



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

May 31, 2016

Mr. Peter P. Sena, III
President
PSEG Nuclear LLC - N09
P.O. Box 236
Hancocks Bridge, NJ 08038

**SUBJECT: 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)**

Dear Mr. Sena:

By letter dated November 10, 2015 (Agencywide Documents Access and Management System Accession No. ML15314A710), 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 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. The NRC staff has reviewed the November 10, 2015, letter submitted by the licensee and determined that additional information is needed, as set forth in the enclosure, in order to assess the continued structural integrity of the HCGS steam dryer under EPU operating conditions.

On January 6, 2016, a draft version of this request was sent to Mr. Paul Duke of your staff to ensure that the request was understandable, the regulatory basis for the request was clear, there is no proprietary information contained in the request for additional information, and to determine if the information had been previously docketed. On March 7, 2016, a conference call was held to clarify the request. Subsequently, the licensee indicated that PSEG will submit a response within 30 days of the date of this letter.

P. Sena, III

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If you have any questions, please contact me at 301-415-4037 or Thomas.Wengert@nrc.gov.

Sincerely,

A handwritten signature in black ink, reading "Thomas J. Wengert". The signature is fluid and cursive, with the first name "Thomas" and last name "Wengert" clearly distinguishable.

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosure:
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

POST-EXTENDED POWER UPRATE STEAM DRYER ANALYSIS

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

By letter dated November 10, 2015 (Agencywide Documents Access and Management System Accession No. ML15314A710), 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 (RAI)

Based on preliminary information received from Continuum Dynamics, 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).

Enclosure

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.

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.

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.

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'," dated 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).

P. Sena, III

- 2 -

If you have any questions, please contact me at 301-415-4037 or Thomas.Wengert@nrc.gov.

Sincerely,

/RA/

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosure:
Request for Additional Information

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ADAMS Accession No.: ML16007A174

**by memorandum*

OFFICE	NRR/DORL/LPL1-2/PM	NRR/DORL/LPL1-2/LA	NRR/DE/EMCB*
NAME	RGladney	LRonewicz	TLupold
DATE	5/6/2016	5/11/2016	12/23/2015
OFFICE	NRR/DORL/LPL1-2/BC	NRR/DORL/LPL1-2/PM	
NAME	DBroaddus (AHon for)	TWengert	
DATE	5/27/2016	5/31/2016	

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