CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9807210331 DOC.DATE: 98/07/13 NOTARIZED: NO DOCKET #
FACIL:50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
AUTH.NAME AUTHOR AFFILIATION
HOVEY,R.J. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Records Management Branch (Document Control Desk)

SUBJECT: Forwards response to NRC 980407 RAI re GL 92-01,Rev 1,Suppl 1, "Reactor Vessel Structural Integrity." Evaluation re addl weld chemistry data for reactor pressure vessels fabricated by B&W obtained from Framatome Technology,encl.

DISTRIBUTION CODE: A028D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 11
TITLE: Generic Letter 92-01, Rev 1, Suppl 1 Responses (Reactor Vessel Struct

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 PD	1	1	JABBOUR,K	1	1
INTERNAL:	FILE CENTER 01	1	1	NRR/DE/EMCB	1	1
	NUDOCS-ABSTRACT	1	1	OGC/HDS3	1	0
	RES/DET/EMMEB	1	1			
EXTERNAL:	NOAC	1	1	NRC PDR	1	1

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE. TO HAVE YOUR NAME OR ORGANIZATION REMOVED FROM DISTRIBUTION LISTS OR REDUCE THE NUMBER OF COPIES RECEIVED BY YOU OR YOUR ORGANIZATION, CONTACT THE DOCUMENT CONTROL DESK (DCD) ON EXTENSION 415-2083

TOTAL NUMBER OF COPIES REQUIRED: LTTR 9 ENCL 8

CATEGORY 1 DOCUMENT

FPL

JUL 13 1998

L-98-155
10 CFR 50, Appendix G

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Response to Request for Additional Information
Generic Letter 92-01, Revision 1,
Supplement 1, "Reactor Vessel Structural Integrity"

On April 7, 1998, the NRC issued "Request for Additional Information Regarding Reactor Pressure Vessel Integrity at Turkey Point Units 3 and 4 (TAC Nos. MA0579 and MA0580)," requesting that Florida Power and Light Co. (FPL) evaluate the additional weld chemistry data for reactor pressure vessels fabricated by Babcok & Wilcox Company obtained from Framatome Technologies, and determine if the additional data identified affects previous reactor pressure vessel integrity analyses.

In accordance with the NRC request, attached is the FPL response to the NRC's questions, for Turkey Point Units 3 and 4.

Should there be any questions, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Plant

OIH

Attachments

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

A028

Turkey Point Units 3 and 4
Response to Request For Additional Information
Generic Letter 92-01, Revision 1 , Supplement 1

The following information is provided in response to "Request for Additional Information Regarding Reactor Pressure Vessel Integrity at Turkey Point Units 3 and 4 (TAC NOS. MA0579 and MA0580)," issued by the NRC on April 7, 1998.

NRC Question 1

The NRC requests an evaluation of the information forwarded by letters from Matthew Devan of Framatome Technologies to Barry Elliot of the NRC and an assessment of its applicability to the determination of best-estimate chemistry for all your reactor pressure vessel (RPV) beltline welds. Based on this reevaluation, supply the information necessary to completely fill out the data requested in Table 1 for each RPV beltline weld material. Also provide a discussion of the copper and nickel values chosen for each weld wire heat noting which heat-specific data were included and excluded from the analysis and the analysis method chosen for determining the best-estimate copper and nickel values.

FPL Response

The Turkey Point Units 3 and 4 RPVs were fabricated by Babcock & Wilcox (B&W) using ring forgings joined by submerged arc welds. Therefore, there is only one beltline circumferential weld in the core midplane. The beltline circumferential weld for both vessels is designated SA 1101, fabricated from Page weld wire heat number 71249.

The copper and nickel values currently used for the Turkey Point Units 3 and 4 RPV circumferential limiting welds are 0.26% and 0.60% respectively. These values were developed by FPL for weld wire number 71249 in 1984 and submitted to the NRC by FPL letter L-84-31, dated February 10, 1984. The NRC evaluated this submittal and approved the use of the current copper and nickel values by letter dated April 26, 1984. FPL developed these values from a database of 51 analyses for copper and 41 for nickel. The 0.26% copper and 0.60% nickel values are an arithmetic mean of all values in the population, consistent with

the guidance provided in Regulatory Guide (RG) 1.99, Revision 2. Based on the information available at that time, all welds using Page weld wire heat number 71249 weld metal were included. These welds were identified as SA 1101, SA 1229, SA 1094 and SA 1769.

As a result of the May 1997 NRC inspection of Framatome Technologies, Inc. (FTI), additional weld chemistry data was identified for RPVs fabricated by Babcock & Wilcox (B&W). BAW-2325, "Response to Request for Additional Information (RAI) Regarding Reactor Vessel Integrity," dated May 1998, was developed by FTI for the B&W Owners Group Reactor Vessel Working Group. BAW-2325 provides the most current materials and fabrication information available for the 15 vessels operated by members of the B&W Owners Group, and documents the methodology used to develop this data. This report was submitted to the NRC by the B&W Owners Group per letter OG-1707, dated May 28, 1998. The BAW-2325 chemistry table pertaining to Turkey Point Units 3 and 4 contains 94 copper values (all of which are included in the reevaluation) and 80 nickel values (of which all but 6 are included in the reevaluation).

The following Table (Table 3-2 from BAW-2325) lists the source from which all the data were derived, and the mean of all sources.

TABLE 3-2 from BAW-2325

Heat Number	Weld ID Number	Flux Lot No.	Source of Weldment	No. of Observ. Cu	No. of Observ. Ni	Source Mean Cu	Source Mean Ni
71249	SA-1094	8457	Weld Qualification	1	1	0.23	0.55
			TP-4 RVSP Weld	4	1	0.29	0.60
	SA-1101	8445	Weld Qualification	1	1	0.21	0.57
			ONS-1 Nozzle Dropout	37	36	0.19	0.59
			TP-3 RVSP Weld	6	1	0.33	0.57
	SA-1229	8492	Weld Qualification	1	1	0.20	0.57
	SA-1344	8504	Weld Qualification	1	1	0.21	0.62
	SA-1706	8669	Weld Qualification	1	1	0.21	0.55
	SA-1769	8738	Weld Qualification	1	1	0.19	0.66
			W Surv. Weld	41	36	0.28	0.62
			Weld Wire Heat Best-Estimate (Mean of the Sources)			**0.23**	**0.59**

The best-estimate copper and nickel chemical compositions for the high-copper Linde 80 weld metals were determined by first establishing the mean for each particular material source, e.g., nozzle belt dropout, surveillance block/specimen, weld qualification, and weld qualification retest. These material source means were then used to calculate the mean for the weld wire heat. This method is preferred because it eliminates the possibility of skewing or misrepresenting data due to performing a large number of analyses based on a few sources.

This current data base includes all data used in the 1984 analysis, and adds 42 new copper data points. The data base provides the basis needed for validation of one copper data point which was not used in 1984. The current data base also adds 39 new nickel data points. The majority of the new data comes from a series of samples tested by Oakridge National Laboratories, B&W (Barberton, Mt. Vernon, and Lynchburg), National Institute for Standards of Testing (formerly National Bureau of Standards), and J&L Steel; and Heavy Section Steel Technology material 61W which was recently identified as a 71249 material. Two new welds, SA 1344 and SA 1706, were located and identified as a Page weld wire heat number 71249. Table A-4 from BAW-2325 (Attachment 2 to this response), lists the individual data points and the specific reasons for exclusion, if applicable. The excluded data has no significant effect on the mean of means best-estimate chemistry data for Turkey Point Units 3 and 4 RPVs.

Based on the validation of the 1984 data, the sources of the new data, and the application of mean of the means averaging technique, FPL understands how the data was developed and is confident that the reported values of 0.23 % copper and 0.59 % nickel represent the best-estimate for the deposited 71249 weld metal. Table 1 is completed as requested.

TABLE 1

Turkey Point Units 3 and 4 Beltline Weld Material

Weld Wire Heat	%Cu Best Estimate	%Ni Best Estimate	EOL ID Fluence (E19)	Chemistry Factor (CF) (°F)	Method for CF	Initial RT_{NDT} (°F)	Sigma Initial (°F)	Sigma Delta (°F)	Margin (°F)	ART/ RT_{pts} @ EOL (°F)
71249	0.23	0.59	2.74	167.55	table	10	0	28	56	278.6

Table 1 Notes:

- Turkey Point Units 3 and 4 have the same limiting weld, SA 1101 (weld wire 71249).
- There are three Turkey Point specific surveillance data points for this weld wire.
- The data is not credible using RG 1.99 Revision 2 criteria. Initial RT_{NDT} is based on 1 set drop weight and charpy data as documented in EPRI NP-373, "An Investigation of Mechanical Properties and Chemistry Within a Thick MnMoNi Submerged Arc Weldment," February 1977.
- Best estimate chemistry is obtained from BAW-2325.
- End of Life (EOL) fluence data was updated as per the Turkey Point Units 3 and 4 Uprating submittals, FPL letters L-95-245, dated December 18, 1995, and L-96-117, dated May 3, 1996.
- The "ratio procedure" was not used other than to verify that the data is not "non-conservative" per NRC guidance of November 1997. Since the surveillance welds have higher copper values than the mean, not using the ratio procedure is conservative.

NRC Question 2

The NRC requests the following: that (1) the information listed in Table 2, Table 3, and the chemistry factor from the surveillance data be provided for each heat of material for which surveillance weld data are available and a revision of the RPV integrity analyses (i.e., current licensing basis) is needed or (2) a certification that previously submitted evaluations remain valid. Separate tables should be used for each heat of material addressed. If the limiting material for your vessel's PTS/PT limits evaluation is not a weld, include the information requested in the tables for the limiting material (if surveillance data are available for this material).

FPL Response

Table 2 summarizes the results of surveillance capsule testing using updated fluence from WCAP 14044, "Westinghouse Surveillance Capsule Neutron Fluence Reevaluation," April 1994, and measured data using the hyperbolic tangent fit from NUREG/CR-6551, Draft, "Improved Embrittlement Correlations for Reactor Vessel Steels."

TABLE 2
Turkey Point Units 3 and 4 Surveillance Results

Capsule ID (Source)	Cu %	Ni %	Irr Temp (°F)	Fluence (E19)	Measured delta RT_{NDT} (°F)	Data used in Assessing Vessel
3T(PTN3)	0.33	0.57	546	.74	166	Yes
3V(PTN3)	0.33	0.57	546	1.53	180	Yes
4T(PTN4)	0.29	0.60	546	.708	211	Yes

Table 3 is a summary of the measured surveillance data from Turkey Point Units 3 and 4 calculated using the analytical treatment recently suggested by the NRC Staff, and referenced in the Request for Additional Information.

TABLE 3
Turkey Point Units 3 and 4 Surveillance Results

Capsule ID	Cu %	Ni %	CF (°F)	Irradiation Temp (°F)	Fluence Factor	Measured delta RT_{NDT} (°F)	Adjusted RT_{NDT} (°F)	Predicted Delta RT_{NDT} (°F)	(Adjusted-Predicted) Delta RT_{NDT} (°F)
3T	.33	.57	201.3	546	0.915	166	163	172	-9
3V	.33	.57	201.3	546	1.12	180	177	210	-33
4T	.29	.60	191	546	0.903	211	219	170	49
AVG.			198						

The adjusted RT_{NDT} was calculated by averaging the chemistry factors (CFs) of the capsule chemistries, dividing the average by each individual capsule chemistry data, and multiplying this ratio by the measured delta. The predicted delta was calculated by multiplying the CF determined from best fit of measured data and fluence factors, by the fluence factor.

All previously submitted reactor vessel integrity evaluations remain conservative. Revisions to existing submittals are not needed at this time.

NRC Question 3

If the limiting material for your plant changes or if the adjusted reference temperature for the limiting material increases as a result of the above evaluations, provide the revised RT_{pts} value for the limiting material in accordance with 10CFR50.61. In addition, if the adjusted Rt_{NDT} value increased, provide a schedule for revising the PT and LTOP limits.

FPL Response

As a result of these evaluations, the best estimate chemistry data for reactor vessel weld wire number 71249 has changed. The new copper and nickel values for the Turkey Point Units 3 and 4 RPVs are 0.23% and 0.59%, respectively. This determination was made using the mean of the means for all sources. All 94 known

copper values and all but 6 of the 80 nickel sources were used. The following comparison best demonstrates the effects of this reduction in chemistry data:

TABLE 4
Comparison of Effects of Existing and New Chemistry Data Application

	RT_{PTS} at EOL (°F)	1/4 T Rt_{NDT} at 19 EFPY (°F)	3/4 T RT_{NDT} at 19 EFPY (°F)
Last Submittal Value*	295	252.5	200.4
Using New Best Estimate Chemistry**	279	244.5	199.9

* The last P/T curve submittal was made per FPL letter L-88-424, dated September 21, 1988. The last 10CFR50.61(PTS) submittals were made per FPL letters L-95-245, dated December 18, 1995, and L-96-117, dated May 3, 1996.

** As defined in Section 1 of this response (0.23% Cu, 0.59% Ni).

The adjusted reference temperature has decreased since the copper and nickel values have been reduced. Therefore, the current PTS and P/T curves are still conservative.

The current P/T curves will expire at 19 EFPY. FPL will be submitting new P/T curves for Turkey Point Units 3 and 4 prior to 19 EFPY. The Units are currently at approximately 16.75 EFPY.

Attachment 2 to L-98-155

TABLE A-4 FROM BAW-2325

Weld ID	Flux Lot	Weld Metal Source	Analysis Source Reference	Cu wt%	Ni wt%	Notes
SA-1094	8457	Weld Qualification	Barberton WQ	0.23	0.55	
			Source Mean	***0.23***	***0.55***	
SA-1094	8457	TP-4 Surv. Weld	RVSP Baseline Chemistry	0.30	0.60	
		TP-4 Surv. Weld	CVN Specimen	0.27	—	
		TP-4 Surv. Weld	CVN Specimen	0.29	—	
		TP-4 Surv. Weld	CVN Specimen	0.30	—	
			Source Mean	***0.29***	***0.60***	
SA-1101	8445	Weld Qualification	Barberton WQ	0.21	0.57	
			Source Mean	***0.21***	***0.57***	
SA-1101	8445	ONS-1 Nozzle Dropout	Specimen No. I	0.23	0.52	
		ONS-1 Nozzle Dropout	Specimen No. H	0.20	0.54	
		ONS-1 Nozzle Dropout	Specimen No. G	0.20	0.54	
		ONS-1 Nozzle Dropout	Specimen No. F	0.17	0.54	
		ONS-1 Nozzle Dropout	Specimen No. E	0.15	0.55	
		ONS-1 Nozzle Dropout	Specimen No. D	0.19	0.54	
		ONS-1 Nozzle Dropout	Specimen No. C	0.18	0.55	
		ONS-1 Nozzle Dropout	Specimen No. B	0.15	0.54	
		ONS-1 Nozzle Dropout	Specimen No. A	0.16	0.55	
		ONS-1 Nozzle Dropout	Round Robin Sample Mt. Vernon Analysis: Lab No. 28772	0.19	0.63	
		ONS-1 Nozzle Dropout	Round Robin Sample Mt. Vernon Analysis	0.19	0.61	
		ONS-1 Nozzle Dropout	Round Robin Sample Mt. Vernon Analysis: Lab No. 28773	0.17	0.62	
		ONS-1 Nozzle Dropout	Round Robin Sample Mt. Vernon Analysis	0.18	0.62	
		ONS-1 Nozzle Dropout	Round Robin Sample Barberton Analysis	0.16	0.60	
		ONS-1 Nozzle Dropout	Round Robin Sample Barberton Analysis	0.16	0.61	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.18	0.62	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.29	0.67	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.18	0.54	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.19	0.53	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.18	0.54	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.23	0.64	
		ONS-1 Nozzle Dropout	Round Robin Sample LRC Analysis	0.23	0.65	
		ONS-1 Nozzle Dropout	Round Robin Sample J&L Steel Company Analysis	0.17	0.62	
		ONS-1 Nozzle Dropout	Round Robin Sample ORNL Analysis	0.18	0.61	
		ONS-1 Nozzle Dropout	Round Robin Sample Y-12 Analysis	0.18	0.65	
		ONS-1 Nozzle Dropout	Round Robin Sample Y-12 Analysis	0.13	0.63	
		ONS-1 Nozzle Dropout	Round Robin Sample NBS Analysis - 62W	0.17	0.62	
		ONS-1 Nozzle Dropout	Round Robin Sample NBS Analysis - 62W	0.17	0.61	
		ONS-1 Nozzle Dropout	Round Robin Sample NBS Analysis - 62W	0.17	0.62	

Weld ID	Flux Lot	Weld Metal Source	Analysis Source Reference	Cu wt%	Ni Wt%	Notes
SA-1101	8445	ONS-1 Nozzle Dropout	Round Robin Sample NBS Analysis - 62W	0.18	0.62	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-309	0.17	0.52	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-359	0.17	0.48	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-202	0.18	0.57	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-223	0.18	0.58	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-223	0.15	0.62	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-276	0.19	0.59	
		ONS-1 Nozzle Dropout	HSST Specimen ID: 62W-276	0.32	1.03	Ni content higher than expected range and analyses on same production weld; Ni content not used in source mean calculation
			Source Mean	***0.19***	***0.59***	
SA-1101	8445	TP-3 Surv. Weld	RVSP Baseline Chemistry	0.31	0.57	
		TP-3 Surv. Weld	Retest RVSP Baseline Chemistry	0.33	---	
		TP-3 Surv. Weld	Retest RVSP Baseline Chemistry	0.32		
		TP-3 Surv. Weld	CVN Specimen ID: W-17	0.35	---	
		TP-3 Surv. Weld	CVN Specimen ID: W-19	0.34	---	
		TP-3 Surv. Weld	CVN Specimen ID: W-20	0.32	---	
			Source Mean	***0.33***	***0.57***	
SA-1229	8492	Weld Qualification	Barberton WQ	0.20	0.57	
			Source Mean	***0.20***	***0.57***	
SA-1344	8504	Weld Qualification	Barberton WQ	0.21	0.62	
			Source Mean	***0.21***	***0.62***	
SA-1706	8669	Weld Qualification	Barberton WQ Lab No. E-70325	0.21	0.55	
			Source Mean	***0.21***	***0.55***	
SA-1769	8738	Weld Qualification	Barberton WQ Lab No. E-76488	0.19	0.66	
			Source Mean	***0.19***	***0.66***	
SA-1769	8738	W Surv. Weld	Mt Vernon Lab No. 29652	0.29	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29651	0.31	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29650	0.31	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29649	0.27	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29648	0.28	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29647	0.28	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29646	0.31	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29645	0.29	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29644	0.28	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29643	0.34	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29642	0.30	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29641	0.29	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29640	0.27	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29639	0.28	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29638	0.28	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29637	0.24	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29636	0.26	0.62	
		W Surv. Weld	Mt Vernon Lab No. 29635	0.27	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29634	0.28	0.63	
		W Surv. Weld	Mt Vernon Lab No. 29633	0.28	0.64	
		W Surv. Weld	Mt Vernon Lab No. 29632	0.31	0.64	
		W Surv. Weld	Mt Vernon Lab No. 29631	0.28	0.64	
		W Surv. Weld	Mt Vernon Lab No. 29630	0.28	0.64	
		W Surv. Weld	Mt Vernon Lab No. 29629	0.27	0.64	
		W Surv. Weld	Mt Vernon Lab No. 29628	0.27	0.64	
		W Surv. Weld	Mt Vernon Lab No. 29627	0.31	0.64	

Weld ID	Flux Lot	Weld Metal Source	Analysis Source Reference	Cu wt%	Ni Wt%	Notes
SA-1769	8738	W Surv. Weld	Weld HSST-61W Westinghouse Analysis	0.31	0.63	
		W Surv. Weld	Weld HSST-61W Westinghouse Analysis	0.28	0.62	
		W Surv. Weld	Weld HSST-61W Westinghouse Analysis	0.26	0.62	
		W Surv. Weld	Weld HSST-61W Westinghouse Analysis	0.28	0.64	
		W Surv. Weld	Weld HSST-61W Westinghouse Analysis	0.27	0.64	
		W Surv. Weld	HSST Specimen ID: 61W-232	0.39	0.47	Ni content lower than expected range and analyses on same production weld; Ni content not used in source mean calculation
		W Surv. Weld	HSST Specimen ID: 61W-276	0.24	0.59	
		W Surv. Weld	HSST Specimen ID: 61W-246	0.21	0.45	Ni content lower than expected range and analyses on same production weld; Ni content not used in source mean calculation
		W Surv. Weld	HSST Specimen ID: 61W-225	0.35	0.44	Ni content lower than expected range and analyses on same production weld; Ni content not used in source mean calculation
		W Surv. Weld	HSST Specimen ID: 61W-222	0.24	0.52	
		W Surv. Weld	HSST Specimen ID: 61W-270	0.24	0.54	
		W Surv. Weld	HSST Specimen ID: 61W-270	0.28	0.62	
		W Surv. Weld	HSST Specimen ID: 61W-270	0.26	0.59	
		W Surv. Weld	HSST Specimen ID: 61W-270	0.36	0.97	Ni content higher than expected range and analyses on same production weld; Ni content not used in source mean calculation
		W Surv. Weld	HSST Specimen ID: 61W-234	0.19	0.43	Ni content lower than expected range and analyses on same production weld; Ni content not used in source mean calculation
			Source Mean	*0.28*	*0.62*	