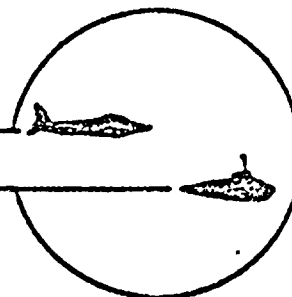


Q 210.51

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AERO
NAV
LABORATORIES, INC.



14-29 112TH STREET • COLLEGE POINT, N.Y. 11356 • (212) 939-4422

(UNCLASSIFIED)
REPORT OF FRAGILITY TEST
ON
SMB-1-25/H4BC
WITH STANDARD CAST ADAPTER
FOR
LIMITORQUE CORPORATION
KING OF PRUSSIA, PENNSYLVANIA

TESTED BY	<i>Walter Polinski</i>	ETL REPORT	5-6267-5
CHECKED BY	<i>C. L. Weigman</i>	AERO NAV SALES ORDER	5-6267
APPROVED BY	<i>Floyd K. ...</i>	CUSTOMER P.O.	383864-3
DATE	17 December 1975		
GOVERNMENT QAR	NONE		

8310130280 830919
PDR ADOCK 05000400
E PDR

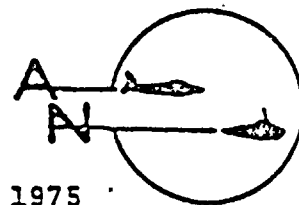


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(UNCLASSIFIED)

ADMINISTRATIVE DATA

DATE

17 December 1975



PURPOSE OF TEST:

To determine the effects of seismic vibration on the physical and operational characteristics of the submitted specimen.

MANUFACTURER:

LIMITORQUE CORPORATION
181 S. Gulph Road
King of Prussia, Pennsylvania 19406

MANUFACTURER TYPE
AND SERIAL NUMBER:

Limitorque SMB-1-25/H4BC Position A
4 Train - 4 Gear Limit Switch

See paragraph 2.0 for name plate data

DRAWINGS SPECIFICATIONS
OR EXHIBIT:

Tested in accordance with IEEE-344 and detailed instructions of client.

QUANTITY OF ITEMS
TESTED:

One (1) only

EQUIPMENT:
REPORT:

Unclassified
Unclassified

DATE TEST COMPLETED:

18 November 1975

TEST CONDUCTED BY:

AERO NAV LABORATORIES, INC.
14-29 112th STREET
COLLEGE POINT, NEW YORK 11356

DISPOSITION OF SPECIMEN:

Returned to client

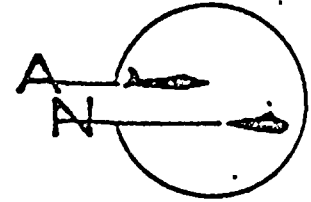
ABSTRACT:

It is the function of the Aero Nav Laboratories, Inc., as an impartial testing agency in performing this test, to subject the specimen to seismic vibration of magnitude and direction as specified in the detailed specifications.

210.71

(UNCLASSIFIED)

FACTUAL DATA



1.0 DESCRIPTION OF TEST APPARATUS:

- 1.1 Vibration Machine & Control System, Type RVH-72-5000, Serial No. 51402, manufactured by L.A.B. Corporation. Calibration Due: 5 March 1976
- 1.2 Accelerometers, Model 2213E, Serial Nos. CP36, CP37, CP48, LA57 and CP43, manufactured by Endevco Corporation. Calibration Due: 18 January 1976.
- 1.3 Amplifier, Model 2616, Serial No. CA13, manufactured by Endevco Corporation. Calibration Due: 18 January 1976.
- 1.4 Power Supply, Model 2622, Serial No. CA24, manufactured by Endevco Corporation. Calibration Due: 18 January 1976.
- 1.5 Band Pass Filter, Model No. 330M, Serial No. 2116, manufactured by Krohn-Hite Corporation. Calibration Due: 26 February 1976.
- 1.6 True R.M.S. VTVM, Model 320A, Serial No. 8622, manufactured by Ballantine Labs. Calibration Due: 29 February 1976.

2.0 NAME PLATE DATA:

SMB-1 S/N 216677 , Order No. 383964E

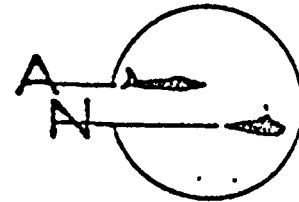
Motor - Reliance
25 ft pounds
ID # 447015-AZ

H4BC - S/N 216691
Order No. 383964E, Position A



210.51
UNCLASSIFIED

FACTUAL DATA



3.0 METHOD OF TEST:

The submitted specimen mounted on a baseplate supplied by Limatorque Corporation was affixed to the table of the seismic simulator in such a manner that the axis of the H4BC stem nut was vertical. Five (5) accelerometers were used to monitor resonant conditions of the actuator.

During the test the actuator was electrically connected to a control console supplied by Limatorque.

3.1 Resonant Frequency Search:

The specimen was subjected to a resonant frequency search from 5 to 33 Hz. The applied excitation levels were in accordance with Table I. The frequency range was increased in discrete steps of 1 Hz and vibration was maintained at each frequency for a period of not less than six (6) hours.

The above test was performed in each of the three (3) mutually perpendicular axis.

Table I - Amplitudes of Vibration

<u>Frequency</u> <u>(Hz)</u>	<u>Acceleration</u> <u>(G peak)</u>
5 to 33	0.1 to 0.75

3.2 Seismic Dwell Test:

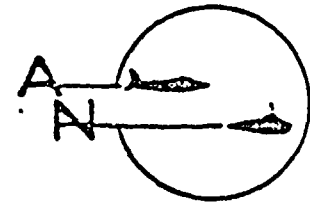
Upon completion of the resonant frequency search in all axes, the specimen was subjected to a seismic dwell test at each of the resonant frequencies noted during the resonant frequency search. If no resonant frequencies were noted the seismic dwell test was performed at 33 Hz.

The acceleration levels used for the dwell tests started at 3 g's and was increased in 1 "g" increments until either the specimen failed or the maximum level of the vibration machine was reached. This test was performed in each of the three (3) mutually perpendicular axes. During and after each dwell in each axis the specimen was operated.

UNCLASSIFIED

FACTUAL DATA

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4.0 RESULTS OF TEST (continued):

The following observations were noted and recorded during the above detailed test procedure:

4.1 Vertical Axis (Along the H4BC Stem):

Accelerometer Locations and Orientation:

Input - On baseplate - vertical

Outputs A - Table Input (H_2)

B - Table Input (H_1)

C - Unit Response (H_1)

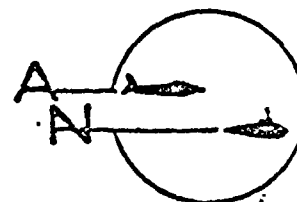
D - Unit Response (V)

E - Unit Response (H_2)

UNCLASSIFIED

FACTUAL DATA

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4.0 RESULTS OF TEST (continued):

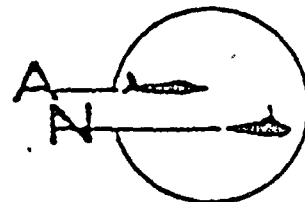
4.1.1 Resonant Frequency Search:

Freq. (Hz)	Input (G's)	Outputs (G's)				
		A	B	C	D	E
4	0.105	0.016	0.0135	0.013	0.115	0.011
5	0.125	0.016	0.011	0.013	0.150	0.008
6	0.185	0.014	0.014	0.015	0.220	0.0086
7	0.240	0.016	0.0155	0.0125	0.270	0.103
8	0.320	0.024	0.017	0.0145	0.370	0.011
9	0.380	0.020	0.0225	0.014	0.430	0.012
10	0.445	0.021	0.037	0.0165	0.485	0.012
11	0.550	0.027	0.051	0.017	0.590	0.0117
12	0.660	0.029	0.056	0.023	0.720	0.012
13	0.820	0.036	0.064	0.022	0.860	0.017
14	1.000	0.052	0.070	0.022	0.920	0.019
15	1.050	0.054	0.076	0.032	1.110	0.013
16	0.200	0.033	0.023	0.025	0.210	0.017
17	0.230	0.035	0.024	0.030	0.240	0.018
18	0.250	0.044	0.039	0.027	0.270	0.019
19	0.270	0.047	0.030	0.026	0.300	0.014
20	0.305	0.031	0.032	0.026	0.330	0.018
21	0.340	0.037	0.035	0.025	0.360	0.017
22	0.370	0.047	0.037	0.026	0.385	0.016
23	0.410	0.053	0.041	0.027	0.420	0.0147
24	0.440	0.054	0.046	0.027	0.470	0.0145
25	0.480	0.052	0.0495	0.0315	0.510	0.016
26	0.530	0.057	0.0545	0.034	0.560	0.019
27	0.570	0.063	0.059	0.042	0.600	0.021
28	0.600	0.054	0.064	0.048	0.655	0.027
29	0.640	0.053	0.067	0.059	0.700	0.0345
30	0.680	0.047	0.072	0.092	0.760	0.062
31	0.730	0.054	0.078	0.068	0.810	0.042
32	0.790	0.050	0.085	0.068	0.890	0.041
33	0.850	0.047	0.093	0.084	1.000	0.057

(UNCLASSIFIED)

FACTUAL DATA

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4.0 RESULTS OF TEST (continued)

4.2 Horizontal Axis (H₁) Along the Motor:

Accelerometer Locations and Orientation:

Input - On baseplate (H₁)

Outputs A - Table Input (H₂)

B - Table Input (V₁)

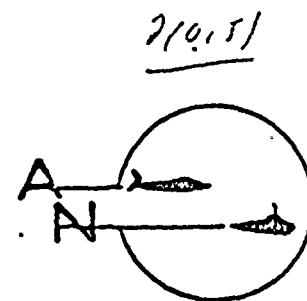
C - Unit Response (H₁)

D - Unit Response (H₂)

E - Unit Response (V)

(UNCLASSIFIED)

FACTUAL DATA



4.0 RESULTS OF TEST (continued)

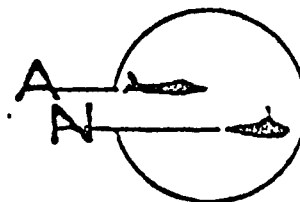
4.2.1 Resonant Frequency Search:

Freq. (Hz)	Input (G's)	Outputs (G's)				
		A	B	C	D	E
4	0.087	0.038	0.0049	0.067	0.018	0.027
5	0.130	0.045	0.008	0.099	.0121	0.031
6	0.170	0.047	0.010	0.150	0.019	0.031
7	0.225	0.049	0.0135	0.220	0.023	0.027
8	0.280	0.051	0.014	0.280	0.026	0.030
9	0.345	0.051	0.016	0.360	0.030	0.033
10	0.420	0.047	0.021	0.430	0.028	0.040
11	0.520	0.044	0.025	0.540	0.025	0.047
12	0.620	0.044	0.029	0.660	0.027	0.052
13	0.760	0.050	0.036	0.770	0.049	0.061
14	0.850	0.053	0.042	0.890	0.066	0.066
15	0.980	0.066	0.053	1.100	0.087	0.087
16	0.190	0.070	0.0185	0.190	0.018	0.028
17	0.220	0.061	0.0195	0.220	0.017	0.031
18	0.230	0.059	0.022	0.240	0.0175	0.0355
19	0.250	0.060	0.025	0.270	0.0195	0.036
20	0.270	0.063	0.028	0.310	0.024	0.038
21	0.295	0.065	0.031	0.340	0.025	0.042
22	0.325	0.045	0.033	0.370	0.029	0.046
23	0.360	0.052	0.036	0.405	0.032	0.047
24	0.400	0.052	0.0395	0.440	0.036	0.056
25	0.425	0.050	0.042	0.475	0.039	0.051
26	0.470	0.040	0.046	0.520	0.042	0.060
27	0.510	0.039	0.050	0.540	0.045	0.063
28	0.550	0.041	0.054	0.620	0.050	0.06
29	0.590	0.046	0.058	0.640	0.061	0.077
30	0.535	0.047	0.063	0.730	0.073	0.105
31	0.680	0.047	0.067	0.780	0.077	0.083
32	0.720	0.044	0.072	0.820	0.086	0.093
33	0.821	0.045	0.082	0.940	0.105	0.096

UNCLASSIFIED)

FACTUAL DATA

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4.0 RESULTS OF TEST (continued):

4.3 Horizontal Axis (H_2) Along the H4BC Input Shaft:

Accelerometer Locations and Orientation:

Input - On baseplate - in direction of vibration

Outputs A - Table Input (H_1)

B - Table Input (V)

C - Unit Response(H_2)

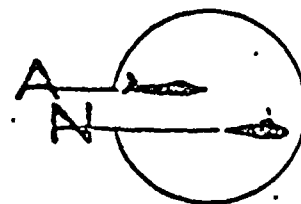
D - Unit Response (H_1)

E - Unit Response (V)

(UNCLASSIFIED)

FACTUAL DATA

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4.0 RESULTS OF TEST (continued):

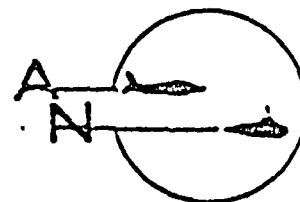
4.3.1 Resonant Frequency Search:

Freq. (Hz)	Input (G's)	A	B	Outputs (G's)		E
				C	D	
4	0.089	0.013	0.0185	0.076	0.024	0.027
5	0.115	0.016	0.0185	0.115	0.027	0.0245
6	0.165	0.0175	0.022	0.175	0.033	0.023
7	0.210	0.018	0.024	0.225	0.033	0.024
8	0.280	0.022	0.027	0.280	0.022	0.031
9	0.360	0.028	0.032	0.340	0.056	0.034
10	0.435	0.036	0.036	0.400	0.067	0.037
11	0.530	0.042	0.041	0.470	0.062	0.038
12	0.670	0.050	0.052	0.640	0.057	0.046
13	0.770	0.057	0.056	0.710	0.062	0.049
14	0.890	0.063	0.066	0.840	0.070	0.049
15	1.100	0.082	0.084	1.100	0.080	0.055
16	0.190	0.021	0.022	0.175	0.027	0.026
17	0.205	0.021	0.024	0.195	0.036	0.027
18	0.230	0.023	0.026	0.225	0.029	0.024
19	0.245	0.024	0.028	0.240	0.028	0.026
20	0.280	0.025	0.030	0.275	0.020	0.026
21	0.310	0.027	0.034	0.310	0.0165	0.031
22	0.340	0.031	0.037	0.335	0.0165	0.031
23	0.370	0.034	0.041	0.370	0.0195	0.037
24	0.395	0.035	0.043	0.400	0.018	0.0325
25	0.440	0.0385	0.047	0.440	0.017	0.033
26	0.461	0.041	0.049	0.470	0.0185	0.034
27	0.510	0.052	0.0445	0.520	0.018	0.0345
28	0.555	0.047	0.057	0.552	0.0205	0.037
29	0.600	0.051	0.061	0.590	0.024	0.040
30	0.630	0.056	0.066	0.630	0.038	0.051
31	0.700	0.060	0.071	0.700	0.027	0.042
32	0.750	0.065	0.075	0.750	0.029	0.036
33	0.790	0.068	0.079	0.790	0.043	0.039



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FACTUAL DATA



4.0 RESULTS OF TEST (continued):

4.4 Seismic Dwell Test:

4.4.1 Vertical Axis (Along the H⁴BC Stem):

The Seismic Dwell Tests were performed at 33 Hz for a duration of thirty (30) seconds at each level.

The following observations were noted and recorded during the Dwell Tests:

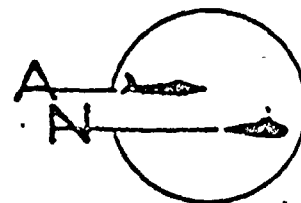
Response Acceleration						
Frequency (Hz)	Input (G's)	Motor (V)	Motor (H _a)	V	H _a	H _a
33	3.4	3.5 g's	0.150 g's	3.8 g's	0.29 g's	0.27 g's
32	4.7	4.9	0.230	5.2	0.38	0.37
33	5.9	6.5	0.330	6.6	0.43	0.46
33	7.3	8.0	0.480	8.2	0.55	0.59
33	8.4	9.4	0.570	9.6	0.62	0.70

There was no evidence of operational malfunction or mechanical damage to the specimen as a result of this test.

(UNCLASSIFIED)

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FACTUAL DATA



4.0 RESULTS OF TEST (continued):

4.4 Seismic Dwell Tests (continued):

4.4.2 Horizontal Axis (H₁) Along the Motor:

The Seismic Dwell Tests were performed at 33 Hz for a duration of thirty (30) seconds at each level.

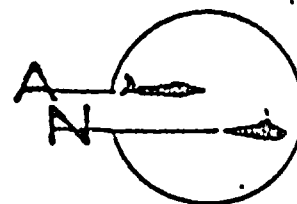
The following observations were noted and recorded during the Dwell Tests.

Response Acceleration						
Frequency (Hz)	Input (G's)	Motor (H ₁)	Motor (V)	H ₁	H ₂	V
33	3.0	3.5 g's	0.010 g's	3.5 g's	0.34 g's	0.08 g's
33	4.1	4.9	0.170	4.8	0.70	0.29
33	5.5	6.3	0.220	6.1	0.82	0.31
33	6.8	7.6	0.330	7.5	0.92	0.45
33	8.0	8.9	0.310	8.9	1.10	0.43

There was no evidence of operational malfunction or mechanical damage to the specimen as a result of this test.

UNCLASSIFIED)

FACTUAL DATA



4.0 RESULTS OF TEST (continued):

4.4 Seismic Dwell Tests (continued):

4.4.3 Horizontal Axis (H₂) Along the H₄Bc Input Shaft):

The Seismic Dwell Tests were performed at 33 Hz for a duration of thirty (30) seconds at each level.

The following observations were noted and recorded during the Dwell Tests:

Response Acceleration

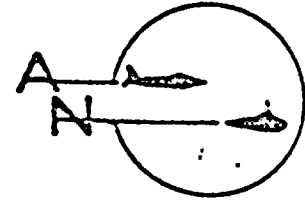
Frequency (Hz)	Input (G's)	Motor (H ₂)	Motor (V)	H ₂	H ₁	V
33	2.8	3.1 g's	0.045 g's	2.8 g's	0.048 g's	0.036 g's
33	3.8	4.3	0.065	4.1	0.065	0.065
33	4.9	5.6	0.078	5.2	0.120	0.130
33	6.2	7.0	0.220	6.4	0.230	0.290
33	7.9	9.0	0.150	8.5	0.290	0.420

There was no evidence of operational malfunction or mechanical damage to the specimen as a result of this test.

(UNCLASSIFIED)

FACTUAL DATA

2/1.5/



5.0 VISUAL POST TEST EXAMINATION:

Visual Post Test Examination revealed no evidence of any external physical damage as a result of the stress of this test.

6.0 RECOMMENDATIONS:

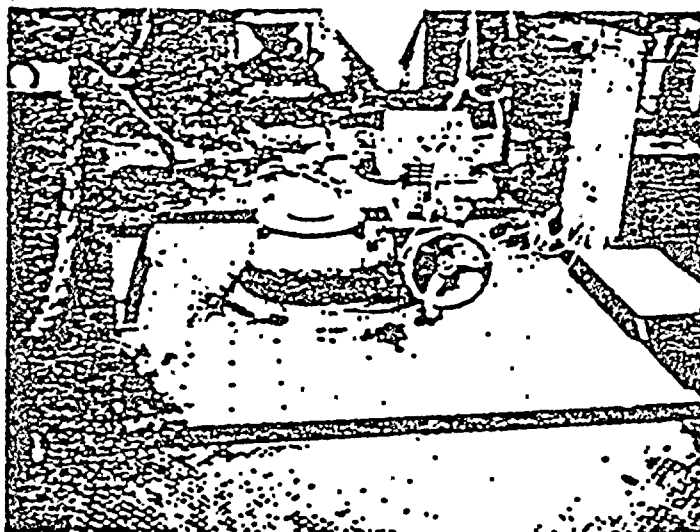
None, data merely submitted.

7.0 CONCLUSIONS:

Final evaluation of the submitted specimen for conformance to the requirements of the detailed specifications will be accomplished by Limitorque Corporation upon review of results reported herein and further examination as required.

210,51

SMB-1-25/H4BC MOTOR ACTUATOR



SEISMIC TEST SETUP

210,51

REPORT B-0006

SUBJECT: Seismic Testing of SMB-1-25/H4BC
with Standard Cast Iron Adapter

REFERENCE: Limitorque Purchase Order #
Aero Nav Test Report: 5-6167-5

Unit Identification:

SMB-1-24/H4BC Position "A"
4-Train-4 Gear Limit Switch

SMB-1 Serial Number 216677
Motor I.D. Number 447015-AZ
H4BC Serial Number 216691

Objective: To perform a fragility test per IEEE-344 on the
SMB-1-25/H4BC with standard cast iron adapter.

Procedure:

The SMB-1 was mounted to the H4BC using a standard cast iron adapter. The combination was then scanned in each of the three major axis and the fragility test performed in one axis.

A new cast adapter was installed after the first fragility test and the fragility test repeated in another axis.

After the 2nd fragility test the cast adaptor was replaced with a new cast iron adapter and the 3rd fragility test was performed in the 3rd axis.

The new adapters were used for each axis even though there was no evidence of damage to any of the adapters during the seismic fragility testing.

All rotors were monitored by means of indicator lights.

Additional contacts on the spare rotors were wired in series with a sensitive chatter circuit to detect contact chatter.

The unit was run from an "open" position (controlled by the limit switch) to a closed torque out position (controlled by the torque switch) back to the "open" position during and after each of the dwells and at the end of the seismic qualification.

The torque switch was set at the minimum setting and the H4BC was torqued out against the internal stops.

2/10/51

Results:

The unit functioned properly performing all control functions and all indicating functions. There was no indication of contact chatter or physical damage.

Conclusion:

The unit performed all functions and torqued out at the minimum torque switch setting with no malfunctions or physical damage during all the dwells and at the end of the seismic qualification test. The unit is considered qualified per the IEEE Standard 344 specification for seismic levels up to 8 g's.



Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.52

(Valve) Requirements of Specification 16.1g

The Specification CAR-SH-M-44, Rev. 13, dated 1/28/83 states that Category 2 and 3 valves shall be capable of sustaining several types of thermal transients. Describe the data furnished by the Seller to assure that Category 2 or 3 butterfly valves meet 16.1g of the Specification.

RESPONSE:

Item 1 & 2 of paragraph 16.1g is a general design requirement for design specification prepared by Ebasco for valves. The requirements are not considered applicable to butterfly valves and, therefore, paragraph 16.1g (Item 1 & 2) will be deleted from specification (CAR-SH-M-44, Rev. 14).

However, discussion with Jamesbury (valve supplier) indicated that Category 2 and 3 butterfly valves can easily withstand heating and cooling of 100°F/hr between 40°F and the valve design temperature. The maximum design temperature of supplied valves are 140°F and 220°F.



Ebasco Specification
Butterfly Valves

Q - 210.52

Project Identification No. CAR-SH-M-44

16.1 SPECIAL REQUIREMENTS (Cont'd)

- d - Valve trim shall not contain copper or copper alloy components, aluminum or aluminum alloy components.
- e - Teflon or other nonmetallic sealing whose properties are affected by radiation shall not be used in the construction of any valves installed in radioactive service.
- f - Valves shall not contain pockets or other cavities where radioactive materials can accumulate.
- g - All valves in Piping System Categories 1, 2 and 3 shall be designed per ASME B & P V Code Section III for cyclic duty as follows. R 14

Category 1 - Later on request

Category 2 and 3

Valves in piping Category 2 and 3 shall be capable of being heated and cooled at a rate of 100° F per hour between 40° F and the design temperature of the valve as defined in the Valve List. In addition valves shall be capable of sustaining cyclic thermal transients as follows:

- 1 - Valves shall be capable of sustaining without adverse effects, a step change in the temperature of the working fluid from 40° F to 400° F for 200 cycles during the design life of the valves.
- 2 - Valves shall be capable of sustaining without adverse effects, a step change in the temperature of the working fluid from 500° F to 40° F for 10 cycles during the design life of the valves.
- h - The design life of all valves and accessories specified herein shall be 40 years.

Shearon Harris Nuclear Power Plant
Draft SFR Open Item No. 354
NRC Question 210.53

Valve Report (JHA-77-99 dated 8/2/78) Pages 2 and 3

Pages 2 and 3 are missing; please supply these pages.

RESPONSE:

Page 2 and 3 are in fact the pages 1 and 2 of two pages of tabulation #28403, Rev. 2.

(7876FXTccc)

Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.54

Valve Report, Correspondence with Specification

The Report JHA-77-99 dated 8/2/78 does not use the same identifications used in the Specification CAR-SH-M-44, Rev. 13, dated 1/28/83. Furnish a cross-index between the Specification Category 2 or 3 valves and the Report. (It seems like there is at least one Category 3 valve in the Specification that is not covered by the Report.)

RESPONSE:

The cross-index between the Specification Category 2 or 3 valves and the Report is provided in the attached tables.

CROSS-INDEX

Page 1 of 5

PONY 435082. QUESTION: 210.54

<u>SPEC . DATA SH</u>	<u>VALVE SIZE</u>	<u>VALVE OPERATOR</u>	<u>SPEC IDENTIFICATION (VALVE TAG NO.)</u>	<u>PROJECT IDENTIFICATION</u>	<u>REPORT PAGE NO.</u>
1/48	30"	Motor	3SW-B1SA-1,2 3SW-D2SB-1,2	30"-SMB00/7-1/2-H2BC	64
2/48	30"	Gear	3SW-B7SA-1,2 3SW-B9SB-1,2 3SW-B105SA-1,2 3SW-B106SB-1,2	30"-VGC-35	40
3/48	30"	Motor	3SW-B5SA-1,2 3SW-B6SB-1,2 3SW-B13SB-1,2 3SW-B14SSB-1,2	30"-SMB00/7-1/2 H2BC	40
4/48	14"	Gear	3SW-B25SA-1,2 3SW-B26SB-1,2	14"-VGC-8	25
5/48	14"	Gear	3SW-B21SA-1,2 3SW-B22SB-1,2 3SW-B23SB-1,2 3SW-B24SB-1,2 3SW-B103SA-1,2 3SW-B104SB-1,2	14"-VGC-8	25
6/48	8"	Motor	3SW-B45SA-1,2 3SW-B46SA-1,2 3SW-B47SA-1,2 3SW-B48SB-1,2	8" SMB00/5H1BC	46
6/48	8"	Motor	3SW-B49SA-1,2 3SW-B50SB-1,2 3SW-B51SB-1,2 3SW-B52SB-1,2	8" SMB00/5H1BC	46

3537X

210.54

CROSS-INDEX

Page 2 of 5

PONY 435082. QUESTION: 210.54'

<u>SPEC DATA SH</u>	<u>VALVE SIZE</u>	<u>VALVE OPERATOR</u>	<u>SPEC IDENTIFICATION (VALVE TAG NO.)</u>	<u>PROJECT IDENTIFICATION</u>	<u>REPORT. PAGE NO.</u>
7/48	24"	Gear	3SW-B17SA-1,2 3SW-B18SA-1,2 3SW-B19SA-1,2 3SW-B20SB-1,2	24" VGC-20	36
8/48	30"	Motor	3SW-B15SA-1,2 3SW-B16SB-1,2	30" SMB00/7-1/2H2BC	64
23/48	12"	Gear	3SW-B82SA-1,2 3SW-B83SA-1,2 3SW-B84SB-1,2 3SW-B85SB-1,2	12" VGC-8	18
25/48	6"	Motor	3SW-B74SA-1,2 3SW-B75SA-1,2 3SW-B76SB-1,2 3SW-B77SB-1,2	6" SMB000/2-HOBC	42
26/48	4"	Handle	3SW-B86SB-1,2 3SW-B87SA-1,2	4" Handle	14
27/48	8"	Gear	3SW-B66SA-1,2 3SW-B67SA-1,2 3SW-B68SB-1,2 3SW-B69SB-1,2 3SW-B107SA-1,2 3SW-B108SA-1,2 3SW-B109SB-1,2 3SW-B110SB-1,2	8" VGC-3	16

210.54

CROSS-INDEX

Page 3 of 5

PONY 435082. QUESTION: 210.54

<u>SPEC DATA SH</u>	<u>VALVE SIZE</u>	<u>VALVE OPERATOR</u>	<u>SPEC IDENTIFICATION (VALVE TAG NO.)</u>	<u>PROJECT IDENTIFICATION</u>	<u>REPORT PAGE NO.</u>
28/48	8"	Motor	3SW-B70SA-1,2 3SW-B71SA-1,2 3SW-B72SB-1,2 3SW-B73SB-1,2	8" SMB00/5-H1BC	46
33/48	36"	Motor	3SW-B8SA-1,2	*Not included (Note: 1)	
36/48	8"	Gear	3SW-B301SA-1,2 3SW-B302SA-1,2 3SW-B304SB-1,2 3SW-B305SB-1,2	8" VGC-3	-16
37/48	10"	Gear	3CH-B5SA-1,2 3CH-B6SB-1,2 3CX-B5SA-1,2 3CH-B6SA-1,2 3CX-B7SA-1,2 3CX-B8SB-1,2	*Not included (Note: 1)	
44/48	4"	Gear	3CH-B7SA-1,2 3CH-B8SA-1,2 3CH-B9SA-1,2 3CH-B10SA-1,2 3CH-B11SA-1,2 3CH-B12SA-1,2 3CH-B13SA-1,2 3CH-B14SB-1,2 3CH-B15SB-1,2 3CH-B16SB-1,2 3CH-B17SB-1,2 3CH-B18SB-1,2 3CH-B19SB-1,2 3CH-B20SB-1,2	Not included	

3537X

210.54

CROSS-INDEX

Page 4 of 5

PONY 435082. QUESTION: 210.54

<u>SPEC DATA SH</u>	<u>VALVE SIZE</u>	<u>VALVE OPERATOR</u>	<u>SPEC IDENTIFICATION (VALVE TAG NO.)</u>	<u>PROJECT IDENTIFICATION</u>	<u>REPORT PAGE NO.</u>
			3CX-B9SA-1,2 3CX-B10SA-1,2 3CX-B11SA-1,2 3CX-B12SA-1,2 3CX-B13SA-1,2 3CX-B14SA-1,2 3CX-B15SA-1,2 3CX-B16SB-1,2 3CX-B17SB-1,2 3CX-B18SB-1,2 3CX-B19SB-1,2 3CX-B20SB-1,2		
42/48	4"	Gear	3CX-B21SB-1,2 3CX-B22SB-1,2	*Not included (Note: 1)	
1/7	16"	Gear	3SF-B6SB-1&4, 2&3 3SF-B20SA-1&4, 2&3 3SF-B18SB-1&4, 2&3 3SF-B1SA-1&4, 2&3 3SF-B2SB-1&4, 2&3 3SF-B5SA-1&4, 2&3	VCC-8	29
2/7 3/7	12"	Gear	3SF-B3SA-1&4, 2&3 3SF-B4SB-1&4, 2&3 3SF-B7SA-1&4, 2&3 3SF-B8SB-1&4, 2&3 3SF-B11SN-1&4, 2&3 3SF-B16SN-1&4, 2&3 3SF-B17SA-1,2 3SF-B17SB-3,4	VCC-8	18

*Note (1): These valves (indicate *) were added to the subject contract (PONY 435082) after Report JHA-77-99 was submitted. Report will be revised to include all added valves.

210.54



CROSS-INDEX

Page 5 of 5

PONY 435082. QUESTION: 210.54

<u>SPEC DATA SH</u>	<u>VALVE SIZE</u>	<u>VALVE OPERATOR</u>	<u>SPEC IDENTIFICATION (VALVE TAG NO.)</u>	<u>PROJECT IDENTIFICATION</u>	<u>REPORT PAGE NO.</u>
			3SF-B21SB-1&4, 2&3		
			3SF-B22SA-1&4, 2&3		
			3SF-B24SB-1&4, 2&3		
			3SF-B25SB-1&4, 2&3		
			3SF-B26SA-1&4, 2&3		
			3SF-B28SA-1&4, 2&3		
			3SF-B29SA-1&4, 2&3		
			3SF-B30SB-1&4, 2&3		
4/7	4"	Handle	3SF-B31SN-1&4, 2&3	Handle	14
			3SF-B32SA-1&4, 2&3		
			3SF-B33SB-1&4, 2&3		
			3SF-B34SA-1&4, 2&3		
			3SF-B35SB-1&4, 2&3		
7/7	12"	Gear	3SF-B9SA-1&4, 2&3	VGC-8	18
			3SF-B10SB-1&4, 2&3		
			3SF-B15SB-1&4, 2&3		
			3SF-B19SA-1&4, 2&3		

210.54

Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.55

Valve Report Dimensional Input

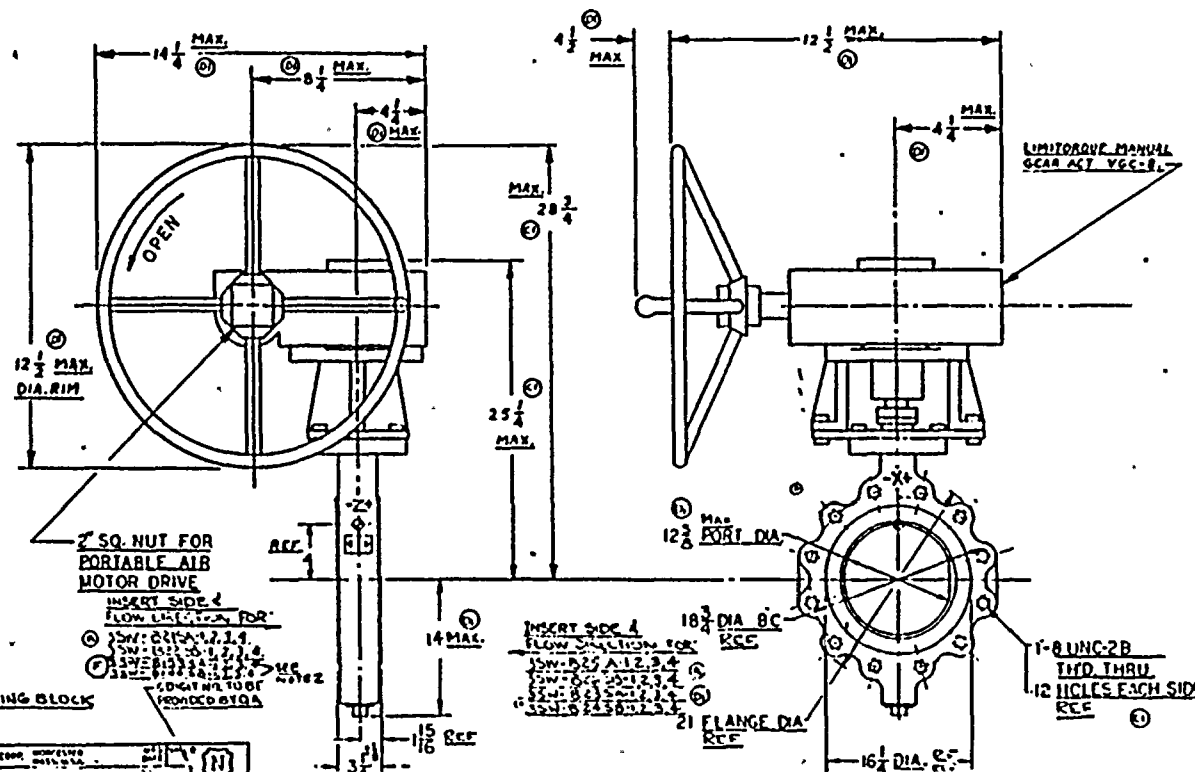
The procedure in Report JHA-77-99 dated 8/2/78 is incomprehensible without drawings of the valves. Furnish drawings for the valve identification on Butterfly Valve Data Sheet 5 of 48, P. O. No. NY-435082. The drawings should be in sufficient detail so that we can check the dimensions used in the calculations in the Report for this specific valve.

RESPONSE:

Please find attached copies of valve drawings on Valve Data Sheet 5 of 48. These are the drawings furnished by Jamesbury to Fbasco. Jamesbury do not release detail (shop) drawings of their product other than to an independent engineering consultant for analysis work. However, if a specific dimension or group can be identified for a given part we can more easily comply with your request.

2.10.55

QTY.	ITEM	TAG NOS.	REV.	DATE	BY	CHKD.	APP'D.	REMARKS
8	4	SWB815SA1234 SWB815SR1234	-1/4	-1/4				1. 1/4" DIA. HOLE 2. ADDED SHEET 8
24	5	SWB815SA1234 SWB815SR1234 SWB815SA1234 SWB815SR1234 SWB815SA1234 SWB815SR1234	1/2	1/4				1. 1/2" DIA. HOLE 2. ADDED SHEET 8 3. ADDED SHEET 8 4. ADDED SHEET 8 5. ADDED SHEET 8 6. ADDED SHEET 8



APPROXIMATE WT. 265
② DENOTES C-G-F UNIT

NOTE:

1. THIS OUTLINE DRAWING IS PICTORALLY SYMBOLIC OF THE PRODUCT TO BE SUPPLIED. ITEMS SUCH AS, BUT NOT LIMITED TO, HANDWHEEL SPOKES OR LINKAGE CONFIGURATIONS MAY OR MAY NOT REFLECT THE ACTUAL APPEARANCE OF THE VALVE. THE DIMENSIONAL DATA PRESENTED HEREON WILL NOT CHANGE.
2. 3/8" B103 SA-1, 2, 3, 4 & 3/8" B104 SB-1, 2, 3, 4 ARE TO BE INSTALLED UP SIDE DOWN.

SEE TAGGING BLOCK ABOVE.

DATE	10/2/55
BY	J. H. HARRIS
CHKD.	J. H. HARRIS
APP'D.	J. H. HARRIS

ALL DATA TO BE STAMPED ON NAMEPLATES MUST BE 3/32 MIN. HEIGHT.

SEE TAGGING BLOCK ABOVE.

DATE	10/2/55
BY	J. H. HARRIS
CHKD.	J. H. HARRIS
APP'D.	J. H. HARRIS

4 DIGIT NO. TO BE PROVIDED BY JAS

SHEARON HARRIS PROJECT CAR 4594
CUSTOMER: BASCO SERVICES AGENT FOR CAROLINA POWER & LIGHT CO.
LEASCO UNIT 475
P O NO NY 135082 JOB NO ND-28404

ITEM 4 QTY. 8
ITEM 5 QTY. 24
TOTAL QTY. 32

DO NOT SCALE DRAWING

THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF THE JAMESBURY CORP AND ARE NOT TO BE USED EXCEPT AS AUTHORIZED BY SAO CORP

1 1/4" WATER SPHERE VALVE NUCLEAR CL3
150 ANSI FLANGED VGC-8 MANUAL GEAR
ACTUATOR

Jamesbury Corp
JAS 111111

NUCLEAR
ASME SECT. III
EDITION 1958
ADDITION 2-74
CLASS - B

NO.	DATE	BY	CHKD.	APP'D.
1	10/2/55	J. H. HARRIS	J. H. HARRIS	J. H. HARRIS

NO 2840404
SHEET 1 OF 2

210.55

ITEM NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	BODY	1	ASME SA-216, WCB	
2	INSERT	1	ASTM A-36, CARBON STEEL	
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* PRESSURE RETAINING PARTS AS DEFINED BY ASME CODE
MUST BE PROCESSED IN NUCLEAR QA PROGRAM.

ITEM NO.	PART NAME	QTY	MATERIAL
1	BODY	1	ASME SA-216, WCB
2	INSERT	1	ASTM A-36, CARBON STEEL
3			
4			
5	SEAT	1	FILLED TEFLON
6	SHAFT BEARING	2	316 TEFLON
7	SPACER	1	ST. STL. AISI 300 SERIES
8	SHAFT SEAL	1	PTFE
9	COMPRESSION RING	1	ST. STL. AISI 300 SERIES
10	COMPRESSION PLATE	1	ASTM A-216, GRADE WCB
11	PRESSURE PLUG	1	ASME SA-113
12	INSERT PIN	1	ST. STL. AISI 300 SERIES
13			
14	STUD	2	ST. STL. AISI 300 SERIES
15	JAM NUT	2	ST. STL. AISI 300 SERIES
16	ROCKWASHER	4	CARBON STEEL, CARBON PLATED
17	NAMEPLATE	1	ST. STL. AISI 300 SERIES
21	SCREW CAP SCREW	12	ST. STL. AISI 300 SERIES
26	INDICATOR PLATE	1	ST. STL. AISI 300 SERIES
27	WAVE SCREW	2	ST. STL. AISI 300 SERIES
28	PATENT TAG	1	ALUMINUM
29	INDICATOR POINTER	1	CARBON STEEL
41	BEARING SPACER (TOP)	1	TEFLON
43	BEARING SPACER (BOT)	1	TEFLON
44	WIRE TIE	1	LEAD & ST. STL.
45	INSTALLATION TAG	1	TEFLON WEATHER RESISTANT PAPER
18	DRIVE SCREW	2	ST. STL. AISI 300 SERIES
22	FLOW DIR. TAG	1	ALUMINUM
20	SHAFT & WAFER 1/2"	1	TEFLON
24	SHAFT	1	ASTM A-564, GRADE 630 HK22
25	WAFER	1	ASTM A-564, GRADE 630 HK22
30	WAFER PIN	2	ASTM A-564, GRADE 630 HK22
46	CUSTOMER'S TAG	1	ST. STL. AISI 300 SERIES

ITEM 20 CONSISTS
OF THESE PARTS

NUCLEAR
ASME SECT. III
DIVISION 5
NO. 1000-1000
JAN 5 1975

CUSTOMER, EBASCO SERVICES AGENT

P.O.

FOR CAROLINA POWER & LIGHT CO.

J. NO.

ITEM NO(S) SEE SHEET 1

SERIAL NO(S)

TAG NO(S)

ITEM NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	WAFER	1	ASTM A-564, GRADE 630 HK22	
2	WAFER PIN	2	ASTM A-564, GRADE 630 HK22	
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D-20401-04

Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.56

Valve Static Equivalent Loads

The Report JHA-77-99 dated 8/2/78 (Page 4) cites static equivalent loads and gives the source as "Ref. 1." Reference 1 (p. 98 of the Report) is: "Ebasco Spec., Addendum F, Rev. 5, 5-19-77." We do not find the cited loads therein. Is the Report incorrect? The Specification CAR-SH-M-44 (Rev. 13) (6.) gives static equivalent seismic loads, without definition as to whether Seismic is SSE or (1/2) SSE. Where did the writer of the Report obtain the static equivalent loads cited on p. 4 of the Report?

RESPONSE:

The Reference 1 listed in page 98 of the Seismic Report should be the Ebasco Specification CAR-SH-M-44; Addendum F is part of the specification.

CAR-SH-M-44 Paragraph 6 specifies the static seismic loads which the valves must be designed to withstand. The specified seismic loads are considered to be DBE (Design Basis Earthquake). Therefore, Seller's interpretation of static seismic loads cited on page 4 of the Report is correct.

Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.57

Valve Shaft, Allowable Stresses (p. 10 of Report JHA-77-99 dated 8/2/78)

- (a) Where did the 95000 (psi?) yield strength for "Type 316 ST. STL." come from?
- (b) Material to A-564 Type 630 is furnished with minimum specified yield strengths ranging from 75 ksi to 170 ksi, depending upon the hardening and/or aging treatment. Where does the Specification CAR-SH-M-44, Rev. 13 address this treatment so that the Report can use a yield strength of 125 ksi?
- (c) Page 93 of the Report shows calculated shaft membrane plus bending stresses of up to 74000 psi. If failure of the shaft can lead to failure of the pressure boundary and if the calculated stresses are mainly due to pressure, the calculated stresses are deemed to be excessive. What are the calculated shaft stresses for the valve identified in Butterfly Valve Data Sheet 5 of 48, P. O. No. NY-435082 due to the Design Pressure of 225 psig? What are the allowable stresses for design conditions and where are they identified in the Specification?

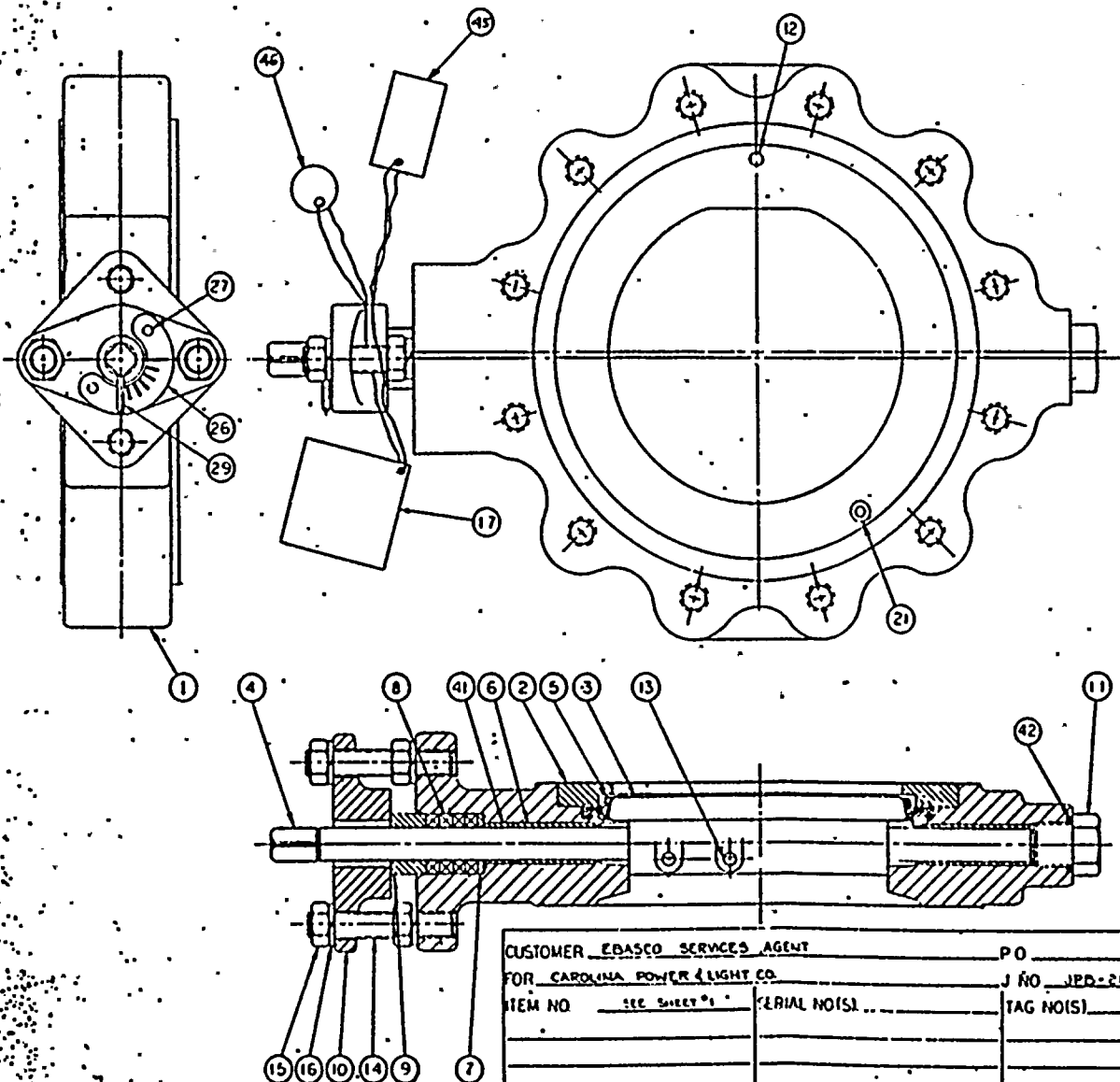
RESPONSE:

- (a) The 316SS referenced is per 00-S-763 condition B which has a yield of 95000 psi. The shaft material was later changed to ASTM A-564 type 630 H1025. (See approved outline/assembly drawing). The yield is higher for A-564 than 00-S-763.
- (b) The Specification does not specify detail requirements of all materials used to fabricate the valves. The Seller had selected A-564 Type 630 H1025 as the shaft material as indicated in the valve assembly drawings (sample attached). Therefore, the use of 125 ksi yield strength is appropriate, per ASME material specification (A-564 type 630 H1025-Yield stress = 145,000 psi).
- (c) The 14" valve with SMB-000/2HIBC Actuator was deleted from the contract and is not applicable. However, the stress shown is for a design pressure of 225 psig and qualifies shaft for the item on data sheet 5 of 48 with gear actuator. The valve shaft is not a pressure retaining part by ASME Section III Code and the actual allowable stress is per the AISC manual of steel construction or $0.9 \times S_y$ of 145000 = 130500 psi, hence a 76% safety factor on allowable.

(7876FXTccc)



SEARCHED			SERIALIZED		
INDEXED	FILED	MAR 11 1964			
FBI - NEW YORK		FBI - NEW YORK			



QTY	PART NAME	MATERIAL
1	BOOT	ASIM A-216 GRADE WCB
2	INSERT	ASIM A-36, CARBON STEEL
3	WAFER	ASIM A-351 CFRM
4	SHAFT	ASIM A 564, GRADE 630 H-1028
5	SEAL	FILLED TEFLON
6	SHAFT BEARING	PLACEMENT WOULD FILLED TEFLON
7	SPACER	ST 51L AISI 300 SERIES
8	SHAFT SEAL	GCRANE 107-12
9	COMPRESSION RING	ST 51L AISI 300 SERIES
10	COMPRESSION PLATE	ASIM A-216, GRADE WCB
11	PRESSURE PLUG	ASIM-A100- GRIZLIS 1-1000
12	INSERT PIN	ST 51L AISI 300 SERIES
13	WEDGE PIN	ASIM A-564 GRADE 630 H-1028
14	STUD	CARBON STEEL CAD OR ZMC PLATE
15	JAM NUT	CARBON STEEL CAD OR ZMC PLATE
16	ACK WASHER	CARBON STEEL CAD OR ZMC PLATE
17	MEMBRATE	ALUMINUM
21	SOO HD CAP SCREW	ST 51L AISI 300 SERIES
26	INDICATOR PLATE	ST 51L AISI 300 SERIES
27	DRIVE SCREW	ST 51L AISI 300 SERIES
29	INDICATOR PENNTER	CARBON STEEL
41	BEARING SPACER	TEFLON
42	PLUG SEAL	TEFLON
45	INSTALLATION TAG	TYPER WEATHER RESISTANT PAPER
46	CUSTOMER TAG	ST 51L AISI 300 SERIES

210.57

CUSTOMER <u>ERASCO SERVICES AGENT</u>	PO <u> </u>
FOR <u>CAROLINA POWER & LIGHT CO.</u>	J NO <u>JPD-20407</u>
ITEM NO <u>SEE SHEET #</u>	SERIAL NO(S) <u> </u>
<u> </u>	TAG NO(S) <u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

		DO NOT SCALE DRAWING	DATE
BY	A. L. EMBURY	7-2-62	
FOR	WAFER SPURGE VALVE FC-872TA-1X-MOD C	12	FILE
	150° ANSI	100	
DESIGNED BY	EMBURY	D R-28405-17	

Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.58

Valve Hydrostatic Tests

The Specification CAR-SH-M-44, Rev. 13 (8.2) gives hydrostatic test requirements for nuclear safety class valves.

- (a) Does Section III require a hydrostatic (body) test of 1.5 times the design pressure? If not, what is your interpretation of the Code hydrostatic test requirements for butterfly valves?
- (b) Specification 8.2a: Is the pressure rating of 100F the same as the Design Pressure? If not, what is the pressure rating of 100F? Provide a sample record of the performance of the seat tightness test.

RESPONSE:

- (a) Yes, hydrostatic (body) test is required. Each valve shall be given a shell test at a gage pressure no less than 1.5 times the 100F rating, rounded off to the next higher 25 psi (1 bar) increment.
- (b) Not necessarily. The design pressure and temperature must fall within the allowable pressure/temperature rating Tables of ANSI B16.5 or B16.34, whichever is applicable, if one adopts the use of the ANSI Class rating. Hence, since 225 psig at 40°F falls within the 150# ANSI Class standard, the hydro test should be (per ANSI 16.34 for SA 216 WCB) 285 psi @ 100°F x 1.5 427.5 psig and then upgrading to the nearest increment of 25 gives a test pressure of 450 psig.

Note: Sample record of seat tightness is attached.

Quality Assurance Department
Lamesbury Corp.
Worcester, MA

210.58 NUCLEAR
Quality Assurance Form

N.Q.A. Form No. 202
Date: 4/24/79
Rev. H Sht. 1 of 4

Title: Nuclear/Projects Products Quality Checklist

Q.A.
Approval SPM
A.25.79

Lamesbury Order No. ND-28404 Valve Serial No. 12A Size 12"

Customer Tag No. 3SW-BR2-SA-1 Valve Assembly Drawing No. ND-28404-12 Rev. B

- | Operation | Performed by | Date |
|--|-------------------|----------------|
| 1. Clean wetted parts per JSN-C <u>2</u> Rev. <u>4</u> | Oper. <u>1464</u> | <u>8-12-80</u> |
| 2. Check that proper handling equipment is being used for pressure retaining parts. | Insp. <u>AT</u> | <u>8-13-80</u> |
| 3. Check for completeness of documentation package per Nuclear QA Manual, Sect. 6, para. 6.2 | Insp. <u>AT</u> | <u>8-13-80</u> |
| 4. Check assembly drawing revision letter with Engineering Services (Blueprint Room) | Insp. <u>AT</u> | <u>8-13-80</u> |
| Record revision letter of pressure retaining parts, and verify with Engineering Services. | Insp. <u>AT</u> | <u>8-13-80</u> |
| 6. Record pressure retaining part information. If incomplete call Q.A.E. | | |

Part Name	Part No.	Rev.	Qty	Heat Code/Serial #	Heat No.
-----------	----------	------	-----	--------------------	----------

W.S. BODY	548-9123-22	0	1	JYA 2	7189
WAFER	096-9114-36	0	1	JYF 5	6914
PRES. PLUG	045-9082-36	0	1	CYT 45	A16588

7. Check parts & materials against order

Assembler 1329

8-18-80

8. Assemble complete per JSN A-2 Rev. 2 & B/P

REVIEWED BY [Signature]
TRASCO ENGINEERING
ASSEMBLER [Signature]
TRASCO QA REP.

Assembler 1329

TW

8-18-80

2360

8-18-80

8/18/80

NY 435082

FOR INFORMATION ONLY

Quality Assurance Department
Jamesbury Corp.
Worcester, MA

210.58
NUCLEAR
Quality Assurance Form

N.Q.A. Form No. 202
Date: 4/24/79
Rev. H Sht. 2 of 4

FOR INFORMATION ONLY

Title: Nuclear/Projects Products Quality Checklist

Valve Serial No. 12A

9. Hydrostatic/Pneumatic Test per JSNT 1 Rev. 8

Body

- (1) Check that tester is on Qualified Valve Testers List.

Q.A. Rep. Shuler 18 AUG 80

- (2) Check that nuclear pressure gages are used and are in calibration. Gage No. PGN-9
Test Pressure 425 psig
Time 10 min.
Leak Rate 0

Tester JP 1982

Witnessed by: Q.A. Rep. Shuler 18 AUG 80

ANI 520122

Customer N/R

All valves over 4"

10. Hydrostatic Test/Pneumatic Test per JSN 125 Rev. 0

Wafer/Ball

- (1) Check that tester is on Qualified Valve Testers List.

Q.A. Rep. Shuler 28 AUG 80

- (2) Check that nuclear pressure gages are used and are in calibration. Gage No. PGN-12
Test Pressure 310 psig
Time 5 min./sec.
Leak Rate 0

Tester 2106 RPK

Witnessed by: Q.A. Rep. Shuler 28 AUG 80

ANI N/R

Customer N/R

All valves over 4"

11. Assemble Topworks

Assembler 2360

8-18-80

12. Hydrostatic/Pneumatic Test per JSN 125 Rev. 0

Seat

- (1) Check that tester is on Qualified Valve Testers List.

Q.A. Rep. Shuler 28 AUG 80

- (2) Check that the pressure gage used is in calibration.

Gage No. PGN-12

Pressure 310 psig

Time 5 min./sec.

Leak rate 0

Directional NO

Tester 2106 RPK

Q.A. Rep. Shuler 28 AUG 80

Customer N/R

REVIEWED

BY

REASON FOR REJECTION
LIVELY VALVE CO.
REASON FOR REJECTION
REASON FOR REJECTION

NY 435082

210.58

Q 210.58

JAMESBURY CORP.

JSN-T35

Rec'd by: TGT

App'd by: [Signature]

ENGINEERING SPECIFICATION

Eff. Date: 1/24/78

SUBJECT: Seat Testing and Disc Hydrostatic Testing - 5 minute duration

REV.	DATE	APPROV.

SCOPE: Wafer-Sphere Valves

1.0 GENERAL TESTING CONDITIONS

1.1 Each valve assembly will be given a seat, seal, and disc static test. The valve actuating device (e.g., handle, actuator, electric or pneumatic actuator) to be used with the valve shall be installed and adjusted for valve opening and closing before conducting the test. Inspect the wafer (disc) for proper position. It shall be level to within 1/32" from the body face.

EBASCO SERVICES INCORPORATED

MATERIALS & TESTING AND QUALITY CONTROL

This Document is:

☒ Reviewed Without Comments

☐ Reviewed With Comments as Noted: [Blank]

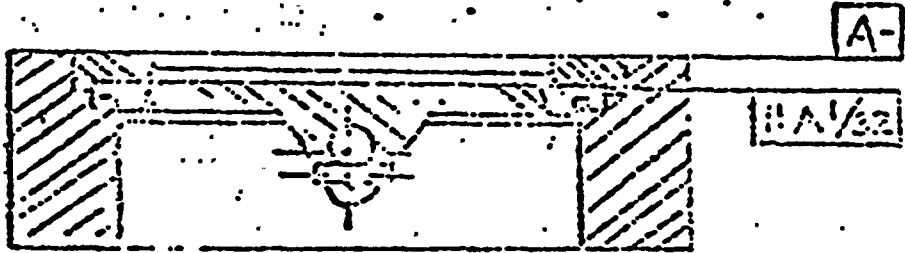
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NOTE:

Review of this document with or without comments is required conference with the engineering department only and is to be completed prior to delivery of the product. The review and comments are to be made according to the [Blank] Order.

BY: [Signature]

DATE: 3/3/78



gaskets are mounted between blind flanges or pipe end flanges using special gasket material provided. The holes carefully to prevent damage to the holes and provide even gasket loading.

Inspect seat and valve assembly for possible contamination. There should be no visible particles, dirt, metal chips, or contamination. If contamination is found, the valve must be rechecked prior to testing.

1.4 Verification of the pointer and indicator plate is necessary to insure that the indicator pointer is over the 0° (closed position) mark on the indicator plate. When looking straight down, the pointer should cover the seat indicator line.

2.0 TEST PROCEDURE

2.1 After the valve has been hydrostatically tested, fully assembled with all applicable accessories, and with the insert properly compressed, the valve is to be stroked carefully from the fully closed to fully open position three (3) times to insure that the wafer is properly

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Seat and Disc Hydrostatic Testing
(5-minute duration) Wafer-Sphere Valves

JSN-T35 Rev. 0

2.0 CYCLE TEST (continued)

seated, and to demonstrate that the valve stroke can be accomplished without galling or binding.

2.2 For power-operated valves, switch settings and other accessories shall be verified to be in accordance with operating and design requirements.

3.0 SEAT AND DISC HYDROSTATIC TEST PROCEDURE

3.1 With valve in closed position, fill inlet side of the valve with water, assuring the removal of any entrapped air, and pressurize in accordance with Table I. Refer to the assembly drawing to establish the correct ANSI rating and shaft material. TABLE I

		HYDRO TEST PRESSURE - 110% - 115%				
		ANSI RATINGS				
Size	Shaft Mat'l	150# Series			300# Series	
		8000	8100	8200, Mod C.	8100	8200
12"	Steel 17-4 PH	310 psig	310 psig	310 psig	310 psig	310 psig
	18-8 Ti	165 psig	310 psig	310 psig	310 psig	310 psig
14" thru 48"	Steel 17-4 PH	310 psig	---	310 psig	---	---
	18-8 Ti	165 psig	---	165 psig	---	---

3.2 Inspect for seat leakage.

3.3 Acceptance/Rejection Criteria (Seat Test)

3.3.1 Non-metallic seats - any visible indication of water leakage in a 5-minute time duration that the valve is subjected to the test pressure shall be cause for rejection.

3.3.2 Metallic seats - leakage rates in excess of that permitted below in a 5-minute time duration that the valve is subjected to the test pressure shall be cause for rejection.

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Disc and Disc Hydrostatic Testing
(Minute Duration) Wafer-Sphere Valves

JSN-T35 Rev. 0

3.3 Acceptance/Rejection Criteria (Seat Test) - continued

<u>Valve Size</u>	<u>Allowable leakage rate @ 310 psig Test Pressure</u>
3"	35 ml/min
4"	60 ml/min
6"	60 ml/min
8"	75 ml/min

3.4 Depressurize and drain valve of water, and dry with dry and clean compressed air or dry nitrogen gas.

3.5 Acceptance/Rejection Criteria (Disc Hydrostatic Test)

3.5.1 Remove the valve from the test fixture and examine the disc. Any indications of deformation and/or cracking shall be cause for rejection.

4.0 TEST MEDIA

Clean tap water at a temperature not to exceed 120°F with 10% by volume of WD2527 rust inhibitor (White & Bagley Co., Worcester, Mass.) shall be used.



Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.60

Piping Specification (CAR-SH-M-30, Rev. 16), Corrosion and Erosion Allowances

Where are corrosion/erosion allowances specified? If not specified, how are the requirements of NB/NC/ND-3640 evaluated?

RESPONSE:

The corrosion or erosion allowances for calculating the piping minimum wall thickness are currently not specified in the Ebasco Specification CAR-SH-M-30, General Power Piping.

However, an additional thickness to provide for corrosion or erosion was considered and is included in the wall thicknesses/schedules specified in the Ebasco Line List.

As stated in ASME-III, subsections NB/NC/ND-3640, the corrosion and erosion vary widely from installation to installation. While there are no code recommendations for a "specific corrosion/erosion thickness," allowances of 0.080" to 0.150" for carbon steel and 0.0025" for stainless steel materials is considered throughout the industry as an "adequate tolerance."

The pipe wall thicknesses/schedules specified on Shearon Harris Project are based on the equations specified in ASME-III, NB/NC/ND-3641.1. After considering the mill tolerances (12 1/2% for seamless pipes and 0.010" for the plate pipes), and additional thickness of 0.080" to 0.150" for CS pipes and 0.0025" for SS pipes is considered for corrosion/erosion.

It is noted that the corrosion/erosion allowance used on the Shearon Harris Project is not unique for each piping system, material grade, pipe size or water chemistry. Rather, a generic allowance (in the range of 0.080" to 0.150" for CS and 0.0025" for SS) is added to the calculated minimum wall. This is generally accomplished by selection of a commercially available wall thickness/schedule which exceeds the minimum calculated wall thickness by 0.080" to 0.150" (for CS pipes) or 0.0025" (for SS pipes).

We shall revise the M-30 specification to indicate that the wall thickness/schedule specified in the Ebasco Line List includes the tolerance for corrosion/erosion.

During the August 16, 1983, meeting with NRC in Bethesda, MD, a question has been raised regarding the "adequacy" of minimum pipe wall for the 48" Service Water lines (7SW48-312 and 7SW48-313).

Our further evaluation revealed the following:

- Min. wall calculation per Code equation assumes the weld joint efficiency equal to 1. This is justified by use of a plate pipe with 100% radiography (ASTM A-155 KC 65, Class 1).

(7876FXTccc)

NRC Question 210.60 (cont'd)

- Considering 0.140" corrosion/erosion allowance (the established range is 0.080" to 0.150") and 0.010" mill tolerance, the min. required wall is 0.371". The selected wall is 0.375".

We are enclosing a copy of our calculations pertaining to these Service Water Lines.

In general, the piping systems constructed from a carbon steel plate material, assume a weld joint efficiency equal to 1. This is based on the fact that the specified material specifications do require 100% radiograph examination. Refer to the individual pipe codes in Appendix A of Specification CAR-SH-M-30.

As stated above, the Ebasco specified pipe wall thicknesses do meet the Code requirements.



210.60

EBASCO SERVICES INCORPORATED
CALCULATION COVER SHEET

SHEET 1 OF 4

CLIENT CAROLINA POWER & LIGHT COMPANY
SASSEL HARRIS NUCLEAR POWER PLANT
PROJECT 900,000 KW-UNITS 1, 2, 3 & 4
OFS NO. CAR-6418.333
DEPT NO. 536-MNE

SUBJECT SERVICE WATER PIPE WALL THICKNESS

CALCULATION NO. SW17 SUPPLEMENT NUMBER OF SHEETS 4

PROBLEM

VERIFY ADEQUACY OF THE WALL THICKNESS
SPECIFIED FOR LARGE DIAMETER PLATE PIPE,
SAFETY & NON-SAFETY, USED IN THE SERVICE
WATER SYSTEM.

0	4	FHEYDEN	8/18/82	8/19/82	OPTIONAL		
REV	SH	NAME	DATE	NAME	DATE	NAME	DATE
NO	NOS	CALCULATION BY	CHECKED BY		REVIEWED OR APPROVED BY		

PRELIMINARY

☐

FINAL

☒

SUPERSEDES CALC NO.



EBASCO SERVICES INCORPORATED

BY F. HEYDEN DATE 8/18/83

211.60

SHEET 2 OF 4

CHKD. BY Aljann DATE 8/19/83

OFS NO. CALC 6418.555 DEPT. NO. 550

CLIENT CP&L

PROJECT SHNPP

SUBJECT CALC NO SW17 SUPPLEMENT - SWS PIPE WALL THICKNESS

CRITERIA

$\frac{3}{8}$ " WALL THICKNESS IS SPECIFIED FOR ALL LARGE DIAMETER PIPING (30" O.D. & LARGER) IN THE SERVICE WATER SYSTEM (SS.1); THIS CALCULATION EXAMINES THE LARGEST O.D. SPECIFIED FOR THIS SERVICE (48" O.D.) TO VERIFY THE ADEQUACY OF ALL LARGE DIAMETER PIPING. THE MATERIAL SPECIFICATION IS ASTM A155 KC 65 CLASS I AND THEREFORE THE LONGITUDINAL WELD JOINT EFFICIENCY IS 100%.

REFERENCES

- 1) PIPING LINE LIST (DWG NO CAR 1364-EO70) RE115
- 2) CALC NO SW-17 - WALL THICKNESS SW SYSTEM
- 3) CODES & STANDARDS
 - DATE OF ISSUE: 6/15/73
 - ANSI B31.1 — FOR NON SAFETY PIPING
 - DATE OF ISSUE: 7/1/71 APPENDIX THEN 6/30/73
 - ASME III — FOR SAFETY CLASS PIPING
- 4) MEMO TO 'F. HEYDEN (MECH)' FROM C. McCaul (CORROSION) DATED 8/18/83: SHEET 4 ATTACHED.

SUMMARY OF RESULTS

RESULTS SHOW SPECIFIED WALL IS ADEQUATE FOR ALL THE LARGE DIAMETER PIPING.

P - DESIGN PRESSURE, PSIG	REF 1	150			
T - DESIGN TEMPERATURE, F	REF 1	140			
PIPE SPECIFICATION & GRADE	REF 1	A155 KC65 CLASS I (WELD JOINT EFFICIENCY = 1.0)			
SE - ALLOWABLE STRESS, PSI **	REF 3	16200			

D - OUTSIDE DIAMETER OF PIPE, IN.	REF 1	48	(LARGEST PIPE O.D. USED)		
C - ALLOWANCE FOR MINIMUM STRUCTURAL STABILITY *		0			
y - COEFFICIENT ***		0.4			
t _m - MINIMUM PIPE WALL THICKNESS, IN. (See NOTE 2)		0.221 + A			
t _n - NOMINAL WALL THICKNESS, IN. (See NOTE 3)		0.231 + A = 0.371			
t _s - FIRST STANDARD SCHEDULE THICKNESS EQUAL TO OR GREATER THAN t _n		0.375			
SCHEDULE (CORRESPONDING TO t _s)		-			
WALL THICKNESS SCHEDULE SELECTED		0.375			

ID - INSIDE DIAMETER OF PIPE, IN. (See NOTE 1)					
C - ALLOWANCE FOR MINIMUM STRUCTURAL STABILITY *					
y - COEFFICIENT ***.					
t _m - MINIMUM PIPE WALL THICKNESS, IN. (See NOTE 2)					
t _n - NOMINAL WALL THICKNESS, IN. (See NOTE 3)					
t _s - FIRST STANDARD SCHEDULE THICKNESS EQUAL TO OR GREATER THAN t _n					
SCHEDULE (CORRESPONDING TO t _s)					
SCHEDULE SELECTED					

Use either of the following equations to determine t_m:

BASED ON OUTSIDE DIAMETER

$$t_m = \frac{P \times D}{2 (SE + P_y)} + C + A$$

- * - C = Allowance for minimum structural stability
= 0.065" for 1/2 to 3-1/2 inch nominal pipe size
= 0.000 for 4 inch nominal pipe size and larger

- ** - SE = Maximum allowable stress in material due to internal pressure and joint efficiency, at the design temperature, psi.

B = .038" for pipe ordered to specified machined I.D. with tapered backing ring and extruded pipe specified by I.D. with tapered backing ring.
= .000" for the above pipe with flat backing ring or other types of pipe with any Design Guide M-4 backing ring.

- *** - y = A coefficient having values as follows: (See NOTE 4)

BASED ON INSIDE DIAMETER (See NOTE 1)

$$t_m = \frac{P \times ID + 2 SEC + 2yPC}{2 (SE + P_y - P)} + B$$

A = CORROSION ALLOWANCE
= 0.140 (REF. 4)

TEMP. F	900 AND BELOW	950	1000	1050	1100	1150 AND ABOVE
Ferritic Steels	0.4	0.5	0.7	0.7	0.7	0.7
Austenitic Steels	0.4	0.4	0.4	0.4	0.5	0.7

NOTE 1 - Use maximum possible inside diameter with all its tolerances on wall thickness and outside diameters, except for pipe ordered to specified machined I.D. and extruded pipe specified by I.D. where note 8, paragraph 4, of Design Guide MNE-65 governs.

NOTE 2 - The pipe wall thickness required for a given pressure-temperature condition increases as pipe size increases.

NOTE 3 - For seamless pipe use $\frac{t_m}{0.875}$; for any size of plate pipe, add 0.010 inches to the calculated t_m to obtain t_n.

NOTE 4 - The value of "y" may be interpolated between 50 F values shown above. For nonferrous materials and cast iron use y = 0.4.

GENERAL NOTES: See Design Guide MNE-65 Pipe Line Sizing - for specific information.

CLIENT CP&L
STATION _____
PROJECT SHNPP
BY F. HEYDEN DATE 8/18/83
CHECKED AB Jamnal DATE 8/19/83
APPROVED _____ DATE _____
(SUPERVISOR)

STANDARDIZED WORK SHEET PIPE WALL THICKNESS AND SCHEDULE DETERMINATION	
EBASCO SERVICES INCORPORATED MECHANICAL-NUCLEAR ENGINEERING	
WORK SHEET	MNE-WS-16

EBASCO

Interoffice Correspondence

DATE August 18, 1983 FILE REF.

TO F. Heyden OFFICE LOCATION 87/2WTC

FROM C. McCaul *C. McCaul* OFFICE LOCATION 88/2WTC

SUBJECT SHEARON HARRIS
SERVICE WATER PIPING - CORROSION ALLOWANCE

I have reviewed the information you provided concerning water chemistry, and coatings to be provided for the subject piping.

Corrosion allowance depends on a number of factors including water chemistry, temperature, velocity, etc. In this case, calculation of corrosion allowance is complicated by the initial presence of a protective coating. I presume the coating will not be maintained, otherwise there would not be a need for any corrosion allowance. J. Firtel, Ebasco coatings expert, informed me that the specified coatings, Plasite 1000 primer and Plasite 7122 topcoat, could be expected to deteriorate 25% in five years.

There are a number of indices one may use to calculate, from water chemistry parameters, approximate corrosivity of a specific water. Based on the Langelier Index, the Shearon Harris service water is relatively corrosive. Corrosion rate for most soft (that is to say - corrosive) fresh waters falls in the range 0.002-0.006 in/yr. An average corrosion rate of 0.004 in/yr could reasonably be assumed for the Shearon Harris water. Based on a 40 year service life and deterioration of the initial coating as discussed above, about 0.140 inch average wall thickness loss could be expected over the life of the piping.

CMcC:j1

cc; J. Firtel

Shearon Harris Nuclear Power Plant
Draft SER Open item No. 354
NRC Question 210.61

Piping Specification (CAR-SH-M-30, Rev. 16), Out-of-Roundness

In 12.01a and 12.02a, there is a requirement: "The degree of out-of-roundness shall be such that there will be no decrease in flexibility or increase in stress over the allowable stress for the design conditions."

- (a) How is assurance obtained that this requirement is met?
- (b) Is an increase in flexibility permitted?
- (c) What is the "allowable stress for the design conditions"?

RESPONSE:

- (a) The tolerances specified for bends in Paragraphs 12.01a and 12.02a in Part Two of Specification CAR-SH-M-30 are incorporated in Southwest's bending procedures and the bends furnished by Southwest are checked for compliance with the applicable procedure. The bending procedures which have been approved for use on the Shearon Harris Project are:

<u>PROCEDURE NO.</u>	<u>REVISION</u>	<u>SUPPLEMENT</u>
4-106	0	1
4-107	0	1
4-108	0	1
4-109	0	1

A copy of the above listed procedures is enclosed for your convenient reference.

- (b) An increase in flexibility is not permitted.
- (c) "The allowable stresses for the design conditions" are the stresses from ASME III, Appendix I for a specific pipe material grade and corresponding temperature specified in the Ebasco Line List.

Paragraphs 12.01a and 12.02a will be revised as follows:

"----- cross section without buckling or undue stretching of pipe wall. Out-of-roundness at pipe bends shall not exceed 6 percent -----."

In addition, Westinghouse will be advised about the 6% out-of-roundness allowed in Southwest Fabricating pipe bends.



216.61

ATTACHMENT