NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

DOCKET NUMBER 50-250/251

FILE NUMBER

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

TO:
Mr. George Lear

FROM:
Florida Power & Light Company
Miami, Florida
Robert E. Uhrig

DATE OF DOCUMENT 10/21/77

DATE RECEIVED 10/26/77

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ENCLOSURE

"Turkey Point Unit No. 3 Reactor Vessel Material Surveillance Program"

"Florida Power & Light Company - Turkey Point Unit No. 3 Reactor Vessel Radiation Surveillance Program"

DISTRIBUTION FOR MATERIAL ON REACTOR VESSEL
DATA PER R. INGRAM 5-26-77

PLANT NAME: Turkey Point Units 3 & 4
RJL 10.26/77 (1-P) (12-P)+(41-P)

566
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FOR ACTION/INFORMATION

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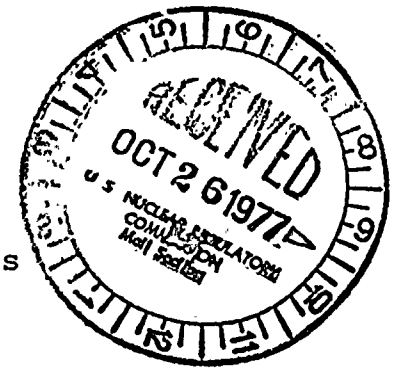
FLORIDA POWER & LIGHT COMPANY

October 21, 1977
L-77-326



Office of Nuclear Reactor Regulation
Attention: Mr. George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Lear:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Reactor Vessel Material Information

Your letter of May 20, 1977 contained a Request for Information regarding the Reactor Vessel Material Surveillance Program at Turkey Point Units 3 and 4. On July 6, 1977 (L-77-211), we agreed to supply the information by October 22, 1977. The information you requested is attached.

Very truly yours,

Robert E. Uhrig
Vice President

REU/MAS/cpc

Attachment

cc: Mr. James P. O'Reilly, Region II
Robert Lowenstein, Esquire

TURKEY POINT UNIT NO. 3 REACTOR VESSEL
MATERIAL SURVEILLANCE PROGRAM

1.) The estimated maximum fluence (E > 1 Mev) at the inner surface of the reactor vessel wall as of March 31, 1977 is 5.65×10^{18} n/cm^2.

2.) The effective full power years (EFPY) of operation accumulated as of March 31, 1977 is 2.87 EFPY.

3.) Fabrication of the reactor vessel was performed by the Babcock and Wilcox Company.

4.) a.) A sketch of the reactor vessel showing all materials in the beltline region is shown in Figure 1.

b.) Information on each of the welds in the beltline region is shown in Tables 1 through 4.

c.) Information on each of the forgings in the beltline region is shown in Tables 4 through 7.

5.) Information relative to weld and forging material included in the material surveillance program is shown in Tables 1 through 3 and 5 trough 7.

FIGURE 1

IDENTIFICATION AND LOCATION OF BELTLINE REGION MATERIAL IN THE TURKEY POINT UNIT NO. 3 REACTOR VESSEL

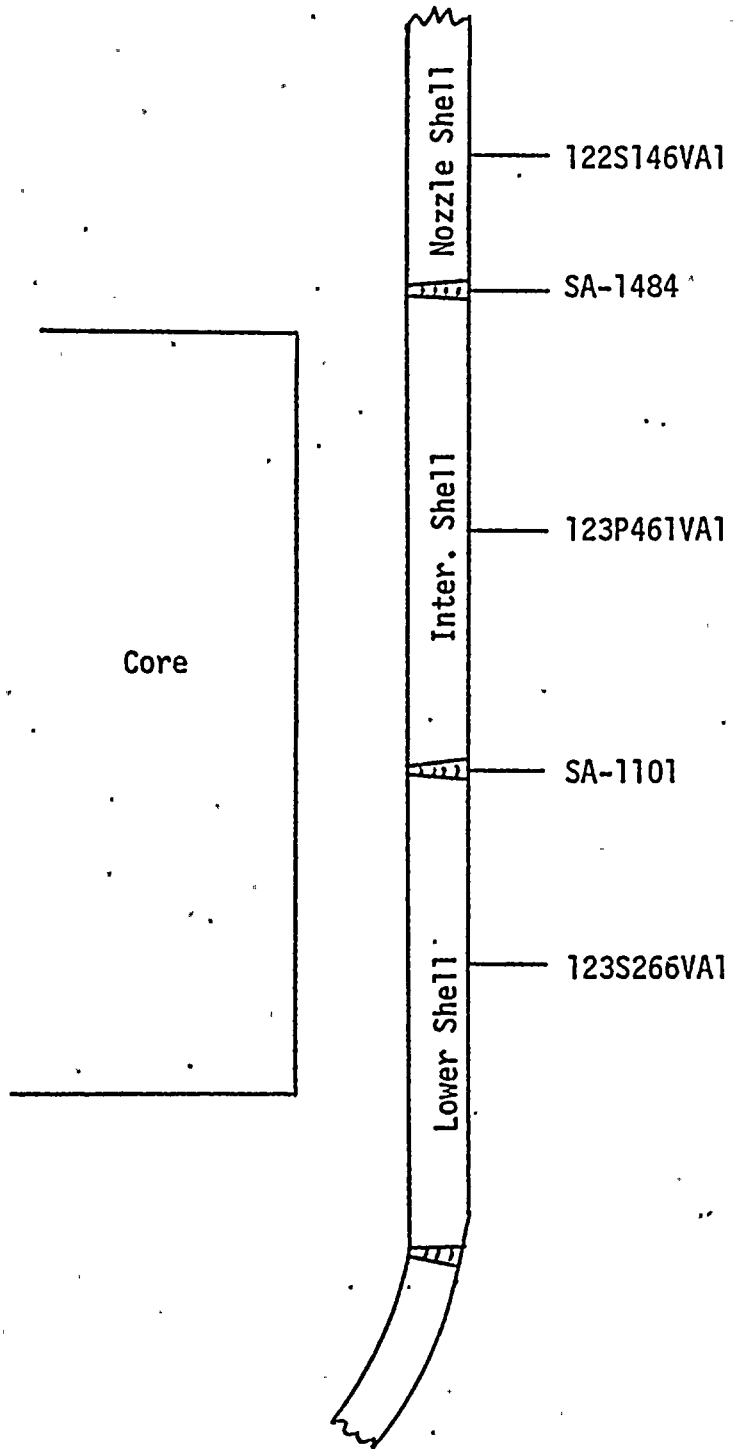


TABLE 1

IDENTIFICATION OF REACTOR VESSEL TURKEY POINT UNIT NO. 3

REACTOR VESSEL BELTLINE REGION WELD MATERIAL

Weld Location	Weld Process	Weld Control No.	Weld Wire		Flux		Post Weld Heat Treatment
			Type	Heat No.	Type	Lot No.	
Nozzle Shell to Inter. Shell	Submerged Arc	SA-1484	Mn Mo Ni	72442	Linde 80	8579	1100-1125°F-48 Hrs-FC
Inter. Shell to Lower Shell	Submerged Arc	SA-1101	Mn Mo Ni	71249	Linde 80	8445	1100-1125°F-48 Hrs-FC
Surveillance Weld	Submerged Arc	SA-1101	Mn Mo Ni	71249	Linde 80	8445	1125°F-10 1/4 Hrs-FC

TABLE 2

CHEMICAL COMPOSITION OF VESSEL BELTLINE REGION WELD MATERIAL

Weld Control No.	Weld Wire		Flux		Weight Percent								
	Type	Heat No.	Type	Lot No.	C	P	S	Mn	Si	Mo	Ni	Cr	Cu
SA-1484	Mn Mo Ni	72442	Linde 80	8579	.08	.018	.015	1.52	.42	.39	.64	.06	.2
SA-1101	Mn Mo Ni	71249	Linde 80	8445	.07	.021	.014	1.28	.52	.36	.57	.17	.21
Surveillance Weld					.076	.011	.018	1.26	.66	.42	.57	.14	.31

TABLE 3

MECHANICAL PROPERTIES OF VESSEL BELTLINE REGION WELD MATERIAL

Weld Control No.	Weld Wire Type	Weld Wire Heat No.	Flux Type	Flux Lot No.	T_{NDT}* °F	Energy at 10°F ft-lb	RT_{NDT}* °F	Shelf Energy ft-lb	YS ksi	UTS ksi	Elong. %	RA %
SA-1484	Mn Mo Ni	72442	Linde 80	8579	0	40,52,41	0	----	-----	84.00	----	----
SA-1101	Mn Mo Ni	71249	Linde 80	8445	0	45,45,46	0	----	68.63	84.26	28.5	----
Surveillance Weld					0	26,37,25	3	64.5	76.30	92.35	24.9	64.1

*Estimated Per NRC Standard Review Plan Section 5.3.2.

TABLE 4

MAXIMUM END-OF-LIFE FLUENCE AT VESSEL INNER WALL LOCATIONS

Shell Forging or Weld Location	Fluence n/cm^2
Nozzle Shell Forging	9.5×10^{18}
Nozzle Shell to Inter. Shell Circle Seam	9.5×10^{18}
Inter. Shell Forging	6.3×10^{19}
Inter. Shell to Lower Shell Circle Seam	6.3×10^{19}
Lower Shell Forging	6.3×10^{19}

TABLE 5

IDENTIFICATION OF VESSEL BELTLINE REGION SHELL FORGING MATERIAL

Component	Forging No.	Heat No.	Material Spec.	Supplier	Heat Treatment		
					Austenitize	Temper	Stress Relief
Nozzle Shell	122S146VA1	122S146	A508 CL 2	Bethlehem	1550°F-11 HR-WQ	1220°F-22 HR-AC	1125°F-40 HR-FC
Inter. Shell	123P461VA1	123P461	A508 CL 2	Bethlehem	1550°F-13 HR-WQ	1210°F-18 HR-AC	1125°F-40 HR-FC
Lower Shell	123S266VA1	123S266	A508 CL 2	Bethlehem	1550°F-13 HR-WQ	1210°F-18 HR-AC	1125°F-40 HR-FC
Surveillance Material - Inter. and Lower Shell as Above Except Stress Relieved by Westinghouse							1125°F-10 1/4 HR FC

TABLE 6

CHEMICAL COMPOSITION OF VESSEL BELTLINE REGION SHELL FORGING MATERIAL

Forging No.	C	Mn	P	S	Si	Ni	Mo	Cr	V	Co	Cu
122S146VA1	.22	.64	.010	.013	.25	.68	.59	.35	.03	.014	----
123P461VA1	.20	.65	.010	.010	.26	.70	.62	.40	.02	.011	.058*
123S266VA1	.20	.62	.010	.008	.20	.67	.59	.38	.02	.016	.079*

*Analyses Performed by Westinghouse as Part of Surveillance Program

TABLE 7

MECHANICAL PROPERTIES OF VESSEL BELTLINE REGION SHELL FORGING MATERIAL

Forging No.	T_{NDT} °F	RT_{NDT}* °F	Shelf* Energy ft-lb	YS ksi	UTS ksi	Elong. %	RA %	
122S146VA1	50	50	98.5	64.0	85.5	26.0	69.95	
123P461VA1	40	40	98.5	68.0	90.7	25.0	68.35	
123S266VA1	30	30	117.5	58.1	83.4	28.0	71.40	
123P461VA1	--	40	94.0	64.4	96.2	26.1	70.35	Surveillance Test Data
123S266VA1	--	30	96.0	57.4	92.6	26.1	70.70	

*Estimated From Test Data in the Major Working Direction Per NRC Standard Review Plan Section 5.3.2

TURKEY POINT UNIT NO. 4 REACTOR VESSEL
MATERIAL SURVEILLANCE PROGRAM

1.) The estimated maximum fluence (E > 1 Mev) of the inner surface of the reactor vessel as of March 31, 1977 is 4.79×10^{18} n/cm^2.

2.) The effective full power years (EFPY) of operation accumulated as of March 31, 1977 is 2.43 EFPY.

3.) Fabrication of the reactor vessel was performed by the Babcock and Wilcox Co.

4.) a.) A sketch of the reactor vessel showing all materials in the beltline region is shown in Figure 1.

b.) Information on each of the welds in the beltline region is shown in Tables 1 through 4.

c.) Information on each of the forgings in the beltline region is shown in Tables 4 through 7.

5.) Information relative to weld and forging material included in the material surveillance program is shown in Tables 1 through 3 and 5 through 7.

FIGURE 1

IDENTIFICATION AND LOCATION OF BELTLINE REGION MATERIAL IN THE TURKEY POINT UNIT NO. 4 REACTOR VESSEL

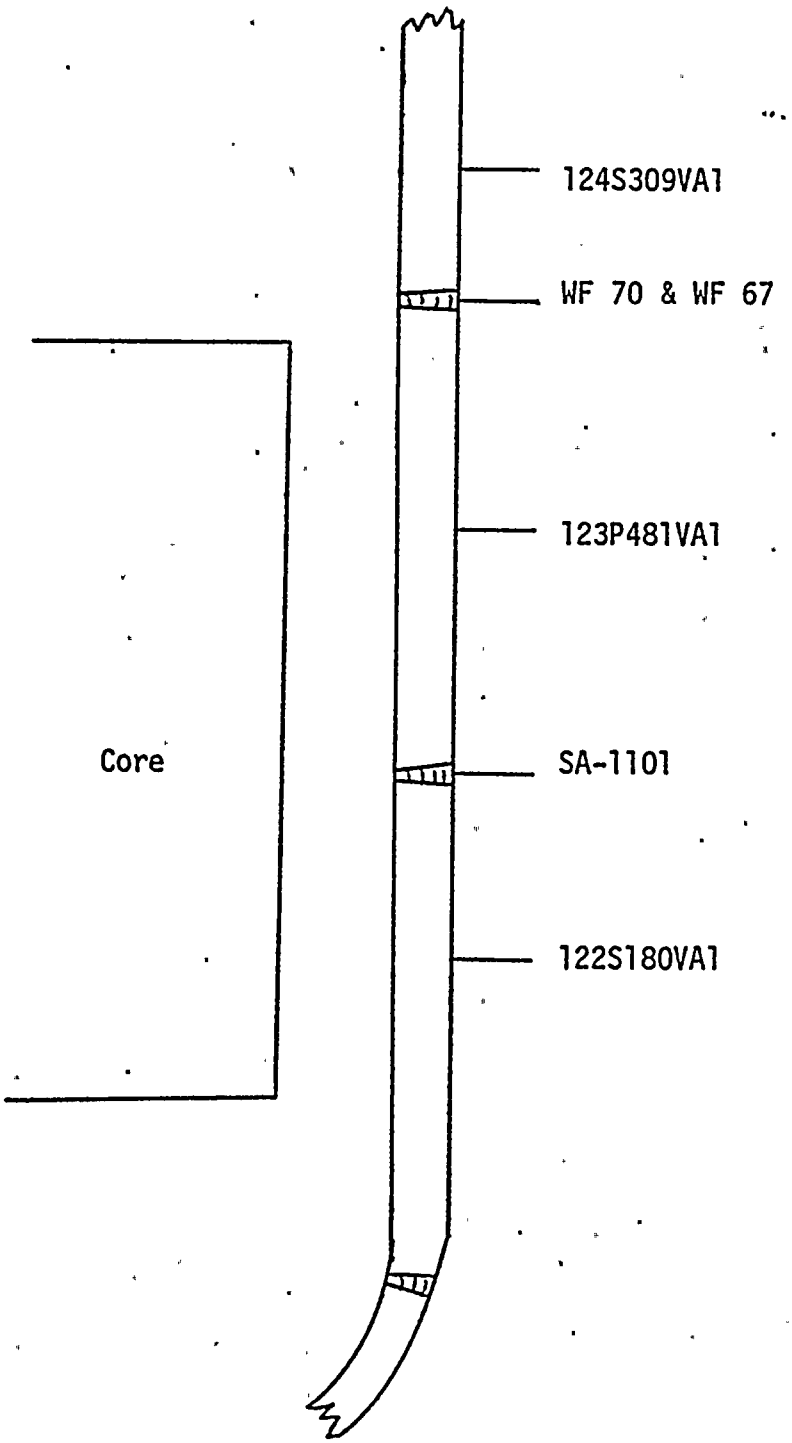


TABLE 1

IDENTIFICATION OF REACTOR VESSEL TURKEY POINT UNIT NO. 4

REACTOR VESSEL BELTLINE REGION WELD MATERIAL

Weld Location	Weld Process	Weld Control No.	Weld Wire		Flux		Post Weld Heat Treatment
			Type	Heat No.	Type	Lot No.	
Nozzle Shell to Inter. Shell	Submerged Arc	WF-70	Mn-Mo-Ni	72105	Linde 80	8669	1100-1150°F-48 HR
	Submerged Arc	WF-67	Mn-Mo-Ni	72442	Linde 80	8669	1100-1150°F-48 HR
Inter Shell to Lower Shell	Submerged Arc	SA-1101	Mn-Mo-Ni	71249	Linde 80	8445	1100-1150°F-48 HR
Surveillance Weld	Submerged Arc	SA-1094	Mn-Mo-Ni	71249	Linde 80	8457	1125°F-10 1/4 HR-FC

TABLE 2

CHEMICAL COMPOSITION OF VESSEL BELTLINE REGION WELD MATERIAL

Weld Control No.	Weld Wire		Flux		Weight Percent								
	Type	Heat No.	Type	Lot No.	C	Mn	P	S	Si	Ni	Mo	Cr	Cu
WF-70	Mn-Mo-Ni	72105	Linde 80	8669	.070	1.60	.014	.011	.48	.46	.40	---	.27
WF-67	Mn-Mo-Ni	72442	Linde 80	8669	.064	1.49	.014	.017	.54	.57	.41	.02	.2
SA-1101	Mn-Mo-Ni	71249	Linde 80	8445	.070	1.28	.021	.014	.52	.57	.36	.17	.21
SA-1094		71249	Linde 80	8457	.070	1.42	.020	.016	.51	.55	.49	.16	.23
Surveillance Weld					.098	1.44	.014	.011	.50	.60	.36	.14	.30

TABLE 3

MECHANICAL PROPERTIES OF VESSEL BELTLINE REGION WELD MATERIAL

Weld Control No.	Weld Wire Type	Weld Wire Heat No.	Flux Type	Flux Lot No.	T_{NDT}* °F	Energy at 10°F ft-lbs	RT_{NDT}* °F	Shelf Energy ft-lb	YS ksi	UTS ksi	Elong. %	RA %
WF-70	Mn-Mo-Ni	72105	Linde 80	8669	0	39,35,44	0	--	69.0	85.5	25.8	64.7
WF-67	Mn-Mo-Ni	72442	Linde 80	8669	0	29,35,30	0	--	64.0	81.5	31.3	65.8
SA-1101	Mn-Mo-Ni	71249	Linde 80	8445	0	45,45,46	0	--	68.6	84.3	28.5	----
SA-1094	Mn-Mo-Ni	71249	Linde 80	8457	0	38,34,52	0	--	72.5	86.0	26.7	65.1
Surveillance Weld					0	29,39,36	0	66	70.2	91.3	23.8	64.7

*Estimated Per NRC Standard Review Plan Section 5.3.2

TABLE 4

MAXIMUM END-OF-LIFE FLUENCE AT VESSEL INNER WALL LOCATIONS

Shell Forging or Weld Locations	Fluence n/cm^2
Nozzle Shell Forging	9.5×10^{18}
Nozzle Shell to Inter. Shell Circle Seam	9.5×10^{18}
Inter. Shell Forging	6.3×10^{19}
Inter. Shell to Lower Shell Circle Seam	6.3×10^{19}
Lower Shell Forging	6.3×10^{19}

TABLE 5

IDENTIFICATION OF VESSEL BELTLINE REGION SHELL FORGING MATERIAL

Component	Forging No.	Heat No.	Material Spec.	Supplier	Heat Treatment		
					Austenitize	Temper	Stress Relief
Nozzle Shell	124S309VA1	124S309	A508 CL 2	Bethlehem	1550°F-15 HR-WQ	1220°F-22 HR-FC	1125°F-40 HR-FC
Inter. Shell	123P481VA1	123P481	A508 CL 2	Bethlehem	1550°F-10 1/4HR-WQ	1210°F-18 HR-AC	1125°F-40 HR-FC
Lower Shell	12S180VA1	122S180	A508 CL 2	Bethlehem	1550°F-10 1/2 HR-WQ	1200°F-18 HR-FC	1125°F-40 HR-FC
Surveillance Material - Inter. and Lower Shell as Above Except Stress Relieved by Westinghouse							1125°F-10 1/2 HR-FC

TABLE 6

CHEMICAL COMPOSITION OF VESSEL BELTLINE REGION SHELL FORGING MATERIAL

Forging No.	Weight Percent										
	C	Mn	P	S	Si	Ni	Mo	Cr	V	Co	Cu
124S309VA1	.20	.60	.010	.012	.27	.70	.57	.33	.02	.008	---
123P481VA1	.21	.65	.010	.011	.25	.69	.59	.33	.02	.011	---
122S180VA1	.22	.60	.010	.009	.23	.74	.60	.34	.02	.013	---
123P481VA1*	.22	.67	.010	.009	.20	.71	.56	.33	.002	.017	.054
122S180VA1*	.21	.67	.011	.009	.23	.70	.56	.31	.001	.015	.056

*Surveillance Material Analysis Performed by Westinghouse.

TABLE 7

MECHANICAL PROPERTIES OF VESSEL BELTLINE REGION SHELL FORGING MATERIAL

Forging No.	T_{NDT} °F	RT_{NDT}* °F	Shelf* Energy ft-lb	YS ksi	UTS ksi	Elong. %	RA %	
124S309VA1	40	40	101	66.1	89.5	26.2	69.3	
123P481VA1	50	50	93	71.0	93.2	25.0	67.2	
122S180VA1	40	40	97	72.2	92.7	24.0	66.9	
123P481VA1	--	50	88	68.5	90.1	25.4	68.1	Surveillance Test Data
122S180VA1	--	40	86	70.8	91.5	24.2	67.8	

*Estimated From Test Data in the Major Working Direction Per NRC Standard Review Plan Section 5.3.2