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PSEG
Nuclear LLC

LR-N16-0119

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Response to Request for Additional Information Regarding Review of Post-Extended Power Uprate Steam Dryer Stress Calculation Acoustic Circuit Model Software Error

References: 1. NRC letter to PSEG, Hope Creek Generating Station – Request for Additional Information Regarding Review of Post-Extended Power Uprate Steam Dryer Stress Calculation Acoustic Circuit Model Software Error (CAC No. MF7077), dated May 31, 2016.

In the referenced letter, the Nuclear Regulatory Commission (NRC) requested PSEG Nuclear LLC (PSEG) to provide additional information in order to assess the continued structural integrity of the Hope Creek steam dryer under extended power uprate conditions. Attachment 1 provides a detailed response to the request for additional information.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding this submittal, please contact Ms. Tanya Timberman at 856-339-1426.

Sincerely,

Paul Davison

Paul Davison
Site Vice President
Hope Creek Generating Station

Attachment 1: Response to Request for Additional Information

cc: Mr. D. Dorman, Administrator, Region I, NRC
Mr. C. Parker, Project Manager, NRC
NRC Senior Resident Inspector, Hope Creek
Mr. P. Mulligan, Chief, NJBNE
Hope Creek Commitment Tracking Coordinator
Corporate Commitment Tracking Coordinator

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Attachment 1

Response to Request for Additional Information

Response to Request for Additional Information Regarding
Post Extended Power Uprate Steam Dryer Analysis
Hope Creek Generating Station
Docket No. 50-354

By letter dated November 10, 2015 (Agencywide Documents Access and Management System Accession No. ML 15314A710), PSEG Nuclear LLC (PSEG or the licensee) submitted to the U.S. Nuclear Regulatory Commission (NRC) Region I Regional Administrator a summary of a courtesy notification made to the NRC Region I staff regarding information that was previously supplied by PSEG to the NRC that was not accurate in accordance with Title 10 of the *Code of Federal Regulations* Section 50.9(a).

The inaccurate information submitted was due to an error discovered in the Acoustic Circuit Model (ACM) software used for calculating the acoustic pressure loading on the Hope Creek Generating Station (HCGS) steam dryer. As noted in the letter, the results of this analysis were included in the licensee's submittals that supported the extended power uprate (EPU) application.

Regulatory Basis

The NRC staff has reviewed the November 10, 2015, letter and requests that the licensee provide the following additional information in order for the staff to assess the continued structural integrity of the HCGS steam dryer under EPU operating conditions. The staff approved the HCGS EPU license amendment request on May 14, 2008 (ADAMS Accession No. ML081230581).

Request for Additional Information

Based on preliminary information received from Continuum Dynamic, Inc. (CDI), PSEG indicated that the minimum alternating stress ratio (MASR) had been reduced from 2.36 to 1.05. This indicates that the ACM software error is quite significant and its correction increased the maximum alternating stress in the steam dryer by more than 100 percent.

Mechanical and Civil Engineering Branch EMCB-RAI-1

Please provide a detailed description of the software error mentioned in Reference 1 below. Also, describe whether the error impact of more than 100 percent applies to the entire dryer or is limited to certain locations only. Identify those locations as applicable, and provide the MASR before and after error correction (for locations where the MASR is less than 2.0).

PSEG Response EMCB-RAI-1:

The software that determines the pressure load distribution as a function of frequency solves the Helmholtz equation numerically. During software development, an alternate representation (the "analytical skirt model") of the solution in the thin gap between the reactor pressure vessel wall and steam dryer skirt was considered as a means of improving accuracy and lowering computational cost. The formulation and implementation of this alternate solution were correct, but the iteration algorithm used to obtain the skirt solution omitted a linearized coupling term that resulted in the skirt solution not being properly converged. Moreover, the alternate skirt solution

was invoked using a switch hardwired into the code that could be set to 0 or 1 by the software operator to omit or invoke this alternate skirt model.

Testing and benchmarking of the Helmholtz solver against Quad Cities data were carried out using the baseline software without this analytical skirt model. However, in subsequent evaluation of the steam dryer pressure load on the Hope Creek steam dryer, the analytical skirt model was inadvertently exercised in violation of CDI Quality Procedure.

When the pressure load was recomputed correctly, the pressure loadings increased. However, areas of the dryer which incorrectly had negligible pressure loading now saw a substantial load increase. The loads were changed at all locations on the dryer. The resulting limiting alternating stress ratios were found to occur primarily on the welds involving the steam dryer hoods or welds connecting the drain channels to the skirt.

The reevaluation of the Steam Dryer acoustic stresses indicates a 100% or more decrease in the MASR when comparing CDI report No. 08-21P to CDI report No. 15-06P; however, all stresses remain less than the American Society of Mechanical Engineers (ASME) code allowable limits. The reduced margin is not a linear relationship between the two calculations.

For the "before error corrected" analysis, refer to CDI Report No. 08-21P. For the "after error corrected" analysis refer, to CDI Report No. 15-06P. The locations of the "after error correction" stress ratios are summarized in Tables 1a and 1b. The locations of the "before error correction" stress ratios are summarized in Table 2a. Any node not summarized in Table 2a has stress ratios greater than 4.0. Also, note that the term "CLTP" refers to Hope Creek's licensed power prior to 115% extended power uprate (EPU).

The lowest MASR, SR-a, "before error correction" is 2.36, which occurs at Hood Support/Inner Hood weld (node: 80664). The MASR, SR-a, "after error correction" is 1.16, for the same node. This is a decrease of 1.20. The lowest MASR, SR-a, "after error correction" is 1.07 which occurs at Backing Bar/Middle Hood weld (node: 87919). The MASR, SR-a, "before error correction" is greater than 4.0, for the same node.

Table 1a, shows limiting non-weld locations at 115% CLTP conditions with frequency shifts. "After error correction"

Location	Location (in.)			node	Stress Intensity (psi), Salt	Stress Ratio, SR-a	% Freq. Shift	Dom. Freq. (Hz)
	x	Y	Z					
1. Mid-height of Inner Hood	83.4	35.9	50.9	40188	6261	1.97	10	48.7
2. Middle Hood	-25.6	68.9	35.1	37926	5435	2.27	2.5	47.5
3. Middle Hood	-24.2	64.9	69	37916	5356	2.31	2.5	47.5
4. Middle Hood	28.4	67.3	52.2	37238	5356	2.31	2.5	47.5
5. Inner Hood	84	37.2	37.7	40185	5098	2.43	10	48.7
6. Inner Hood	30.4	33.5	68.2	42011	5063	2.44	-2.5	48.6
7. Inner Hood	-28.6	37.4	36.1	41834	5020	2.46	-2.5	48.6
8. Inner Hood	93.6	36	50.8	40554	5011	2.47	10	48.7
9. Inner Hood	73.2	36	50.4	40518	4911	2.52	10	48.7

Table 1b, shows limiting alternating stress ratios, SR-a on welds at 115% CLTP conditions with frequency shifts. Note: (a) Full penetration welds so the weld factor, WF=1.4. "After error correction"

Location	Location (in.)			node	Stress Intensity (psi), Salt	Stress Ratio, SR-a	% Freq. Shift	Dom. Freq. (Hz)
	x	Y	Z					
1. Backing Bar/Middle Hood	-29.1	69.9	8.5	87919	6397	1.07	2.5	47.7
2. Backing Bar/Inner Hood	30	38.4	8.5	88060	6020	1.14	-2.5	48.6
3. Hood Support/Inner Hood[(a)]	0	-36.1	49.6	80664	5941	1.16	10	36.8
4. Hood Support/Inner Hood[(a)]	0	37.2	38.4	88025	5805	1.18	10	36.8
5. Bottom Skirt/Drain Channel	73.8	-93.1	-94.2	93833	5781	1.19	10	28.4
6. Hood Support/Inner Hood[(a)]	0	34.7	60.8	88019	5568	1.23	10	36.8
7. Drain Channel/Bottom Skirt	-118.2	12	-94.2	82775	5469	1.26	10	47.7
8. Backing Bar/Inner Hood	81.9	38.4	8.5	85261	4969	1.38	10	48.7
9. Backing Bar/Middle Hood	-16.5	69.9	8.5	87922	4863	1.41	2.5	47.7
10. Hood Support/Middle Hood[(a)]	0	68.3	42.2	87903	4856	1.41	-5	47.7
11. Hood Support/Inner Hood[(a)]	59.5	36.1	49.6	88043	4739	1.45	10	36.8
12. Hood Support/Hood[(a)]	0	67.1	53.3	87900	4605	1.49	7.5	41.8
13. Backing Bar/Inner Hood	42.7	38.4	8.5	88063	4493	1.53	-2.5	48.6
14. Backing Bar/Inner Hood	17.2	38.4	8.5	88057	4483	1.53	-2.5	48.6
15. Hood Support/Middle Hood[(a)]	0	65.6	64.4	87897	4475	1.53	-5	47.7
16. Hood Support/Inner Hood[(a)]	59.5	37.2	38.4	88046	4420	1.55	10	36.8
17. Hood Support/Inner Hood[(a)]	0	37.9	27.2	88028	4360	1.58	10	36.8
18. Hood Support/Inner Hood[(a)]	0	32.9	71.9	88016	4313	1.59	10	36.8
19. Hood Support/Inner Hood[(a)]	59.5	34.7	60.8	88040	4177	1.64	10	36.8
20. Backing Bar/Middle Hood	42.1	69.9	8.5	87826	4023	1.71	2.5	47.7
21. Backing Bar/Inner Hood	-94.8	38.4	8.5	85455	3874	1.77	10	48.6
22. Closure Plate/Hood	108.4	35.9	51.5	85304	3818	1.8	10	48.7
23. Hood Support/Vane Bank/Mid Cover Plate	0	22.9	7.5	93159	3810	1.8	10	36.8
24. Hood Support/Hood[(a)]	0	69.2	31	87906	3802	1.81	-5	47.7
25. Backing Bar/Hood	68.6	38.4	8.5	85256	3672	1.87	10	48.7
26. Hood Support/Hood[(a)]	59.5	37.9	27.2	88049	3643	1.89	10	36.8
27. Hood Support/Hood[(a)]	54.5	67.1	53.3	87806	3486	1.97	10	46.8

Table 2a, shows limiting alternating stress ratios, SR-a on welds at 115% CLTP conditions with frequency shifts. (Reference CDI Report No. 08-21P). "Before error correction"							
Location	Location (in.)			node	Stress Intensity (psi), Salt	Stress Ratio, SR-a	% Freq. Shift
	x	Y	Z				
1. Inner Hood/Hood Support	0	-36.1	49.6	80664	2910	2.36	7.5
2. Inner Hood/Hood Support	0	-34.7	60.8	80662	2745	2.50	7.5
3. Inner Hood/Hood Support	0	-37.2	38.4	80716	2732	2.51	7.5
4. Middle Hood/Hood Support	0	-68.3	42.2	90114	2335	2.94	-5
5. Inner Hood/Backing Bar	-30	-38.4	8.5	79668	2261	3.04	0
6. Middle Hood/Hood Support	0	-65.6	64.4	90096	2251	3.05	-5
7. Middle Hood/Hood Support	0	-67.1	53.3	90095	2133	3.22	-7.5
8. Inner Hood/Hood Support	0	-32.9	71.9	80704	2028	3.39	7.5
9. Middle Hod/Backing Bar	29.1	-69.9	8.5	89651	1939	3.54	0
10. Inner Hood/Hood Support	0	-37.9	27.2	80667	1873	3.67	7.5
11.Middle Hood/Hood Support	0	-69.2	31	90100	1827	3.76	-5
12. Inner Hood/Hood Support	-59.5	-36.8	42.2	80650	1809	3.80	5
13. Inner Hood/Hood Support	-59.5	-35.6	53.4	80594	1786	3.85	5

EMCB-RAI-2

In Reference 1, the licensee states that the CDI calculation contains conservatisms that can be reduced to raise the calculated MASR margins. These conservatisms are being reviewed to determine if additional margin can be credited. Any new methodologies, including any that were not part of the HCGS EPU safety evaluation, and not reviewed by the NRC, need a technical review for acceptability. Also, some methodologies, such as consideration of vibration-induced load reduction and perforated plate damping, may not be acceptable without an end-to-end benchmark.

(a) Describe what new approaches are considered in the re-assessment of the dryer.

(b) Describe what specific conservatisms in the calculations are being reviewed and evaluated to credit additional margin. Please note that Regulatory Guide 1.20 (Reference 2 below) allows a structural damping ratio of 1 percent for steam dryer analysis. This is significantly higher than the average measured damping ratio (0.053 percent) from the HCGS spare steam dryer testing that was performed in air.

PSEG Response EMCB-RAI-2:

(a) Noise subtraction previously used over the 75-85 Hz frequency interval to address a fictitious 80 Hz acoustic mode is no longer applied since the revised loads no longer contain this mode.

In all other respects, the finite element model of the steam dryer is essentially identical to those previously described in CDI Report No. 08-21P. Specifically, the same acoustic circuit analysis ACM 4.0 used in CDI Report No. 08-21P is used in CDI Report No. 15-06P. The same ACM Rev. 4.0 analysis, frequency-based structural analysis and post-processing techniques are employed.

No new methodologies were used in the re-evaluation of steam dryer stresses. The resulting stresses were assessed for compliance with the ASME B&PV Code 2007, Section III, subsection NG, for the load combination corresponding to normal operation (the Level A Service Condition) and EPU condition. The revised maximum stress values are less than the allowable limits defined by the code of record. Some changes were made to the dryer analysis inputs and are described below.

For specific Nodes identified on Table 1b, a fatigue strength reduction factor of 1.4 was used for full penetration welds versus the original 1.8 factor. The factors are consistent with the fatigue strength reduction factors recommended by the Welding Research Council, (WRC 432).

Lastly, the drain channels density was changed from 0.284 lbm/in^3 to a new value of 2.082 lbm/in^3. This increase in density credits the water inertia effect on the submerged structure to account for the added hydrodynamic mass. This methodology is consistent with the methodology used for the skirt structure, previously described in CDI Report No. 08-21P. Note that the increased effective density for submerged components is only used in the harmonic analysis. When calculating the stress distribution due to the static dead weight load, the unmodified density of steel (0.284 lbm/in^3) is used throughout, which is consistent with the previous analysis.

(b) The conservatisms credited in the reanalysis are described above. The reanalysis did not consider Vibration Induced Load (VIL) reduction or perforated plate damping to improve stress margins. There were no specific changes made to the structural damping of the steam dryer, in the reanalysis.

EMCB-RAI-3

HCGS is currently operating (under EPU conditions) with its original steam dryer installed in 1986 (with some steam dryer modifications performed when the EPU was implemented in 2008). Over some 29 years of operation, including 7 years of operation at the EPU level, the HCGS steam dryer has some intergranular stress corrosion cracking indications that may act as sources for fatigue crack growth, if alternating stresses are high at those locations. The structural qualification of the HCGS steam dryer for EPU operation was based on main steamline strain gage data, which is an indirect and remote method to infer fluctuating pressure loading on the steam dryer with unknown uncertainties. The NRC acceptance criteria for steam dryer structural qualification using this method is to maintain an MASR of greater than or equal to 2.0 as described in Reference 3 below.

Please provide any measures taken or planned to achieve the MASR of 2.0 after the ACM software error correction.

PSEG Response EMCB-RAI-3:

The NRC staff's review of the potential adverse flow effects on the Hope Creek steam dryer at EPU conditions is described in Appendix A to the safety evaluation for Amendment No. 174 (NRC Adams Accession No. ML081270714). No steam dryer modifications were performed when EPU was implemented. While the staff's evaluation does not specify a minimum acceptable MASR, it does state that the stress ratios at EPU show sufficient margin to support

the Hope Creek steam dryer for EPU operation. The stress ratios were based on predicted loads at EPU conditions.

Section 3.9.5.5.2 of the UFSAR describes the Power Ascension Monitoring and Analysis. Level 1 and Level 2 acceptance criteria are established for main steam line (MSL) strain gage and accelerometer data and for moisture carryover data, where Level 1 requires that power be reduced to a previous acceptable level and Level 2 requires that power be held at that level with a re-evaluation of the data. The Level 1 limit curves for MSL strain gages are based on not exceeding the ASME allowable alternating stress value on the dryer's limiting component. The Level 2 limit curves are based on not exceeding 80 percent of the allowable alternating stress value on the dryer.

As required by Facility Operating License Condition 2.C(22)2.e for long-term monitoring of plant parameters potentially indicative of steam dryer failure, Hope Creek maintains a steam dryer inspection program consistent with BWRVIP-139. Since issuance of Amendment No. 174, Hope Creek has operated at EPU conditions, with the exception of outages and occasional downpowers, since August 26, 2008, with no indications of adverse flow effects on the steam dryer.

Power ascension testing at EPU conditions confirmed Hope Creek does not exhibit strong acoustic resonances similar to those which led to steam dryer fatigue failures at EPU conditions at other BWRs.

Moisture carryover was sampled every 2.5% power and upon reaching 115% reactor power with Crossflow applied and final pressure set adjusted. No abnormal spikes, shifts or deviations in narrow range water level or reactor pressure were observed. Thus, the moisture carryover data in conjunction with other dryer data and indications supports that dryer integrity is maintained throughout power ascension testing. There are no trends of increased moisture carryover since EPU implementation, as provided in Table 3a.

The Hope Creek steam dryer has a curved hood design, as described in BWRVIP-139 Section 2.3.10. The BWRVIP issued BWRVIP-139, "Steam Dryer Inspection and Flaw Evaluation Guidelines" in 2005, with BWRVIP-139-A (the NRC approved version) issued in 2009. This report specified the required inspections for steam dryers, based on the design of the dryer. Hope Creek currently follows BWRVIP-139-A for its steam dryer inspections. A summary of the inspection results is described below.

From Refueling Outage (RF) RF2 through RF12, the steam dryer support ring was inspected, along with other areas based on industry operating experience (drain channels, cover plates) (HC.ER-PS.BB-0510, rev. 0). A baseline inspection was performed in RF13 in accordance with BWRVIP-139. Five issues were identified as part of this inspection, with four related to intergranular stress corrosion cracking (IGSCC). Re-inspection in RF14 indicated no change in growth for the four areas previously identified. A 15% EPU was performed during fuel cycle 15. As a result, a complete re-baseline inspection was performed in RF15 in accordance with BWRVIP-139-A. Two new indications were identified; horizontal crack on upper support ring at 185° and crater crack on brace for 40° lifting rod. Additionally, one previous indication had changed – indications on the 140° lifting rod found in RF13 had joined. The remainder of the previous indications remained unchanged.

A second complete re-baseline inspection was performed in RF16, with no changes to previous indications. There was one new indication on the 320° lifting rod. RF17 consisted of re-

examination of IGSCC flaw and redundant tack weld on a lifting rod. No discernable changes were noted on previous flaws. A new indication on the redundant weld was discovered and evaluated for use-as-is (HC.ER-PS.BB-0510, rev. 0); no repairs were made. RF18 consisted of examination of six known flaws for growth. No growth was observed. RF19 consisted of examination of 100% of the support bracket to the RPV. No indications were observed. Examinations of previous indications were examined with no new growth. The next re-baseline inspection for the steam dryer is scheduled in accordance with HC.ER-PS.BB-0510.

A review of the locations of the identified indications and the areas of highest stress (lowest margin) in the revised CDI calculation was performed. The areas identified as high stress locations do not appear to coincide with the locations where flaws have been previously identified. Future inspections are scheduled in accordance with BWRVIP-139-A.

Based upon the predicted alternating stresses remaining below the allowable limit after correction of the error and the accumulated operating history since Hope Creek reached EPU conditions, PSEG does not plan to further revise the steam dryer analysis.

Table 3a, shows moisture carryover across the steam dryer since EPU conditions.

Date	MCO (%)	Date	MCO (%)	Date	MCO (%)	Date	MCO (%)
5/16/2008 8:13	0.005	10/20/2008 8:14	0.018	7/20/2009 0:30	0.026	3/29/2010 0:44	0.026
5/19/2008 0:28	0.004	10/27/2008 1:15	0.017	7/27/2009 7:49	0.026	4/5/2010 0:07	0.025
5/21/2008 8:07	0.004	11/3/2008 0:29	0.017	8/3/2009 2:05	0.028	4/12/2010 10:26	0.027
5/22/2008 19:30	0.004	11/10/2008 0:22	0.017	8/10/2009 2:10	0.026	4/19/2010 0:35	0.027
5/23/2008 5:00	0.008	11/17/2008 0:35	0.025	8/17/2009 8:43	0.025	4/26/2010 1:30	0.027
5/26/2008 0:15	0.008	11/20/2008 8:31	0.026	8/24/2009 0:44	0.025	5/3/2010 1:24	0.024
5/27/2008 22:50	0.016	11/24/2008 7:53	0.028	8/31/2009 0:38	0.031	5/10/2010 10:27	0.020
6/1/2008 9:58	0.019	12/1/2008 8:00	0.026	9/7/2009 1:45	0.022	5/17/2010 9:57	0.025
6/6/2008 0:25	0.016	12/8/2008 0:05	0.026	9/14/2009 1:30	0.024	5/24/2010 0:11	0.025
6/9/2008 1:43	0.017	12/15/2008 8:33	0.024	9/21/2009 0:12	0.026	5/31/2010 0:37	0.027
6/13/2008 2:32	0.017	12/22/2008 8:07	0.026	9/28/2009 3:09	0.028	6/7/2010 8:14	0.026
6/16/2008 1:25	0.021	12/29/2008 8:57	0.025	10/5/2009 0:36	0.025	6/14/2010 0:17	0.026
6/20/2008 8:03	0.018	1/5/2009 2:30	0.026	10/12/2009 1:00	0.025	6/21/2010 7:30	0.028
6/23/2008 0:35	0.019	1/12/2009 2:04	0.024	10/19/2009 9:21	0.025	6/28/2010 0:39	0.007
6/23/2008 11:05	0.018	1/23/2009 7:33	0.026	10/26/2009 0:40	0.025	7/7/2010 0:34	0.009
6/27/2008 0:39	0.018	1/26/2009 0:20	0.027	11/2/2009 0:35	0.026	7/12/2010 7:30	0.024
6/30/2008 1:45	0.018	2/2/2009 9:02	0.026	11/9/2009 2:35	0.024	7/19/2010 2:00	0.014
7/3/2008 8:04	0.018	2/9/2009 1:30	0.027	11/16/2009 0:36	0.027	7/26/2010 0:26	0.027
7/11/2008 7:30	0.018	2/17/2009 8:12	0.024	11/23/2009 2:26	0.025	8/2/2010 0:17	0.029
7/14/2008 0:28	0.018	2/23/2009 0:57	0.024	11/30/2009 10:00	0.023	8/9/2010 0:48	0.016
7/23/2008 0:08	0.019	3/4/2009 10:01	0.025	12/7/2009 6:25	0.028	8/16/2010 0:12	0.018
7/28/2008 1:27	0.018	3/9/2009 0:03	0.025	12/14/2009 2:03	0.026	8/23/2010 8:06	0.021
8/4/2008 8:03	0.020	3/16/2009 8:43	0.024	12/21/2009 8:44	0.024	8/30/2010 3:19	0.013
8/11/2008 0:39	0.017	3/23/2009 2:20	0.023	12/28/2009 0:22	0.024	9/6/2010 0:14	0.024
8/18/2008 0:03	0.018	3/30/2009 0:58	0.022	1/4/2010 0:54	0.025	9/13/2010 1:09	0.023
8/22/2008 12:16	0.022	4/6/2009 2:07	0.017	1/11/2010 9:00	0.023	9/20/2010 2:28	0.025
8/25/2008 2:18	0.024	5/11/2009 0:39	0.026	1/25/2010 8:31	0.026	9/27/2010 7:59	0.023
8/26/2008 9:50	0.024	5/25/2009 0:15	0.024	2/1/2010 8:02	0.023	10/4/2010 0:36	0.025
9/1/2008 0:13	0.023	6/1/2009 7:54	0.024	2/8/2010 8:18	0.025	10/11/2010 0:35	0.021
9/8/2008 0:39	0.024	6/8/2009 0:18	0.026	2/15/2010 10:38	0.024	11/15/2010 0:22	0.005
9/15/2008 0:05	0.023	6/15/2009 2:58	0.026	2/22/2010 0:24	0.028	11/22/2010 8:08	0.028
9/22/2008 2:06	0.024	6/22/2009 7:16	0.028	3/1/2010 0:17	0.028	11/29/2010 7:46	0.026
9/29/2008 0:15	0.023	6/29/2009 2:48	0.026	3/8/2010 0:56	0.028	12/6/2010 7:01	0.026
10/6/2008 8:31	0.026	7/6/2009 1:51	0.027	3/15/2010 2:05	0.028	12/13/2010 1:41	0.026
10/13/2008 0:20	0.023	7/13/2009 0:37	0.024	3/22/2010 8:39	0.025	12/20/2010 8:21	0.028

Date	MCO (%)	Date	MCO (%)	Date	MCO (%)
12/27/2010 0:12	0.026	3/24/2012 20:01	0.009	8/6/2014 8:21	0.020
1/3/2011 0:20	0.026	3/28/2012 1:03	0.009	9/19/2014 8:13	0.021
1/10/2011 1:28	0.027	3/30/2012 11:22	0.009	10/8/2014 8:13	0.020
1/17/2011 0:03	0.022	4/4/2012 8:39	0.009	11/5/2014 8:52	0.021
1/24/2011 0:01	0.023	4/11/2012 8:05	0.006	12/17/2014 8:17	0.019
1/31/2011 1:42	0.024	5/16/2012 1:12	0.019	1/7/2015 8:32	0.020
2/7/2011 0:18	0.024	6/13/2012 7:28	0.019	2/4/2015 8:14	0.022
2/14/2011 8:25	0.024	7/11/2012 8:40	0.020	3/4/2015 8:08	0.020
2/21/2011 0:24	0.024	8/1/2012 7:45	0.013	3/11/2015 7:58	0.020
2/28/2011 0:28	0.027	8/27/2012 7:50	0.018	3/18/2015 8:22	0.020
3/7/2011 9:01	0.027	9/5/2012 8:08	0.019	3/25/2015 8:28	0.021
3/14/2011 0:03	0.026	10/3/2012 8:15	0.019	4/8/2015 8:16	0.014
3/28/2011 0:05	0.025	11/7/2012 9:50	0.018	5/20/2015 8:07	0.021
4/4/2011 11:58	0.025	12/5/2012 8:22	0.019	6/10/2015 8:36	0.020
4/11/2011 8:03	0.025	1/2/2013 8:15	0.021	7/8/2015 8:18	0.019
5/4/2011 9:45	0.021	2/6/2013 8:12	0.019	8/5/2015 8:22	0.019
6/1/2011 7:50	0.022	3/6/2013 8:10	0.020	9/2/2015 8:16	0.018
7/6/2011 1:13	0.022	4/3/2013 8:50	0.020	10/7/2015 8:38	0.019
8/3/2011 9:31	0.019	5/1/2013 8:30	0.018	11/18/2015 8:00	0.016
9/7/2011 9:34	0.017	6/5/2013 7:57	0.020	11/20/2015 8:28	0.019
10/5/2011 10:26	0.019	7/3/2013 7:21	0.020	12/2/2015 8:13	0.020
11/9/2011 11:12	0.019	8/14/2013 7:35	0.017	1/6/2016 8:33	0.020
12/7/2011 9:46	0.021	8/15/2013 7:48	0.017	2/3/2016 7:44	0.018
1/4/2012 10:02	0.017	9/4/2013 7:00	0.017	3/2/2016 8:16	0.020
1/6/2012 8:12	0.020	9/27/2013 8:10	0.013	4/6/2016 7:56	0.021
2/1/2012 9:58	0.021	10/9/2013 7:27	0.015		
2/15/2012 8:49	0.020	11/20/2013 8:42	0.020		
2/22/2012 10:00	0.020	12/18/2013 8:20	0.021		
2/29/2012 7:47	0.021	1/8/2014 8:04	0.021		
3/7/2012 8:05	0.005	2/5/2014 9:21	0.020		
3/13/2012 3:18	0.012	3/5/2014 8:00	0.021		
3/13/2012 11:06	0.013	4/9/2014 8:18	0.021		
3/14/2012 7:59	0.013	5/7/2014 8:39	0.020		
3/21/2012 8:15	0.015	6/4/2014 7:42	0.019		
3/24/2012 1:13	0.011	7/9/2014 7:39	0.021		

EMCB-RAI-4

Please provide a schedule for completing final resolution of this ACM software error issue and the HCGS steam dryer re-assessment as applicable.

PSEG Response EMCB-RAI-4:

Based on the re-evaluated stresses remaining less than the ASME code allowable limits, PSEG does not plan to perform additional stress evaluations. Hope Creek's operating experience at EPU conditions since implementation in 2008, including the long-term monitoring of plant parameters potentially indicative of steam dryer failure as required by the Facility Operating License, provides reasonable assurance of steam dryer functionality.

References

1. Letter No. LR-N15-02330, from Paul J. Davison, Site Vice President, Hope Creek Generating Station, PSEG Nuclear LLC, to Daniel Dorman, Regional Administrator - Region 1, U. S. Nuclear Regulatory Commission, “Summary of Courtesy Notification for ‘Completeness and Accuracy of Information’,” November 10, 2015. (ADAMS Accession No. ML15314A710).

2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.20, Revision 3, "Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing," dated March 2007 (ADAMS Accession No. ML070260376).

3. Letter with two attachments from Thomas B. Blount, U.S. Nuclear Regulatory Commission to David Czufin, Chairman, BWR Vessel and Internals Project, Electric Power Research Institute, "Clarification of Intent on Methodologies for Demonstrating Steam Dryer Integrity for Power Uprate - Boiling Water Reactor Vessel and Internals Project," dated May 6, 2011 (ADAMS Package Accession No.ML111160120).