
Attachment 2 to PLA-6332 Non-Proprietary Version of Susquehanna Replacement Steam Dryer Instrumentation Acceptance Criteria - Dryer Mounted Instrumentation

Non-Proprietary Notice

This is a non-proprietary version of the Attachment 1 of PLA-6332, which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[]].



HITACHI

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Non-proprietary Version

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Class I

February 2008

Engineering Report

Susquehanna Replacement Steam Dryer Instrumentation Acceptance Criteria – Dryer Mounted Instrumentation

**IMPORTANT NOTICE REGARDING THE
CONTENTS OF THIS REPORT**

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NON-PROPRIETARY NOTICE

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REVISION SUMMARY

Rev	Required Changes to Achieve Revision
0	None
1	Created the non-proprietary version by revising the non-proprietary notices, deleting proprietary markings, and removing proprietary information consistent with GEH standards. No technical changes made.
2	Revised description of abbreviation of PPL. No technical changes made.

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ACRONYMS AND ABBREVIATIONS

Item	Short Form	Description
1	ACM	Acoustic Circuit Model
2	BWR	Boiling Water Reactor
3	CLTP	Currently Licensed Thermal Power
4	EPU	Extended Power Uprate
5	FEA	Finite Element Analysis
6	FE	Finite Element
7	FFT	Fast Fourier Transform
8	FIV	Flow Induced Vibration
9	Freq	Frequency
10	GE	General Electric
11	GEH	GE Hitachi Nuclear Energy
12	Hz	Hertz
13	Mlbm/hr	Millions pounds mass per hour
14	MS	Main Steam
15	MSIV	Main Steam Line Isolation Valve
16	MSL	Main Steam Line
17	MW _t	Megawatt Thermal
18	NA	Not Applicable
19	NRC	Nuclear Regulatory Commission
20	OLTP	Original Licensed Thermal Power
21	PATP	Power Ascension Test Plan
22	PPL	PPL Susquehanna LLC
23	PSD	Power Spectral Density
24	psi	Pounds per square inch
25	RMS	Root-Mean-Squared
26	RPV	Reactor Pressure Vessel
27	SCF	Stress Concentration Factor
28	SG	Strain Gage
29	Sqrt	Square Root
30	SRSS	Square Root Sum of Squares
31	SSES	Susquehanna Steam Electric Station
32	Stdev	Standard Deviation
33	V ²	Velocity Squared

1. EXECUTIVE SUMMARY

This report documents the development of the steam dryer instrumentation acceptance criteria and provides the acceptance limit curves that will be used to confirm the acceptability of the Susquehanna Steam Electric Plant (SSES) replacement steam dryer to withstand the effects of flow induced vibration at Extended Power Uprate (EPU) conditions. Acceptance criteria are developed for the on-dryer installed instrumentation.

The acceptance criteria presented in this report will be incorporated into the Power Ascension Test Plan (PATP) for the replacement steam dryer.

2. INTRODUCTION AND BACKGROUND

The first replacement steam dryer installed in SSES will be instrumented [[

]] The locations for the
dryer instrumentation sensors are shown in Figures 1-1 through 1-4.

[[

]]

During the steady state conditions after the first two power ascension steps ~103.5% and ~107% of 3489 MWT, the dryer data will be compared to the acceptance limits. If a measurement exceeds the Level 1 criteria, a reduction in power to the previously acceptable power level is required. The level 2 criteria are used to provide margin to the Level 1 criteria. If a

measurement exceeds the Level 2 criteria, the plant shall hold at the current power level and re-evaluate the dryer loading and structural response.

The rate of increase dryer gages shall be monitored to identify whether there are resonance frequencies increasing above nominal levels in proportion to instrumentation data.

Acceptance criteria for the on-dryer mounted instrumentation was previously developed in Reference 1 based upon the Reference 2 finite element (FE) model stress results. This was provided to the NRC as an Attachment to Reference 1. As part of the Susquehanna license for Extended Power Uprate, it was required that PPL provide dryer sensor acceptance criteria based on the final as-designed dryer. This report provides the dryer gage acceptance criteria as required by the NRC.

The acceptance criteria developed in this report are based on the as designed and fabricated SSES replacement steam dryer FE model results documented in Reference 3. The acoustic loads used in the stress analysis were developed in Reference 4 and were not affected by the structural differences in the dryer design represented by the two FE models. The existing Susquehanna steam dryer was instrumented previously in 1985 as documented in Reference 5.

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Table 1-1 Replacement Dryer [[Sensor Locations

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3. Acceptance Criteria for Dryer Mounted Instrumentation

3.1 [[]] Acceptance Criteria

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Table 3-1 Peak Stress Intensity with [[

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Table 3-3 [[]]

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Table 3-4 Dryer Instrumentation Acceptance Limits

3.2 Spectra Curves for Dryer Instrumentation

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4. CONCLUSIONS

Level 1 and Level 2 criteria were developed for on-dryer installed instrumentation that will be used to confirm the acceptability of the replacement steam dryers installed at SSES.

Table 3-4 provides the acceptance limits for instrumentation mounted on the replacement steam dryer. [[

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5. REFERENCES

- [1] PPL Letter To USNRC PLA-6242, B.T. McKinney (PPL) to USNRC, "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 Uprate Application Regarding Steam Dryer And Flow Effects Request For Additional Information Responses", July 31, 2007.
- [2] "Susquehanna Replacement Steam Dryer Fatigue Analysis", GE-NE-0000-0061-0595-P-R1, June 2007.
- [3] "Susquehanna Replacement Steam Dryer Stress Analysis at Extended Power Uprate Conditions", GE-NE-0000-0079-2250-P-R0, January 2008.
- [4] C.D.I. Report No. 06-22 Rev. 0, "Hydrodynamic Loads at OLTP, CLTP, and 113% OLTP on Susquehanna Unit 1 Steam Dryer to 250 Hz," September 2006.
- [5] MDE #199-0985, "Susquehanna - 1 Steam Dryer Vibration Steady State and Transient Response," October 1985.
- [6] PPL Letter to USNRC PLA-6138, B.T. McKinney (PPL) to USNRC, "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 Constant Pressure Power Uprate Application - Supplement", December 4, 2006.

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Figure 1-1 Dryer Top View

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Figure 1-2 Elevation Ninety Degree View

* Dimension measured along circumference.

*** This [[]] is vertical, all others horizontal

[[

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Figure 1-3 Elevation Zero Degree View

**** Dimension measured along circumference.**

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Figure 1-4 Elevation 270 Degree View

Figure 3-1 Frequency Spectra for [[]]

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Figure 3-2 Frequency Spectra for [[]]

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Figure 3-3 Frequency Spectra for [[]]

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Figure 3-4 Frequency Spectra for [[]]

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Figure 3-5

Frequency Spectra for [[

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Figure 3-6 Frequency Spectra for [[]]

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Figure 3-7 Frequency Spectra for [[]]

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Figure 3-8 Frequency Spectra for [[]]

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Figure 3-9 Frequency Spectra for [[]]

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Figure 3-10 Frequency Spectra for [[

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Figure 3-11 Assessment of [] for Monitoring Peak Stress []

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Figure 3-13 **Depiction of ASME III Fatigue Curve C**

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Attachment 3 to PLA-6332
GE- Hitachi Nuclear Energy Americas, LLC
Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, **Tim E. Abney**, state as follows:

- (1) I am Vice President, Services Licensing, Regulatory Affairs, GE-Hitachi Nuclear Energy Americas LLC (“GEH”), 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 GEH proprietary report, GE-NE-0000-0080-2994-P-R2, Susquehanna Replacement Steam Dryer Instrumentation Acceptance Criteria – Dryer Mounted Instrumentation, February, 2008. The proprietary information is identified by a dotted underline inside double square brackets. [[This sentence is an example^{3}]] 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 or licensee, GEH 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 GEH's competitors without license from GEH 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 GEH customer-funded development plans and programs, resulting in potential products to GEH;
 - 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 GEH, 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 GEH, 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, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH 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 for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH 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 results and details of structural analysis methods and techniques developed by GEH for evaluations of BWR Steam Dryers. Development of these methods, techniques, and information and their application to the design, modification, and analyses methodologies and processes for the Steam Dryer Program was achieved at a significant cost to GEH.

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 GEH asset.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH'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 GEH.

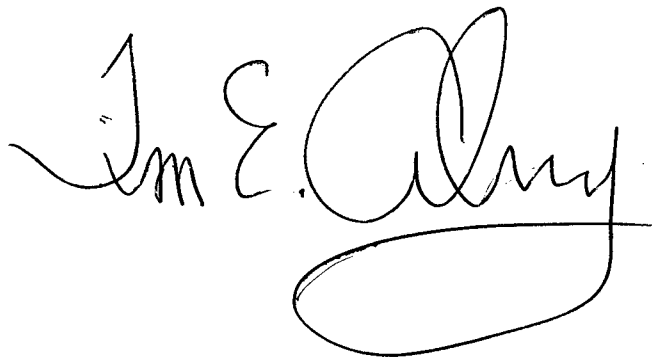
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH 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 GEH 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 GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining 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 21st day of February 2008.

A handwritten signature in black ink, appearing to read "Tim E. Abney". The signature is fluid and cursive, with a large, prominent loop at the end.

Tim E. Abney
GE-Hitachi Nuclear Energy Americas LLC