Attachments 4 and 5 Contain Proprietary Information
Withhold from public disclosure under 10 CFR 2.390

March 13, 2019

L-2019-054

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

Turkey Point Nuclear Plant, Units 3 and 4
Docket Nos. 50-250 and 50-251

SUBJECT: Turkey Point Baffle-Former Bolts Predictive Evaluations

Florida Power & Light (FPL) completed an ultrasonic testing (UT) examination of the baffle-former bolts (BFB) at Turkey Point Unit 3 during the fall 2018 refueling outage and at Turkey Point Unit 4 during the fall 2017 refueling outage. Westinghouse subsequently applied its BFB predictive model to the inspection results, and this letter provides the plant-specific predictive evaluations for determining the subsequent inspection intervals. FPL is voluntarily providing the evaluations for information only as requested by the NRC in its November 20, 2017 assessment of interim guidance on baffle-former bolts.

Attachments 1 and 4 contain non-proprietary and proprietary versions, respectively, of Westinghouse document LTR-AMLR-18-68, Rev 0, "Turkey Point Unit 3 Baffle Former Bolt Predictive Evaluation." Attachments 2 and 5 contain non-proprietary and proprietary versions, respectively, of Westinghouse document LTR-AMLR-17-37, Rev 1, "Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation." As Attachments 4 and 5 contain information proprietary to Westinghouse Electric Company LLC (Westinghouse), they are supported by an affidavit in Attachment 3 signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Nuclear Regulatory Commission (Commission) and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the copyright or proprietary aspects of the items above or the supporting Westinghouse affidavit should reference CAW-19-4860 and should be addressed to Camille T. Zozula, Manager, Facilities and Infrastructure Licensing, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 2, Suite 259, Cranberry Township, Pennsylvania 16066.

There are no new or revised commitments in this submittal.

Should you have any questions regarding this submittal, please contact me at 305-246-4112.

Sincerely,

Robert Hess
Licensing Manager
Turkey Point Nuclear Plant

Attachments

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

ATTACHMENT 1

LTR-AMLR-18-68-NP, Rev. 0

Turkey Point Unit 3 Baffle Former Bolt Predictive Evaluation

Westinghouse

To: Nathan Lang
Reactor Internals Design & Analysis I

Date: January 29, 2019

From: Louis Turicik
Aging Management & License Renewal

Your ref: N/A

Ext: 412-374-6072

Our ref: LTR-AMLR-18-68-NP, Rev. 0

Subject: **Turkey Point Unit 3 Baffle Former Bolt Predictive Evaluation**

Attachment: 1. FPE-18-025, PTN Baffle Former Bolt Inspection Results.pdf (electronically attached)

Florida Power & Light (FPL) completed an ultrasonic testing (UT) examination of the baffle-former bolts (BFBs) at Turkey Point Unit 3 (TP3) during the fall 2018 refueling outage. The inspection reported one BFB with relevant indications and one BFB that was non-inspectable [1]. A partial inspection was performed during the fall 2015 refueling outage with no relevant indications. No BFB replacement activity was conducted at the time of either outage.

This letter summarizes application of the BFB predictive model to the TP3 inspection results, which was performed in CN-AMLR-18-13 [2]. Please transmit this evaluation to FPL.

Authored by: ELECTRONICALLY APPROVED[1]
Louis W. Turicik
Aging Management & License Renewal

Verified by: ELECTRONICALLY APPROVED[1]
Joshua K. McKinley
Aging Management & License Renewal

Approved by: ELECTRONICALLY APPROVED[1]
Melanie R. Fici, Manager
Aging Management & License Renewal

[1]**Electronically approved records are authenticated in the electronic document management system.**

© 2019 Westinghouse Electric Company LLC
All Rights Reserved

*** This record was final approved on 1/29/2019 11:02:52 PM. (This statement was added by the PRIME system upon its validation)

1.0 Background

FPL performed a UT examination of the BFBs at TP3 in October 2018. The inspection occurred during refuel outage (RFO) 30, corresponding with the end of operation cycle (EOC) 29. The inspection reported one BFB with relevant indications, and one BFB that was non-inspectable. These inspection results are shown in Figure 1 and documented in [1]. Green cells (marked “G”) identify baffle-former bolts without UT indications. Gray cells (marked “U”) are locations where BFBs were non-inspectable. Red cells (marked “X”) are locations with reported indications. The single observed indication represents approximately 0.1% of the total population of BFBs in TP3, which is categorized as “Typical” BFB degradation per PWROG-17071 [14]. Expansion component examinations were not triggered due to the level of failures being below the MRP-227-A [5] expansion threshold of 5%. Prior to the inspections in 2018, a partial inspection of the BFBs at TP3 was completed during the fall 2015 RFO. No relevant indications were found. Fall 2015 inspection results can be seen in Figure 2. Note that in Figure 1 the baffle plate nomenclature was changed to be consistent with the fall 2015 RFO inspection results from [1]. No replacement activity was conducted by FPL after either inspection.

		Quadrant 1 (Octants 1 and 2)																																	
Baffle Plate		1			Ang.		2		3				4		5		6		7		8		9		10				11		Ang.		12		
Bolt		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Top	8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	7 or G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers	4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	3 or C	G	G	G	G	G	G	U	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Bottom	1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

		Quadrant 2 (Octants 3 and 4)																																	
Baffle Plate		12			Ang.		13		14				15		16		17		18		19		20		21				22		Ang.		23		
Bolt		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
Top	8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	7 or G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers	4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Bottom	1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

		Quadrant 3 (Octants 5 and 6)																																	
Baffle Plate		23			Ang.		24		25				26		27		28		29		30		31		32				33		Ang.		34		
Bolt		69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
Top	8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	7 or G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers	4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Bottom	1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

		Quadrant 4 (Octants 7 and 8)																																	
Baffle Plate		34			Ang.		35		36				37		38		39		40		41		42		43				44		Ang.		1		
Bolt		103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136
Top	8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	7 or G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers	4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	2 or B	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Bottom	1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

Figure 1: TP3 Fall 2018 As-Found Pattern of Bolts with Ultrasonic Test Indications [1]

	Quadrant 1 (Octants 1 and 2)																																	
Baffle Plate	1			Ang.		2		3				4		5		6		7		8		9		10				11		Ang.		12		
Bolt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Top 8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	0	G	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
7 or G	G	G	G	G	G	G	G	G	G	G	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
Formers 4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	0	G	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
Bottom 1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	0	G	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0

	Quadrant 2 (Octants 3 and 4)																																	
Baffle Plate	12			Ang.		13		14				15		16		17		18		19		20		21				22		Ang.		23		
Bolt	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
Top 8 or H	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
7 or G	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
6 or F	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
5 or E	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
Formers 4 or D	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
3 or C	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
2 or B	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
Bottom 1 or A	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0

	Quadrant 3 (Octants 5 and 6)																																	
Baffle Plate	23			Ang.		24		25				26		27		28		29		30		31		32				33		Ang.		34		
Bolt	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
Top 8 or H	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
7 or G	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
6 or F	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
5 or E	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
Formers 4 or D	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
3 or C	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
2 or B	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0
Bottom 1 or A	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	0	0	0	0

	Quadrant 4 (Octants 7 and 8)																																	
Baffle Plate	34			Ang.		35		36				37		38		39		40		41		42		43				44		Ang.		1		
Bolt	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136
Top 8 or H	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
7 or G	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
6 or F	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
5 or E	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
Formers 4 or D	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
3 or C	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
2 or B	0	0	0	0	G	G	U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	G	G	G	G	G	G
Bottom 1 or A	0	0	0	0	G	G	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	U	G	G	G	G	G	G

Note: Note in the inspection results from [1], several bolts were found to be of suspect shank length and were marked "SL." No head to shank indications were found in these bolts and for the purpose of this evaluation are considered to be intact at time of inspection and are marked "G."

Figure 2: TP3 Fall 2015 As-Found Pattern of Bolts with Ultrasonic Test Indications [1]

BFB degradation is a known occurrence in PWR operating experience and believed to be initiated by irradiation-assisted stress corrosion cracking (IASCC) [8, 9, 10, 11]. In 2016, UT inspections were conducted at Indian Point 2, Salem 1, and DC Cook 2. Extensive BFB degradation was detected in these 4-loop downflow units. A nuclear safety advisory letter [3] was published in response to these inspection results, which categorizes various plant designs into "Tiers" of expected BFB degradation.

TP3 is categorized as "Tier 2b," a 3-Loop downflow plant with Type 347 BFBs. The recommendations of NSAL-16-1, Rev. 1 [3] were used to create interim guidance [4] for MRP-227-A [5] and were incorporated into NEI-03-08 "Needed" Requirements.

*** This record was final approved on 1/29/2019 11:02:52 PM. (This statement was added by the PRIME system upon its validation)

The TP3 BFB material (Type 347 stainless steel) [6, 7] is susceptible to IASCC [8, 9, 10, 11]. The observed degradation of BFBs led to Westinghouse development of the acceptable bolting pattern analysis (ABPA) methodology [12], which has since been applied to several operating plants. An ABPA can be used to assess whether a baffle former assembly with degraded BFBs is acceptable for continued operation. However, the ABPA does not directly consider future degradation rates of bolts or the locations where degradation may occur. To estimate future degradation, a BFB predictive evaluation is required.

2.0 BFB Predictive Evaluation Overview

Westinghouse developed a predictive methodology for simulating the degradation of BFBs due to IASCC. The evaluation characterizes the evolution of stress in a reactor environment, as well as the redistribution of stress amidst neighboring bolt failures. Empirically-validated Weibull parameters are utilized in a stochastic framework. The bolt degradation model within the evaluation is exercised as a Monte Carlo simulation to evaluate a range of plausible scenarios from which trends of bolt failure rates and patterns can be determined. The predictive evaluation was developed from industry operating experience, laboratory testing, and a plant-specific finite element analysis that quantifies stress at each bolt location throughout the reactor operating history.

This stochastic semi-empirical model is constructed as a probabilistic network / influence diagram, as illustrated in Figure 3.

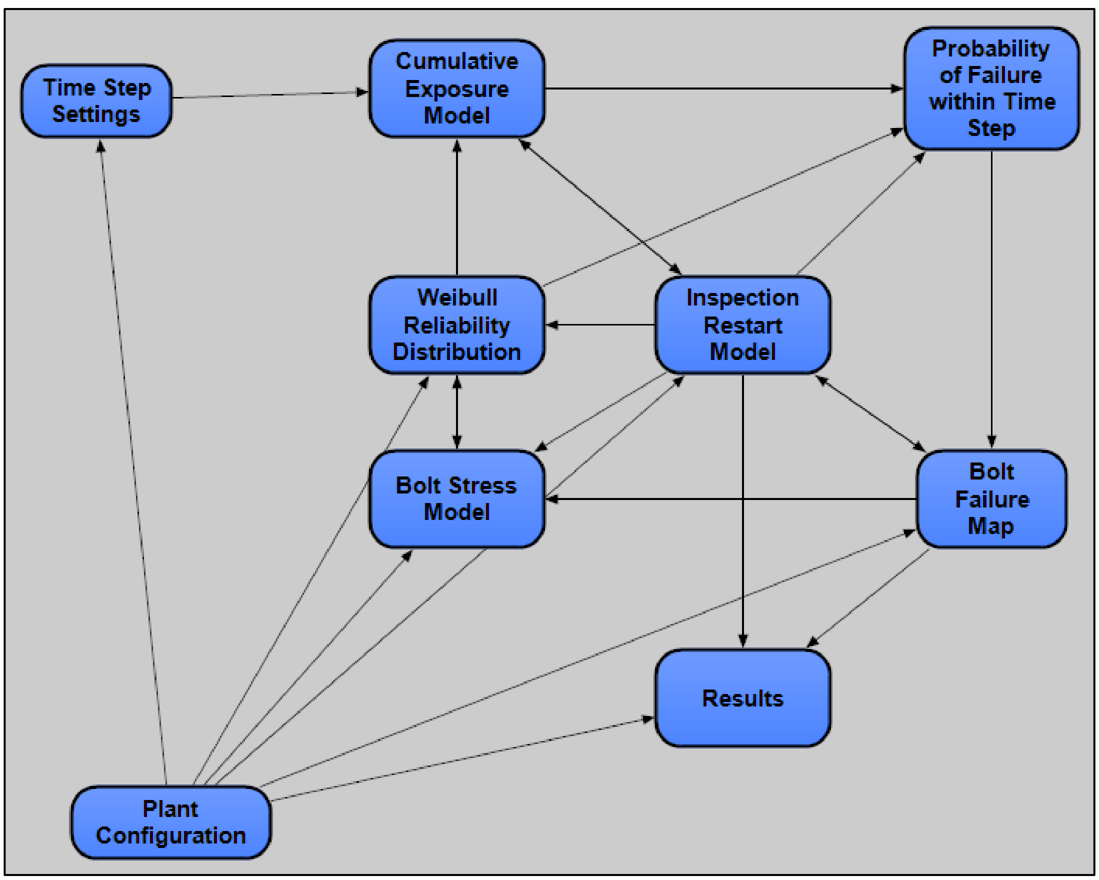

Figure 3: Influence Diagram of BFB Predictive Reliability Model

The bolt degradation model within the generic predictive evaluation was calibrated to Turkey Point operating experience and modified to include the following plant-specific inputs [2]:

- TP3 baffle plate and BFB geometry
- TP3 preload and pressure stresses at each bolt location
- TP3 bolt design stress concentration factor including head-to-shank fillet radius
- TP3 differential pressure across the baffle plates
- TP3 stress relaxation due to accumulated dose at each BFB location
- TP3 UT inspection results

The analysis includes the following case:

- TP3 prediction given 2015 and 2018 inspection results and no replacement activity

The data from each run are displayed in plots of the predicted overall fraction of failed bolts versus time, expressed as effective full-power years (EFPY). EFPY can be converted into calendar years using a plant capacity factor. For this analysis a capacity factor of 0.9 EFPY/calendar year (1.35 EFPY/cycle) was used. Heat maps of bolt failure probability at each location for a specific point in time (four and seven cycles of operation following the inspection) are also provided in Section 3.

The determination of recommended inspection intervals for TP3 is based on 95th percentile projections to maintain conservatism in the recommendations. Although no replacement activity was conducted at the time of inspection, there is no evidence of BFB clustering, which also supports the TP3 recommended inspection interval discussed in Section 5.

*** This record was final approved on 1/29/2019 11:02:52 PM. (This statement was added by the PRIME system upon its validation)

3.0 Turkey Point Unit 3 BFB Predictive Evaluation Results

Figure 5 through Figure 8 depict the predicted proportion of failed bolts for each quadrant, given the inspection results and no bolt replacement activity. For comparison purposes, inspection data from Turkey Point Unit 4 (TP4) [15] and four additional 3-loop plants is included on each proportion failed plot. These data points are labeled "3-Loop A" through "3-Loop D" respectively. Each figure also includes a predicted bolt failure probability heat map at the end of the fourth and seventh cycles following the UT inspection.

Note that the quadrant location definitions seen in the inspection results and predictive model are not the same. The predictive model intent is to analyze the entire wide (6 BFB across) baffle plate centered at 0°, 90°, 180°, and 270° locations around the baffle assembly. This requires a 45° shift in the definition of each quadrant. For example, quadrant 1 is defined in the inspection data as octants 1 and 2, quadrant 1 is defined in the predictive model as octants 2 and 3. See Figure 4 for further detail.

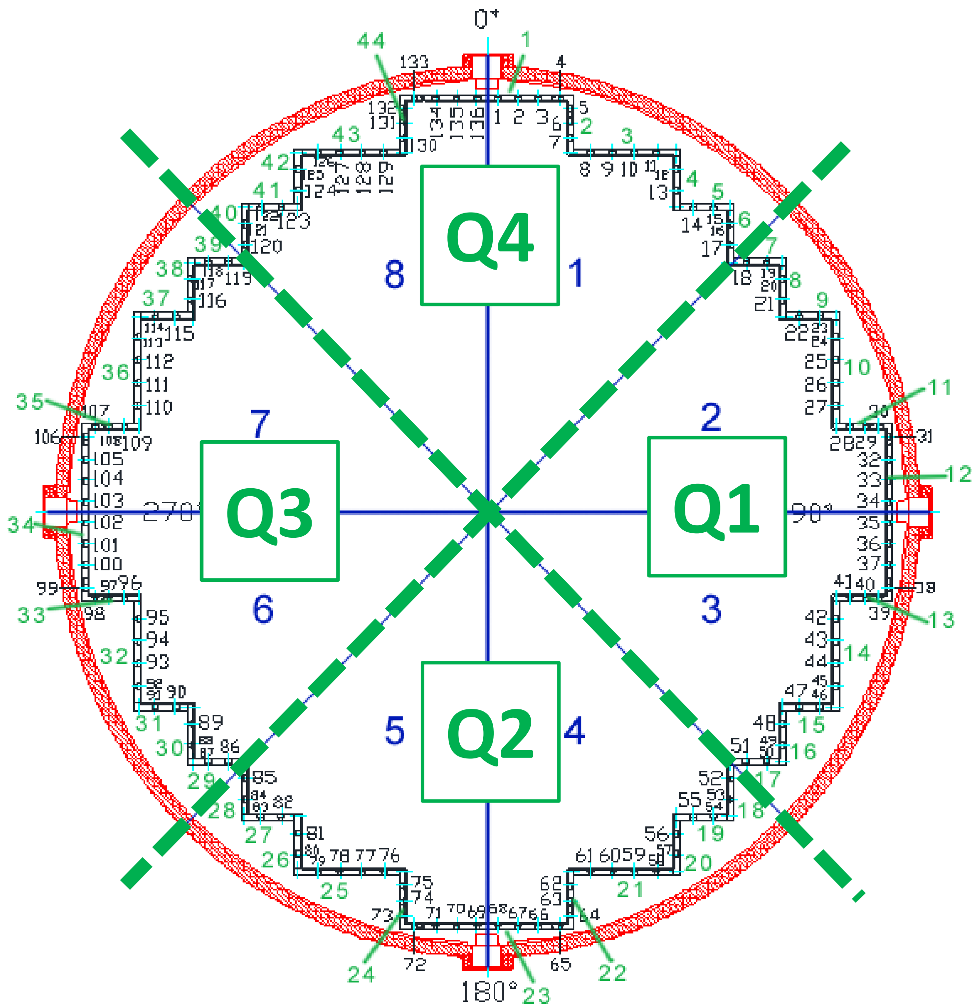

Figure 4: Quadrant Definition for the Predictive Model

a,c

Figure 5: TP3 Quadrant 1 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

*** This record was final approved on 1/29/2019 11:02:52 PM. (This statement was added by the PRIME system upon its validation)

a,c

Figure 6: TP3 Quadrant 2 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

a,c

Figure 7: TP3 Quadrant 3 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

a,c

Figure 8: TP3 Quadrant 4 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

TP3 is currently operating on 18 month fuel cycles. Table 3-1 and Table 3-2 summarize the predicted proportion of failed bolts following four and seven cycles of operation.

Table 3-1: TP3 Predicted Percent of Total Bolts Failed (EOC 29 + 4 Cycles of Operation)

[ ] a,c

Table 3-2: TP3 Predicted Percent of Total Bolts Failed (EOC 29 + 7 Cycles of Operation)

[ ] a,c

4.0 Assessing the Likelihood of Cluster Formation

At the time of inspection in fall 2018, clustering is not present at TP3 and there is little evidence of BFB failure acceleration. Per the interim guidance provided in PWROG-17071-P [14], TP3 is considered to have "Typical" BFB degradation with less than 3% indications and no clustering. The re-inspection interval for TP3 can be determined by applying the "Margin Ratio" or "Probabilistic Model" approaches specified in PWROG-17071-P.

5.0 Summary and Conclusions

Based on the inspection results (less than 3% total failed BFBs and no clustering) and the future degradation projections provided by the BFB predictive model, it is concluded that TP3 can implement an inspection interval of 10 years. This is the maximum re-inspection interval currently provided under the BFB inspection interim guidance of MRP 2017-009 [4]. The interval would start from EOC 29 (RFO 30) refueling outage. This conclusion is based on the EOC 29 + 7 cycles of operation predictions provided in Table 3-2, where even at the 95^{th} percentile prediction level, only **[ ]**^{a,c} of the total population of BFBs are projected to fail.

6.0 References

1. FPL Letter, ENG/JW-FPE-18-025, "Inspection Results for the PTN-3 Baffle Former Bolts," October 30, 2018. *[electronically attached to this letter, see PRIME]*
2. CN-AMLR-18-13, Rev 0, "Baffle Former Bolt Predictive Reliability Analysis for Turkey Point Unit 3," January 10, 2019. (Proprietary)
3. Westinghouse Nuclear Safety Advisory Letter, NSAL-16-1, Revision 1, "Baffle-Former Bolts," August 1, 2016.
4. Materials Reliability Program Letter, MRP 2017-009, Rev. 0, "Transmittal of NEI-03-08 "Needed" Interim Guidance Regarding Baffle Former Bolt Inspections for PWR Plants as Defined in Westinghouse NSAL 16-01 Rev. 1," March 15, 2017.
5. *Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)*. EPRI, Palo Alto, CA: 2011. 1022863.
6. WCAP-13266, Revision 1, "Baffle-Former Bolt Program for the Westinghouse Owners Groups Phase 1: Plant Categorization," July 1993. (Proprietary)
7. Westinghouse Drawing, 206C003, Rev. 2, "155.5/157-00-000-000 PWR Baffle to Former .625 External Hex Cap Screw." (Proprietary)
8. *Hot Cell Testing of Baffle/Former Bolts Removed from Two Lead Plants: (PWRMRP-28),* EPRI, Palo Alto, CA: 2000. 1000971.
9. *Materials Reliability Program: Hot Cell Testing of Baffle/Former Bolts Removed from Two Lead PWR Plants (MRP-51),* EPRI, Palo Alto, CA: 2001. 1003069.
10. McKinley, J., et al., "Examination of Baffle-Former Bolts from D.C. Cook Unit 2," 16th International Conference on Environmental Degradation of Materials in Nuclear Power Systems, Asheville, North Carolina, USA, August 11-15, 2013.
11. Somville, F., et al., "Ageing Management of Baffle Former Bolts in Belgian Nuclear Power Plants," Fontevraud 8, Avignon, France, September 15-18, 2014.
12. WCAP-15029-P-A, Revision 1, "Westinghouse Methodology for Evaluating the Acceptability of Baffle-Former-Barrel Bolting Distributions Under Faulted Load Conditions," January 1999. (Proprietary)
13. Westinghouse Report: WCAP-17887-P, Rev. 1, "Determination of Acceptable Baffle-Barrel Bolting for Turkey Point Units 3 and 4," February 2018. (Proprietary)
14. PWROG Report, PWROG-17071-NP, Rev. 0, "WCAP-17096-NP-A Interim Guidance," March 2018.
15. Westinghouse Letter, LTR-AMLR-17-37, Rev. 0, "Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation," January 22, 2018. (Proprietary)

*** This record was final approved on 1/29/2019 11:02:52 PM. (This statement was added by the PRIME system upon its validation)

This page was added to the quality record by the PRIME system upon its validation and shall not be considered in the page numbering of this document.

Approval Information
Author Approval Turicik Louis W Jan-29-2019 15:10:39
Verifier Approval Mckinley Joshua K Jan-29-2019 17:23:37
Manager Approval Fici Melanie R Jan-29-2019 23:02:52

Files approved on Jan-29-2019

*** This record was final approved on 1/29/2019 11:02:52 PM. (This statement was added by the PRIME system upon its validation)

ATTACHMENT 2

LTR-AMLR-17-37-NP, Rev. 1

Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation

Westinghouse

To:	Nathan Lang Reactor Internals Design & Analysis I	Date:	January 29, 2019
From:	Louis Turicik Aging Management & License Renewal	Your ref:	N/A
Ext:	412-374-6072	Our ref:	LTR-AMLR-17-37-NP, Rev. 1

Subject: **Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation**

Florida Power & Light (FPL) completed ultrasonic testing (UT) examination of the baffle-former bolts (BFBs) at Turkey Point Unit 4 (TP4) during the fall 2017 refueling outage. Approximately 3.3% of the 1088 TP4 BFBs were found to be either suspected of degradation or were uninspectable [1]. These bolts were relatively dispersed across the baffle plates. No BFB replacement activity was conducted at the time of the outage.

Westinghouse has updated its BFB predictive model to include 3-loop downflow Pressurized Water Reactors (PWRs). This letter summarizes the application of the updated model to the TP4 inspection results, which was performed in CN-AMLR-17-7 [13]. Please transmit this evaluation to FPL.

Authored by: ELECTRONICALLY APPROVED[1]
Louis W. Turicik
Aging Management & License Renewal

Verified by: ELECTRONICALLY APPROVED[1]
Joshua K. McKinley
Aging Management & License Renewal

Approved by: ELECTRONICALLY APPROVED[1]
Melanie R. Fici, Manager
Aging Management & License Renewal

[1]**Electronically approved records are authenticated in the electronic document management system.**

© 2019 Westinghouse Electric Company LLC
All Rights Reserved

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

1.0 Background

FPL performed a UT examination of the BFBs at TP4 in October 2017. The inspection occurred during refuel outage (RFO) 30, corresponding with the end of operation cycle (EOC) 29. The inspection reported 0 BFBs with relevant indications, 20 BFBs suspected to possibly have indications, and 16 BFBs that were non-inspectable. These inspection results are shown in Figure 1 and documented in [1]. Green cells (marked "G") identify baffle-former bolts without UT indications. Yellow cells (marked "Y") are BFBs suspected to have UT indications. Gray cells (marked "X") are locations where BFBs were non-inspectable. No confirmed indications were reported. For conservatism, in this evaluation both suspect and non-inspectable BFBs are considered to be failed. This results in 36 failures, approximately 3.3% of the total unit. Expansion component examinations were not triggered due to the level of failures being below the expansion threshold of 5%. No replacement activity was conducted by FPL after the inspection.

	Quadrant 1 (Octants 1 and 2)																																	
Baffle Plate	1			Ang.		2		3				4		5		6		7		8		9		10				11		Ang.		12		
Bolt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Top 8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
7 or G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G
6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	Y	Y	G	G	G	G	G	G	G	G	G	G	G
5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers 4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Bottom 1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

	Quadrant 2 (Octants 3 and 4)																																	
Baffle Plate	12			Ang.		13		14				15		16		17		18		19		20		21				22		Ang.		23		
Bolt	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
Top 8 or H	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
7 or G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G
6 or F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G
5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers 4 or D	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G
3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
2 or B	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	G	G	G	G	G
Bottom 1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G

	Quadrant 3 (Octants 5 and 6)																																	
Baffle Plate	23			Ang.		24		25				26		27		28		29		30		31		32				33		Ang.		34		
Bolt	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
Top 8 or H	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
7 or G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
6 or F	G	G	G	G	G	G	G	X	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers 4 or D	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G
3 or C	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G
2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	Y	G	G	G
Bottom 1 or A	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	Y	G	G	G	G	G	G	G	G	G

	Quadrant 4 (Octants 7 and 8)																																	
Baffle Plate	34			Ang.		35		36				37		38		39		40		41		42		43				44		Ang.		1		
Bolt	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136
Top 8 or H	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	Y	G	G
7 or G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
6 or F	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5 or E	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Formers 4 or D	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
3 or C	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	Y	G	G	G	G	G	G	G	G	G	G
2 or B	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	Y	G	G	G	G	G	G	G	G	G	G	G
Bottom 1 or A	G	G	G	G	G	G	G	G	G	X	X	G	G	G	G	G	G	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

Figure 1: TP4 As-Found Pattern of Bolts with Ultrasonic Test Indications [1]

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

BFB degradation is a known occurrence in PWR operating experience and believed to be initiated by irradiation-assisted stress corrosion cracking (IASCC). In 2016, UT inspections were conducted at Indian Point 2, Salem 1, and DC Cook 2. Extensive BFB degradation was detected in these 4-loop units. A nuclear safety advisory letter [2] was published in response to these inspection results, which led to the recommendation to inspect TP4 during the fall 2017 outage.

TP4 is classified as “Tier 2b,” a 3-Loop downflow plant with Type 347 BFBs. The recommendations of NSAL-16-1, Rev. 1 [2] were used to create interim guidance [3] for MRP-227-A [4] and were incorporated into NEI-03-08 “Needed” Requirements.

The TP4 BFB material (Type 347 stainless steel) [5, 6] is susceptible to IASCC [7, 8, 9, 10]. The observed degradation of BFBs led to Westinghouse development of the acceptable bolting pattern analysis (ABPA) methodology [11], which has since been applied to several operating plants. An ABPA can be used to assess whether a baffle former assembly with degraded BFBs is acceptable for continued operation. However, the ABPA does not directly consider future degradation rates of bolts or the locations where degradation may occur. To estimate future degradation, a BFB predictive evaluation is required.

2.0 BFB Predictive Evaluation Overview

Westinghouse developed a predictive methodology for simulating the degradation of BFBs due to IASCC. The evaluation characterizes the evolution of stress in a reactor environment, as well as the redistribution of stress amidst neighboring bolt failures. Empirically-validated Weibull parameters are utilized in a stochastic framework. The bolt degradation model within the evaluation is exercised as a Monte Carlo simulation to evaluate a range of plausible scenarios from which trends of bolt failure rates and patterns can be determined. The predictive evaluation was developed from industry operating experience, laboratory testing, and a plant-specific finite element analysis that quantifies stress at each bolt location throughout the reactor operating history.

This stochastic semi-empirical model is constructed as a probabilistic network / influence diagram, as illustrated in Figure 2.

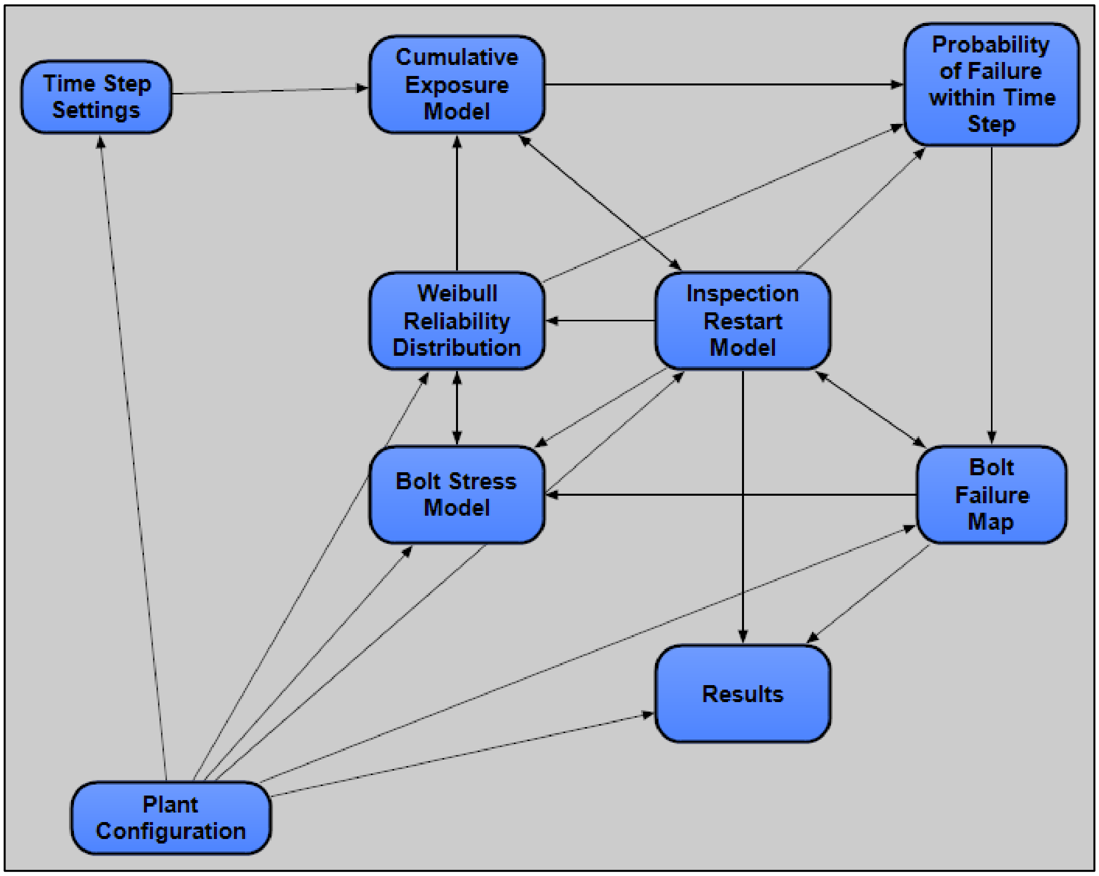

Figure 2: Influence Diagram of BFB Predictive Reliability Model

The bolt degradation model within the generic predictive evaluation was calibrated to TP4 operating experience and modified to include the following plant-specific inputs:

- Turkey Point 4 baffle plate and BFB geometry
- Turkey Point 4 preload and pressure stresses at each bolt location
- Turkey Point 4 bolt design stress concentration factor including head-to-shank fillet radius
- Turkey Point 4 differential pressure across the baffle plates
- Turkey Point 4 stress relaxation due to accumulated dose at each BFB location
- Turkey Point 4 UT inspection results

The analysis includes the following case:

- Turkey Point 4 prediction given 2017 inspection results and no replacement activity

The data from each run are displayed in plots of the predicted overall fraction of failed bolts versus time, expressed as effective full-power years (EFPY). EFPY can be converted into calendar years using a plant capacity factor. For this analysis a capacity factor of 0.9 EFPY/calendar year (1.35 EFPY/cycle) was used. Heat maps of bolt failure probability at each location for a specific point in time (four and seven cycles of operation following the inspection) are also provided in Section 3.

The determination of recommended inspection intervals for Turkey Point 4 is based on 95th percentile projections to maintain conservatism in the recommendations. Although no replacement activity was conducted at the time of inspection, there is little evidence of BFB clustering, which also supports the Turkey Point 4 recommended inspection interval discussed in Section 5.

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

3.0 TP4 BFB Predictive Evaluation Results

Figure 4 through Figure 7 depict the predicted proportion of failed bolts for each quadrant, given the inspection results and no bolt replacement activity. For comparison purposes, inspection data from four additional 3-loop plants is included on each proportion failed plot. These data points are labeled “3-Loop A” through “3-Loop D” respectively. Each figure also includes a predicted bolt failure probability heat map at the end of the fourth and seventh cycles following the UT inspection.

Note that the quadrant location definitions seen in the inspection results and predictive model are not the same. The predictive model intent is to analyze the entire wide (6 BFB across) baffle plate centered at 0°, 90°, 180°, and 270° locations around the baffle assembly. This requires a 45° shift in the definition of each quadrant. For example, quadrant 1 is defined in the inspection data as octants 1 and 2, quadrant 1 is defined in the predictive model as octants 2 and 3. See Figure 3 for further detail.

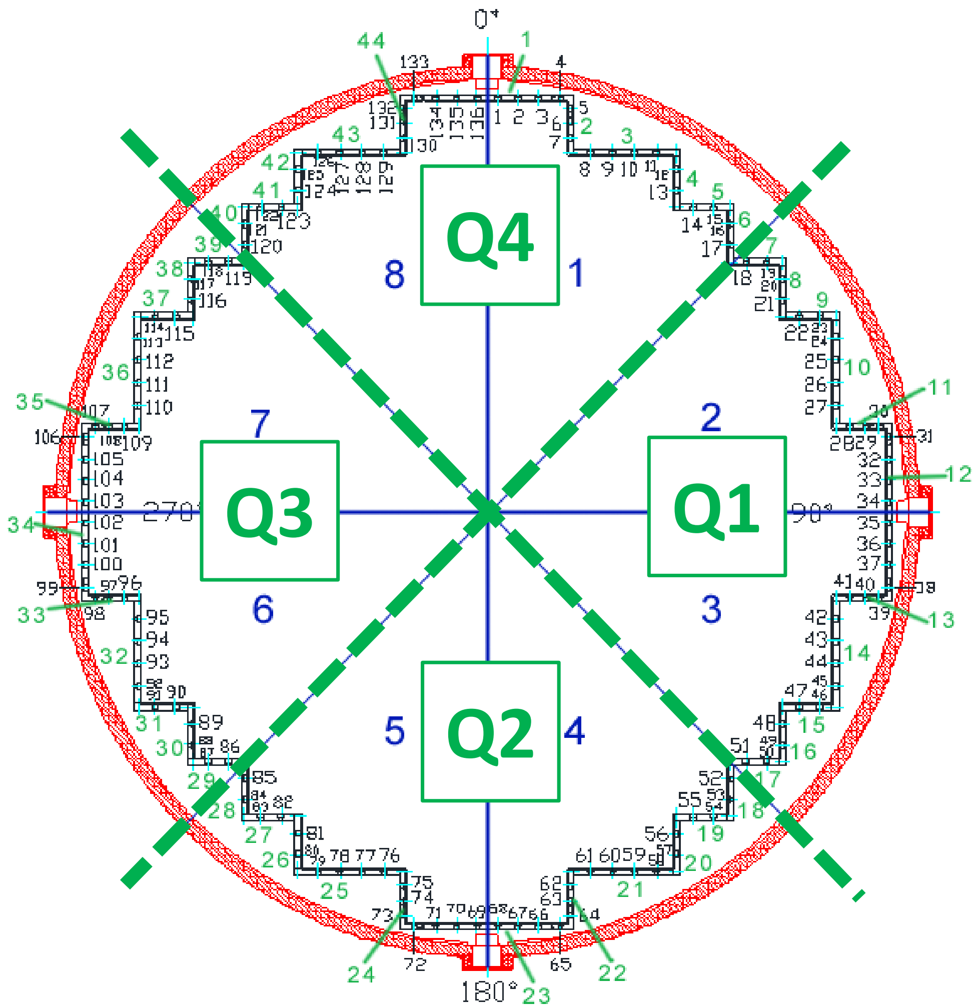

Figure 3: Quadrant Definition for the Predictive Model

a,c

Figure 4: Turkey Point 4 Quadrant 1 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

a,c

Figure 5: Turkey Point 4 Quadrant 2 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

a,c

Figure 6: Turkey Point 4 Quadrant 3 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

a,c

Figure 7: Turkey Point 4 Quadrant 4 Predicted Fraction of Failed Bolts and Bolt Failure Probability Heat Map Following Four and Seven Cycles of Operation

TP4 is currently operating on 18 month fuel cycles. Table 3-1 and Table 3-2 summarize the predicted proportion of failed bolts following four and seven cycles of operation.

Table 3-1: Turkey Point 4 Predicted Percent of Total Bolts Failed (EOC 29 + 4 Cycles of Operation)

[ ]a,c

Table 3-2: Turkey Point 4 Predicted Percent of Total Bolts Failed (EOC 29 + 7 Cycles of Operation)

[ ]a,c

4.0 Assessing the Likelihood of Cluster Formation

The Turkey Point ABPA [12] was updated via Real Time Analysis (RTA) during the fall 2017 outage at TP4. The ABPA RTA considered 8 patterns of bolt failures based on UT inspection data, and analyzed these patterns for acceptability. All 8 patterns analyzed were acceptable. The 8 acceptable patterns ranged between **[ ]a,c** and **[ ]a,c** intact baffle-former bolts.

The 95th percentile estimates from Table 3-1 are between **[ ]a,c** and **[ ]a,c** failed bolts after four cycles of operation. The range of intact bolts for the 95th percentile falls between **[ ]a,c** and **[ ]a,c** after four cycles of operation from EOC 29 (RFO 30). The 95th percentile estimates from Table 3-2 are between **[ ]a,c** and **[ ]a,c** failed bolts for Unit 4 after seven cycles of operation from EOC 29 (RFO 30). Conversely, the range of intact bolts for the 95th percentile falls between **[ ]a,c** and **[ ]a,c**. Overall, this level of failed bolts is similar to bolt failure patterns that were considered in the Turkey Point ABPA [12].

While the precise location of bolt failures in future cycles cannot be predicted, the heat maps generated do not illustrate a high likelihood of significant clustering for Unit 4 after four or seven cycles of operation. The 95th percentile estimates represent a reasonable conservative projection of the future degradation and are appropriate to use when determining the re-inspection interval. It is likely that inspection at these later outages would find degradation at one of the lower percentile levels rather than the 95th.

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

Finally, a review of all of the potential bolt failure patterns generated by the Monte Carlo analysis in the predictive evaluation was performed. Each pattern was categorized based on the risk of failing an ABPA assessment (High, Medium, Low, None) and assigned a corresponding weighted value. These values were aggregated to generate respective probabilities for each unit of failing a future ABPA. TP4 was analyzed after four and seven cycles of operation. The results of the aggregated data are as follows.

- Turkey Point Unit 4: +4 cycles of operation post-inspection: Approximate **[ ]**[a,c] chance of having an unacceptable bolt pattern after 4 cycles of operation from EOC 29 (RFO 30).

- Turkey Point Unit 4: +7 cycles of operation post-inspection: Approximate **[ ]**[a,c] chance of having an unacceptable bolt pattern after 7 cycles of operation from EOC 29 (RFO 30).

5.0 Summary and Conclusions

Based on the inspection results (≥3% total failed BFBs, no replacement), the maximum allowable UT re-examination period is not to exceed 6 years (four cycles) per MRP 2017-009 [3] modified requirements for subsequent UT examinations. However, the plant-specific evaluation as performed in the aforementioned predictive analysis shows that the 95th percentile results from the predictive evaluation (**[ ]**[a,c] total failed after 7 cycles of operation) and clustering assessment (informed by the results of [12]) demonstrate that there is an approximate **[ ]**[a,c] probability of the bolt pattern being acceptable after seven cycles of operation. Additionally, there is little evidence of BFB failure acceleration post-inspection. Westinghouse considers this a reasonable technical basis to support 7 cycles of operation from EOC 29 (RFO 30) prior to the next UT inspection. This re-inspection interval is approximately 10 years since TP4 is operating on an 18 month refuel cycle.

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

6.0 References

1. AREVA Letter, DOC-ES-17-0233, Rev. 0, "PNT – 4 Baffle Bolt Examination Results Rev-1," October 18, 2017.
2. Westinghouse Nuclear Safety Advisory Letter, NSAL-16-1, Revision 1, "Baffle-Former Bolts," August 1, 2016.
3. Materials Reliability Program Letter, MRP 2017-009, Rev. 0, "Transmittal of NEI-03-08 "Needed" Interim Guidance Regarding Baffle Former Bolt Inspections for PWR Plants as Defined in Westinghouse NSAL 16-01 Rev. 1," March 15, 2017.
4. *Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)*. EPRI, Palo Alto, CA: 2011. 1022863.
5. WCAP-13266, Revision 1, "Baffle-Former Bolt Program for the Westinghouse Owners Groups Phase 1: Plant Categorization," July 1993. (Proprietary)
6. Westinghouse Drawing, 206C003, Rev. 2, "155.5/157-00-000-000 PWR Baffle to Former .625 External Hex Cap Screw." (Proprietary)
7. *Hot Cell Testing of Baffle/Former Bolts Removed from Two Lead Plants: (PWRMRP-28)*, EPRI, Palo Alto, CA: 2000. 1000971.
8. *Materials Reliability Program: Hot Cell Testing of Baffle/Former Bolts Removed from Two Lead PWR Plants (MRP-51)*, EPRI, Palo Alto, CA: 2001. 1003069.
9. McKinley, J., et al., "Examination of Baffle-Former Bolts from D.C. Cook Unit 2," 16th International Conference on Environmental Degradation of Materials in Nuclear Power Systems, Asheville, North Carolina, USA, August 11-15, 2013.
10. Somville, F., et al., "Ageing Management of Baffle Former Bolts in Belgian Nuclear Power Plants," Fontevraud 8, Avignon, France, September 15-18, 2014.
11. WCAP-15029-P-A, Revision 1, "Westinghouse Methodology for Evaluating the Acceptability of Baffle-Former-Barrel Bolting Distributions Under Faulted Load Conditions," January 1999. (Proprietary)
12. Westinghouse Report: WCAP-17887-P, Rev. 1, "Determination of Acceptable Baffle-Barrel Bolting for Turkey Point Units 3 and 4," February 2018. (Proprietary)
13. Westinghouse Calculation Note, CN-AMLR-17-7, Rev. 0, "Baffle Former Bolt Predictive Reliability Analysis for Turkey Point Unit 4," January 22, 2018. (Proprietary)

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

This page was added to the quality record by the PRIME system upon its validation and shall not be considered in the page numbering of this document.

Approval Information
Author Approval Turicik Louis W Jan-29-2019 15:05:56
Verifier Approval Mckinley Joshua K Jan-29-2019 17:21:02
Manager Approval Fici Melanie R Jan-29-2019 22:59:24

Files approved on Jan-29-2019

*** This record was final approved on 1/29/2019 10:59:24 PM. (This statement was added by the PRIME system upon its validation)

ATTACHMENT 3

CAW-19-4860

Application for Withholding Proprietary Information from Public Disclosure

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-3382
Direct fax: (724) 940-8542
e-mail: anderstc@westinghouse.com

CAW-19-4860

January 31, 2019

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-AMLR-18-68-P, Rev 0, "Turkey Point Unit 3 Baffle Former Bolt Predictive Evaluation"
LTR-AMLR-17-37-P, Rev 1, "Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation"

The Application for Withholding Proprietary Information from Public Disclosure is submitted by Westinghouse Electric Company LLC ("Westinghouse"), pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Nuclear Regulatory Commission's ("Commission's") regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary information for which withholding is being requested in the subject report is further identified in Affidavit CAW-19-4860 signed by the owner of the proprietary information, Westinghouse. The Affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying Affidavit by Florida Power & Light Company.

Correspondence with respect to the proprietary aspects of the Application for Withholding or the Westinghouse Affidavit should reference CAW-19-4860, and should be addressed to Camille T. Zozula, Manager, Facilities and Infrastructure Licensing, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 2, Suite 259, Cranberry Township, Pennsylvania 16066.

Theodore C. Andersen, Director
Component Replacements & Engineering

Enclosures:
1. Affidavit CAW-19-4860
2. Proprietary Information- Notice and Copyright Notice
3. LTR-AMLR-18-68-P & -NP Rev 0 – "Turkey Point Unit 3 Baffle Former Bolt Predictive Evaluation"
4. LTR-AMLR-17-37-P & -NP Rev 1 – "Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation"

© 2019 Westinghouse Electric Company LLC. All Rights Reserved.

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

I, Theodore C. Andersen, am authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC ("Westinghouse") and declare that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

Executed on: Feb. 1, 2019

Theodore C. Andersen

Theodore C. Andersen, Director
Component Replacements & Engineering

(1) I am Director, Component Replacements and Engineering, Westinghouse Electric Company LLC ("Westinghouse"), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Nuclear Regulatory Commission's ("Commission's") regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute Westinghouse policy and provide the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage (e.g., by optimization or improved marketability).

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(iii) There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iv) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, is to be received in confidence by the Commission.

(v) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(vi) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-AMLR-18-68-P, Rev 0, "Turkey Point Unit 3 Baffle Former Bolt Predictive Evaluation" and LTR-AMLR-17-37-P, Rev 1, "Turkey Point Unit 4 Baffle Former Bolt Predictive Evaluation" (Proprietary), for submittal to the Commission, being transmitted by Florida Power and Light letter. The proprietary information as submitted by Westinghouse is that associated with Turkey Point Unit 3 and Unit 4Baffle Former Bolt Predictive Evaluation, and may be used only for that purpose.

(a) This information is part of that which will enable Westinghouse to evaluate Reactor Vessel Internals Core Support Barrel flaws.

(b) Further, this information has substantial commercial value as follows:

(i) Westinghouse plans to sell the use of similar information to its customers for the purpose of evaluating Reactor Vessel Internals Core Support Barrel flaws.

(ii) Westinghouse can sell support and defense of industry guidelines and acceptance criteria for plant-specific applications.

(iii) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and non-proprietary versions of a document, furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the Affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

COPYRIGHT NOTICE

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.