Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

January 27, 2010

10 CFR 50.90

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

Browns Ferry Nuclear Plant, Unit 1
Facility Operating License No. DPR-33
NRC Docket No. 50-259

Subject: **Technical Specifications (TS) Change TS-431 – Extended Power Uprate (EPU) – Response to Round 27 Request for Additional Information (RAI) Regarding Steam Dryer Analyses (TAC No. MD5262)**

References:

1. Letter from TVA to NRC, "Browns Ferry Nuclear Plant (BFN) - Unit 1 - Proposed Technical Specifications (TS) Change TS-431 - Request for License Amendment - Extended Power Uprate (EPU) Operation," dated June 28, 2004

2. Letter from NRC to TVA, "Browns Ferry Nuclear Plant, Unit 1, Request for Additional Information for Extended Power Uprate - Round 27," dated December 29, 2009

3. Letter from TVA to NRC, " Technical Specifications (TS) Change TS-431 - Extended Power Uprate (EPU) - Response to Round 24 Request for Additional Information (RAI) EMCB.208 Regarding Steam Dryer Analyses," dated August 28, 2009

4. Letter from TVA to NRC, "Technical Specifications (TS) Change TS-431 - Extended Power Uprate (EPU) - Steam Dryer Reports," dated August 31, 2009

By letter dated June 28, 2004 (Ref. 1), the Tennessee Valley Authority (TVA) submitted a license amendment application for the EPU of BFN Unit 1. The proposed amendment would modify the operating license to increase the maximum authorized core thermal power level by approximately 14 percent to 3952 megawatts.

NRC issued a Round 27 RAI on December 29, 2009 (Ref. 2) based on the review of the steam dryer analyses that were performed at 110% of original licensed power (OLTP) with the currently modified BFN Unit 1 steam dryer (Ref. 3). The Reference 2

D030
NRR

letter indicated that TVA had agreed to respond to the request for additional information within 30 days of issuance of the letter, i.e., by January 28, 2010.

Based on the planned outages for Unit 1, TVA no longer anticipates operation above the current licensed thermal power level prior to the completion of any necessary steam dryer modifications needed for EPU. Therefore, TVA does not need NRC review of CDI Report No. 09-24P, "Stress Assessment of Browns Ferry Nuclear Unit 1 Steam Dryer to 110% OLTP Power Level," provided in Reference 3. Although the Round 27 RAIs are based upon the NRC review of the 110% OLTP steam dryer stress analysis, Enclosure 1 provides the responses for the RAIs as they apply to the methodology that was used for the steam dryer stress analysis at EPU conditions provided by CDI Report No. 09-25P, "Stress Assessment of Browns Ferry Nuclear Unit 1 Steam Dryer to 120% OLTP Power Level" (Ref. 4).

Enclosure 1 contains information that Continuum Dynamics, Inc. (CDI) considers to be proprietary in nature and subsequently, pursuant to 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," paragraph (a)(4), it is requested that such information be withheld from public disclosure. Enclosure 3 provides an affidavit from CDI supporting this request. Enclosure 2 contains the redacted version of the proprietary enclosure with the CDI proprietary material removed, which is suitable for public disclosure.

TVA has determined that the additional information provided by this letter does not affect the no significant hazards considerations associated with the proposed TS change. The proposed TS change still qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

No new regulatory commitments are made in this submittal. Please direct any questions concerning this matter to William M. Bentley at (256) 729-7893.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 27th day of January, 2010.

Respectfully,

R. M. Krich
Vice President
Nuclear Licensing

Enclosures: Enclosure 1 - Response to Round 27 Request for Additional Information (RAI) Regarding Steam Dryer Analyses (Proprietary Version)

Enclosure 2 - Response to Round 27 Request for Additional Information (RAI) Regarding Steam Dryer Analyses (Non-proprietary Version)
Enclosure 3 - CDI Affidavit

cc: (Enclosures):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Browns Ferry Nuclear Plant
State Health Officer – Alabama Department of Public Health

ENCLOSURE 2

TECHNICAL SPECIFICATIONS (TS) CHANGE TS-431
EXTENDED POWER UPRATE (EPU)

RESPONSE TO ROUND 27 REQUEST FOR ADDITIONAL INFORMATION (RAI)
REGARDING STEAM DRYER ANALYSES

(NON-PROPRIETARY VERSION)

Attached is the non-proprietary version of the Response to Round 27 RAI Regarding Steam Dryer Analyses.

Introduction

Based on the planned outages for Unit 1, the Tennessee Valley Authority (TVA) no longer anticipates operation above the current licensed thermal power (CLTP) prior to the completion of any necessary steam dryer modifications needed for extended power uprate (EPU). Therefore, TVA no longer needs NRC review of Continuum Dynamics, Inc. (CDI) Report No. 09-24P, "Stress Assessment of Browns Ferry Nuclear Unit 1 Steam Dryer to 110% OLTP Power Level," provided in Reference 1.

Although the 110% original licensed thermal power (OLTP) steam dryer stress analysis is no longer needed, the same methodology was utilized in the 120% OLTP steam dryer stress analysis that was provided in CDI Report No. 09-25P, "Stress Assessment of Browns Ferry Nuclear Unit 1 Steam Dryer to 120% OLTP Power Level," (Ref. 2). Therefore, TVA is providing responses to the RAIs as they apply to the 120% OLTP analysis provided in CDI Report No. 09-25P.

NRC RAI EMCB

By letter dated August 28, 2009, the licensee submitted the steam dryer analysis for 110 percent original licensed thermal power (OLTP) in Enclosure 2, CDI 09-24P, *Stress Assessment of Browns Ferry Nuclear Unit 1 Steam Dryer to 110 percent OLTP Power Level.* A nonproprietary version of this report is available in Enclosure 6. Subsequently by letter dated August 31, 2009, the licensee submitted the steam dryer analysis for 120 percent OLTP. The NRC staff's questions contained below are limited to the 110 percent submittal.

NRC RAI EMCB.210

In the Executive Summary of Enclosure 2 to a letter dated August 28, 2009 (CDI-09-24P), it is stated that:

[[

]]

Discuss how the biases and uncertainties [[ ]] frequency ranges were revised [[ ]] over these ranges.

TVA Response to EMCB.210

Benchmarking of the ACM to Quad Cities data involves 1) a calibration of the Helmholtz and acoustic circuit analyses by adjusting the modeling parameters and then 2) addressing model uncertainty by the calculation of bias and uncertainty in specified frequency intervals. In response to RAI EMCB.204/168 (Ref. 3), only the calculation of bias and uncertainty was revised. CDI [[

]]

The recalculated bias and uncertainty values are the same for both the 110% and 120% OLTP steam dryer analyses. These values are listed in Table 5.1 of CDI Report No. 09-23P, "Acoustic

and Low Frequency Hydrodynamic Loads at CLTP power Level to 120% OLTP Power Level on Browns Ferry Nuclear Unit 1 Steam Dryer to 250 Hz," submitted in Reference 2.

NRC RAI EMCB.211

On page 46 of CDI Report 09-24P, it is stated:

[[

]]

Discuss how the bias errors and uncertainties are applied [[ ]] Further, provide confirmation that the [[ ]] at the [[ ]] is subjected to the [[ ]] bias errors and uncertainties in the [[ ]] frequency range.

TVA Response to EMCB.211

Dryer loads predicted by the ACM model are multiplied by the bias and uncertainties assigned to each of the frequency intervals prior to shifting. Thus, the revised bias and uncertainty for the [[ ]] frequency interval were applied to the signal at [[ ]] before the frequency shift was applied.

NRC RAI EMCB.212

In Section 4.4 (page 37) of CDI Report 09-24P, it is stated,

> In the present analysis, undersize weld factors are used in two locations known to be undersized:..

Provide the dimensions of these undersized welds and discuss how the undersized weld factors were estimated.

TVA Response to EMCB.212

As discussed in the "Introduction" section above, TVA no longer anticipates operation above CLTP prior to the completion of any necessary steam dryer modifications needed for EPU. The two undersized weld locations identified in the 110% OLTP steam dryer stress report will be increased to full sized welds prior to operation at EPU and, thus, the 120% OLTP stream dryer stress report does not include any undersized welds.

NRC RAI EMCB.213

This RAI is in regards to the [[ ]] signals from the Current Licensed Thermal Power (CLTP) signals, [[ ]] the hydrodynamic and acoustic loads on the steam dryer. In a recent conference call with another BWR licensee, using revision 4 of the CDI ACM, regarding their extended power uprate application, the NRC staff was informed that during the benchmarking of the ACM parameters, by means of the Quad Cities 2 (QC2) data, the [[ ]] from the data used to estimate the steam dryer loads.

The NRC staff identified that this was also the case for Unit 1; [[ ]] from the corresponding main steam line (MSL) strain gage signals could produce non-conservative estimates for the steam dryer loads. As a result the NRC staff, reexamined the MSL signals [[

]] were negligible. The NRC

staff's review suggests that [[ ]] impacts the steam dryer loads (compare pages E1-24 through 27 to pages E1-57 through 60).

Provide a revised dryer stress analysis results for 110 percent OLTP conditions based on dryer loads [[ ]]. Should the minimum alternating stress ratio (SR-a) fall below 2.0 for any dryer component, provide the power level at which the minimum SR-a is 2.0 or higher.

TVA Response to EMCB.213

RAI EMCB.208 (Ref. 1) previously questioned MSL signal adjustments used in the Quad Cities benchmarking. In the response to RAI EMCB.208 , TVA noted that [[

]] See the response to EMCB.214 below for additional discussion.

As part of the efforts to seek approval of Boiling Water Reactor Vessel and Internals Project (BWRVIP)-194, "Methodology for Demonstrating Steam Dryer Integrity for Power Uprate," CDI is re-evaluating the benchmarking of the ACM with Quad Cities data. TVA plans on reviewing the results of this effort prior to performing additional steam dryer stress analyses for BFN. Additionally, TVA is reviewing other options including new replacement steam dryers. TVA will provide the results of their review in a subsequent submittal.

NRC RAI EMCB.214

Provide a detailed description (i.e., a step-by-step procedure) of how the QC2 CLTP signals were modified (both during or after data acquisition) before they were applied to the ACM Rev. 4 code (whose results were used for benchmarking) to estimate acoustic loads on the instrumented QC2 dryer. Also provide the following information about any exclusion frequencies:

a) Provide the amplitudes of the QC2 CLTP signals at [[ ]]. Explain which of these frequencies were treated as exclusion frequencies in modifying QC2 signals.

b) Provide the information on the magnitude of the QC2 recirculating pump frequency. Provide the amplitudes of the CLTP signals at this frequency. Explain whether this frequency was treated as an exclusion frequency in modifying QC2 signals.

c) Explain whether any exclusion frequency filtering was also applied to the instrumented dryer pressure signals.

d) Provide a comparison of frequencies that were treated as exclusion frequencies in ACM Rev. 4 benchmarking and Unit 1 stress analysis. Provide an explanation of the differences.

TVA Response to EMCB.214

In the response to RAI EMCB.208 (Ref. 1), TVA noted that [[

]]. Additionally, the response to RAI EMCB.208 stated that it was apparent from the examination of data plots that [[

]].

The Quad Cities data showing amplitudes that were used in the benchmarking is provided in Figures 9.1 (MSL data) and 9.3 (steam dryer pressure data) of CDI Report No. 05-28P, "Bounding Methodology to Predict Full Scale Steam Dryer Loads from In-Plant Measurements," which was submitted by Reference 4.

a) As explained above, [[

]]

b) The recirculation vane passing frequencies for these Quad Cities data were approximately 126 and 129 Hz. [[

]]

c) As discussed above, [[
]].

d) The [[ ]] applied in the ACM Revision 4 benchmarking is described above. The filtering applied to the BFN Unit 1 120% OLTP steam dryer stress analysis is described in Table 3.2 of CDI Report No. 09-23P.

References

1. Letter from TVA to NRC, "Technical Specifications (TS) Change TS-431 - Extended Power Uprate (EPU) - Response to Round 24 Request for Additional Information (RAI) EMCB.208 Regarding Steam Dryer Analyses," dated August 28, 2009

2. Letter from TVA to NRC, "Technical Specifications (TS) Change TS-431 - Extended Power Uprate (EPU) - Steam Dryer Reports," dated August 31, 2009

3. Letter from TVA to NRC, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Technical Specifications (TS) Changes TS-431 and TS-418 - Extended Power Uprate (EPU) - Response to Round 23 Request for Additional Information (RAI) EMCB.204/168 Regarding Steam Dryer Analyses," dated February 18, 2009

4. Letter from TVA to NRC, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Technical Specifications (TS) Changes TS-431 and TS-418 - Extended Power Uprate (EPU) - Steam Dryer Stress Report," dated May 5, 2006

ENCLOSURE 3

TECHNICAL SPECIFICATIONS (TS) CHANGE TS-431
EXTENDED POWER UPRATE (EPU)

CDI AFFIDAVIT

Attached is the CDI affidavit for the proprietary information contained in Enclosure 1.

Continuum Dynamics, Inc.

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

AFFIDAVIT

Re: BROWNS FERRY NUCLEAR PLANT – UNIT 1 TECHNICAL SPECIFICATIONS (TS) CHANGE TS-431 – EXTENDED POWER UPRATE (EPU) – RESPONSE TO ROUND 27 REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING STEAM DRYER ANALYSES (TAC NO. MD5262)

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

1. I hold the position of President and Senior Associate of Continuum Dynamics, Inc. (hereinafter referred to as C.D.I.), and I am authorized to make the request for withholding from Public Record the Information contained in the documents described in Paragraph 2. This Affidavit is submitted to the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 2.390(a)(4) based on the fact that the attached information consists of trade secret(s) of C.D.I. and that the NRC will receive the information from C.D.I. under privilege and in confidence.

2. The Information sought to be withheld, as transmitted to TVA Browns Ferry as attachment to C.D.I. Letter No. 10011 dated 25 January 2010, BROWNS FERRY NUCLEAR PLANT – UNIT 1 TECHNICAL SPECIFICATIONS (TS) CHANGE TS-431 – EXTENDED POWER UPRATE (EPU) – RESPONSE TO ROUND 27 REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING STEAM DRYER ANALYSES (TAC NO. MD5262)

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 25 day of JANUARY 2010.

Alan J. Bilanin
Continuum Dynamics, Inc.

Subscribed and sworn before me this day: January 25, 2010

Eileen P. Burmeister, Notary Public

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