



10 CFR 50.90

LR-N08-0014  
LCR H05-01, Rev. 1  
January 18, 2008

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

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

Subject: Responses to Requests for Additional Information  
Request for License Amendment - Extended Power Uprate

Reference: 1) Letter from George P. Barnes (PSEG Nuclear LLC) to USNRC,  
September 18, 2006  
2) Letter from USNRC to William Levis (PSEG Nuclear LLC),  
December 28, 2007  
3) Letter from Carl J. Fricker (PSEG Nuclear LLC) to USNRC,  
January 15, 2008

In Reference 1, PSEG Nuclear LLC (PSEG) requested an amendment to Facility Operating License NPF-57 and the Technical Specifications (TS) for the Hope Creek Generating Station (HCGS) to increase the maximum authorized power level to 3840 megawatts thermal (MWt).

In Reference 2, the NRC requested additional information concerning PSEG's request. PSEG provided responses to questions 14.79, 14.110, 14.115, 14.118(a) and 14.121(d) in Reference 3. Attachment 1 to this letter provides responses to the remaining questions.

Attachment 1 contains information proprietary to Continuum Dynamics, Inc. (C.D.I.). C.D.I. requests that the proprietary information in Attachment 1 be withheld from public

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disclosure in accordance with 10 CFR 2.390(a)(4). An affidavit supporting this request is included with Attachment 1. A non-proprietary version of PSEG's Attachment 1 responses is provided in Attachment 2.

C.D.I. Report 07-17P, Revision 3, "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Revision 4 Loads Model," is provided in Attachment 3 to this letter. The report provides updated dryer stress analyses based on the loads determined from the MSL in-plant measurements.

C.D.I. Report 07-17P contains information which C.D.I. considers to be proprietary. C.D.I. requests that the proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390(a)(4). An affidavit supporting this request is provided in Attachment 3.

PSEG will provide a non-proprietary version of the document in Attachment 3 suitable for public disclosure by January 30, 2008.

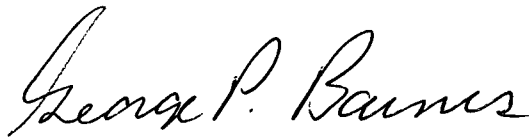
There are no regulatory commitments contained within this letter.

Should you have any questions regarding this submittal, please contact Mr. Paul Duke at 856-339-1466.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 1-18-08  
(date)

Sincerely,

A handwritten signature in cursive script that reads "George P. Barnes".

George P. Barnes  
Site Vice President  
Hope Creek Generating Station

Attachments (3)

1. Response to Request for Additional Information (proprietary)
2. Response to Request for Additional Information (non-proprietary)
3. C.D.I. Report 07-17P

cc: S. Collins, Regional Administrator – NRC Region I  
J. Lamb, Project Manager - USNRC  
NRC Senior Resident Inspector - Hope Creek  
P. Mulligan, Manager IV, NJBNE



**Continuum Dynamics, Inc.**

(609) 538-0444 (609) 538-0464 fax

34 Lexington Avenue Ewing, NJ 08618-2302

### **AFFIDAVIT**

**Re: Responses to Hope Creek Generating Station – Request for Additional Information Regarding Extended Power Uprate (TAC No. MD3002), December 28, 2007**

**I, Alan J. Bilanin, being duly sworn, depose and state as follows:**

- 1. I hold the position of President and Senior Associate of Continuum Dynamics, Inc. (hereinafter referred to as C.D.I.), and I am authorized to make the request for withholding from Public Record the Information contained in the documents described in Paragraph 2. This Affidavit is submitted to the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 2.390(a)(4) based on the fact that the attached information consists of trade secret(s) of C.D.I. and that the NRC will receive the information from C.D.I. under privilege and in confidence.**
- 2. The Information sought to be withheld, as transmitted to PSEG Nuclear LLC as attachment to C.D.I. Letter No. 08013 dated 18 January 2008 Responses to Hope Creek Generating Station – Request for Additional Information Regarding Extended Power Uprate (TAC No. MD 3002), December 28, 2007.**
- 3. The Information summarizes:**
  - (a) a process or method, including supporting data and analysis, where prevention of its use by C.D.I.'s competitors without license from C.D.I. constitutes a competitive advantage over other companies;**
  - (b) Information which, if used 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 of a similar product;**
  - (c) Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.**

**The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs 3(a), 3(b) and 3(c) above.**

- 4. The Information has been held in confidence by C.D.I., its owner. The Information has consistently been held in confidence by C.D.I. and no public disclosure has been made and it is not available to the public. All disclosures to**

third parties, which have been limited, have been made pursuant to the terms and conditions contained in C.D.I.'s Nondisclosure Secrecy Agreement which must be fully executed prior to disclosure.

5. The Information is a type customarily held in confidence by C.D.I. and there is a rational basis therefore. The Information is a type, which C.D.I. considers trade secret and is held in confidence by C.D.I. because it constitutes a source of competitive advantage in the competition and performance of such work in the industry. Public disclosure of the Information is likely to cause substantial harm to C.D.I.'s competitive position and foreclose or reduce the availability of profit-making opportunities.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to be the best of my knowledge, information and belief.

Executed on this 18 day of Jan 2008.

  
Alan J. Bilanin  
Continuum Dynamics, Inc.

Subscribed and sworn before me this day: January 18, 2008

  
Eileen P. Burmeister, Notary Public

EILEEN P. BURMEISTER  
NOTARY PUBLIC OF NEW JERSEY  
MY COMM. EXPIRES MAY 6, 2012

**ATTACHMENT 2**

**Hope Creek Generating Station**

**Facility Operating License NPF-57  
Docket No. 50-354**

**Extended Power Uprate**

**Response to Request for Additional Information**

In Reference 1, PSEG Nuclear LLC (PSEG) requested an amendment to Facility Operating License NPF-57 and the Technical Specifications (TS) for the Hope Creek Generating Station (HCGS) to increase the maximum authorized power level to 3840 megawatts thermal (MWt).

In Reference 2, the NRC requested additional information concerning PSEG's request. PSEG provided responses to questions 14.79, 14.110, 14.115, 14.118(a) and 14.121(d) in Reference 3. PSEG's responses to the remaining questions are provided below.

**RAI 14.107 2<sup>nd</sup> Follow-Up**

PSEG estimates that a standpipe resonance may be excited at 118 Hz. Since the frequencies of resonance/instability coupling are known to shift slightly with increasing flow rate, it is possible that the actual observed resonance frequency may be closer to 120 Hz. Please explain whether current filtering of 120 Hz signal from the MSL measurements would affect the magnitude of the standpipe resonance signal, which may be close to 120 Hz. Please also explain how the standpipe resonance signal would be quantified.

**Response**

As discussed in response to 14.107, the 120 Hz electrical noise is not easily masked by the SRV resonance. [[

The main steam line pressure data will then be processed and analyzed with the ACM methodology as has been previously discussed in C.D.I. Report No. 07-18P. ]]

**RAI 14.116(a) Follow-Up**

The signal to noise ratio assumed in the analysis is not apparent from the response. PSEG is requested to provide typical values of the factor **[[** **]]**, which is used to remove the background noise.

**Response**

Typical values of the factor may be taken from the Hope Creek main steam line data at the A upper strain gage (as an example). These values are shown below at selected frequencies, averaged from -0.5 Hz to 0.5 Hz around the frequency listed:

**[[**

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**]]****RAI 14.116(c) Follow-Up**

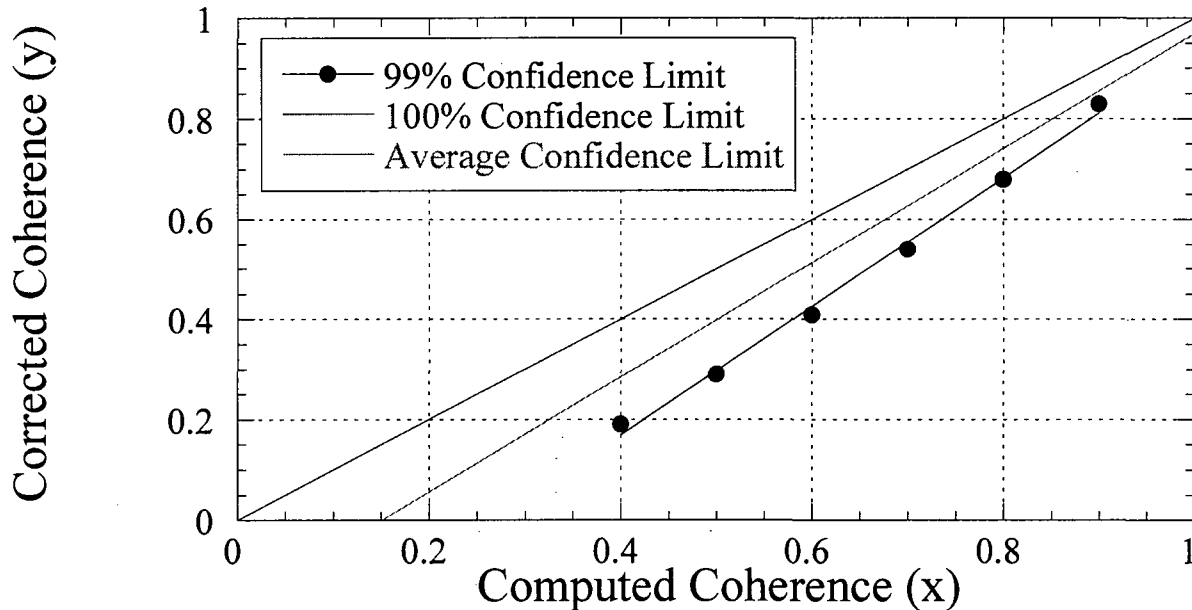
The PSEG response does not provide the basis for correcting the coherence between **[[**

**]]****Response**

The reference J. S. Bendat and A. G. Piersol, 1966, Measurement and Analysis of Random Data, John Wiley and Sons, Page 215, Table 5.1 (described in C.D.I. Report No. 07-09P) gives 99% confidence limits on the coherence based on coherence estimates, as provided in our previous response to this RAI:

| Coherence Estimate | Lower Confidence Limits |
|--------------------|-------------------------|
| 0.4                | 0.19                    |
| 0.5                | 0.29                    |
| 0.6                | 0.41                    |
| 0.7                | 0.54                    |
| 0.8                | 0.68                    |
| 0.9                | 0.83                    |

A plot of these data gives the following:



where a linear curve fit through the data points (black circles) gives the line  $y = -0.346 + 1.286x$  ( $R^2 = 0.995$ ) in black, the one-to-one curve (no correction) in blue, and the line halfway between the linear curve fit and no correction (halfway to the lower confidence limits, identified in the figure as the average confidence limit) in red. The average confidence limit recovers a corrected coherence that is more conservative (a higher value) than use of the 99% confidence limit as suggested in the data of Bendat and Piersol, as it follows from the equation  $y = -0.173 + 1.143x$ . For example, if the computed coherence between the upper and lower strain gage measurements is 0.6, no correction would leave the coherence at 0.6, use of the 99% confidence limit curve would give a corrected coherence of 0.4, while an average coherence value would give 0.5. The average values are used in the analysis.

[[



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

]]

**RAI 14.118 Follow-Up**

- (b) Substantiate the choice of various model parameters such as [[  
]] at the inlet of the MSLs.

**Response**

The values of the various ACM modeling parameters at the inlets of the MSLs are as follows:

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These parameters were chosen for the following reasons:

Acoustic Speed: an application of the ASME steam tables in subroutine form [1], used previously in examining pipe flow [2] determined that the acoustic speed at 1000 psig saturated steam conditions was 1484.3 ft/sec.

Acoustic Speed Damping in Steam Dome: the steam dome is assumed to be lightly damped, as no structures, or moisture are present in the steam dome volume that can result in damping.

[[





]]

#### REFERENCES:

1. Indiana University Chemistry Department / Babcock and Wilcox Co. Fossil Generation Division. Subprograms of 1967 ASME Steam Tables. Quantum Chemistry Program Exchange Program No. SPHF006.
2. Bliss, D. B., T. R. Quackenbush, and M. E. Teske. 1982. Computational Simulation of High-Speed Steady Homogeneous Two-Phase Flow in Complex Piping Systems. *Transactions of the ASME Journal of Pressure Vessel Technology* 104: 272-277.

- (c) If the dipole source strengths show a high degree of asymmetry, explain the reason of this large asymmetry by referring to pressure measurements on the dryer which cause this large asymmetry.

Response

Please refer to the two figures attached below shown schematically. [[

]]

[[

]]

Figure 14.118(c).1

[[

]]

Figure 14.118(c).2

**RAI 14.120 Follow-Up**

PSEG compares measurements of [[

]]

- (a) What is the purpose of Figure 14.120-1? Why are the unfiltered data at low flow conditions (1000#) compared with [[ ]] at CLTP? Are the CLTP data in Figure 14.120-1c filtered or unfiltered? Why are there no CLTP data in Figure 14.120-1d?

**Response**

CDI Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Rev. 4 Loads Model," Revision 3 (Attachment 3 to this letter) describes the method using filtered 1000# data to remove a portion of the 80 Hz dryer load.

- (b) Are the dryer loads (shown in Figure 14.120-2) for the low flow condition based on filtered or raw MSL pressures? If they are based on filtered MSL pressures, please provide additional comparisons of the filtered MSL pressures at CLTP and at low flow rates [[

]].

**Response**

CDI Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Rev. 4 Loads Model," Revision 3 describes the method using filtered 1000# data to remove a portion of the 80 Hz dryer load.

- (c) Why are data for MSL pairs with coherence less than [[ ]]? What is the basis for this assumption?

**Response**

Please refer to the response to RAI 14.116(c) Follow-Up. [[

]]

- (d) Will improved strain gage calibrations be used to reduce extraneous MSL pressure signals at 80 Hz in future submissions, as discussed in recent meetings with PSEG? Specifically, during the October 11, 2007, meeting, it was mentioned that the 80 Hz signal may be due to [[

]]. Please provide variations in [[  
]] and how they are accounted for in estimating acoustic pressures at those locations.

Response

PSEG does not currently plan to use improved strain gage calibrations to reduce extraneous MSL pressure signals at 80 Hz. See CDI Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Rev. 4 Loads Model," Revision 3 for a description of the method using filtered 1000# data to remove a portion of the 80 Hz dryer load.

- (e) What is the final PSEG stress margin for the dryer: [[  
]]?

Response

The minimum alternating stress ratio on the dryer at CLTP conditions with all end-to-end biases and uncertainties included is [[ ]] See CDI Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Rev. 4 Loads Model," Revision 3 for additional information.

- (f) To conclusively confirm the reasonableness of removing a portion of the 80 Hz dryer loads at CLTP, provide a dryer stress analysis using the filtered MSL inputs at 1000# and compare the dryer stress margins at high CLTP stress locations against those computed using filtered CLTP loads. In particular, explain the differences in stresses at 80 Hz. To ensure consistency, be sure to use signal processing and filtering for the 1000# stress analyses that are identical to those used for the previous CLTP stress analysis.

Response

See CDI Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Rev. 4 Loads Model," Revision 3 for the requested analysis.

**RAI 14.121(c) Follow-Up**

PSEG provides dryer pressure data for frequencies between 75 and 85 Hz in 1 Hz increments to justify linearly interpolating acoustic pressure loads in 5 Hz increments (Figure RAI14.121.1).

(a) Where are these pressure/velocity ratios computed?

Response

The peak pressure/velocity ratios were found at the intersection of the outer bank hood with the cover plate, at the centerline of the dryer between main steam lines C and D.

(b) How do the pressure loads vary at the frequencies where peaks are observed in the MSL data [[ ]]?

Response

PSD of the pressure load was provided in Figure 4.6 of C.D.I. Report No. 07-18P. The PSDs at frequencies when peaks are observed in the main steam lines, up to 100 Hz, at the intersection of the outer bank hood with the cover plate, at the centerline of the dryer between main steam lines C and D, are as follows:

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(c) The comparison shown in Figure RAI14.121.1 indicates that if the load frequency were [[ ]], then there will be a nonconservative error of about [[ ]]. If the load frequency were [[ ]], then there will be a conservative error of about [[ ]]. Should these errors be treated as uncertainties and included in the dryer stress estimates? For other peaks below 100 Hz, are there any other uncertainties or bias errors?

Response

The Helmholtz solution is a part of the ACM. [[

]] The apparent nonconservative or conservative effects seen in Figure RAI14.121.1 are



**ATTACHMENT 3**

**Hope Creek Generating Station**

**Facility Operating License NPF-57  
Docket No. 50-354**

**Extended Power Uprate**

**Stress Assessment of Hope Creek Unit 1 Steam Dryer  
Based on Revision 4 Loads Model  
CDI Report No. 07-17P, Revision 3**



# Continuum Dynamics, Inc.

(609) 538-0444 (609) 538-0464 fax

34 Lexington Avenue Ewing, NJ 08618-2302

## AFFIDAVIT

Re: C.D.I. Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Revision 4 Loads Model," Revision 3 dated January 2008.

I, Alan J. Bilanin, being duly sworn, depose and state as follows:

1. I hold the position of President and Senior Associate of Continuum Dynamics, Inc. (hereinafter referred to as C.D.I.), and I am authorized to make the request for withholding from Public Record the Information contained in the documents described in Paragraph 2. This Affidavit is submitted to the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 2.390(a)(4) based on the fact that the attached information consists of trade secret(s) of C.D.I. and that the NRC will receive the information from C.D.I. under privilege and in confidence.
2. The Information sought to be withheld, as transmitted to PSEG Nuclear LLC as attachment to C.D.I. Letter No. 08014 dated 18 January 2008 C.D.I. Report No. 07-17P "Stress Assessment of Hope Creek Unit 1 Steam Dryer Based on Revision 3 dated January 2008.
3. The Information summarizes:
  - (a) a process or method, including supporting data and analysis, where prevention of its use by C.D.I.'s competitors without license from C.D.I. constitutes a competitive advantage over other companies;
  - (b) Information which, if used 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 of a similar product;
  - (c) Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

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I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to be the best of my knowledge, information and belief.

Executed on this 18 day of Jan 2008.

  
Alan J. Bilanin  
Continuum Dynamics, Inc.

Subscribed and sworn before me this day: January 18, 2008

  
Eileen P. Burmeister, Notary Public

EILEEN P. BURMEISTER  
NOTARY PUBLIC OF NEW JERSEY  
MY COMM. EXPIRES MAY 6, 2012