Q 210.58

Jamesbury Corp.

Incorporated

Worcester, Massachusetts

Accep'd by: TGT

App'd by: [signature]

JSN-T35

Eff. Date: 1/24/78

ENGINEERING SPECIFICATION

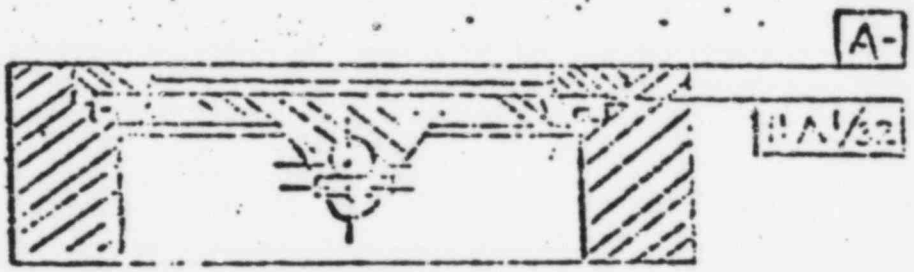
REV.	DATE	APPR'L

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

SCOPE: Wafer-Sphere Valves

1.0 GENERAL TESTING CONDITIONS

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



Valves are mounted between blind flanges or pipe with flanges using special gasket material provided. Tighten the bolts carefully to prevent damage to the bolt holes and provide even gasket loading.

Inspect seat and valve cavity for possible contamination. There should be no visible particles, dirt, weld chips, or contamination. If contamination is found, the valve must be recleaned 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 slot 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 smoothly from the fully closed to fully open position three (3) times to insure that the wafer is properly

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 inboard 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 +10%/-0%				
		ANSI RATING				
Size	Shaft Mat'l	150# Series			300# Series	
		8000	8100	8200, Mod C.	8100	8200
2" thru 12"	Steel 17-4 PH Nitronic	310 psig	310 psig	310 psig	310 psig	310 psig
	316	165 psig	310 psig	310 psig	310 psig	310 psig
14" thru 48"	Steel 17-4 PH Nitronic	310 psig	---	310 psig	---	---
	316	165 psig	---	165 psig	---	---

3.2 Inspect for seat leakage.

3.3 Acceptance/Rejection Criteria (Seat Test)

3.3.1 Resilient (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 seat pressure shall be cause for rejection.

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

JSN-T35 Rev. 0

3.3 Acceptance/Rejection Criteria (Seat Test) - continued

Valve Size	Allowable leakage rate @ 310 psig Test Pressure
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 WB2527 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 — OFS NO. CAR-6418.333

PROJECT SHEARON HARRIS NUCLEAR POWER PLANT 900,000 KW-UNITS 1, 2, 3 & 4 — 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.

REV NO	SH NOS	CALCULATION BY NAME	DATE	CHECKED BY NAME	DATE	OPTIONAL	REVIEWED OR APPROVED BY NAME	DATE
0	4	F Heyden	8/18/82	[signature]	8/19/82			

PRELIMINARY ☐ FINAL ☒ SUPERSEDES CALC NO. _____

BY F Hayden DATE 8/18/83 211.60 SHEET 2 OF 4

CHKD. BY [illegible] DATE 8/19/83 OFS NO. CAR-SWP-E-E-E DEPT. NO. [illegible]

CLIENT CP&L

PROJECT SHNPP

SUBJECT CALC No SW17 SUPPLEMENT — SWS PIPE WALL THICKNESS

CRITERIA

3/8" WALL THICKNESS IS SPECIFIED FOR ALL LARGE DIAMETER PIPING (30" O.D. & LARGER) IN THE SERVICE WATER SYSTEM (SWS). 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-E-070) Rev 15
2) CALC No SW-17 — WALL THICKNESS SW SYSTEM
3) CODES & STANDARDS
   ANSI B31.1 — DATE OF ISSUE: 6/15/73 — FOR NON SAFETY PIPING
   ASME III — DATE OF ISSUE: 7/1/71 ADDENDA THRU 6/30/72 — FOR SAFETY CLASS PIPING
4) MEMO TO F HAYDEN (MECH) FROM C McCAUL (CIVIL) DATED 8/18/83: SHEET 4 ATTACHED.

SUMMARY OF RESULTS

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

CALC NO. SW-1 SUPPLEMENT SHEET 2 OF 4

SYSTEM SERVICE WATER LINE DESIGNATION NO. SW 2"-16"

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 @ P/T EFFICIENCY = 1.0)		
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

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

BASED ON INSIDE DIAMETER (See NOTE 1)

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

A = CORROSION ALLOWANCE = 0.140 (REF. 4)

* - 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)

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 govems.

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 (ENGINEER) DATE 8/18/83

CHECKED A.B. Jamal DATE 8/19/83

APPROVED (SUPERVISOR) DATE

STANDARDIZED WORK SHEET
PIPE WALL THICKNESS AND SCHEDULE DETERMINATION

EBASCO SERVICES INCORPORATED
MECHANICAL-NUCLEAR ENGINEERING

WORK SHEET | MNE-WS-16

638-16/7-72

CALC No 3W17 SUPPLEMENT 210.60 SHEET 4 OF 4

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:jl

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:

PROCEDURE NO.	REVISION	SUPPLEMENT
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.

(7876FXTccc)

210.61

ATTACHMENT