Britt T. McKinney
Sr. Vice President & Chief Nuclear Officer

PPL Susquehanna, LLC
769 Salem Boulevard
Berwick, PA 18603
Tel. 570.542.3149 Fax 570.542.1504
btmckinney@pplweb.com

ppl

APR 27 2007

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop OP1-17
Washington, DC 20555

**SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED LICENSE AMENDMENT NO. 285
FOR UNIT 1 OPERATING LICENSE NO. NPF-14
AND PROPOSED LICENSE AMENDMENT NO. 253
FOR UNIT 2 OPERATING LICENSE NO. NPF-22
EXTENDED POWER UPDATE APPLICATION
REGARDING STEAM DRYER AND FLOW EFFECTS
REQUEST FOR ADDITIONAL INFORMATION
RESPONSES
PLA-6176**

**Docket Nos. 50-387
and 50-388**

Reference: 1) PPL Letter PLA-6076, B. T. McKinney (PPL) to USNRC, "Proposed License Amendment Numbers 285 for Unit 1 Operating License No. NPF-14 and 253 for Unit 2 Operating License No. NPF-22 Constant Pressure Power Uprate," dated October 11, 2006.

2) Letter, R. Guzman (NRC) to B. T. McKinney (PPL), "Request for Additional Information (RAI) – Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2) - Extended Power Uprate Application Regarding Steam Dryer and Flow Effects (TAC Nos. MD3309 and MD3310)," dated March 20, 2007.

3) PPL Letter PLA-6138, B. T. McKinney (PPL) to USNRC, "Proposed License Amendment Numbers 285 for Unit 1 Operating License No. NPF-14 and 253 for Unit 2 Operating License No. NPF-22 Constant Pressure Power Uprate – Supplement," dated December 4, 2006.

4) PPL Letter PLA-6146, B. T. McKinney (PPL) to USNRC, "Proposed License Amendment No. 285 For Unit 1 Operating License No. NPF-14 And Proposed License Amendment No. 253 For Unit 2 Operating License No. NPF-22 Constant Pressure Power Uprate - Second Supplement," dated December 26, 2006.

Pursuant to 10 CFR 50.90, PPL Susquehanna LLC (PPL) requested in Reference 1 approval of amendments to the Susquehanna Steam Electric Station (SSES) Unit 1 and Unit 2 Operating Licenses (OLs) and Technical Specifications (TS) to increase the maximum power level authorized from 3489 megawatts thermal (MWt) to 3952 MWt, an approximate 13% increase in thermal power. The proposed Constant Pressure Power Uprate (CPPU) represents an increase of approximately 20% above the Original Licensed Thermal Power (OLTP).

A001

The purpose of this letter is to provide responses to the Request for Additional Information transmitted to PPL in Reference 2.

Attachment 1 contains the PPL responses.

The PPL responses in Attachment 1 contain information that General Electric Company and Continuum Dynamics Incorporated (CDI) consider proprietary. General Electric Company and Continuum Dynamics Incorporated (CDI) request that the proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390 (a) 4 and 9.17 (a) 4. Affidavits supporting this request are provided in Attachment 3. A non-proprietary version of Attachment 1 is provided in Attachment 2.

There are no new regulatory commitments associated with this submittal.

PPL has reviewed the "No Significant Hazards Consideration" and the "Environmental Consideration" submitted with Reference 1 relative to the Enclosure. We have determined that there are no changes required to either of these documents.

If you have any questions or require additional information, please contact Mr. Michael H. Crowthers at (610) 774-7766.

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

Executed on: April 27, 2007

for B. T. McKinney

Attachment 1: Proprietary Version of the Request for Additional Information Responses
Attachment 2: Non-Proprietary Version of the Request for Additional Information Responses
Attachment 3: General Electric Company and Continuum Dynamics Incorporated (CDI) Affidavits

Copy: NRC Region I
Mr. A. J. Blamey, NRC Sr. Resident Inspector
Mr. R. V. Guzman, NRC Project Manager
Mr. R. R. Janati, DEP/BRP

Attachment 2
Non-Proprietary Version of the Request for Additional Information Responses

NRC Question 1:

In Attachment 10, "Steam Dryer Structural Evaluation," to the licensee's submittal dated October 11, 2006, forwarding an EPU license amendment application for SSES 1 and 2, the licensee asserts that a composite grouping of three main steam line (MSL) measurements with one from another set of three MSL measurements acquired during slow main steamline isolation valve (MSIV) closure is conservative, citing Figure 4.11. However, there appears to be several locations in the figure where the composite loading is nonconservative (e.g., node numbers 10-12, 14-17, 25-30, 42-47, 51-56, 64-71, 86-93, 101-103). The licensee is requested to explain how this nonconservatism affects dryer stresses, particularly at the components with little margin against the American Society of Mechanical Engineers (ASME) fatigue limits.

PPL Response:

There is not a direct correlation between nodes with low stress margins and the direct pressure applied to those nodes. The peak stress intensities for all of the low margin components occur at welds (Table 4-7 of Attachment 10, Reference 1). Theses peak stress intensities are the result of flexing, bending, and twisting of large components and structures, which have loads applied to them. Figure 5-16 of the Susquehanna Replacement Steam Dryer Fatigue Analysis, Reference 4, shows the pressure distribution on the outer hood. Figure 6-11 of the Susquehanna Replacement Steam Dryer Fatigue Analysis, Reference 4, shows the stress intensity distribution of the outer hood. These two figures illustrate that there is not a direct correlation between nodal pressure loading and nodal stress intensity.

The composite loading constructed from the MSIV closure steam flows was manipulated to maximize the peak pressure applied to the steam dryer. This resulted in a conservatively high peak pressure being applied to the outer hood. It is PPL Susquehanna's and CDI position that this loading will apply conservative flexing, bending, and twisting forces to the steam dryer. This will yield conservative stress intensities.

The apparent under-prediction of the load definition will be accommodated in two ways, depending on the location of the under-predicted regions and the potentially affected components. [[

]]

As seen on Figure 4-11 of Attachment 10 (Reference 1), the locations where the peak loads are highest (nodes 7 and 99) are bounded by the composite load. As discussed in the responses to RAI #s 3 & 5, the Susquehanna Unit 1 steam dryer is to be instrumented for the first phase of power ascension. [[

]]

Strains measured on Unit 1 will be compared to strain acceptance criteria derived from the dynamic finite element model of the new SSES steam dryers. During the power ascension, data will be taken and compared to limit curves, which are based on ASME fatigue limits. Appropriate actions will be taken, including limiting power ascension. In addition, the data obtained will be used to re-perform the 113% OLTP load definition and dryer stress analysis. Therefore, the revised stress analysis, which will be based on actual dryer data, will supersede the composite load definition identified in Figure 4-11 of Attachment 10 (Reference 1).

NRC Question 2:

In Attachment 10, Table 4-13 lists all bias errors and uncertainties associated with their dryer stress assessment approach. The bias associated with the acoustic circuit model (ACM) and the finite element (FE) models are said to be included in the licensee's "stress underprediction factor" (SUPF). However, the licensee assumes a positive bias credit of 24% for "conservatism" in the 113% original licensed thermal power (OLTP) load definition, citing Continuum Dynamics Inc. (CDI)'s report on SSES 1 and 2 steam dryer load definitions. The licensee should reconcile CDI's conclusion that the loads at 113% OLTP are conservatively biased by 24% (CDI Report 06-22, Rev. 0) with Figures 5-21 and 5-22 of GE-NE-0000-0057-4166-R1-P, which shows significant pressure load underpredictions compared to the 1985 dryer pressure measurements. The licensee is requested to explain why it does not appear to include the uncertainty and bias errors (Table 4-13 in Attachment 10) in the stress uncertainty calculations.

PPL Response:

The benchmarking effort of the hydrodynamic loads against the 1985 Unit 1 instrumented test data recognized that the CDI pressure load definition under predicted dynamic loads at OLTP. Not only were pressures under predicted but more importantly the resulting strains were under predicted. Section 4.2.5.1.1 of Attachment 10 to PPL Susquehanna's CPPU License Amendment Request (LAR), in which the stress under prediction factor was derived, detailed this observation. [[

]]

PPL Susquehanna had the following two options for addressing this under prediction:

1. Include the under prediction as a negative bias for the hydrodynamic load uncertainty in Section 4.4 of Attachment 10 of the CPPU LAR. (Term U3b – "Ability of ACM to Determine Spatial Distribution of Non-Acoustic Pressure Loads"); or,

2. Adjust the stress intensities by use of a stress under prediction factor (SUPF) in the GE stress report (GE-NE-0000-0061-0595-P-R0) for the SSES replacement dryer.

The GE stress report incorporated the SUPF as documentation of this negative bias (Reference 4). This path more accurately represents the actual stress intensities and documents them in the GE stress report. Including the SUPF in the GE stress report also provides better documentation of this significant bias. Had PPL Susquehanna documented the bias in the uncertainty analysis, the CPPU LAR would be the only documentation of this bias. The GE stress report also exists as a PPL Susquehanna design basis calculation in the Susquehanna Records Management System. This provides an additional record and explanation of the bias.

[[

]]. Thus, when considering the maximum under-prediction uncertainty identified in Section 4.2.2 of Attachment 10 (Reference 1) of -0.8%, the maximum calculated end-to-end stress intensities are mathematically identical when determined by either method.

NRC Question 3:

The licensee is requested to submit the limit curves for power ascension, along with the power ascension-monitoring plan, for review. The plan should clearly explain how the licensee will monitor and limit the dryer excitation tones below 50 hertz (Hz), and the recirculation pump vane passing frequency tone above 100 Hz. If limit curves need to be established for sensors other than the MSL strain gages to monitor these tones, the licensee should substantiate them.

PPL Response:

The power ascension monitoring plan is provided in the Appendix 1 to this Attachment. For the first two CPPU steps on Unit 1, the new SSES steam dryer will be instrumented to monitor strains, pressures and accelerations. See response to RAI #5 for a more detailed discussion of the dryer instrumentation. [[

]]

The associated monitoring limits for the dryer instrumentation [[

]] The power ascension limits for the strain gauges will be based on the finite element analysis results. The methodology for developing the dryer instrumentation acceptance criteria is described below. Strains measured on Unit 1 will be compared to strain acceptance criteria derived from the dynamic finite element model of the new SSES steam dryers. [[

]]

The main steam lines will be instrumented on both Unit 1 and Unit 2 in order to measure the pressures in the main steam lines. The Unit 1 main steam line pressure data will be used to validate and benchmark the analytical tools for calculating steam dryer stress using main steam line strains. Steam dryer stress of the second two Unit 1 CPPU steps and all four Unit 2 CPPU steps will be monitored using main steam line strain readings. Evaluation of the strain gauge data will be by comparison against the limit curves developed from the steam dryer finite element analysis after it has been benchmarked against the Unit 1 steam dryer instrument data. The methodology for developing the main steam line limit curves is described below.

[[

]]

Based on the approach described above, no limit curves will be established for sensors other than the MSL strain gauges.

NRC Question 4:

With regard to CDI Report 05-32, Revision 0 (March 2006), "Onset of High Frequency Flow Induced Vibration in the Main Steam Lines at Susquehanna Unit 2: A Subscale Investigation of Standpipe Behavior," the licensee is requested to:

a. Provide results of pressure measurements performed in line A and the dead leg;

b. Provide phase relations between measurements at different locations; and

c. Explain the nature of the 16 Hz mode, including its mode pattern.

d. In the conclusion section, CDI recommends that "in-plant measurements...should be sampled at a high enough digitization rate" to determine whether the acoustic response of the valve standpipe is captured. Provide the digitization rate considered sufficient and the licensee's plans to satisfy this provision.

PPL Response:

a. [[

]]

b. [[

]]

c. [[

]]

d. [[

]] [[

]]

NRC Question 5:

The licensee is requested to provide information on the measuring system to be used on the new dryer at SSES 1 and 2, including the sampling rate of data acquisition.

PPL Response:

[[

]]

Component	Strain Gages	Accelerometers	Dynamic Pressure	TOTAL
[[				
				]]

[[

]]

NRC Question 6:

With regard to General Electric (GE) Report GENE-0000-0054-2552-01-P (October 2006), "Test Report #1 Susquehanna Steam Electric Station, Unit 1 Scale Model Test," the licensee is requested to:

a. Provide information on the acoustic FE study of the subscale model (or the full scale model if available) indicating whether the MSLs are included in the model (of particular interest is plant frequency range of 15 to 40 Hz); and

b. If the MSLs are not included in the FE study, provide/explain the effect of including the MSLs on the resonance frequencies and mode shapes of the lower acoustic modes.

PPL Response:

[[

]]

NRC Question 7:

The licensee is requested to provide any available evidence which supports the assumption that pressure amplitude at low frequencies (in particular, the 15 Hz component) will continue to increase proportionally to the square of flow velocity beyond OLTP.

PPL Response:

The SSES 1985 instrumented dryer [[

]]

The main steam line measurements taken at SSES Unit 1 [[

]]

Steamline Location	0-40 Hz	Steamline Location	15 Hz
[[			
			]]

Steam line data from 75%, 80%, 85%, 90%, 98%, 100% [[

]]

75% MSIV Closure - Flow in 3 Steam Lines

		Steam Line Flow Rate (Mlb/hr)				
Power	**Total Flow**	**Equivalent 4 Line Flow**	**MSL A**	**MSL B**	**MSL C**	**MSL D**
[[						
						]]
4 Line flow case for comparison						
[[						]]

[[

]]

Section 3 of GE-NE-0000-0049-6652-01P [[

]]

As described in the PPL submittal dated December 4, 2006, [[

]]

In addition, the 1/5th scale model testing performed by CDI, and documented in CDI Report 05-32 (Appendix 1 of Attachment 10 –Reference 1), suggests that the magnitude of the 15 Hz component will actually drop above EPU Mach number (see attached Figure 7-1).

NRC Question 8:

With regard to CDI Report 06-22, Revision 0 (September 2006), "Hydrodynamic Loads at OLTP, CLTP [current licensed thermal power], and 113% OLTP on Susquehanna Unit 1 Steam Dryer to 250 Hz," the licensee is requested to:

a. Indicate which ACM model was used to predict the dryer load at SSES 1 and 2; and

b. Explain the reason(s) for choosing the model used to predict the dryer load for SSES 1 and 2.

PPL Response:

a. Revision 2 - Bounding Peak Pressure Model was used.

b. At the time of data analysis, this model was considered appropriate and was also used for the Vermont Yankee and Hope Creek steam dryer loads.

NRC Question 9:

With regard to CDI 06-22, the licensee is requested to provide samples of unfiltered strain gage time signals and power spectral densities. In particular, the provided samples should include the worst case of signal to noise ratio and any other signals experiencing saturation problems or poor frequency response.

PPL Response:

The attached Figures 9-1 through 9-8 provide the unfiltered pressure time histories and PSDs at CLTP conditions.

NRC Question 10:

With regard to CDI 06-22, the licensee is requested to explain why:

a. The [[ ]] and

b. The [[ ]].

PPL Response:

[[

]]

NRC Question 11:

With regard to CDI 06-22, the licensee is requested to provide the following information:

a. Explain how the reduced flow rate through the dryer during MSIV closure affects the prediction of the dryer load at 113% OLTP power level.

b. How this effect would be addressed in the dryer load definition?

c. Additional information which confirms the assumption that, beyond CLTP, the low frequency dryer load will increase as a function of velocity squared.

PPL Response:

a. [[

]]

b. This effect was quantified by the benchmarking efforts discussed in Section 4.2.4.5 of Attachment 10 (Reference 1). Additional discussions regarding this effect is provided in the response to RAI #1.

c. See the response to RAI #7 for a discussion regarding the projected increase in dryer loading above CLTP.

<u>NRC Question 12</u>:

With regard to CDI 06-22, the licensee is requested to provide an assessment of the effect of the MSL strain gage noise reduction on the hydrodynamic part of the ACM predicted load on the dryer.

<u>PPL Response</u>:

The attached Figure 12-1 provides a comparison between the upstream pressure signal on MSL D before and after applying coherence with the downstream pressure signal to reduce noise.

NRC Question 13:

With regard to CDI 06-22, the licensee is requested to explain:

a. The reasons causing such large differences between the ACM predicted load and the in-plant measured load. The deviations between these dryer loads are particularly large at low frequencies; and

b. How these deviations will be addressed in the stress analysis.

PPL Response:

a. [[ ]] The loads acting on the Susquehanna dryer are primarily hydrodynamic in nature. In order to obtain a true representative load definition, the acoustic and hydrodynamic loads should be combined.

b. The difference between the predicted load definition and the in-plant measured loads are discussed in Section 5.3 of GENE-0057-4166-R1-P. The frequency content in the load definition is compared with the in-plant measurements in Figures 5-21 and 5-22. These comparisons demonstrate that the load definition captures the key frequency peaks in the measured data. The difference in amplitude is addressed in the fatigue analysis with the incorporation of the stress under prediction factor, as described in Section 6.3 of GENE-0057-4166-R1-P.

NRC Question 14:

With regard to CDI 06-22, the licensee is requested to explain the basis for assuming a positive bias in the 113% OLTP load definition. The above comments suggest the bias in the load definition to be negative rather than positive.

PPL Response:

CDI Report 06-22 documents a composite load, which is intended to simulate 113% OLTP steam flows. The algorithm to determine the 113% composite load was based on a benchmark where MSL strain gauge data was taken during MSIV slow closure tests at 75% power, where each line was isolated "one-at-a-time." This process simulated 100% CLTP steam flow conditions. The loads derived from the data taken during the 75% MSIV slow closure tests were compared to the loads derived with all lines open at 100% CLTP. As described in Section 3.3 of CDI Report 06-22, the peak RMS pressures obtained for the 75% MSIV testing bounded the 100% "full-open" CLTP case by 24% conservatism (i.e., a positive bias).

Strain gauge data obtained during MSIV slow closure testing at a power level of 80%, which corresponds to steam flows through the remaining three lines at the 113% OLTP condition. This data was then applied to the algorithm described above to obtain the 113% composite case. Since the same algorithm was used, a +24% bias was included as a component in the end-to-end uncertainty analysis in determining the overall 113% OLTP dryer stress intensities.

It is important to note that, since the ACM only predicts acoustic loads, the 24% positive bias applies only to the acoustic component of the total stress intensity bias. That is, the hydrodynamic load contribution towards the end-to-end dryer stress intensities is not included. As discussed in the response to RAI #2, the hydrodynamic contribution is accounted for via a stress under prediction factor, which is applied to the stresses generated from the ACM load definition.

During the power ascension, data obtained will be used to re-perform the 113% OLTP load definition and dryer stress analysis. The revised stress analysis, which will be based on actual dryer data, will supersede the 113% composite load definition, which is the subject of this question. As part of the revised stress analysis, a new uncertainty evaluation will be performed, which will not contain the aforementioned 24% bias, since the 113% composite load definition will not be used.

NRC Question 15:

With regard to CDI Report No. 05-28P, Revision 2 (October 2006), "Bounding Methodology to Predict Full Scale Steam Dryer Loads from In-Plant Measurements," the licensee is requested to provide the following:

a. An explanation of how both increasing (bounding pressure, bounding root mean square (RMS), and bounding power spectral density (PSD)) and decreasing MSL damping (bounding peak pressure) in the four new 'bounding' ACMs leads to higher dryer loads.

b. Has the licensee applied each of the new "bounding" ACM models to SSES 1 and 2? If so, which of the models matched the measurements referenced in GE MDE #199-0985-P, Rev. 1 (Susquehanna – 1 Steam Dryer Vibration Steady State and Transient Response – Final Report, January 1986)?

PPL Response:

a. [[

]]

b. [[

]]

NRC Question 16:

CDI has applied the noise reduction techniques described in Section 9 of CDI 05-28P, Rev. 2 to adjust the MSL inputs to the ACM model used for analysis of the SSES 1 and 2 steam dryer. The licensee is requested to confirm whether the same noise reduction techniques were used in Quad Cities Unit 2 calculations to validate the ACM model. If not, provide justification.

PPL Response:

Yes. The noise reduction techniques used for Susquehanna were the same were used in Quad Cities Unit 2 calculations to validate the ACM model.

NRC Question 17:

With regard to CDI 05-28P, CDI computes a bias error of 4% and an uncertainty of 17.6% for the bounding peak pressure model based on comparing simulated and measured pressures integrated between 130 and 157 Hz. However, Figures E.1 through E.12 show that the bounding peak pressure model underestimates loads at the strongest loading peak at 156 Hz, in some cases by nearly an order of magnitude (for pressure squared). The licensee is requested to consider the worst-case underestimates at 156 Hz and provide a revised worst-case bias error for the bounding pressure peak ACM.

PPL Response:

[[

]]

NRC Question 18:

With regard to CDI 05-28P, the licensee is requested to clarify if the ACM bias errors and uncertainties cited in this report are for raw MSL inputs, or for MSL inputs that have been adjusted using noise cancellation.

PPL Response:

The ACM bias errors and uncertainties are for MSL inputs that have been adjusted using noise cancellation.

NRC Question 19:

With regard to CDI 05-28P,CDI asserts that the Bounding Pressure ACM may be applied to any boiling-water reactor (BWR) plant with MSL velocity Mach Numbers less than 0.122 with no uncertainty or bias error (pages 21 and 72 of CDI 05-28P). However, the dominant loading mechanism in the Quad Cities plants (prior to acoustic side branch installation) was singing of the safety relief valves (SRVs) and electromatic relief valves (ERVs), which depend on parameters other than MSL flow Mach number, such as SRV and ERV standpipe dimensions. The licensee is requested to provide additional justification for CDI's assertion, given the other parameters that affect dryer loading. If additional parameters need to be considered when quantifying the accuracy of the various ACM models, bounds for those parameters should be defined.

PPL Response:

[[

]]

NRC Question 20:

With regard to GE Report GENE-0057-4166-R1-P, Revision 1 (September 2006), "Susquehanna Steam Dryer Fatigue Analysis," Section 5.3 assumes that the pressure time history for the 1985 steam dryer hood is the same as the measured time histories at its cover plate. In Figures 5-21 and 5-22, it compares the predicted pressure time histories at the 90-degree and 270-degree outer hoods with those for the 1985 cover plate and concludes the frequency content of these time histories compare reasonably well. The licensee is requested to address the following:

a. Justify the assumption that the pressure time history for the 1985 steam dryer hood is the same as the measured time histories at its cover plate.

b. The measured pressure time history for the 270-degree cover plate of 1985 dryer has two peaks between 90 and 100 Hz, whereas predicted time history has no peaks in this range. Also, the measured time history has a 110 Hz peak, which is not present in the predicted time history. Explain these discrepancies in the frequency comparison.

c. Provide a comparison of pressure time history measured at both cover plates of the 1985 steam dryer with the ones predicted at the same locations so that their frequency content can be compared.

PPL Response:

a. MDE #199-0985-P Rev. 1 describes the frequency content of the pressure drum (cover plate), strain gauge, and accelerometer measurements. [[

]]

b. The source of the 110 Hz peak is described in response to Supplemental Comment 2 in the December 4, 2006 submittal. The 110 Hz peak shown in the plot is due to the mechanical excitation of pressure drum diaphragm by the recirculation loop vibration. The 110 Hz excitation is present in the 1985 test data at the 4 accelerometers on the support ring including locations adjacent to the support lugs. It is expected that the dryer is being excited through the motion of the support lugs.

The measured peaks within the 90-100 Hz band do not appear on the raw Main Steam Line (MSL) strain gauge data (see Figures 4-7 through 4-10 of Attachment 10 of PPL's CPPU LAR - Reference 1). In addition, as noted, predicted time history has no peaks in this range. This could suggested that these peaks are mechanically induced, but at this point, there is insufficient data to positively conclude the source.

As discussed in the responses to RAI #s 3 & 5, the Susquehanna Unit 1 steam dryer is to be instrumented for the first phase of power ascension. [[

]]

Data measured on the Unit 1 dryer will be compared to that predicted. This evaluation, which will utilize a more extensive suite of instrumentation, will include the examination of frequency content in the 90-100 Hz band. This will allow for the comparison of the 1985 measured response within the 90-100 Hz band.

c. Figures 5-21 and 5-22 of GENE-0057-4166-R1-P, Rev. 1 show a comparison of the frequency content for the 1985 cover plate [[

]]

NRC Question 21:

With regard to GENE-0057-4166-R1-P, the licensee is requested to explain the cause of the 83 Hz peak in the dryer loading shown in Figures 5.20 and 5.21.

PPL Response:

While an 83 Hz component is indicated on the outer 90° and 270° dryer hoods, a corresponding response of similar magnitude does not appear on the raw Main Steam Line (MSL) strain gauge data (see Figures 4-7 through 4-10 of Attachment 10 of PPL's CPPU LAR - Reference 1). It is likely that this response is related to the effect discussed in the response to RAI #10.

As discussed in the responses to RAI #s 3 & 5, the Susquehanna Unit 1 steam dryer is to be instrumented for the first phase of power ascension. [[

]]

Data measured on the Unit 1 dryer will be compared to that predicted. This evaluation, which will utilize a more extensive suite of instrumentation, will include the examination of frequency content in the 83 Hz range.

NRC Question 22:

With regard to GE-NE-0000-0061-0595-P-R0 (December 2006), "Susquehanna Replacement Steam Dryer Fatigue Analysis," [[

]].

PPL Response:

The analysis reported in GE-NE-0061-0595-R0-P showed that [[

]]

NRC Question 23:

In GENE-0057-4166-R1-P, Revision 1, it is shown that the [[

]].

PPL Response:

The dryer model and analyses for the replacement dryer evaluation in GE-NE-0061-0595-R0-P [[

]]

NRC Question 24:

With regard to GE-NE-0000-0061-0595-P-R0, Table 7-2, the stresses from the finite element analysis for the replacement dryer at 113% OLTP [[

]]:

a. Since the plates of different thicknesses are welded together in the replacement dryer, the licensee should explain why the stresses at the welds are not multiplied by corresponding undersized weld factors.

b. Since the stress underprediction factor [[ ]] and scale factor [[ ]] are derived from the stress results for the currently installed steam dryer, the licensee should explain why these factors with the same magnitudes are applicable to the replacement dryer having larger thicknesses for several of its components.

PPL Response:

a. GE-NE-0061-0595-R0-P provided the fatigue analysis for the replacement dryer design. [[

]]

b. [[

]]

NRC Question 25:

With regard to GE-NE-0000-0061-0595-P-R0, the licensee is requested to provide discussion as to how the subsequent hammer test results will validate the finite element model of the replacement dryer.

PPL Response:

The hammer test validates the finite element analysis model by comparing the predicted modal and frequency response against the measured test results. Several hood and skirt locations will be tested in the hammer tests. Finite element analysis predictions of the frequency response and mode shapes will be performed. Comparisons of the predicted and measured modal responses and frequency response functions will be performed. If necessary, the finite element model may be revised to address biases identified by the comparisons of the experimental data with the predicted response.

[[

]]

NRC Question 26:

With regard to GE-NE-0000-0061-0595-P-R0, the licensee is requested to provide natural frequencies of the dryer components and the pump vane bypass frequency at 120% OLTP. If any component experiences a resonance with the pump bypass frequency, the licensee should explain how the resulting stresses are addressed in the fatigue evaluation of that component.

PPL Response:

[[

]]

The dryer vibrations resulting from the recirculation pump vane passing frequency will be evaluated [[

]]

NRC Question 27:

In GE Report GENE-0057-4166-R1-P, Revision 1, the licensee provides the frequency content of the dryer stresses at key locations (Figures 8-3 and 8-7). The plots show the frequencies that dominate the dryer stresses. The licensee is requested to submit similar plots for the revised dryer at the locations [[ ]].

PPL Response:

[[

]]

NRC Question 28:

With regard to the licensee's submittal dated December 4, 2006, responding to NRC staff acceptance review comments, the licensee is requested to reassess the methodology of determining its "stress underprediction factor" (SUPF). Referring to the plant measurements in 1985, the licensee should review the low frequency excitations (15, 24 and 32 Hz) at all critical locations on the dryer and compare these measurements with the load predicted by ACM. The licensee should demonstrate that the SUPF is conservative for all EPU power levels (i.e., 100 to 120% OLTP) at all critical locations on the dryer where low frequency excitations are predicted.

PPL Response:

[[

]]

NRC Question 29:

With regard to the licensee's submittal dated December 4, 2006, responding to NRC staff acceptance review comments, the licensee is requested to submit its instrumentation plan for the replacement SSES 1 and 2 steam dryer for review. The plan should show where pressure transducers will be mounted to the dryer, and how the pressure measurements will be used to assess dryer loading at the critical frequencies of 15, 24, and 32 Hz. The plan should further explain how dryer loading not correctly estimated by ACM analysis would be computed based on instrumented dryer results. The plan should also show where strain gages and accelerometer will be mounted to the dryer, and how they will be used to (a) assess the strength of the loading induced by the vane passing frequency of the recirculation pump (near 100 Hz), and (b) the end-to-end adequacy of their dryer stress simulation procedure. If the licensee determines that limit curves need to be specified for dryer instrumentation (since the dryer excitation under 50 Hz and at the recirculation pump vane passing frequency are not measured well by MSL strain gages), the licensee should submit them, and their bases, for review.

PPL Response:

The instrumentation plan is provided in the response to RAI #3.

NRC Question 30:

With regard to the licensee's submittal dated December 4, 2006, responding to NRC staff acceptance review comments, the licensee is requested to address the following:

a. Does the vane passing frequency tone (about 110 Hz at OLTP) caused by the recirculation pump still exist at SSES 1 and 2? If so, the licensee should explain how it will be monitored since it does not appear in the MSL strain gage measurements applied to the ACM.

b. If the recirculation pump vane passing frequency tone still exists at SSES 1 and 2, the licensee should explain how its amplitude and frequency will change between CLTP and EPU conditions. Figures 2 and 3 of Attachment 1 to the December 4 submittal show the tone's strength increasing significantly between 90% and 100% OLTP.

c. The licensee states that localized dryer resonances near the recirculation pump vane passing frequency amplified the tone in the 1985 strain gage dryer measurements. The licensee should explain whether there are any resonances in the modified dryer that the licensee proposes to install in the Susquehanna units that might coincide with the recirculation pump vane passing frequency as the licensee increments Susquehanna power between CLTP and EPU. If there are, the licensee should provide a list of dryer resonances and corresponding mode shapes for review, and estimate how strongly those modes might be excited by the pump tones at EPU conditions.

PPL Response:

a. The recirculation piping vibrations due to the recirculation pump vane passing frequency are still present during operation between 100% and 108% rated core flow. [[

]]

b. The recirculation pump vane passing frequency is a function of the pump speed. [[

]]

c. See response to RAI #26.

NRC Question 31:

With regard to the licensee's submittal dated December 4, 2006, responding to NRC staff acceptance review comments, the licensee is requested to provide an explanation of the sources of the low frequency tones (15, 24, and 32 Hz) that appear in the original steam dryer loading measured in 1985. Specifically:

a. What excites these frequencies (such as flow within the reactor pressure vessel, or flow in the MSLs passing over the mouths of the dead legs)? If flow over the dead leg openings is responsible, the licensee should explain the estimates for the Strouhal Numbers of the instabilities over the dead leg mouths, and how the instabilities will behave at EPU conditions.

b. What is resonating? If the acoustic modes within the dead legs are resonating, the licensee should quantify their behavior.

c. Provide a clear schematic of the dimensions of the MSLs, the dead legs, and the location of the MSL strain gages with respect to the dead leg piping.

d. How will the flow excitation and resonance response change between CLTP and EPU conditions? How will the licensee monitor these changes with methods other than MSL strain gage measurements and ACM simulations?

PPL Response:

a. A description of the low frequency sources is provided in the responses to Supplemental Comments 3 through 5 in PPL's December 4, 2006 submittal (Reference 3). [[

]] [[

]]

The 15, 24, and 32 Hz responses are considered to be hydrodynamic in origin, and are therefore expected to increase as a function of the flow squared. [[

]] it is expected that it will increase at, or less than the power of the flow squared, as discussed in the response to RAI #7.

b. As discussed in Part (a) of this RAI, [[

]]

As discussed in the response to RAI #7, it is expected that the 15 Hz content will increase at, or less than the power of the flow squared,

c. Figure 31-1 provides schematic of the dimensions of the MSLs, the dead legs, and the location of the MSL strain gages with respect to the dead leg piping.

d. As discussed in the response to RAI #7, [[

]] As discussed in the response to RAI #30, [[

]] As discussed in the response to RAI #3, [[

]]

[[

]]

Figure 4-1 - Pressure time histories in the one-fifth scale dead leg at EPU conditions: branch midpoint (top); branch endcap (bottom)

[[

]]

Figure 4-2 - Low frequency buffeting load calculation comparison for Vermont Yankee (VY), Susquehanna (SQ), Hope Creek (HC), and Quad Cities (QC)

[[

]]

Figure 4-3 - Location of dead-headed leg on main steam lines A and D = 54.4 ft (red line). The analysis assumes a normalized pressure of 1.0 at the entrance to the main steam line. Note that the dead-headed leg is positioned very close to a node on the main steam line (for a mode shape corresponding to 16 Hz)

[[

]]

Figure 5-1 - Dryer Instrumentation – 90° Side

[[

]]

Figure 5-2 - Dryer Instrumentation – 270° Side

[[

]]

Figure 5-3 - Dryer Instrumentation – 0° Side

[[

]]

Figure 5-4 - Dryer Instrumentation – Top View

[[

]]

Figure 5-5 - Dryer Instrumentation – Vertical Support Strain Gauge (Interior)

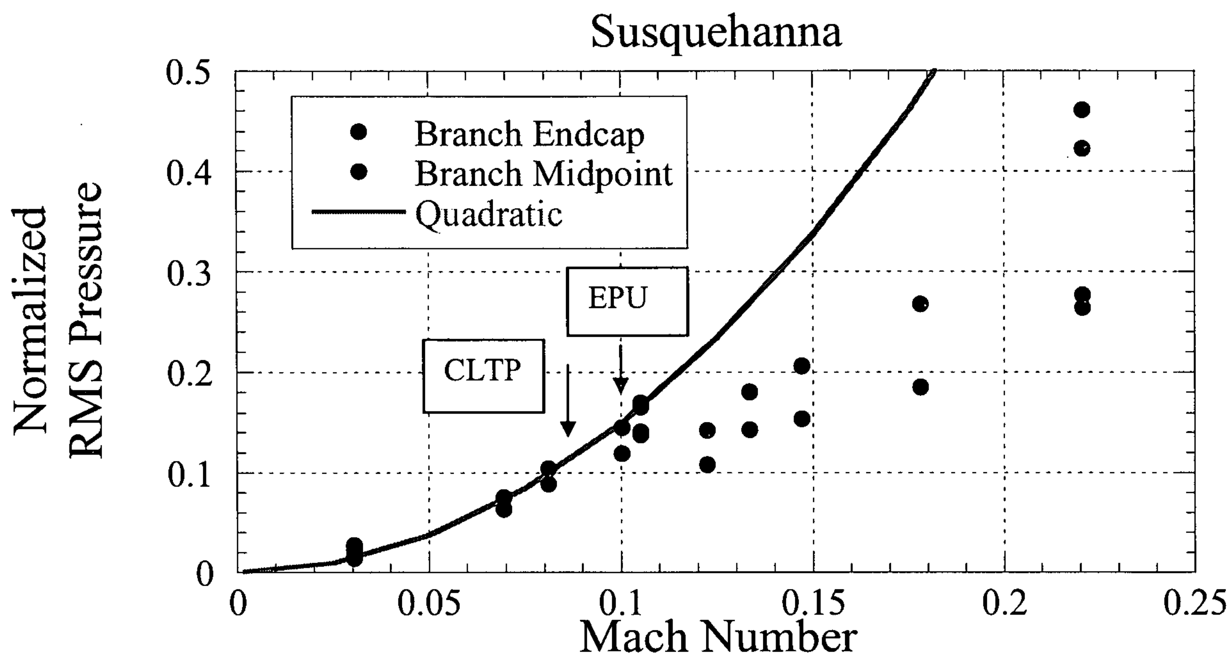
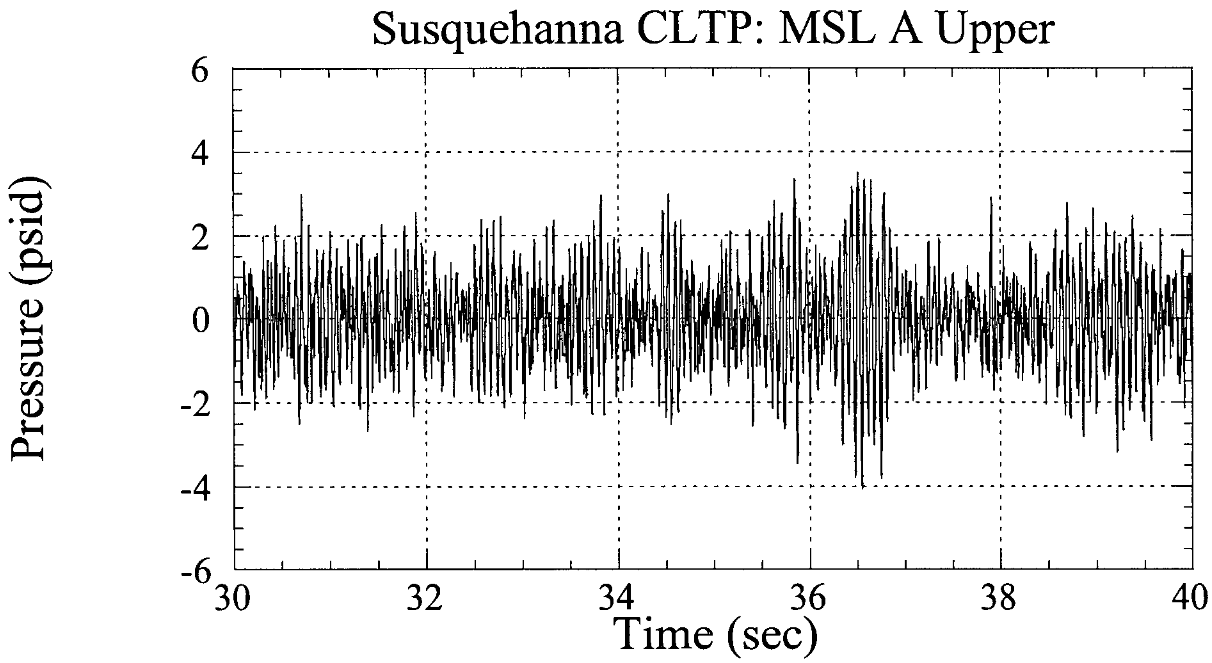


Figure 7-1 - Normalized RMS pressure for all A/D tests: branch endcap refers to the pressure at the end of the dead-headed branch line; and branch midpoint refers to the pressure at the middle of the dead-headed branch line (the two locations where pressure was measured in the one-fifth scale tests). The thick red curve represents the expression $0.15\times(M/0.1)^2$, where M is the Mach number.



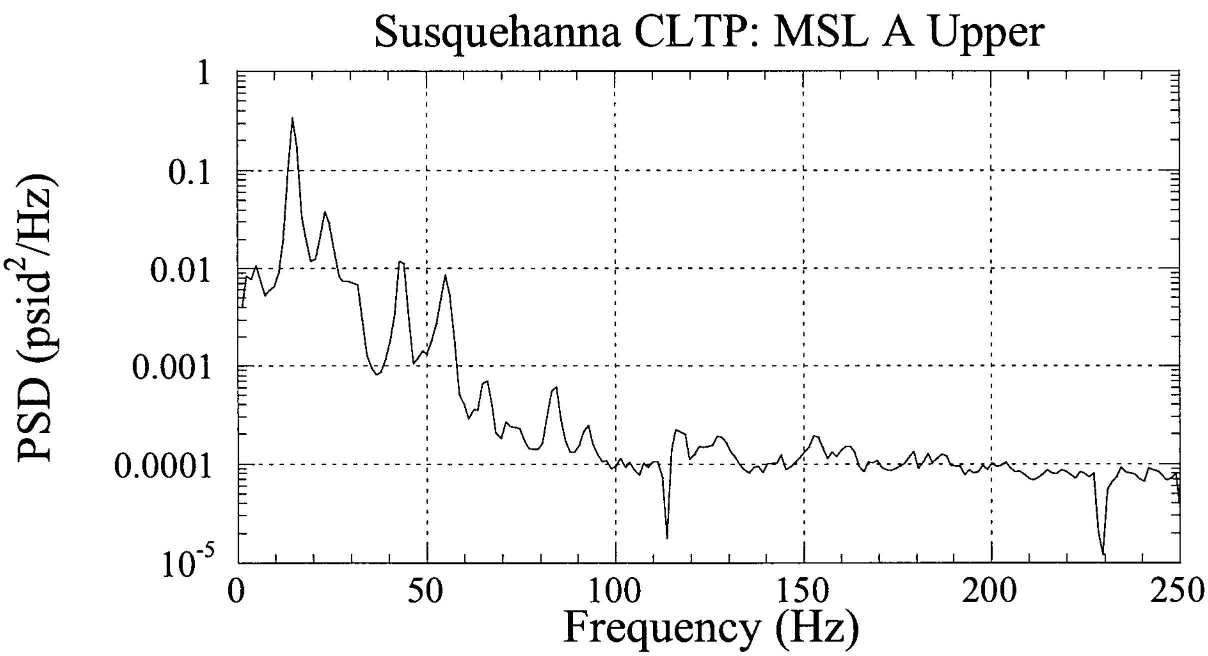
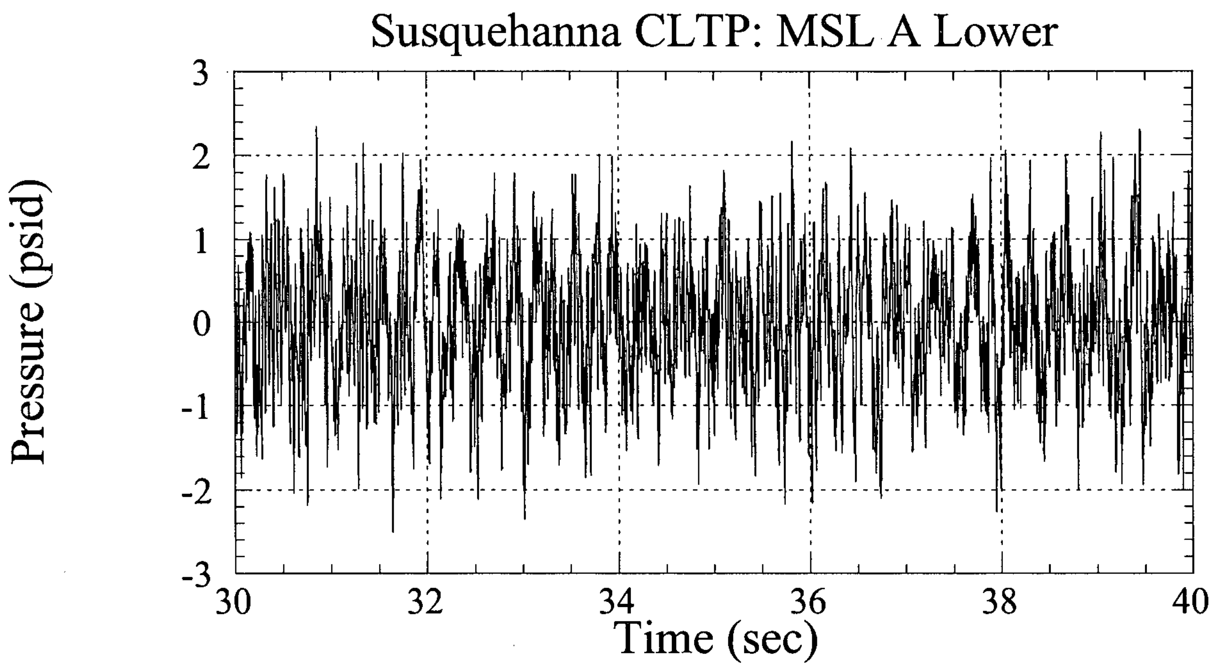


Figure 9-1 - Pressure data collected on main steam line A (upper location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.



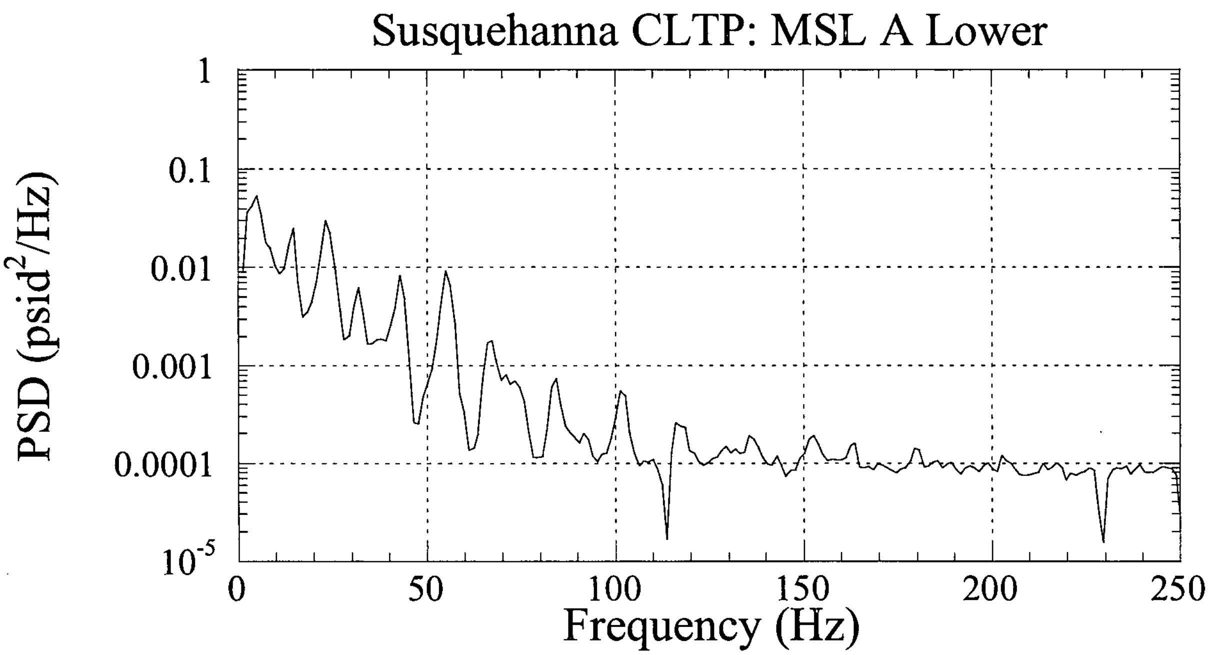
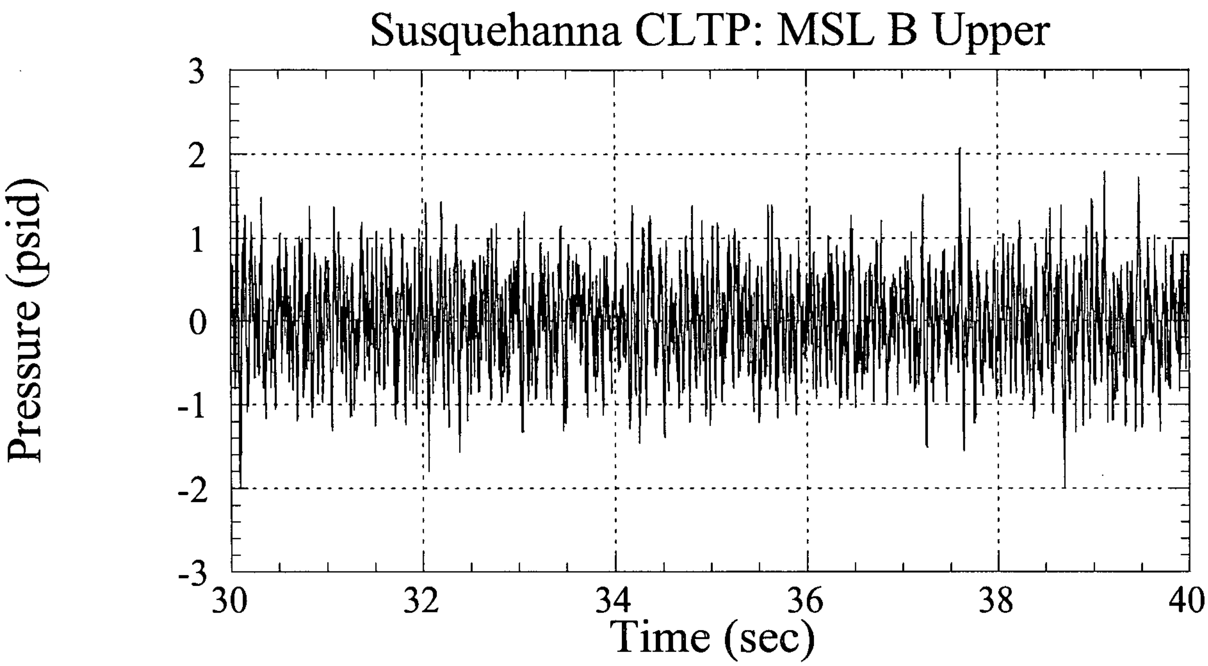


Figure 9-2 - Pressure data collected on main steam line A (lower location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.



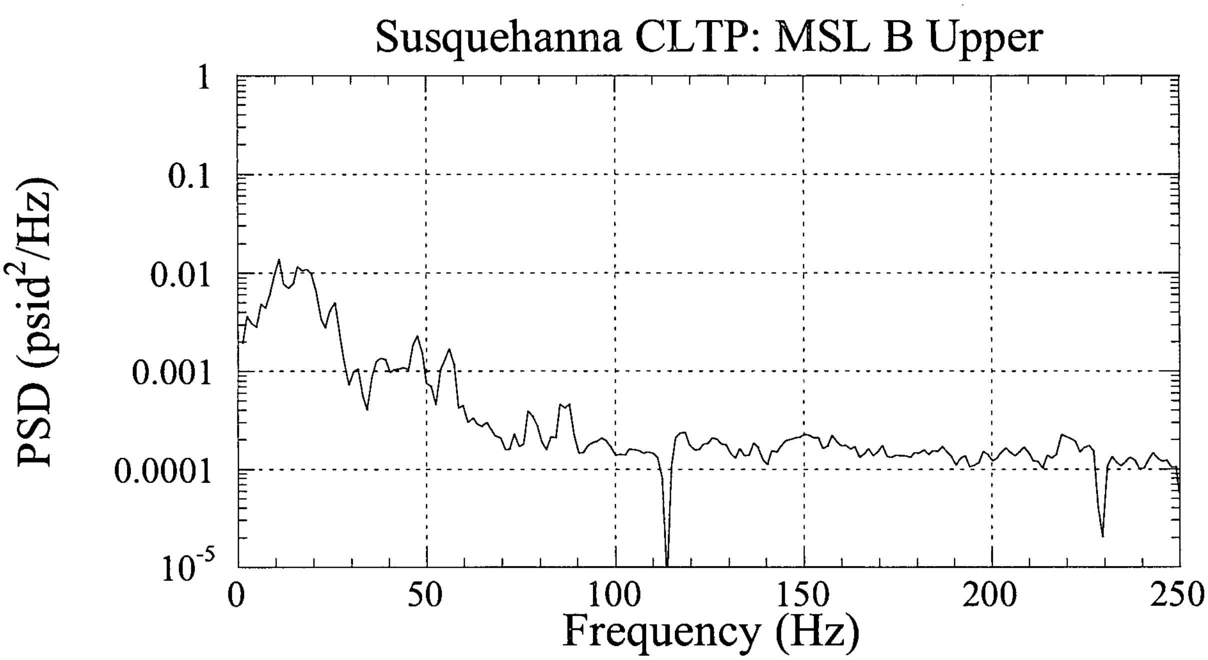
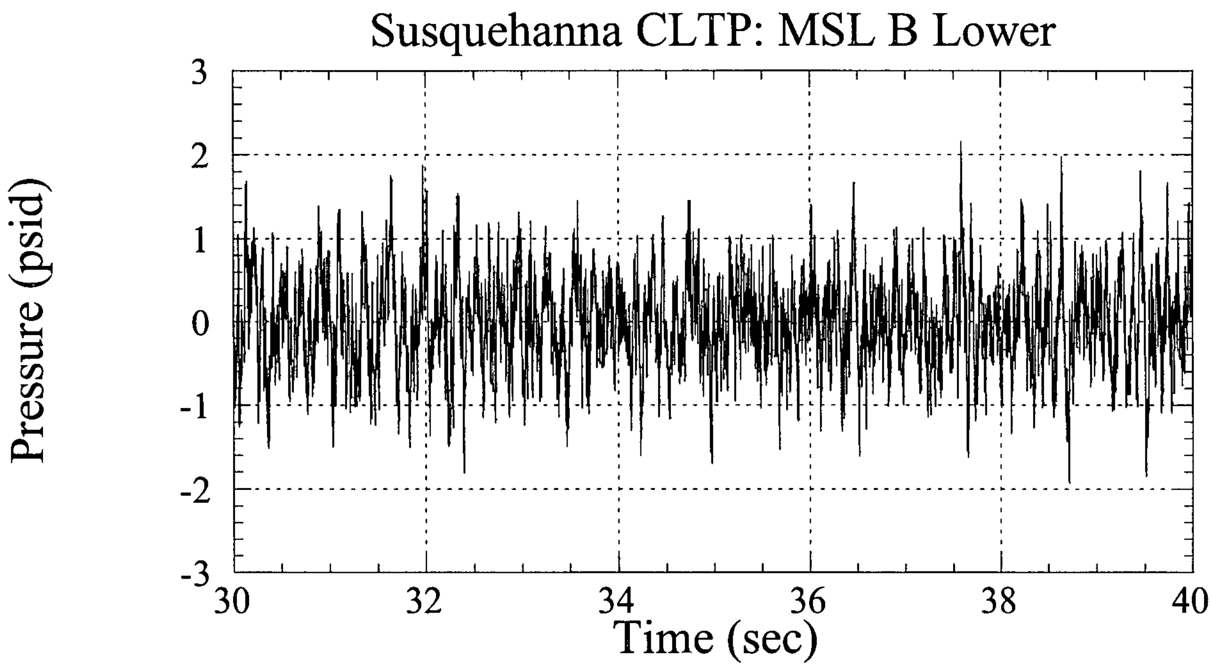


Figure 9-3 - Pressure data collected on main steam line B (upper location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.



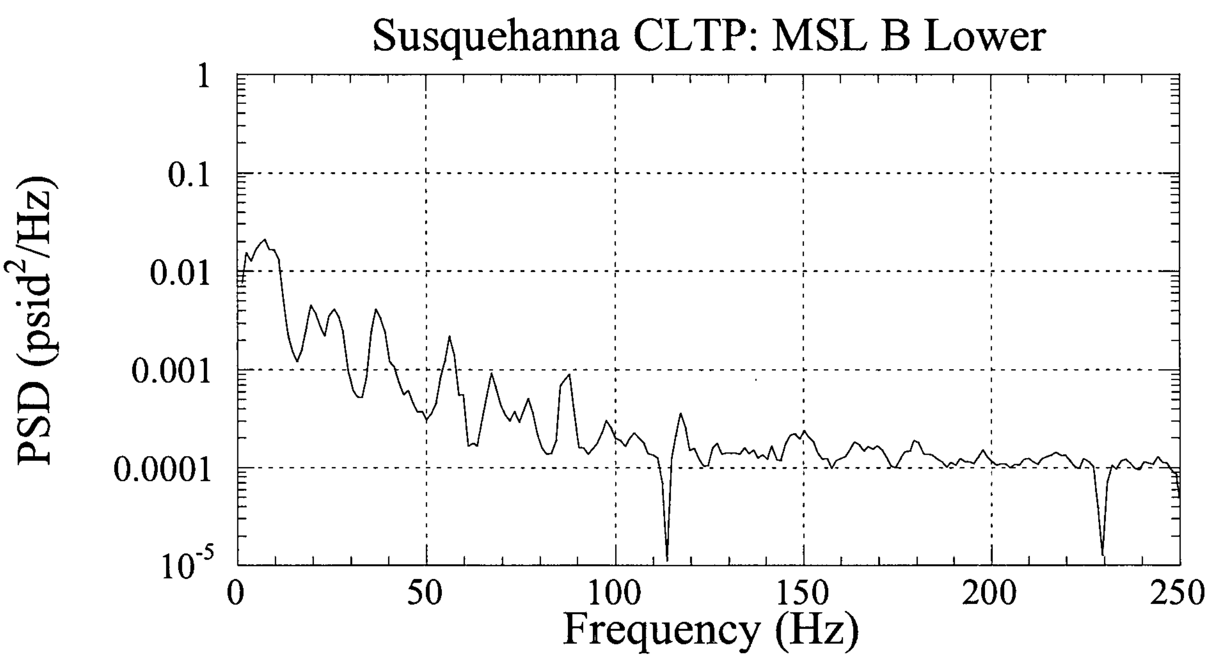
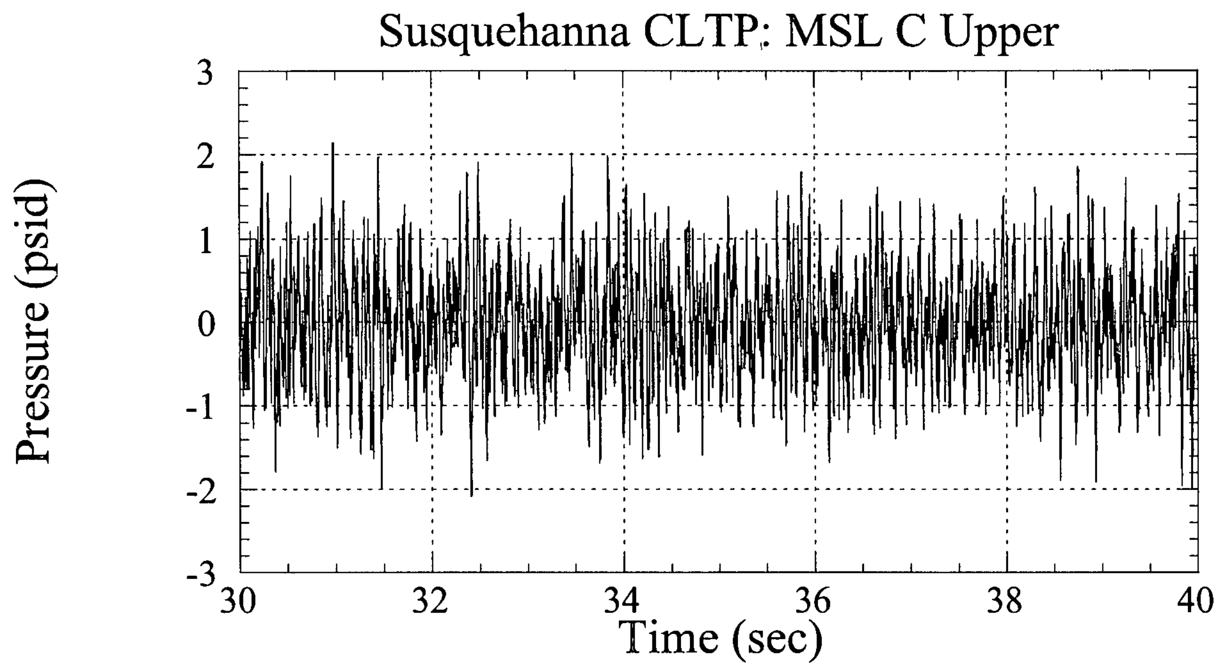


Figure 9-4 - Pressure data collected on main steam line B (lower location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.



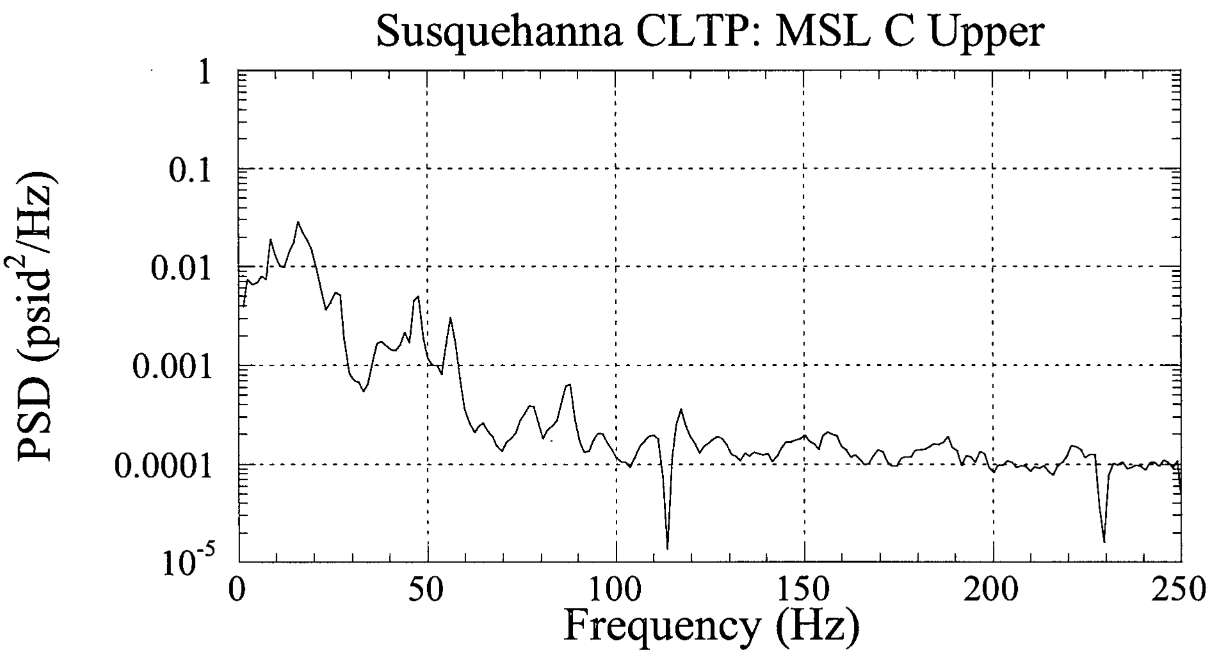


Figure 9-5 - Pressure data collected on main steam line C (upper location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.

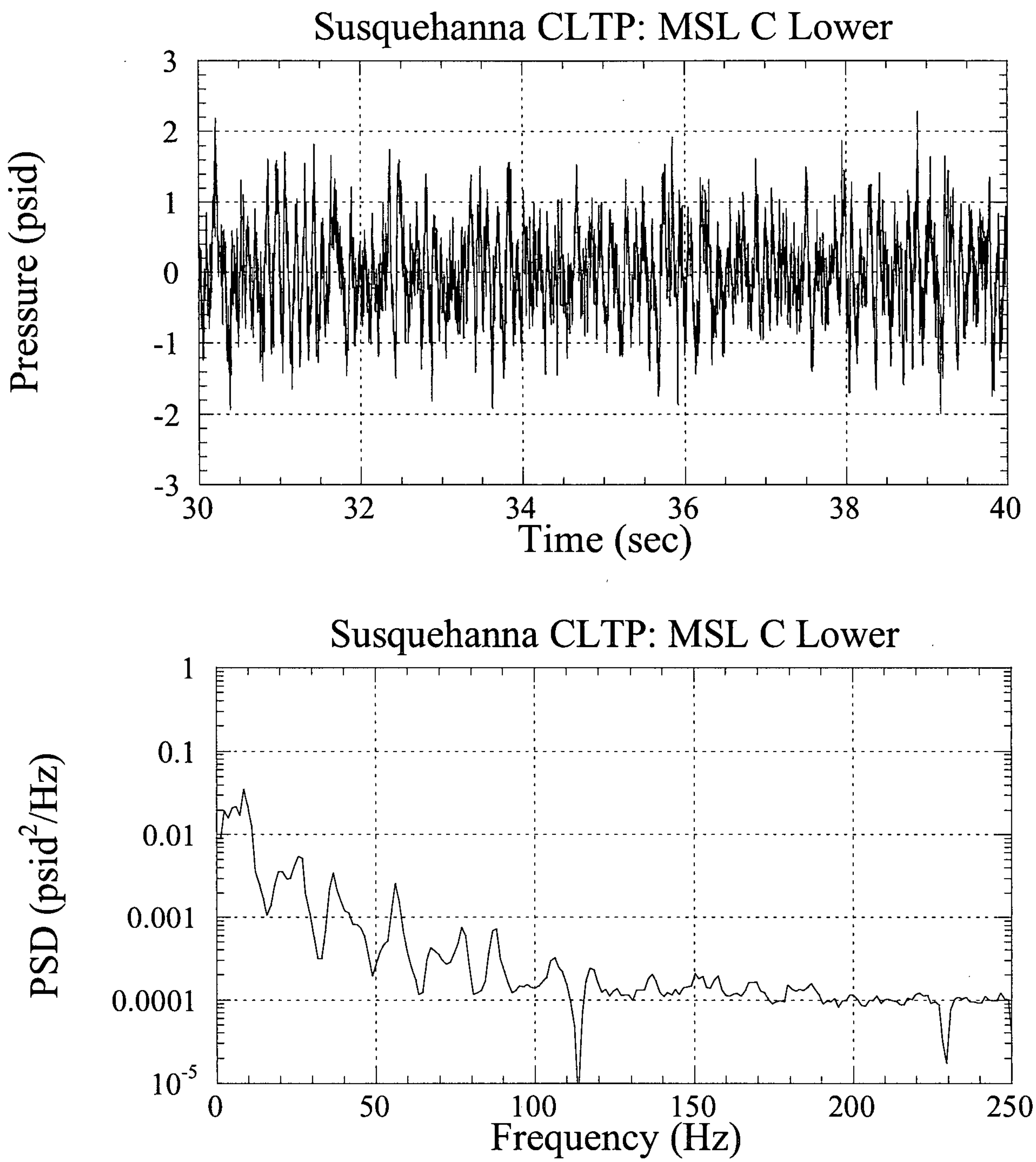
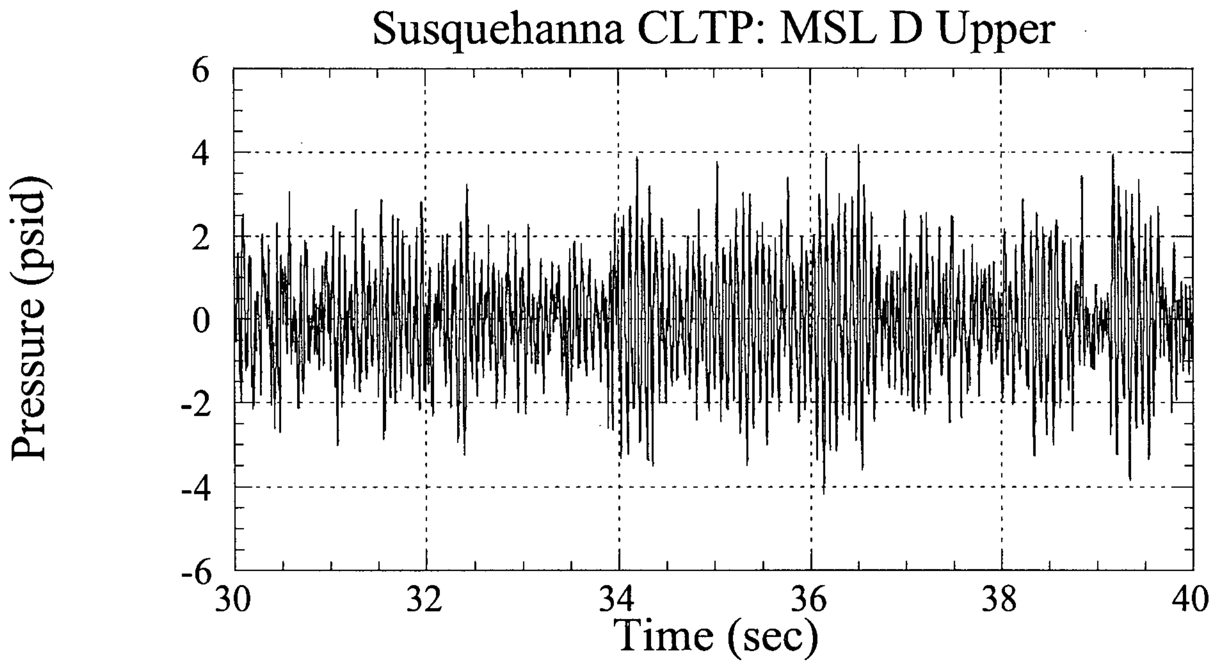


Figure 9-6 - Pressure data collected on main steam line C (lower location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.



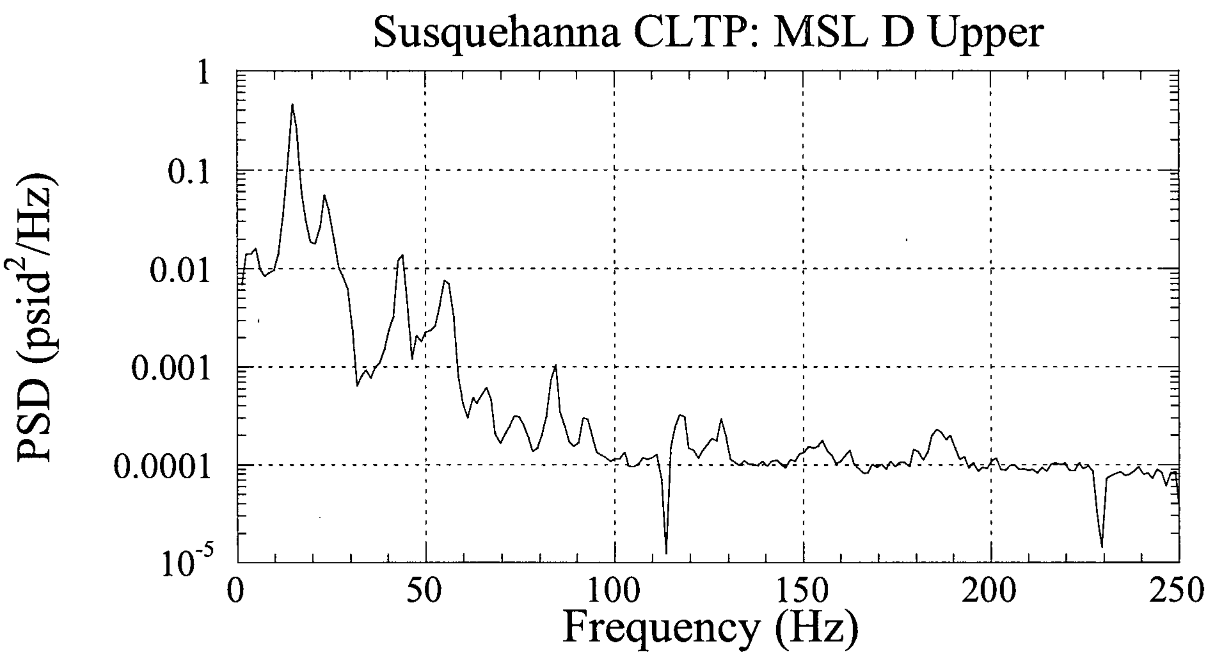


Figure 9-7 - Pressure data collected on main steam line D (upper location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.

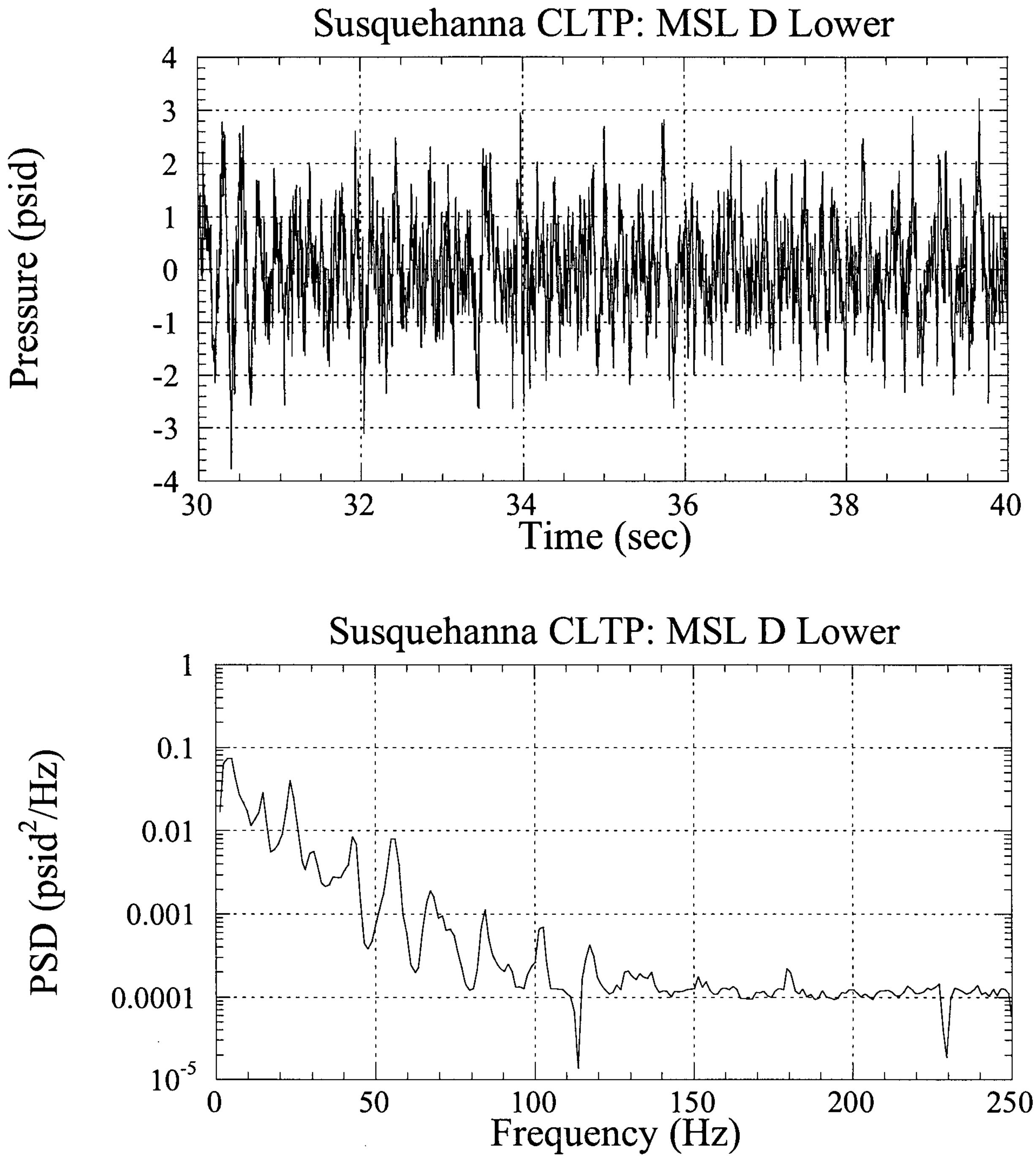
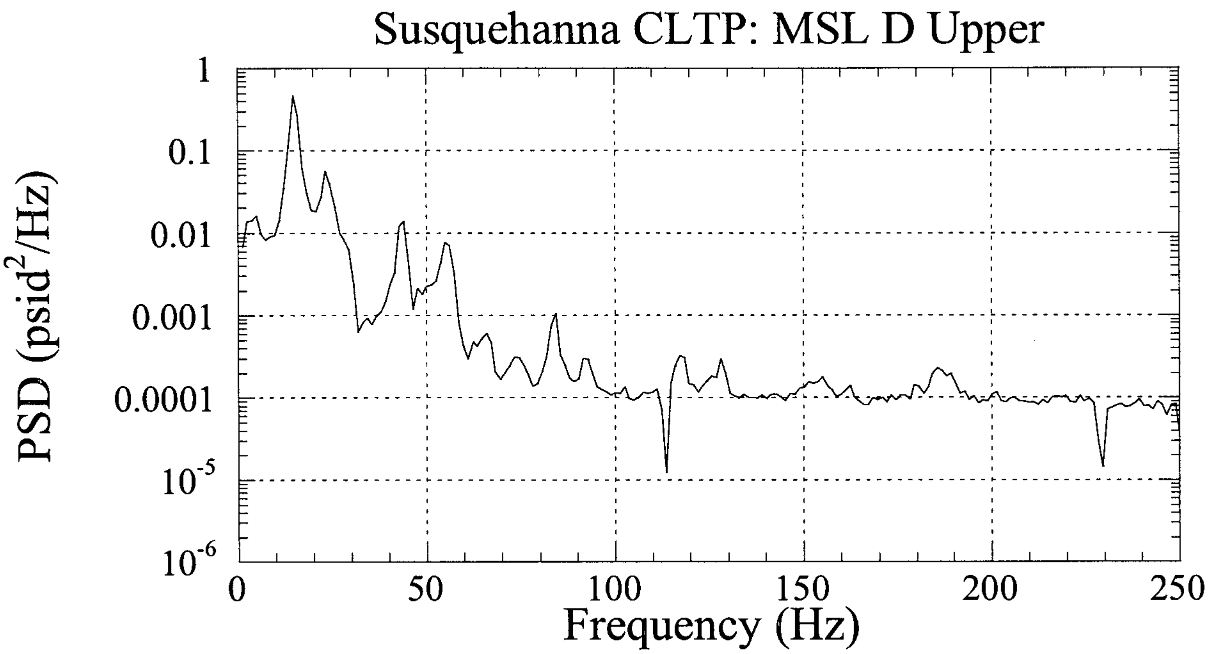


Figure 9-8 - Pressure data collected on main steam line D (lower location) at Susquehanna (converted from strain gage data), prior to application of coherence to reduce noise. Top: A typical time segment from 30 to 40 seconds is shown; bottom: the PSD.

[[

]]

Figure 10-1 - Response of the Susquehanna acoustic circuit model to noise placed at each of the eight strain gage locations.



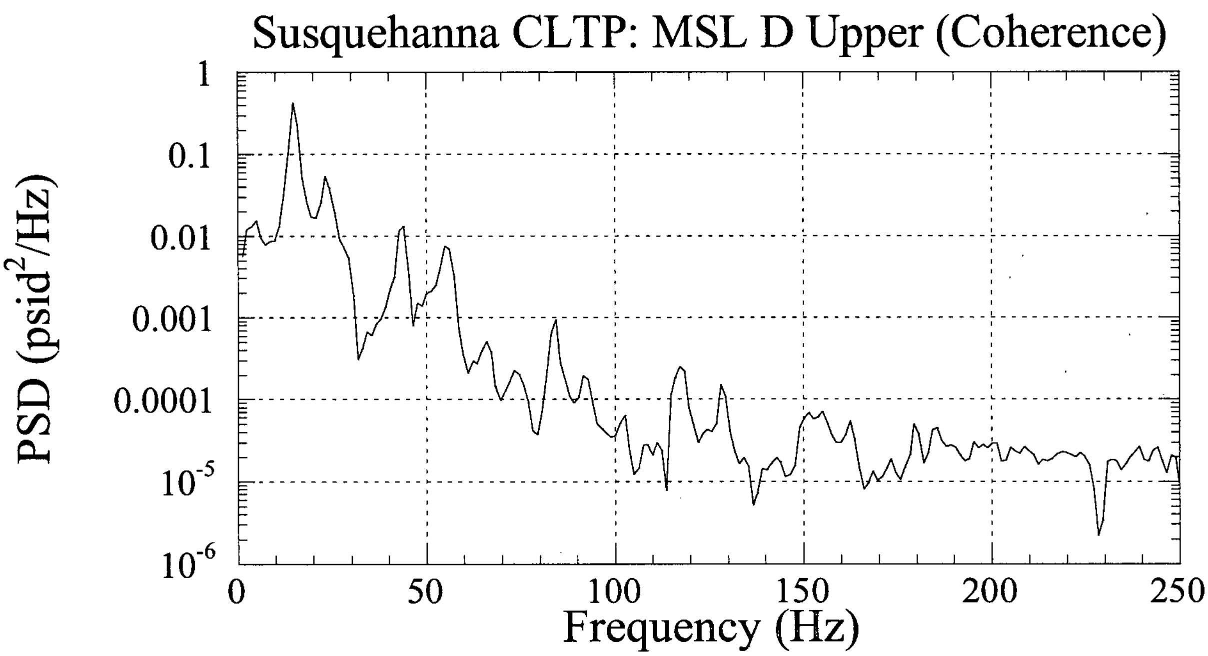


Figure 12-1 - Pressure data collected on main steam line D (upper location) at Susquehanna (converted from strain gage data), prior to application of coherence with main steam line D (lower location) to reduce noise (top) and after application of coherence (bottom).

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

]]

[[

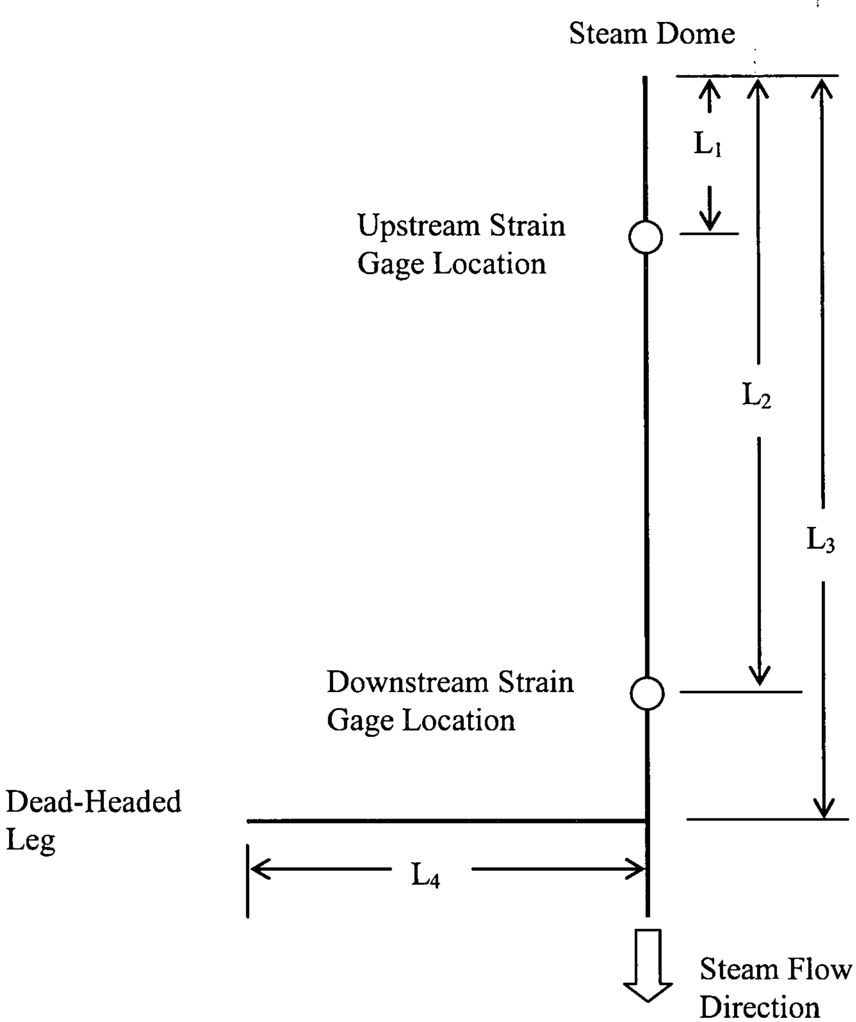
]]

[[

]]

[[

]]



Length	MSL A (ft)	MSL B (ft)	MSL C (ft)	MSL D (ft)
Distance from steam dome to upstream SG location (L_1)	22.8	22.8	22.8	22.8
Distance from steam dome to downstream SG location (L_2)	52.7	49.6	48.3	52.6
Distance from steam dome to dead-headed leg location (L_3)	54.4	NA	NA	54.4
Length of dead-headed leg (L_4)	24.1	NA	NA	24.2

Figure 31-1 - Susquehanna Main Steam Line Schematic

CONSTANT PRESSURE POWER UPRATE FLOW INDUCED VIBRATION POWER ASCENSION TEST PLAN NRC QUESTION 3 APPENDIX

SUSQUEHANNA STEAM ELECTRIC STATION
FACILITY OPERATING LICENSE NPF-14 AND NPF-22
DOCKET No's 50-387 AND 50-388

REQUEST FOR LICENSE AMENDMENT
CONSTANT PRESSURE POWER UPRATE
FLOW INDUCED VIBRATION POWER ASCENSION TEST PLAN

INTRODUCTION AND PURPOSE

The Susquehanna Steam Electric Station (SSES) Constant Pressure Power Uprate (CPPU) Flow Induced Vibration Power Ascension Test Plan (PATP) describes the planned course of action for monitoring and evaluating the performance of the Steam Dryer as well as the Main Steam and Feedwater piping systems during power ascension testing and operation above 100% of the Current Licensed Thermal Power (CLTP). The PATP covers power ascension up to the full 120% CPPU condition to verify acceptable performance and steam dryer and piping system integrity. Through the establishment of operating limits, data collection and analysis, and any subsequent actions, the PATP will ensure that the integrity of the steam dryer and piping systems will be maintained in an acceptable state. This PATP is a portion of the overall CPPU start-up testing described in Attachment 8 of PPL's CPPU License Amendment Request (LAR); Reference 1.

The plan includes specific hold points and durations during power ascension above CLTP; activities to be accomplished during hold points; data to be collected; required inspections and walk downs; data evaluation methods; and acceptance criteria for monitoring and trending plant parameters. Detailed procedures will be developed to implement this plan.

POWER ASCENSION TEST PLAN (PATP) SCOPE

The PATP assesses steam dryer and selected piping system performance for the entire power ascension process for both Susquehanna Units. The PATP will also perform confirmatory inspections for a period of time following initial and continued operation at uprated power levels. Power ascension above 100% CLTP will be achieved in a series of 3.5% power step increases above CLTP.

There are three main elements of the PATP:

1. Slow and deliberate power ascension with defined hold points and durations, allowing time for monitoring and analysis.

2. A detailed power ascension monitoring and analysis program to trend steam dryer and critical piping system performance through the monitoring of Steam Dryer Instrumentation (Unit 1 only), main steam line strain gauges, piping accelerometers, and moisture carryover.

3. An inspection program to verify steam dryer and piping system performance above CLTP conditions.

1. Power Ascension

A detailed test procedure will be developed for the implementation of the actual power ascension testing evolutions. The SSES power ascension will occur over a period of time with gradual increases in power, hold periods, and engineering analysis of monitored data prior to subsequent power increases. The PATP includes (but is not limited to):

1. Collection of baseline data at 100% CLTP;

2. Power ascension rate of ~ 1% CLTP / hr;

3. Collection of steam dryer instrument (Unit 1 only), main steam line strain, and vibration data during power ascension at pre-determined power levels; and,

4. Data evaluated at every power step increase against acceptance criteria.

2. Monitoring and Analysis

The assessment of the system/component performance and integrity will be completed through the analysis of both strain and moisture carryover data.

Power ascension above 100% CLTP will be achieved via the following methodology:

- Obtain baseline observations at 100% CLTP
- Maximum hourly power increase restriction ~1 % CLTP per hour (~34.8 MWt)
- During power increases, obtain steam dryer instrument (Unit 1 only), main steam line strain, and piping vibration data at each 3.5% power ascension step

- Perform MSIV slow closure testing at ~80% CLTP and ~85.5% CLTP to obtain steam dryer data at the equivalent main steam flows for 107% CLTP and 114% CLTP
- Obtain steam dryer instrument data at Increased Core Flow (ICF) conditions up to 108 Mlb_m/hr at 107% CLTP (Unit 1 only).
- Each 3.5% power ascension step (~122 MWt)
    - Compare strain and vibration data to acceptance criteria
    - Obtain/ evaluate moisture carryover data
    - Perform plant walk downs
    - Review data evaluation and walk down results

The duration of the individual 3.5% power ascension steps will be determined by the time required to obtain the specified data, complete the evaluation, and determine acceptability to proceed.

As noted, system performance and integrity will be evaluated based on the review and analysis of both strain and moisture carryover values. For both the strain and moisture carryover elements, acceptance criteria will be established for use in the subject analysis. Data evaluation / analyses will be performed by comparing actual obtained data against the acceptance criteria. Both the strain and moisture carryover criteria will provide two action levels, which will be used in determining the acceptability of the continuance of power ascension increases. The following information further defines the action levels for both the piping and dryer strains and moisture carryover analyses:

Pipe Stress Evaluation

Data evaluation / analysis will be performed by comparing accelerometer data obtained at each 3.5% power ascension step over 100% CLTP against the acceptance criteria. The subject acceptance criteria as derived from plant specific analyses, which are based on actual piping geometries, will provide two action levels. The development of vibration acceptance criteria is discussed in Section 6 of Attachment 9 (Reference 1). The action levels and the required actions are:

Level 1: Allowable Stress Exceeded
- Action — Reduce power to previous acceptable level

Level 2: Low Margin to Allowable Stresses
- Action — Hold at current power level and re-evaluate

Steam Dryer Monitoring/Evaluation

Up through the first two power ascension steps on Unit 1, the new SSES steam dryer will be instrumented to monitor strains, pressures and accelerations. (See Table 1 below for steam dryer instrumentation.) [[

]] The required actions for these levels are:

Level 1: Allowable Stress Exceeded
- Action — Reduce power to previous acceptable level

Level 2: Low Margin to Allowable Stresses
- Action — Hold at current power level and re-evaluate

In addition to the strain data, steam dryer pressures and accelerations and main steam line strains will be recorded. This data will be used to validate and benchmark the analytical tools for calculating steam dryer stress using main steam line strains. For the Unit 1 first and second power ascension steps, [[

]]

Steam dryer stress for the third and fourth Unit 1 steps and for all Unit 2 steps will be monitored using main steam line strain readings. Evaluation of the strain gauge data will be by comparison against the limit curves developed from the steam dryer finite element analysis after it has been benchmarked against the Unit 1 steam dryer instrument data. The dryer stresses, as derived from the main steam line strain measurements, will be compared to acceptance criteria identical to those used for the first and second Unit 1 CPPU power ascension steps.

MSIV slow closure will be performed at ~80% CLTP and ~85.5% CLTP to obtain main steam line mach numbers equivalent to 107% CLTP and 114% CLTP power levels. The 80% CLTP closure data will be used to benchmark and evaluate the composite pressure load definition that was input into the steam dryer finite element model. The 85.5% CLTP closure data will be used to confirm the power scaling factor derived in Section 4.3.5 of Attachment 10 (Reference 1) which was used to calculate stress intensities at the full CPPU power levels.

Steam dryer vibration measurements will be taken at ICF conditions up to 108 Mlb_m/hr at the 107% CLTP power level. The ICF measurement data will be used to benchmark and evaluate the recirculation vibration load definition that was input into the steam dryer finite element model.

<u>Steam Dryer Instrumentation</u>

[[

]]

Moisture Carryover Evaluation

Data evaluation / analysis will be performed by comparing moisture carryover data obtained at each 3.5% power ascension step over 100% CLTP against the predetermined acceptance criteria. The subject acceptance criteria and the required action upon failure are:

Level 1: N/A
- Action – None

Level 2: Moisture carryover ≤0.1% by weight
- Action – Hold at current power level and re-evaluate

Data Collection Methods and Locations

A. Pipe / Component Stress

1. Piping Inside the Drywell
Main Steam and Feedwater piping inside the drywell will be monitored using accelerometers with data recorded on a Data Acquisition System (DAS) located outside of the drywell. Monitoring locations were established based on detailed analysis of the SSES piping which identified the optimal quantity and locations of the subject sensors. Instrumentation to be used for monitoring piping flow induced vibration is discussed in Section 7 of Attachment 9 (Reference 1).

2. Components Inside the Drywell
Individual components inside the drywell will be monitored using accelerometers with data recorded on a DAS located outside of the drywell. Locations have been chosen based upon recent industry experience with component failures during CPPU conditions in conjunction with engineering judgment as to the susceptibility of the components. Two (2)

Main Steam Safety Relief Valves (SRVs) per unit have been selected for monitoring. A complete list of components is provided in the Appendices of Attachment 9 (Reference 1).

3. Piping Outside the Drywell
Process piping will be monitored via walk downs and inspections to the extent practical. If unexpected conditions are observed, vibration levels will be quantified and evaluated using ASME O/M-S/G Part 3 guidelines.

B. Steam Dryer

1. Moisture Carryover
Moisture Carryover data collection will be completed via the implementation of existing station operating procedures. Frequency of the data collection and required analysis (including any "hold" times) will be controlled via a test procedure.

2. Main Steam Line Strain Gauges
Strain Gauge locations as discussed in Attachment 10 (Reference 1) will be monitored. Data obtained from the strain gauges will be recorded on a DAS located outside of the drywell.

3. Steam Dryer Instrumentation
Steam dryer instrumentation as described in Table 1 below will be monitored. Data obtained from the strain gauges, pressure transducers, and accelerometers will be recorded on a DAS located outside of the drywell.

Inspections and Walk Downs

As discussed in Attachment 9 (Reference 1), piping, valves and other related components outside the drywell will be monitored visually, either by walk down or cameras at each test power level. If visual observation indicates significant vibration, the noted condition will be evaluated in more detail.

Other Monitoring

Plant data that may be indicative of off-normal steam dryer and or piping system performance will be monitored during power ascension (e.g. reactor water level, steam flow, feed flow, steam flow distribution between the individual steam lines). Plant data can provide an early indication of unacceptable steam dryer/system performance. The enhanced monitoring of selected plant parameters will be controlled by test procedure.

NRC Communication

Three written reports will be provided to the NRC. These reports will be issued following completion of testing of Unit 1 power ascension to 107% CLTP and 114% CLTP, and Unit 2 ascension to 114% CLTP. Each report will include evaluations or corrective actions that were required to obtain satisfactory steam dryer performance. Additionally, they will include relevant data collected at each power step, comparisons to performance criteria (design predictions), and evaluations performed in conjunction with steam dryer structural integrity monitoring.

3. Post CPPU Monitoring & Inspection Program

Monitoring of various plant parameters potentially indicative of steam dryer / system failure will be continued after completion of the test program. Monitoring results will be made available to the NRC Staff. The following inspections will be performed:

Moisture Carryover

Station operating procedures will be used to monitor operating moisture carryover conditions. Results will be reviewed / evaluated on a defined basis to monitor moisture carryover conditions.

Strain Gauge / Accelerometer Monitoring

As the previously installed main steam line strain gauges and accelerometers remain operable, future data collection will be performed as deemed appropriate during the remainder of the operating cycles following CPPU implementation. The Unit 1 steam dryer instrumentation is expected to be rendered non-functional for the third and fourth power ascension steps.

Steam Dryer Monitoring and Inspection

The steam dryer inspection and the monitoring of plant parameters, potentially indicative of steam dryer failure, will be conducted. Future steam dryer non-destructive examinations during refueling outages will be conducted in accordance with BWRVIP-139 and General Electric recommendations regarding the new dryer weld configurations.

Inspections and Walk Downs

During the subsequent refueling outage or other outage that provides access for inspection, piping, valves and other related components inside and outside the drywell will be monitored visually by walk down. If visual observation indicates significant vibration, the noted condition will be documented in the corrective action program and evaluated in more detail.

REFERENCES

1) PPL Letter PLA-6076, "B.T. McKinney (PPL) to USNRC, "Proposed License Amendment Numbers 285 for Unit 1 Operating License No.NPF-14 and 253 for Unt 2 Operating License No. NPF-22 Constant Pressure Power Uprate", dated October 11, 2006

Table 1
Steam Dryer Instrumentation

Component	Strain Gauges	Accelerometers	Dynamic Pressure	TOTAL
[[				
				]]

Attachment 3
General Electric Company and Continuum Dynamics Incorporated (CDI) Affidavits

General Electric Company

AFFIDAVIT

I, George B. Stramback, state as follows:

(1) I am Manager, Regulatory Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GE's letter, GE-SSES-AEP-320, Larry King (GE) to Mike Gorski (PPL), entitled *GE Responses to NRC RAIs Regarding Steam Dryers and Flow Effects (NRC dated 3/20/2007)*, dated April 20, 2007. The proprietary information in Enclosure 1, which is entitled *GE Responses to RAIs 1, 3, 5, 6, 7, 13b, 20, 22, 23, 24, 25, 26, 27, 28, 29 30, 31a, b, and d,* is delineated by a double underline inside double square brackets. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic 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 reveals aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. 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 (4)a., and (4)b, above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed Dryer design and analysis flow effects information related to the BWR Steam Dryer. Development of this information and its application for the design, procurement and analysis methodologies and processes for the Steam Dryer Program was achieved at a significant cost to GE, on the order of approximately two million dollars.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

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

Executed on this 20th day of April 2007.

George B. Stramback

George B. Stramback
General Electric Company

General Electric Company

AFFIDAVIT

I, George B. Stramback, state as follows:

(1) I am Manager, Regulatory Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GE's letter, GE-SSES-AEP-321, Larry King (GE) to Mike Gorski (PPL), entitled *GE Review of Draft Responses to NRC Questions 1, 2, 3, 4, 20, 21, and Constant Pressure Power Uprate Flow Induced Vibration Power Ascension Test Plan NRC Question 3 Appendix*, dated April 26, 2007. The proprietary information in Enclosure 1, which is entitled *GE Review of Draft Responses to NRC Questions 1, 2, 3, 4, 20, 21, and Constant Pressure Power Uprate Flow Induced Vibration Power Ascension Test Plan NRC Question 3 Appendix,* is delineated by a dashed underline inside double square brackets. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic 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 reveals aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. 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 (4)a., and (4)b, above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed Dryer design, analysis and testing effects information related to the BWR Steam Dryer. Development of this information and its application for the design, procurement and analysis methodologies and processes for the Steam Dryer Program was achieved at a significant cost to GE, on the order of approximately two million dollars.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

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

Executed on this 26th day of April 2007.

George B. Stramback

George B. Stramback
General Electric Company

Continuum Dynamics, Inc.
(609) 538-0444 (609) 538-0464 fax 34 Lexington Avenue Ewing, NJ 08618-2302

AFFIDAVIT

Re: Enclosure to PLA-6176 Request for Additional Information Responses

I, Barbara A. Agans, being duly sworn, depose and state as follows:

1. I hold the position of Director, Business Administration 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 PPL Susquehanna, LLC as attachment to C.D.I. Letter No. 07076 dated 24 April 2007, Enclosure to PLA-6176 Request for Additional Information Responses.

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 24th day of April 2007.

Barbara A. Agans

Barbara A. Agans
Continuum Dynamics, Inc.

Subscribed and sworn before me this day: April 24 2007

Eileen P. Burmeister

Eileen P. Burmeister, Notary Public

EILEEN P. BURMEISTER
NOTARY PUBLIC OF NEW JERSEY
MY COMM. EXPIRES MAY 6, 2007