May 22, 2008

Alex S. Karlin, Esq., Chair
Administrative Judge
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dr. William H. Reed
Administrative Judge
Atomic Safety and Licensing Board
1819 Edgewood Lane
Charlottesville, VA 22902

Dr. Richard E. Wardwell
Administrative Judge
Atomic Safety and Licensing Board
Mail Stop T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

In the Matter of
ENTERGY NUCLEAR OPERATIONS, INC.
(Vermont Yankee Nuclear Power Station)
Docket No. 50-271-LR; ASLBP No. 06-849-03-LR

Dear Administrative Judges:

It has come to the Staff's attention that testimony provided in "Affidavit of Kenneth C. Chang Concerning NEC Contentions 2A & 2B (Metal Fatigue)" (Staff Exh. 2) contained errors. Enclosed are "Affidavit of Kenneth C. Chang" dated May 21, 2008 and replacement pages for "Affidavit of Kenneth C. Chang Concerning NEC Contentions 2A & 2B.

It has also come to the Staff's attention that in Staff Exh. 1, the last page of Section 4.3 (page 4-43) was missing. Please find that page enclosed.

Sincerely,

/RA/

Lloyd B. Subin
Counsel for NRC Staff

Enclosures: As Stated

cc: Attached Service List

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR VERMONT YANKEE, LLC	)	Docket No. 50-271-LR
AND ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Vermont Yankee Nuclear Power Station)	)	

AFFIDAVIT OF KENNETH C. CHANG

I, Kenneth C. Chang, do hereby declare under penalty of perjury as follows:

1. In A.4 on page 5, lines 11-12, of Affidavit of Kenneth C. Chang Concerning NEC Contentions 2A & 2B (Metal Fatigue) (Staff Exh. 2) I in inadvertently wrote that "the FW nozzle is Vermont Yankee's most FAC-susceptible nozzle." I intended to write that "the FW nozzle is Vermont Yankee's most limiting (i.e. nozzle with highest CUFen)."

2. Therefore, in A.4 on page 5 in line 12, the words "FAC-susceptible" should be stricken and replaced with the words "most limiting (i.e. nozzle with the highest CUFen)."

3. The sentence in A.11 on page 10 lines 1-7 of Affidavit of Kenneth C. Chang Concerning NEC Contentions 2A &2B (Metal Fatigue) (Staff Exh. 2) is unclear and must be revised.

4. The existing sentence should be replaced with the following: Error analysis is not necessary because conservatism is built into the design fatigue curves for carbon steel/stainless steel in the light water environment. As stated in NUREG/CR-6583 and NUREG/CG-5704, these design curves have been adjusted for uncertainties that are associated with material and loading conditions.

With the above revisions, I hereby declare under penalty of perjury that my statements in Affidavit of Kenneth C. Change Concerning NEC Contentions 2A & 2B (Metal Fatigue) (Staff Exh. 2) are true and correct to the best of my knowledge and belief

Kenneth C. Chang

Executed at Rockville, MD
this 21st day of May, 2008

concerns on the reanalysis and informed the ACRS Committee members that the staff did not have sufficient time to evaluate the confirmative analysis. 549th ACRS Meeting Transcript (ML080500208) at 81-82, 87 (Staff Exh. 9). The staff reviewed Entergy's response, which included an audit on February 14, 2008, and found that for this analysis of the FW nozzle, the stress intensities and the CUFs were calculated in accordance with the ASME Code requirements and the CUF met the Code limit. However, it also showed that the previous analysis was not bounding for the feedwater nozzle using all the same inputs, including Fen values. Therefore, the staff requested that Entergy define this analysis as the "analysis of record" for the FW nozzle. By letter dated February 21, 2008 (Staff Exh. 23), Entergy stated that it considers the January 2008 analysis the analysis of record for the FW nozzle. As explained below, the FW nozzle is limiting (i.e. nozzle with the highest CUFen). Vermont Yankee's most ~~FAC-susceptible nozzle.~~ Nevertheless, because the CUF value from the analysis of record does not bound the CUF value from Entergy's December 11, 2007 Amendment 33 for the FW nozzle, the staff questioned whether the CUF values for CS and RR outlet nozzles from December 2007, which also used the simplified 1-D stress input, are bounding. Thus, the staff imposed a license condition requiring Vermont Yankee to perform ASME Code NB-32003200 analysis for CS and RR outlet nozzles without using simplified stress inputs.

Q5. In Table 4.3-3 of Vermont Yankee's LRA (Staff Exh. 10), the CUFens for some of the listed components are greater than 1.0. Explain why it is possible to "refine" predicted CUFens to less than 1.0?

A5. When a calculated CUFen for a component is greater than the allowable value of 1.0, it is possible to reduce the predicted value of CUFen. This is done by analyzing the actual transients cycles experienced by the plant to obtain CUFen instead

design
analyses. Error analysis is not necessary because conservatism is built into ~~the ASME~~ fatigue curves for carbon steel/stainless steel in the ~~Code (the code used by the analysis of record as well as by the refined analysis for the~~ light water environment. As stated in NUREG/CR-6583 and ~~reactor vessel and recirculation nozzle), the equations used to calculate Fen values in~~ NUREG/CR-5704, these design fatigue curves have been ~~NUREG/CR-6583 (Staff Exh. 11) and NUREG/CR-5704 (Staff Exh. 12) (which have~~ adjusted for uncertainties that are associated with ~~been adjusted for uncertainties in life), and the parameters affecting the Fen values~~ material and loading conditions. ~~(which had been adjusted for uncertainties that are associated with material and operating conditions).~~ Fen values were maximized as practicable consistent with plant conditions. In addition, the FMP and the Water Chemistry Program will track the transients and chemistry conditions in the analyses to ensure their validity as it relates to transient cycles and Fen values. Specifically, water chemistry will be monitored to verify that dissolved oxygen concentration values are below the values used in the analysis.

Q12. Dr. Hopenfeld proposed his own recalculation of CUFen values based on the CUF values originally presented in the LRA and what he asserts are "bounding" values for Fens. See Fourth Hopenfeld Declaration at 10. Do you agree with Dr. Hopenfeld's analysis? Why or why not.

A12. I do not agree with Dr. Hopenfeld's recalculation of CUFen values. The key to the CUFen values is in the calculation of Fen. The Fen values used in Dr. Hopenfeld's recalculation are maximum Fen values for low-alloy steel and stainless steel. Their usage assumes the worst-case scenarios for reactor conditions, which Entergy has proved otherwise based on data VYNPS has collected over its operating history. For Dr. Hopenfeld's recalculation, the design basis CUF values are multiplied by these maximum Fen values which yielded CUFen values greater than 1.0 for almost all of the components' locations. While these CUFen values may seem to be un-acceptable, the CUF values used to calculate CUFen do not pertain to VYNPS. This is

application using the specific software could underestimate the CUF, and therefore, cannot be the analysis of record. However, the updated analysis, whether using the maximum F_{en} or appropriate F_{en}'s, yields CUFs lower than the Code allowable. The staff concludes that this updated analysis are the analysis of record for the FW nozzle. Based on the above discussion, the staff concludes that similar analysis should be performed for the CS and the RR outlet nozzles and that these analyses will be documented as the "analyses of record" for these two nozzles.

On this basis, the staff finds that although the applicant has used a 2-dimensional axisymmetric model to handle thermal transient and pressure, it did consider the six stress components and use them to develop three principle stresses and the stress intensities. Therefore, the staff finds that for the updated analysis of the FW nozzle, the stress intensities and the CUFs are calculated in accordance with ASME Code requirements. The staff concluded that the updated FW analysis consistent with the rules of the ASME Code Section III yields lower EAF CUF values for the FW nozzle. In the letter dated February 21, 2008, the applicant stated that it considers the updated EAF analysis, submitted in the January 30, 2008 letter, as the analysis of record for the FW nozzle. The staff's concern expressed in RAI 4.3.3-2 is resolved. However, a license condition for performing the ASME Code analyses for the CS and the RR outlet nozzles will remain in effect until the applicant has completed and submitted those final analyses for NRC review and approval no later than two years prior to entering the PEO.

4.3.3.3 UFSAR Supplement

The applicant provided a UFSAR Supplement summary description of its TLAA evaluation of effects of reactor water environment on fatigue life in LRA Section A.2.2.2.3.

The staff reviewed the applicant's Commitment No. 27 and concludes that implementation of this commitment prior to period of extended operation will address environmentally assisted fatigue for the seven components which have not been addressed.

On the basis of its review of the UFSAR Supplement, the staff concludes that the summary description of the applicant's actions to address effects of reactor water environment on fatigue life is adequate.

4.3.3.4 Conclusion

On the basis of its review, and Commitment No. 27 as discussed above, the staff finds that the applicant has demonstrated that, as required by 10 CFR 54.21(c)(1)(iii), the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the UFSAR Supplement contains an appropriate summary description of the TLAA evaluation, as required by 10 CFR 54.21(d).

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	)	ASLBP No. 06-849-03-LR
	)	
(Vermont Yankee Nuclear Power Station)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the NRC Staff letter dated May 22, 2008, transmitting corrected testimony and missing exhibit pages in the above-captioned proceeding have been served on the following by electronic mail with copies by deposit in the NRC's internal mail system or, as indicated by an asterisk, by electronic mail, with copies by U.S. mail, first class, this 22nd day of May, 2008.

Alex S. Karlin, Chair
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
E-mail: ask2@nrc.gov

Office of the Secretary
Attn: Rulemakings and Adjudications Staff
Mail Stop: O-16G4
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
E-mail: hearingdocket@nrc.gov

William H. Reed*
Administrative Judge
Atomic Safety and Licensing Board
1819 Edgewood Lane
Charlottesville, VA 22902
E-mail: whrcville@embarqmail.com

Marcia Carpentier, Esq.
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
E-mail: mxc7@nrc.gov

Richard E. Wardwell
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
E-mail: rew@nrc.gov

Lauren Bregman, Law Clerk
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Mail Stop: T-3 F23
Washington, D.C. 20555-0001
E-mail: Lauren.Bregman@nrc.gov

Office of Commission Appellate Adjudication
Mail Stop: O-16G4
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
E-mail: OCAAmail@nrc.gov

Peter C.L. Roth, Esq*
Office of the Attorney General
33 Capitol Street
Concord, NH 3301
E-mail: peter.roth@doj.nh.gov

Ronald A. Shems, Esq.*
Karen Tyler, Esq.
Shems Dunkiel Kassel & Saunders, PLLC
91 College Street
Burlington, VT 05401
E-mail: rshems@sdkslaw.com
Ktyler@sdkslaw.com

Anthony Z. Roisman, Esq.*
National Legal Scholars Law Firm
84 East Thetford Rd.
Lyme, NH 03768
E-mail: aroisman@nationallegalscholars.com

David R. Lewis, Esq.*
Matias F. Travieso-Diaz, Esq
Elina Teplinsky, Esq
Blake J. Nelson, Esq
Pillsbury Winthrop Shaw Pittman LLP
2300 N Street, NW
Washington, DC 20037-1128
E-mail: david.lewis@pillsburylaw.com
matias.travieso-diaz@pillsburylaw.com
elina.teplinsky@pillsburylaw.com
blake.nelson@pillsburylaw.com

Sarah Hofmann, Esq.*
Director of Public Advocacy
Department of Public Service
112 State Street - Drawer 20
Montpelier, VT 05620-2601
E-mail: sarah.hofmann@state.vt.us

Diane Curran*
Harmon, Curran, Spielberg, & Eisenberg, LLP
1726 M Street N.W., Suite 600
Washington, D.C. 20036
E-mail: dcurran@harmoncurran.com

James R. Milkey*
Assistant Attorney General, Chief
Environmental Protection Division
Office of the Attorney General
One Ashburton Place, 18th Floor
Boston, MA 02108
E-mail: jim.milkey@state.ma.us

/RA/

Lloyd B. Subin
Counsel for NRC Staff