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RECIP. NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to NRC Bulletin 87-001, "Thinning of Pipe Walls in Nuclear Power Plants." All piping inspected for wall thinning designed & fabricated in accordance w/ANSI B31.1.

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SEPTEMBER 1 0 1987

L-87-373

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
NRC Bulletin 87-01 Response

Florida Power & Light has reviewed NRC Bulletin 87-1, Thinning of Pipe Walls in Nuclear Power Plants. The answer to the information requests and the results of the inspections performed on Turkey Point Units 3 and 4 is attached.

Should there be any questions on this information, please contact us.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/SDF/gp

Attachments

cc: J. Nelson Grace, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

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PLP1/053/1

STATE OF FLORIDA)
) ss.
COUNTY OF PALM BEACH)

C. O. Woody being first duly sworn, deposes and says:

That he is a Group Vice President of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said Licensee.

C. O. Woody

Subscribed and sworn to before me this 10 day of September, 1987.

NOTARY PUBLIC, in and for the County of Palm Beach, State of Florida

NOTARY PUBLIC STATE OF FLORIDA
MY COMMISSION EXP SEPT 18,1989
My Commission expires: BONDED THRU GENERAL INS. UND.

NRC BULLETIN 87-01 THINNING OF PIPE WALLS IN NUCLEAR POWER PLANTS

Information Request 1

Identify the codes or standards to which the piping was designed and fabricated.

Response 1

All piping that has been inspected for wall thinning was designed and fabricated in accordance with ANSI B31.1.

Information Request 2

Describe the scope and extent of your programs for ensuring that pipe wall thicknesses are not reduced below the minimum allowable thickness. Include in the description the criteria that you have established for:

a. Selecting points at which to make thickness measurements
b. Determining how frequently to make thickness measurements
c. Selecting the methods used to make thickness measurements
d. Making replacement/repair decisions

Response 2

2a. Locations for thickness measurements for two-phase flow systems were selected using the guidelines of EPRI Report No. NP-3944. Configurations with the greatest susceptibility for thinning based on geometry, system temperature and piping material were investigated. Inspection was done on a sampling basis - not every susceptible configuration was examined. Priority was based on susceptibility. Sampling was used when similar configurations expressed equivalent susceptibility, i.e., parallel lines in the same system. When wall thinning is discovered, the number of items inspected is increased for the particular population and configurations with equal susceptibility.

2b. Thickness measurements are scheduled for planned refueling outages. Particular circumstances may dictate monitoring an existing condition on a more frequent basis such as every three (3) months.

2c. Thickness measurements are made using an ultrasonic technique with a longitudinal wave.

2d. Thickness measurements are compared against minimum allowable wall thicknesses. Corrosion rates and existing wall thicknesses are evaluated as in EPRI NP-3944. Configurations with wall thicknesses less than minimums or those where wall thickness would be reduced below minimum before the next refueling outage are considered for repair or replacement.

For liquid-phase systems, state specifically whether the following factors have been considered in establishing your criteria for selecting points at which to monitor piping thickness (Item 2a):

a. piping material (e.g., chromium content)
b. piping configuration (e.g., fittings less than 10 pipe diameters apart)
c. pH of water in the system (e.g., pH less than 10)
d. system temperature (e.g., between 190 and 500°F)
e. fluid bulk velocity (e.g., greater than 10 ft/s)
f. oxygen content in the system (e.g., oxygen content less than 50ppb)

Response 3

3a. All the piping which has been inspected is carbon steel, with no required chromium content. Chromium content of individual pieces was not determined prior to selecting inspection points.

3b Piping configuration was the primary determinant in selecting points for inspection. Configurations were evaluated based on rankings in EPRI NP-3944 and VEPCO report "Surry Unit 2 Reactor Trip and Feedwater Pipe Failure Report" Rev. 0, dated January 14, 1987.

3c Inspection points were not selected based on pH of water in the system since pH was considered essentially the same throughout the systems inspected. The pH is normally in the range of 9.3 to 9.6.

3d System temperature was a major consideration in selecting inspection points. Priority for inspection was based on the rating scheme in the VEPCO report concerning the Surry accident.

3e Bulk fluid velocity was not considered when selecting inspection points.

3f Inspection points were not selected based on oxygen content in the system since oxygen content was considered essentially the same throughout the systems inspected. Oxygen content is normally in the range of 5 to 10 PPB.

Information Request 4

Chronologically list and summarize the results of all inspections that have been performed, which were specifically conducted for the purpose of identifying pipe wall thinning, whether or not pipe wall thinning was discovered, and any other inspections where pipe wall thinning was discovered even though that was not the purpose of that inspection.

a. Briefly describe the inspection program and indicate whether it was specifically intended to measure wall thickness or whether wall thickness measurements were an incidental determination.

b. Describe what piping was examined and how (e.g., describe the inspection instrument(s)), test method, reference thickness, locations examined, means for locating measurement point(s) in subsequent inspections).

c. Report thickness measurement results and note those that were identified as unacceptable and why.

d. Describe actions already taken or planned for piping that has been found to have a nonconforming wall thickness. If you have performed a failure analysis, include the results of that analysis. Indicate whether the actions involve repair or replacement, including any change of materials.

Response 4

4a. Main steam reheat cross-under piping was inspected at Units 3 & 4 during the 1983 & 1984 outage. The results are in Attachment A. In addition, two separate series of inspections were performed at Turkey Point to measure pipe wall thinning. The first inspection was performed on Unit 4 in December 1986. This inspection was an immediate response to the feedwater piping failure at Surry 2. The details of this inspection follow immediately. A second inspection for wall thinning was performed on Unit 3 during the Spring 87' refueling outage. The details of this second inspection also follow.

4b. The examination method utilized throughout was the ultrasonic nondestructive test method. The ultrasonic instrumentation was of the pulse-echo type with cathode ray tube display. Carbon steel incremental step blocks were utilized to provide reference thicknesses to calibrate the instrumentation.

Thickness readings were obtained by performing line scans along a two (2) inch grid pattern. Readings were recorded by strip chart continuous recording where such information was deemed to be beneficial. Where consistent readings indicated no apparent erosion, only representative readings were recorded.

Details of December '86 Inspections on Unit 4

4c. Piping in the following systems was examined for wall thickness using an ultrasonic technique:

- Condensate Bypass
- Condensate to Feedwater Pump 4B
- Condensate to Feedwater Suction
- Condensate to Feedwater Pump 4A
- Condensate Pump Discharge
- Heater Drain Pump Discharge
- Heater Drain Pump Discharge Recirculation

Each fitting was examined by obtaining a series of thickness readings along the extrados and intrados of elbows and reducers and along the backside of tees. Readings were also taken in bands extending circumferentially around each fitting for 30 degrees on each side of the center line. In each case, ten to twenty readings were taken, but only the lowest and highest readings were recorded. Piping was also examined downstream of the circumferential welds between the fitting and the piping.

Seventy fittings were examined. The acceptance criteria for this inspection was the minimum wall thickness allowed by the piping material specification. The results of this inspection are shown in Attachment B. Three items were found which had a wall thickness below the acceptance criteria. These are Items 58,61 and 67.

Items 68, 69 and 70 are on Unit 3 and represent the same items on Unit 4 where thinning was discovered. One item, 69, was found to also have a reduced wall thickness.

Therefore, this inspection discovered a total of four locations where wall thickness had been reduced.

The four elbows found to have reduced wall thickness have been replaced. The elbow on Unit 3 was replaced during the Unit 3 Spring '87 outage.

Deatails of Inspections Performed During Unit 3, Spring '87 Refueling Outage

Piping in the following systems was examined for wall thickness using an ultrasonic technique:

- MSR Crossunder
- HP Turbine Extraction Steam
- LP Turbine Extraction Steam
- Steam Generator Feed Pump Suction
- Heater Drain Pump Discharge
- Heater Drain Pump Recirculation
- Steam Generator Feed Pump Discharge

Each identified fitting and downstream piping, for a length equal to two pipe diameters, was scanned circumferentially. The outline of areas less than the acceptance criteria was plotted and the location of the thinnest spot was recorded. The average thickness was also recorded.

Eighty-eight fittings were examined. The acceptance criteria for this inspection was the calculated minimum piping wall thickness plus 0.075". For drawings prefixed by 5610 only, the acceptance criteria was the minimum wall thickness allowed by the piping material specification plus 0.075". The value of 0.075" represents a severe corrosion loss which could occur during the next fuel cycle - based on corrosion which occurred at Surry 2. The results of this inspection are shown in Attachment C.

c. This inspection identified 30 items with a wall thickness less than the acceptance criteria. These items are identified in Attchment C by an entry in the column titled "Lowest Thickness Below Acceptance".

The items identified as having reduced wall thickness were dispositioned as follows (also shown in Attachment C):

Disposition	Number of Items
Weld Buildup	3
Replace	13
Continue in Use	14
TOTAL	30

The items dispositioned "Weld Build Up" had the wall thickness in low areas restored to the original dimensions by weld deposited metal of the same composition as the base metal.

The items dispositioned as "Replace" were replaced with fittings made of the same type of material as the original fittings.

The items dispositioned "Continue in Use" were evaluated as being suitable for further service. These items will be monitored at future outages to determine any further reduction in wall thickness.

Information Request 5

Describe any plans either for revising the present or for developing new or additional programs for monitoring pipe wall thickness.

Response 5

The next scheduled inspection for monitoring pipe wall thickness will be done on Unit 4, during its Fall '88 refueling outage. The inspection will use the same methodology as was used previously. The efforts of this program will be directed to:

1) Inspect potential problem areas identified on Unit 3

2) Inspect selected areas done on Unit 3 to verify parallel conditions between units

3) Reinspect selected areas previously done to establish corrosion rates for a known operating period

4) Inspect systems not previously done but which have a potential for wall thinning

ATTACHMENT A

MSR CROSS-UNDER PIPING INSPECTION REPORT

1983 & 1984 OUTAGES

MCI1:5

I. UNIT #4, 1983 SCHEDULED OUTAGE

During the scheduled outage, the plant requested Power Plant Engineering to inspect the MSR crossunder piping. The system was inspected utilizing ultrasonic methods to obtain pipe thickness readings. Several areas were found to be badly eroded and since time was a factor, it was decided to repair all areas with 0.5" and below wall thickness.

Of the 75 welds inspected, 23 had wall thickness of 0.5" and below. Fifteen drawings were prepared and issued to Construction for weld repairs.

The following welding plans were recommended:

1) Power Plant Engineering
   a) Use E7018 (carbon steel) rod to build up eroded areas
   b) Alternate - use 309 stainless steel rod
2) Westinghouse - use 309 stainless steel rod
3) EBASCO - use E7018 carbon steel rod
4) Plant - has used 309 rods

A design and installation package was issued to the plant by Power Plant Engineering. Included in this package were the Power Plant Engineering welding recommendations as indicated above. Because of the limited time, a letter was issued by Plant Maintenance to Construction with a change to the welding procedure as follows: Build-up all eroded areas to within 3/16"; flush and finish building up with 309 rod. This procedure was used by Bechtel, Code welders and Q.C. inspection was vaived.

Observations

Several areas in the MSR crossunder piping system were examined. The majority of the welds examined were found to be eroded. This condition was more severe at the backing rings (some backing rings were completely washed out). Backing rings projection from 1/4" to 1/2" were also observed. It appears that when the steam strikes the backing ring or any other high spots, the steam flow pattern changes and reverses. Erosion was also observed adjacent to existing 309 welds. (previous repairs made with 309 rods were Westinghouse recommendation.) These weld repairs had high and low spots which created turbulence. In addition, several damaged turning vanes were replaced.

II. UNIT #3, 1983 SCHEDULED OUTAGE

The following is a brief summary of inspection and repair work done to the MSR crossunder, MSR extraction, inlet lines to safety relief valves and MSR internals. All of the inspection and repair methods used were similar to those used on Unit 4 1983 outage.

The following welding recommendation was used to repair the MSR crossunder piping and was performed in accordance with Bechtel welding procedures and ANSI B31.1:

Weld Recommendation

Use E7018 to fill all eroded areas to within 1/8" of flush with inner wall; complete this buildup with E309 and grind flush (similar to Unit 4 1983 outage).

Additional engineering support was required to complete the scope of work. The additional support included two (2) piping designers and two (2) ISI inspectors. The following drawings were prepared and issued for construction:

1) Twenty drawings with U.T. results
2) Twenty drawings with repair details
3) Two isometric drawings indicating weld locations

Inspection and repairs of the specific systems were conducted as follows:

A. MSR Crossunder Piping

All welds were tested ultrasonically and all pipes with eroded areas of 0.5" and below were repaired using the weld procedure listed above. In addition, some pipes with eroded areas above 0.5" were filled.

B. MSR Extraction

A total of six (6) fittings were replaced and three (3) fittings were temporarily repaired with patches welded to the outside wall of pipe. It should be noted that because of the limited time, the extraction lines were not completely inspected during this outage.

C. MSR Inlet Valves to Safety Relief Valves

All inlet lines were inspected up to the welded tees with U.T. and all four (4) branch connections were inspected using angle beam projection.

Repairs to these lines included partial replacement of one (1) branch connection and the repair of pinhole leak in the weld seam.

D. MSR Internals

Repairs were made to all four (4) MSRs. The repairs included replacement of C.S. pipe supports with stainless steel pipe, replacement of damaged stainless steel baffle plates and numerous washed out carbon steel areas requiring repairs.

III. UNIT #4 1984 SCHEDULED OUTAGE

U.T. Inspection of approximately 300 weld joints, random U.T. inspection of pipe, liquid penetrant/magnetic particle examinations of weld and end preps, angle beam projection data and visual examination results of approximately 120 MSR crossunder welds.

There were fifty-nine (59) weld repair drawings prepared and issued for construction, four (4) MSR internal repair drawings, eight (8) isometrics indicating weld locations and six (6) insulation reinstallation drawings.

Inspection and repairs of the specific systems were conducted as follows:

A. <u>MSR Crossunder Pipe</u>

1) <u>Inspection</u>

As mentioned previously, 75 welds were inspected during the 1983 outage and pipe wall thicknesses close to minimum wall were repaired. The entire system was inspected and the remaining ultrasonic testing results were obtained. Two short vertical runs of pipe with no access from inside were partially inspected from the outside.

An on-site material analysis of the MSR crossunder piping and turning vanes was conducted by Florida Power and Light's Power Resources Central Laboratory using a portable X-ray alloy analyzer. The identification of the alloys was based upon an X-ray spectralmeter.

2) <u>Repairs</u>

One hundred and twenty-two welds requiring grinding and filling, from 1/16" to 3/8" deep, were repaired. In addition, all eroded areas between welds requiring grinding and filling were repaired using the new FPL welding procedures.

Two (2) turning vanes were damaged at weld #87. One vane was completely broken free from support ring and was replaced with a new vane using Florida Power and Light welding procedure WPS-46. The turning vane directly below had a hairline crack on the north side and was repaired using Florida Power and Light welding procedure WPS-46 (no post weld heat treatment).

Two (2) diaphram hinge-type expansion joints had sufficient wear on the internal carbon steel sleeve to require a completely new sleeve in one and a partial replacement of the other. Replacement material used was ASTM A240 type 316L (FPL WPS-9 and WPS-10 were used).

Seven (7) access openings were made in the pipe to permit necessary repairs to the inner pipe walls. Upon completion of repairs, access plates were reinstalled using Florida Power and Light welding procedure WPS-24.

The final repairs made to the MSR cross-under piping were to grind smooth all internal weld repairs.

B. <u>MSR 16" Extraction Steam Lines</u>

1) <u>Inspection</u>

All welded fittings were inspected for reductions in wall thickness by U.T. method upstream and downstream of the weld, and 100% along the outside radius.

Straight runs of pipe were randomly inspected by U.T. on the outside wall of pipe and visually, whenever a fitting was removed from the line.

2) Repairs

Repairs to the lines included replacement of thirteen (13) 16" Schedule 40 fittings and approximately 28 feet of 16" Schedule 30 pipe and two (2) fabricated spool pieces. The new spool pieces developed cracks in the weld prep area after completing the first root pass. The cause may have been as a result of numerous laminations found in the new pipe. The two (2) new pipe spool pieces were cut and removed. New piping was ordered, a 100% U.T. was performed and released for fabrication. Replacement fittings used were Schedule 40 instead of 30 and minor counterboring was required to match existing pipe wall thickness.

Both extraction branch connections of the MSR cross-under piping required major grinding of existing weld repairs and some fittings. Other branch connections required building-up around the weld prep area to match the heavier walls of the new replacement elbows.

C. MSR Crossunder Pipe Inlet Pipe to Safety Valves

1) Inspection

All pipe adjacent to welds upstream and downstream, as well as the outside radius of all elbows were inspected by U.T. In addition, all bottom portions of the welded tees at relief valves were inspected and all welds up to the first tee were inspected with angle beam projection. All four (4) 24" branch connections were ground smooth internally and examined, using the angle beam method.

2) Repairs

Some erosion was observed; repairs are not required at this time.

D. MSR Heater Drain Lines

1) Inspection

Same U.T. procedure was used as explained above.

2) Repairs

Total repairs to the lines included the replacement of eight (8) fittings and five (5) feet of pipe. All replacement fittings were heavier wall.

The replacement of two (2) elbows adjacent to heater drain tank 4T6B required protecting the lift check valves in the lines. However, when bonnet caps from valves were removed, it was noted that the internals of both valves had been completely removed at some earlier date, therefore no protection was needed.

E. MSR Cross-Under Vents and Drain Lines

1) Inspection

All piping adjacent to fittings plus pipe bends were inspected for erosion of inner walls by U.T. A visual inspection indicated out of specification material used in previous repairs.

2) Repairs

Some erosion was observed; repairs are not required at this time.

F. MSR Internals

1) Inspection

All inspection work performed on the MSR internals was made visually.

2) Repairs

MSR 4A required additional 1/8" thick stainless steel plate (welded) to prevent further erosion of the carbon steel support base plates. In addition, minor fill and grinding were required at all four (4) corners of the deck plate.

MSR 4B stainless steel plates previously installed to prevent further erosion of the carbon steel baffle plate were partially replaced due to cracks in the plates. One (1) 4" pipe support was partially replaced between the deck plate and the base plate. Numerous eroded areas below the deck plate required fill and grinding and a new grid plate (access plate) was fabricated and installed.

MSR 4C internal repairs consisted of partial replacement of both 4" carbon steel pipe supports with stainless steel pipe. Also, fabrication and installation of a new grid plate, as well as minor fill and grinding to areas below the deck plate.

MSR 4D internal repairs consisted of removing carbon steel angle, installed during a previous outage, and installing carbon steel plate in its place. Partial replacement of one (1) 4" carbon steel pipe support with stainless steel and the fabrication and installation of a new access plate (grid plate).

IV. RECOMMENDATIONS

Unit 3, 1985 Planned Outage:

1) Consider the replacement of the majority of the 16" extraction pipe and fittings from the MSR crossunder line to the first block valve.

2) Expand the inspection program to include MSR drain piping and the MSR crossunder vent and drain lines.

3) Reinspect MSR crossunder piping and fill and grind any eroded areas. Inspect the diaphram hinge type expansion joints and repair if necessary.

4) Continue to inspect and repair MSR internals.

T20.2

5) Estimate and purchase all materials necessary to complete the repairs prior to the schedule.

Unit 4 1986 Planned Outage:

1) Reinspect all crossunder piping as part of a continuous maintenance program (this should be performed at all subsequent outages).

2) Analyze and determine possible replacement of erroded extraction steam piping.

3) Inspect all vent and drain lines, from MSR corss-under, extraction and heater drain lines.

ATTACHMENT B

PIPING WALL THICKNESS MEASUREMENTS

TURKEY POINT UNIT 4

JANUARY 1986

MCI1:5

ATTACHMENT B

PIPING WALL THICKNESS MEASUREMENTS MADE AT TURKEY POINT, UNIT 4 DURING DECEMBER 1986

Item	Fitting/Type	Size	Thickness Measured At Extrados	Thickness Measured At Intrados	Disposition Of Reduced Wall Thickness
	Condensate Bypass - Drawing E-2389-IC-11A				
1	A - Elbow	16"	.400	.460	
2	B- Tee	16" x 16 x 12"	.600	.890	
3	C - Elbow	12"	.400	.490	
4	D - Elbow	12"	.400	.440	
5	E - Conc. Red.	20" x 12"	.590		
6	F - Tee	20"	1.000		
7	G - Elbow	18"	.520		
8	H - Elbow	18"	.530		
9	I - Elbow	18"	.520		
	Condensate to FW Pump 4 PIB Suction - Drawing: E-2389-IC-12				
10	A - Elbow	20"	.540	.510	
11	B - Elbow	20"	.520	.560	
12	C - Elbow	20"	.500	.520	
13	D - Elbow	20"	.560	.550	
14	E - Elbow	20"	.510	.500	
15	F - Conc. Red.	20" x 14"	.580		
16	G - Elbow	14"	.410		
	Condensate to FW Suction - Drawing: E-2389-IC-12A				
17	A - Elbow	18"	.510		
18	B - Elbow	18"	.520		
19	C - Elbow	20"	.500		
20	D - Elbow	20"	.540		
21	E - Elbow	12"	.410	.410	
22	F - Elbow	12"	.380	.420	
23	G - Elbow	12"	.400	.420	
	Condensate to FW Pump 4P1A Suction - Drawing: E-2389-IC-13				
24	A - Elbow	20"	.540	.500	
25	B - Elbow	20"	.540	.520	
26	C - Elbow	20"	.520	.540	
27	D - Elbow	20"	.500	.540	
28	E - Pipe Spool	20"	.500		
29	F - Elbow	20"	.520	.540	
30	G - Elbow	20"	.460	.580	
31	H - Elbow	20"	.500	.520	
32	I - Elbow	20"	.460	.540	
33	J - Conc. Red.	20" x 14"	.400 (14" side)		
34.	K - Elbow	14"	.440		

ATTACHMENT B (Continued)

PIPING WALL THICKNESS MEASUREMENTS MADE AT TURKEY POINT, UNIT 4 DURING DECEMBER 1986

Item	Fitting/Type	Size	Thickness Measured At Extrados	Thickness Measured At Intrados	Disposition Of Reduced Wall Thickness
	Condensate Bypass - Drawing E-2389-IC-14				
35	A - Pipe-to-Cap	16"	.400		
36	B - Elbow	16"	.440	.440	
37	C - Elbow	12"	.420	.500	
38	D - Elbow	16"	.440	.430	
39	E - Elbow	16"	.440	.460	
40	F - Elbow	16"	.420	.460	
41	G - Elbow	16"	.420	.420	
42	H - Elbow	16"	.410	.820	
43	I - Tee	16" x 16" x 14"	.620	.820	
44	J - Elbow	14"	.420		
	Heater Drain Pump Discharge - Drawing E-2389-IC-30				
45	A - Elbow	12"	.400	.460	
46	B - Elbow	12"	.380	.430	
47	C - Elbow	12"	.400	.460	
48	D - Conc. Red.	16" x 12"	.400		
49	E - Red. Tee	16" x 16" x 12"	.600	.820	
50	F - Elbow	16"	.480	.520	
51	G - Red. Tee	16" x 16" x 12"	.600	.800	
52	H - Elbow	16"	.480	.520	
53	I - Elbow	16"	.380	.420	
54	J - Pipe-to-Cap	16"	.380		
	Heater Drain Pump Discharge (Mini Recirc. Line) - Drawing E-2389-IC-51 (To Heater Drain Tank 4T6B)				
55	B - Elbow	4"	.280	.290	
56	A - Elbow	4"	.240	.250	
	Heater Drain Pump Discharge (Mini Recirc Line) - E-2389-IC-51B (To Heater Drain Tank 4T6B)				
57	A - Elbow	3"	.220		
58	B - Elbow	3"	.120	.360	Replace
59	C - Elbow	3"	.220	.300	
60	D - Elbow	3"	.220		
61	E - Elbow	3"	.140	.360	Replace
62	F - Conc. Red.	4" x 3"	.300		
63	G - Red. Tee	4" x 3"	.340		
64	H - Elbow	4"	.240	.320	
65	I - Elbow	4"	.240	.360	
66	J - Elbow	4"	.250	.300	
67	K - Elbow	4"	.180	.320	Replace
	Heater Drain Pump Discharge (Mini Recirc Line) - Drawing: E-2387-IC-51B (To Heater Drain Tank 3T6B)				
68	A - Elbow	3"	.200		
69	B - Elbow	3"	.180		Replace
70	C - Elbow	4"	.270	.320	

ATTACHMENT C

PIPING WALL THICKNESS MEASUREMENTS

TURKEY POINT UNIT 3

SPRING 1987

ATTACHMENT C

PIPING WALL THICKNESS MEASUREMENTS MADE AT TURKEY POINT, UNIT 3 DURING SPRING '87 OUTAGE

Item	Fitting/Type	Size (in.)	Average Thickness (in.)	Lowest Thickness Below Acceptance (in.)	Disposition of Reduced Wall Thickness
	MSR Crossunder, Dwg. FSK-M-2084 Sht. 1				
101	Elbow	32	0.76		
102	Pipe	32	0.8	0.4	Weld Build Up
103	Elbow	32	0.8		
104	Elbow	45	1.0		
105	Tee	45 x 45 x 32	1.1		
106	Pipe	32	0.75		
107	Elbow	32	0.76		
108	Tee	45 x 45 x 24	1.0/.47		
109	Elbow	32	0.75		
110	Elbow	32	0.74		
111	Tee	45 x 45 x 24	1.0/4.5		
112	Pipe	32	0.75		
113	Pipe	45	0.640	0.440	Weld Build Up
115	Pipe	45	0.9	0.52	Continue In Use
116	Pipe	24	0.54		
	MSR Crossunder, Dwg. FSK-M-2085 Sht. 1				
201	Elbow	32	0.75		
202	Tee	45 x 45 x 32	0.96/0.7		
203	Elbow	45	0.98		
205	Elbow	32	0.56		
206	Elbow	32	0.58		
207	Elbow	32	0.76		
208	Tee	45 x 45 x 24	1.0/.48		
209	Reducer	45 x 32	0.95/.72		
210	Pipe	45	0.66	0.4	Weld Build Up
211	Pipe	45	0.99		
212	Pipe	45	0.98		
213	Tee	45 x 45 x 24	0.95/48	0.3	Continue In Use
	HP Turbine Extraction to FW Heater, 5A, Dwg. FSK-M-2087 Sht. 1				
301	Steam Trap	16	0.30		
302	Elbow	16	0.40	0.18	Continue In Use
303	Elbow	16	0.32		
304	Elbow	16	0.40		
305	Elbow	16	0.37		

ATTACHMENT C (Continued)

PIPING WALL THICKNESS MEASUREMENTS MADE AT TURKEY POINT, UNIT 3 DURING SPRING '87 OUTAGE

Item	Fitting/Type	Size (in.)	Average Thickness (in.)	Lowest Thickness Below Acceptance (in.)	Disposition of Reduced Wall Thickness
	HP Turbine Extraction to FW Heater 5B, Dwg. FSK-M-2086 Sht. 1				
401	Elbow	16	0.37		
402	Elbow	16	0.40		
403	Steam Trap	16	0.40		
404	Elbow	16	0.55		
405	Elbow	16	0.40	0.17	Continue In Use
406	Elbow	16	0.48		
	LP Turbine Extraction to FW Heater 4A, Dwg. E-2387-IC-94				
502	Elbow	18	0.40		
503	Tee	18	0.79		
	LP Turbine Extraction to FW Heater 4B, Dwg. E-2387-IC-55				
602	Elbow	18	0.40		
603	Elbow	18	0.39		
	Steam Generator Feed Pump Suction, Dwg. 5610-P-208				
701	Tee	20	0.65	0.47	Continue In Use
702	Reducer	20 x 18	0.5	0.5	Continue In Use
	Steam Generator Feed Pump Suction, DWG. 5610-P-209				
703	Elbow	14	0.41		
	Steam Generator Feed Pump Suction, Dwg. 5610-P-207				
801	Elbow	20	0.52	0.46	Continue In Use
802	Elbow	14	0.41		
	Heater Drain Pump Discharge, Dwg. 5610-P-206				
901	Elbow	16	0.41	0.36	Continue In Use
902	Elbow	16	0.39	0.34	Continue In Use
903	Tee	16 x 16 x 12	0.6	0.36	Continue In Use
	Heater Drain Pump Recirculation, Dwg. E-2387-IC-51B				
1001	Pipe	3	0.22		
1002	Elbow	4	0.24		
1003	Elbow	3	0.24		
1004	Tee	4	0.34		
1005	Elbow	3	0.2		
1006	Pipe	4	0.22		
1007	Elbow	4	0.23		

ATTACHMENT C (Continued)

PIPING WALL THICKNESS MEASUREMENTS MADE AT TURKEY POINT, UNIT 3 DURING SPRING '87 OUTAGE

Item	Fitting/Type	Size (in.)	Average Thickness (in.)	Lowest Thickness Below Acceptance (in.)	Disposition of Reduced Wall Thickness
	Steam Generator Feed Pump Discharge, Dwg. 5610-P-210				
1101	Elbow	12	0.74	0.64	Continue In Use
1102	Elbow	18	1.06		
1103	Elbow	24	1.16		
1104	Tee	18 x 18 x 14	0.94/0.80		
1105	Elbow/Pipe	14	0.83/0.64		
1106	Elbow	12	0.81		
	HP Turbine Extraction to FW Heater 6B, Dwg. E-2387-IC-52				
1201	Elbow	12	0.35	0.12	Replace
1202	Elbow	12	0.36	0.12	Replace
1203	Elbow	12	0.36	0.28	Replace
1204	Elbow	12	0.36	0.22	Replace
1205	Elbow	12	0.36	0.25	Replace
1206	Elbow	12	0.38	0.18	Replace
1207	Elbow	12	0.35	0.28	Continue In Use
1208	Elbow	12	0.35	0.28	Continue In Use
	HP Turbine Extraction to FW Heater 6A, Dwg. E-2387-IC-24				
1301	Elbow	12	0.35	0.22	Replace
1302	Elbow	12	0.37	0.20	Replace
1303	Elbow	12	0.39		
1304	Elbow	12	0.37	0.22	Replace
1305	Elbow	12	0.36	0.24	Replace
1306	Elbow	12	0.36	0.27	Continue In Use
1307	Elbow	12	0.36	0.24	Replace
1308	Elbow	12	0.36		
1309	Elbow	12	0.38	0.18	Replace
1310	Elbow	12	0.40		
1311	Elbow	12	0.38	0.20	Replace
	LP Turbine Extraction to FW Heater 3A, Dwg. E-2387-IC-92				
1401	Steam Trap	18	0.40		
1403	Elbow	18	0.42		
1401	Elbow	18	0.41		
1405	Elbow	18	0.41		
	LP Turbine Extraction to FW Heater 3B, Dwg. E-2387-IC-81				
1503	Elbow	18	0.39		
1504	Elbow	18	0.42		