6.71 '#

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. Z x O/A RATIO =

@ 110Z VOLTAGE 11.0 x 0.-5 x 55.8 x 1.21 = 371 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO x UNIT EFF. x H/W DIA.}} = \frac{2 \times 66}{1 \times 1 \times 0.834} =$ 158 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 10 x 0.49 x 0.4 x 0.9 x 55.8 = 98 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO x EFF.}}$

$= \frac{375}{1 \times 1}$ = 375 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 16 SECONDS. (APPROX)

SMB - 00 OPERATOR WITH 10 FT.# MOTOR. MAX. THRUST: 14000 #

MAX. STEM TORQUE = 250 '# O/A RATIO RANGE = 23 - 109

H/W RATIO = 1 :1 ADD GEAR - :1 MAX. STEM DIA.: 1 3/4

CURRENT SUPPLY 460 AC VOLTS 3PH 60 C Y MUST OPERATE AT 70 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:							
APPROVED BY:							
IND. REV.BY:							

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/59

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 59 (TAG: 1E51*MOV042 VELAN DWG. NO.:

VALVE DESC: 3" 900 LBS. BB GATE

LINE PRESS: 1337 PSI

ORIF. DIA.: 2.625 ORIF. AREA: 5.409 ΔP 1135 PSI @ TEMP. 563 °F.

STEM DIA.: 1 1/8 STEM AREA: 0.994 TED: 1/5 P 2/5 L LIFT: 3.12 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 5.409 x 1135 x 0.3 = 1842 #

LINE PRESS. x S.A. = 1337 x 0.994 = 1128 #

Packing Friction Load = 2454 #

Total Stem Thrust = 5425 #

STEM TORQUE = STEM THRUST x STEM FACT. 5424 x 0.01215 = 66 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}}$ = $\frac{1900}{\frac{12.064}{2/5}}$ = = 63

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}}$ = $\frac{66}{0.4 \times 0.9 \times 63}$ = 2.91 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{2.91}{(\%\text{Volt.})^2}$ = $\frac{2.91}{0.8}$ = 3.64 '#

N.B. IF DC SUPPLY, DO NOT SQ. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 8.25 x 0.5 x 63 x 1.21 = 286 '#

E/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{E/W RATIO x UNIT EFF. x E/W DIA.}}$ = $\frac{2 \times 66}{4.37 \times 0.95 \times 1}$ = 32 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 7.5 x 0.8 x 0.4 x 0.9 x 63 = 136 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO x EFF.}}$

= $\frac{375}{4.37 \times 0.95}$ = 90 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 16 SECONDS. (APPROX)

SMB - 00 OPERATOR WITH 7.5 FT.# MOTOR. MAX. THRUST: 14000 #

MAX. STEM TORQUE = 250 '# O/A RATIO RANGE = 23 - 109

H/W RATIO = 4.37 :1 ADD GEAR - :1 MAX. STEM DIA.: 1 3/4

CURRENT SUPPLY 125 VDC VOLTS - Φ MUST OPERATE AT 80 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:							
APPROVED BY:							
IND. REV.BY:							

LONG ISLAND

FORM VE-[illegible]-7-7A

VELAN ENGINEERING COMPANIES

000041 1366

3"-900#-B.B. GATE-C/S.

CERTIFICATE OF NDT APPROVAL

P2-3287-N Item 5

"REVISED EDITION - FEB.4/85"

PART	SERIAL NO. OR HEAT CODE		QUANTITY ACCEPTED	LIQUID PENETRANT		MAGNETIC PARTICLE	
				NDT INSPTR.	DATE	NDT INSPTR.	DATE
BODY	041		1				Sept 26 1974
BODY BUTTWELD			2				Sept 26 1974
BONNET (COVER) & BACKSEAT	4600		1		oct 7 1974		oct 10 1974
DISC (WEDGE)	F310		1				oct 4 1974
STEM							
STUDS							
NUTS							
WELD SEATS AND GUIDE			2		oct 7 1974		
HARDFACE SEAT			2		oct 7 1974		
HARDFACE DISC. (WEDGE)	F310		2		oct 4 1974		
Leak-off Pipe Welds to Bonnet			1		Oct. 22 74		

CERTIFICATE OF PRODUCTION (HYDROSTATIC) TEST

TYPE OF TEST	SHELL	SEAT 'A' SIDE	SEAT 'B' SIDE	BACK SEAT	PACKING
DURATION MINS.	30 mins.	3 mins.		30 mins.	5 mins.
PRESSURE P.S.I.	3250 PSI.	2200 PSI.		3250 PSI.	3250 PSI.
RESULT c.c.	0 - Leakage	1 cc	2 cc	0 - Leakage	0 - Leakage

TEST DATA FOR MOTOR - OPERATED VALVES

OPERATOR TYPE	SMB-00	RATED VOLTS DC : 125
SERIAL NO.	199377	DIFFERENTIAL PRESSURE 1,135
1E51-MOV-042	FULL RATED VOLTS 100%	RATED VOLTS 80%
TIME TO OPEN (SECS)	15.7 sec.	15.8 sec.
TIME TO CLOSE (SECS)	15.8 sec.	15.9 sec.
PEAK STARTING CURRENT (AMPS)	1.0 amps.	1.1 amps.
NORMAL OPERATING CURRENT (AMPS)	.8 amps.	.6 amps.
	OPEN 1½	CLOSE 1½
TORQUE SWITCH SETTING		
LIMIT SWITCH SETTING	ON	ON

DATE OF TEST

JAN 27 1975

TESTED BY

D Brault

VELAN H.T. 2

CERTIFIED

CUSTOMER'S REPRESENTATIVE

APR. - 9 1975

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/38

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 38 (TAG: 1G33*MOV030A/B)* VELAN DWG. NO.: -

VALVE DESC: 4 " 900 LBS. BB GATE

LINE PRESS: 1375 PSI

ORIF. DIA.: 3.44 ORIF. AREA: 9.29 ΔP 1030 PSI @ TEMP. 563 °F.

STEM DIA.: 1.375 STEM AREA: 1.484 THD: 1/4 P 1/2 L LIFT: 4.0 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 9.29 x 1030 x 0.3 = 2871

LINE PRESS. x S.A. = 1375 x 1.484 = 2041

Packing Friction Load = 2721

Total Stem Thrust = 7633 #

STEM TORQUE = STEM THRUST x STEM FACT. 7633 x 0.01499 = 114 '#

O/A OR UNIT RATIO = MOTOR DESIGN R.P.M. / STEM SPEED IN./MIN. / THREAD LEAD = 1700 / 11.806 / 1/2 = 72

MOTOR CALC. TORQUE = STEM TORQUE / PULL OUT EFF. x APPL. FACT. x O/A RATIO = 114 / 0.4 x 0.9 x 72 = 4.40 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = ____ / (%Volt.)² / 0.49 = 8.98 '#
N.B. IF DC SUPPLY, DO NOT SO. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 17.5 x 0.5 x 72 x 1.21 = 762 '#

H/W PULL = 2 x STEM TORQUE / H/W RATIO x UNIT EFF. x H/W DIA. = 2x 114 / 4.37 x 0.95 x 1 = 55 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 15 x 0.49 x 0.4 x 0.9 x 72 = 191 '#

MAX. H/WHEEL TORQUE = MAX. VALVE TORQUE / H/W RATIO x EFF.

= 350 / 4.37 x 0.95 = 84 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 21 SECONDS. APPROX.

SMB - 00 OPERATOR WITH 15 FT.# MOTOR. MAX. THRUST: 14000 #

MAX. STEM TORQUE = 250 '# O/A RATIO RANGE = 23 - 109

H/W RATIO = 4.37 :1 ADD GEAR - :1 MAX. STEM DIA.: 1 3/4

CURRENT SUPPLY 460 AC VOLTS 3PH 60 Cy MUST OPERATE AT 70 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	24.4.85						
APPROVED BY:							
IND. REV.BY:							

072-11-76, REV. 1

* FOR INFORMATION
1G33* MOV030A IS F106 AND 1G33* MOV030B IS F100 ON RWCU FLOW DIAG, LILCO M10H9-18

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/39

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 39 (TAG: 1G33*MOV031)* VELAN DWG. NO.:

VALVE DESC: 6 " 900 LBS. BB GLOBE

LINE PRESS: 1375 PSI

ORIF. DIA.: 4 3/4 ORIF. AREA: 15.025 ΔP 1030 PSI @ TEMP. 563 °F.

STEM DIA.: 1 3/4 STEM AREA: 2.404 THD: 1/5 P 1/5 L LIFT: 2 1/2 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 15.025 x 1030 x 1.1 = 17024

Packing Friction Load = 4330

Total Stem Thrust = 21354 #

STEM TORQUE = STEM THRUST x STEM FACT. 21354 x 0.01338 = 286 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}} = \frac{1700}{\frac{4.05}{1/5}} = 84$

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}} = \frac{286}{0.4 \times 0.9 \times 84} = 9.46$ '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{9.46}{(\%\text{Volt.})^2} = \frac{9.46}{0.49} = 19.31$ '#
N.B. IF DC SUPPLY, DO NOT SQ. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 48 x 0.5 x 84 x 1.21 = 2439 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO} \times \text{UNIT EFF.} \times \text{H/W DIA.}} = \frac{2 \times 286}{21.1 \times 0.3 \times 1.17} = 39$ #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 40 x 0.49 x 0.4 x 0.9 x 84 = 593 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO} \times \text{EFF.}} = \frac{2700}{21.1 \times 0.3}$ = 427 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 38 SECONDS. (APPROX)

SMB - 0 OPERATOR WITH 40 FT.# MOTOR. MAX. THRUST: 24000 #

MAX. STEM TORQUE = 500 '# O/A RATIO RANGE = 26.4 - 150.8

H/W RATIO = 21.1:1 ADD GEAR - :1 MAX. STEM DIA.: 2 3/8

CURRENT SUPPLY 460 AC VOLTS 3PH 60 CY MUST OPERATE AT 70 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	[illegible]						
APPROVED BY:	[illegible]						
IND. REV.BY:	[illegible]						

072-11-76, REV. 1

* FOR INFORMATION: 1G33*MOV031 IS F102 ON ANCV FLOWDIAG, LILCO M1019-18

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/41

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 41 (Tag: 1G33*MOV033 VELAN DWG. NO.:

VALVE DESC: 6 " 900 LBS. BB GATE

LINE PRESS: 1375 PSI

ORIF. DIA.: 5 3/16 ORIF. AREA: 21.14 ΔP 1165 PSI @ TEMP. 563 °F.

STEM DIA.: 1 3/4 STEM AREA: 2.404 THD: 1/4P 1/2 L LIFT: 5.75 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 21.14 x 1165 x 0.3 = 7388.

LINE PRESS. x S.A. = 13.75 x 2.404 = 3306

Packing Friction Load = 2500

Total Stem Thrust = 13194 #

STEM TORQUE = STEM THRUST x STEM FACT. 13194 x 0.01733 = 229 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}}$ = $\frac{1700}{\frac{11.806}{1/2}}$ = 72

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}}$ = $\frac{229}{0.4 \times 0.9 \times 72}$ = 8.85 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{8.85}{(\%\text{Volt.})^2}$ = $\frac{8.85}{0.49}$ = 18.05 '#

N.B. IF DC SUPPLY, DO NOT SQ. % V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 29.0 x 0.5 x 72 x 1.21 = 1263 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO x UNIT EFF. x H/W DIA.}}$ = $\frac{2 \times 229}{4.37 \times 0.95 \times 1}$ = 110 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 25 x 0.49 x 0.4 x 0.9 x 72.0 = 318 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO x EFF.}}$

= $\frac{1325}{4.37 \times 0.95}$ = 319 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 29.5 SECONDS. (APPROX)

SMB - 00 OPERATOR WITH 25 FT.# MOTOR. MAX. THRUST: 14000 #

MAX. STEM TORQUE = 250 '# O/A RATIO RANGE = 23 - 109

H/W RATIO = 4.37 :1 ADD GEAR - :1 MAX. STEM DIA.: 1 3/4

CURRENT SUPPLY 460 AC VOLTS 3PH 60Cy MUST OPERATE AT 70 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:							
APPROVED BY:							
IND. REV.BY:							

072-11-76, REV. 1

MOTOR OPERATOR CALCULATIONS

P.O. NO. OR PROJECT: LILCO REF.: P2-3287-MC/42

CUSTOMER NAME: STONE & WEBSTER

VELAN NO.: P2-3287-N ITEMS: 42 (TAG: 1G33*MOV034) VELAN DWG. NO.:

VALVE DESC: 6 " 900 LBS. RB GATE

LINE PRESS: 1375 PSI

ORIF. DIA.: 5 3/16 ORIF. AREA: 21.14 ΔP 1165 PSI @ TEMP. 563 °F.

STEM DIA.: 1 3/4 STEM AREA: 2.404 THD: 1/4 P 1/2 L LIFT: 5.75 "

STEM THRUST: O.A. x ΔP x SEAT FACT.: 21.14 x 1165 x 0.3 = 7388

LINE PRESS. x S.A. = 1375 x 2.404 = 3306

Packing Friction Load = 2500

Total Stem Thrust = 13194 #

STEM TORQUE = STEM THRUST x STEM FACT. 13194 x 0.01738 = 229 '#

O/A OR UNIT RATIO = $\frac{\text{MOTOR DESIGN R.P.M.}}{\frac{\text{STEM SPEED IN./MIN.}}{\text{THREAD LEAD}}}$ = $\frac{1700}{\frac{11.806}{1/2}}$ = $\frac{1700}{23.612}$ = 72

MOTOR CALC. TORQUE = $\frac{\text{STEM TORQUE}}{\text{PULL OUT EFF. x APPL. FACT. x O/A RATIO}}$ = $\frac{229}{0.4 \times 0.9 \times 72}$ = 8.85 '#

MOTOR CALC. TORQUE @ REDUCED VOLTAGE = $\frac{8.85}{(\%\text{Volt.})^2}$ = $\frac{8.85}{0.8}$ = 11.06 '#

N.B. IF DC SUPPLY, DO NOT SQ. %V.

STALLED TORQUE = MOT. STALL TORQUE x ST. EFF. % x O/A RATIO =

@ 110% VOLTAGE 20 x 0.5 x 72 x 1.10 = 792 '#

H/W PULL = $\frac{2 \times \text{STEM TORQUE}}{\text{H/W RATIO} \times \text{UNIT EFF.} \times \text{H/W DIA.}}$ = $\frac{2 \times 229}{4.37 \times 0.95 \times 1}$ = 110 #

MAX. TORQ. SW. SETTING = MOT. TORQ. x P/O EFF. x APP. FACTOR x O/A RATIO:

(@RED. VOLTAGE) 15 x 0.8 x 0.4 x 0.9 x 72 = 311 '#

MAX. H/WHEEL TORQUE = $\frac{\text{MAX. VALVE TORQUE}}{\text{H/W RATIO} \times \text{EFF.}}$

= $\frac{1325}{4.37 \times 0.95}$ = 319 '#

OPERATING TIME = (60 x LIFT) ÷ STEM SPEED = 29.5 SECONDS. (APPROX)

SMB - 00 OPERATOR WITH 15 FT.# MOTOR. MAX. THRUST: 14000 #

MAX. STEM TORQUE = 250 '# O/A RATIO RANGE = 23 : 109

H/W RATIO = 4.37 :1 ADD GEAR - :1 MAX. STEM DIA.: 1 3/4

CURRENT SUPPLY 125 VDC VOLTS C y MUST OPERATE AT 80 %VOLTAGE

	0 REV.	1	2	3	4	5	6
COMPILED BY:	[signature] 8/4/85						
APPROVED BY:	[signature] 8/24/85						
IND. REV. BY:	[signature] 8/26/85						

072-11-76, REV. 1