June 15, 2007

Mr. Randy C. Bunt, Chair
BWR Owners' Group
Southern Nuclear Operating Company
40 Inverness Center Parkway/Bin B057
Birmingham, AL 35242

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RE: THE BOILING WATER REACTOR OWNERS' GROUP (BWROG) TOPICAL REPORT (TR) NEDC-33178P, REVISION 0, "GENERAL ELECTRIC METHODOLOGY FOR DEVELOPMENT OF REACTOR PRESSURE-TEMPERATURE CURVES" (TAC NO. MD2693)

Dear Mr. Bunt:

By letter dated July 28, 2006, the BWROG submitted for U.S. Nuclear Regulatory Commission (NRC) staff review TR NEDC-33178P, Revision 0, "General Electric Methodology for Development of Reactor Pressure-Temperature Curves." Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review. Mr. Fred Emerson, BWROG Project Manager, and I agreed that the NRC staff will receive your response to the enclosed Request for Additional Information (RAI) questions by the end of June 2007.

If you have any questions regarding the enclosed RAI questions, please contact me at 301-415-1774.

Sincerely,

/RA/

Michelle C. Honcharik, Project Manager
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 691

Enclosure: RAI questions

cc w/encl: See next page

June 15, 2007

Mr. Randy C. Bunt, Chair
BWR Owners' Group
Southern Nuclear Operating Company
40 Inverness Center Parkway/Bin B057
Birmingham, AL 35242

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RE: THE BOILING WATER REACTOR OWNERS' GROUP (BWROG) TOPICAL REPORT (TR) NEDC-33178P, REVISION 0, "GENERAL ELECTRIC METHODOLOGY FOR DEVELOPMENT OF REACTOR PRESSURE-TEMPERATURE CURVES" (TAC NO. MD2693)

Dear Mr. Bunt:

By letter dated July 28, 2006, the BWROG submitted for U.S. Nuclear Regulatory Commission (NRC) staff review TR NEDC-33178P, Revision 0, "General Electric Methodology for Development of Reactor Pressure-Temperature Curves." Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review. Mr. Fred Emerson, BWROG Project Manager, and I agreed that the NRC staff will receive your response to the enclosed Request for Additional Information (RAI) questions by the end of June 2007.

If you have any questions regarding the enclosed RAI questions, please contact me at 301-415-1774.

Sincerely,

/RA/

Michelle C. Honcharik, Project Manager
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 691

Enclosure: RAI questions

cc w/encl: See next page

DISTRIBUTION:

PUBLIC	RidsNrrDpr	PSPB Reading File
RidsNrrDprPspb	RidsNrrLADBaxley	RidsAcrsAcnwMailCenter
RidsNrrPMMHoncharik	RidsOgcMailCenter	Vanice Perin (VAP)
Barry Elliot	RidsNrrDciCvib	DCI planning rep

Accession No.: ML071660092 *No major changes from input memo. NRR-106

OFFICE	PSPB/PM	PSPB/LA	CVIB/BC*	PSPB/BC
NAME	MHoncharik	DBaxley	MMitchell	SRosenberg
DATE	6/15/07	6/15/07	3/29/07	6/15/07

OFFICIAL RECORD COPY

REQUEST FOR ADDITIONAL INFORMATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

TOPICAL REPORT (TR) NEDC-33178P, REVISION 0

"GENERAL ELECTRIC METHODOLOGY FOR DEVELOPMENT OF REACTOR

PRESSURE-TEMPERATURE CURVES"

BOILING WATER REACTOR OWNERS' GROUP (BWROG)

PROJECT NO. 691

All section, appendix, and attachment numbers refer to TR NEDC-33178P, Revision 0, unless specified otherwise.

1.a. Section 4.3 and Appendices F, G, and H describe the methodology for determining pressure-temperature limit curves for the closure flange, core beltline, upper vessel, and lower vessel regions. Letter dated July 28, 2006, indicates that licensees have utilized this methodology in the past. Identify a prior plant-specific submittal and an U.S. Nuclear Regulatory Commission (NRC) safety evaluation that documented and approved the General Electric (GE) Nuclear Energy (GENE) methodology documented in Section 4.3 and Appendices F, G, and H.

1.b. If the methodologies identified in the above sections and appendices are different than those previously reviewed by the NRC staff, identify the difference between the methodology approved by the NRC staff and the methodology documented in the TR.

1.c. If the computer codes used are different than those used in the prior plant-specific submittals, identify the computer codes that were used in TR NEDC-33178P, Revision 0. How were these codes benchmarked?

2. Appendix F provides an example of a calculation to determine the allowable temperatures for recirculation inlet nozzles in the beltline. This appendix indicates that the methodology utilized is that discussed in Section 4.3.2.1.4. Section 4.3.2.1.4 indicates that in a case where the total stress exceeds yield, a plasticity correction factor is applied based on the recommendations of Welding Research Council Bulletin 175, Section 5.C.3. Explain how this plasticity factor was utilized in the calculations documented in Appendix F.

3. The Requirements for Methodology and Pressure Temperature Limit Report (PTLR) table in Generic Letter 96-03, "Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protection System Limits," identifies the minimum requirements to be included in the PTLR methodology and the minimum requirements to be included in the PTLR. Discuss how the proposed PTLR methodology and PTLR satisfy the minimum requirements identified in the table. If the PTLR methodology or

ENCLOSURE

PTLR do not contain all the required information, revise the PTLR methodology and/or the PTLR to include the required information.

4. Section 4.2 describes the method for calculating the adjusted reference temperature (ART) for beltline materials. Appendix I provides guidance for evaluating surveillance data. Section 4.2 does not indicate surveillance that data is to be evaluated in accordance with Appendix I. Section 4.2 should be revised to indicate surveillance data is to be evaluated in accordance with Appendix I.

5. Appendix I, Procedure 1, Step 3, "Determining Credibility of Surveillance Data," identifies information that the licensee should review to determine whether the data is "credible" or "not credible". In accordance with Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials" (Agencywide Documents Access and Management System Accession No. ML003740284), the following criteria should also be evaluated. These criteria should be added to this section of Appendix I.

   a) Scatter in the plots of Charpy energy versus temperature for the irradiated and unirradiated conditions should be small enough to permit the determination of the 30-foot-pound temperature and the upper-shelf energy unambiguously.

   b) When there are two or more sets of surveillance data from one reactor, the scatter of $\triangle RT_{NDT}$ values about a best-fit line drawn as described in Regulatory Position 2.1 normally should be less than 28 °F for welds and 17 °F for base metal. Even if the fluence range is large (two or more orders of magnitude), the scatter should not exceed twice those values.

6. Appendix I, Procedure 1, Step 3.(b) states: "If the vessel wall temperature is an outlier, appropriate temperature adjustments to the surveillance data may be required."

   In order for this procedure to be utilized in the PTLR methodology, the NRC staff must review the procedure for determining the adjustments to the surveillance data. Therefore, the PTLR methodology must be revised to document a proposed procedure for adjusting the surveillance data if the vessel wall temperature is an outlier. If the adjustments to the surveillance data are not performed in accordance with the approved procedure, then the PTLR methodology should indicate that the surveillance data adjustments will not be used in the PTLR process.

7. Appendix I, "Definitions and Background" in Procedure 1 and Procedure 2 states: "For generic values [of initial RT_{NDT}] of weld metal, the following generic mean values must be used unless justification for different values is provided."

   In order for other generic values of initial RT_{NDT} to be utilized in the PTLR methodology, the NRC staff must review the procedure for determining the best estimate initial RT_{NDT}. Therefore, the PTLR methodology must be revised, either explicitly or by referencing a previously approved methodology, to document the procedure for determining the initial RT_{NDT} . If the initial RT_{NDT} are not determined in accordance with the approved procedure, then the PTLR methodology should indicate that the methodology for determining the initial RT_{NDT} will not be used in the PTLR process.

8. Appendix I, Procedure 1 and Procedure 2, Step 5 states: "Revised best estimate chemistries for selected BWR welds and plates have been calculated by the BWRVIP [Boiling Water Reactor Vessel and Internals Project]. Calculation of the best estimate chemistries for all other vessel materials is the responsibility of the plant."

   In order for this procedure to be utilized in the PTLR methodology, the NRC staff must review the procedure for determining the best estimate chemistries for all beltline materials and the results from the data. Therefore, the PTLR methodology must be revised to document the BWRVIP procedure for determining the best estimate chemistries. If the best estimate chemistries are not performed in accordance with the approved procedure, then the PTLR methodology should indicate that the procedure for determining best estimate chemistries will not be used in the PTLR process.

9. To ensure that the pressure-temperature limits have been developed using the approved methodology, the following information should be included in the PTLR:

   9.a. The method of determining the initial RT_{NDT} (i.e., American Society of Mechanical Engineers Boiler and Pressure Vessel Code, generic letter, Branch Technical Position-MTEB 5-2 in Standard Review Plan 5.3.2 in NUREG-0800, or other NRC approved methodologies),

   9.b. The computer codes used in the finite element analysis to determine bending and membrane stresses.

   9.c. Identify whether Procedure 1 or Procedure 2 was utilized to evaluate the surveillance data. If surveillance data was utilized, provide the surveillance data and the analysis of the surveillance data that was used to determine the ART. If surveillance data was not utilized, state why it was not utilized.

   9.d. Identify whether any of the pressure-temperature limit curves were adjusted to bound the generic analyses documented in the Section 4.3 or in accordance with Attachment 1, Appendix G. Identify the required adjustment in each pressure-temperature curve.

10. Section 4.1.1.3 indicates that a GE-developed methodology for determining the initial RT_{NDT} was submitted for generic approval in 1994 and approved by the NRC staff for generic use. Section 4.12, "Values of Initial RT_{NDT} and Lowest Service Temperature (LST)," states:

    > Where the lowest energy Charpy value is less than 50 ft-lb, it is adjusted by adding 2 °F per ft-lb energy difference from 50 ft-lb. If the test specimens are transverse and the lowest value is less than 50 ft-lb, it is adjusted by adding 3 °F per ft-lb energy difference from 50 ft-lbs.

    The second sentence in the above statement is inconsistent with the example that follows in this section. Please clarify whether the above statement is consistent with the GE methodology that was approved by the NRC staff.

11. Section 4.2.1 states: "The margin term σ_{Δ} as described above, is defined in RG 1.99; this methodology is used except when Integrated Surveillance data from BWRVIP-135 is available, and BWRVIP-102 methods are applied."

Explain the above statement. The margin term used in determining the ART should be calculated using the guidance in RG 1.99, Revision 2. The above statement implies that the RG 1.99, Revision 2, methodology will be used to determine the margin except when integrated surveillance data from BWRVIP-135 is available, and BWRVIP-102 methods are applied. The NRC staff must approve the methodology for determining the margin term, if it is different than those specified in RG 1.99, Revision 2. State whether the methodology contained in this TR requires the margin term to be calculated using the methodology in RG 1.99, Revision 2, and whether the methodology in BWRVIP-102 is consistent with RG 1.99, Revision 2. If it is the intention of the BWROG to permit an alternative method of calculating the margin term, the TR should indicate that licensees must get NRC staff approval to use an alternative methodology for calculating the margin term, prior to implementing PTLR pressure-temperature curves.

Mr. Doug Coleman
Vice Chair, BWR Owners' Group
Energy Northwest
Columbia Generating Station
Mail Drp PE20
P.O. Box 968
Richland, WA 99352-0968
DWCOLEMAN@energy-northwest.com

Mr. Amir Shahkarami
Executive Chair, BWR Owners' Group
Exelon Generation Co., LLC
Cornerstone II at Cantera
4300 Winfield Road
Warrenville, IL 60555
amir.shahkarami@exeloncorp.com

Mr. Richard Libra
Executive Vice Chair, BWR Owners' Group
DTE Energy - Fermi 2
M/C 280 OBA
6400 North Dixie Highway
Newport, MI 48166
librar@dteenergy.com

Mr. William A. Eaton
Entergy Operations Inc.
P.O. Box 31995
Jackson, MS 39286
weaton@entergy.com

Mr. Richard Anderson
First Energy Nuclear Operating Co
Perry Nuclear Power Plant
10 Center Road
Perry, OH 44081
randerson@firstenergycorp.com

Mr. Scott Oxenford
Energy Northwest
Columbia Generating Station
Mail Drp PE04
P.O. Box 968
Richland, WA 99352-0968
wsoxenford@energy-northwest.com

Mr. James F. Klapproth
GE Energy
M/C A-16
3901 Castle Hayne Road
Wilmington, NC 28401
james.klapproth@gene.ge.com

Mr. Joseph E. Conen
Regulatory Response Group Chair
BWR Owners' Group
DTE Energy-Fermi 2
200 TAC
6400 N. Dixie Highway
Newport, MI 48166
conenj@dteenergy.com

Mr. J. A. Gray, Jr.
Regulatory Response Group Vice-Chair
BWR Owners' Group
Entergy Nuclear Northeast
440 Hamilton Avenue Mail Stop 12C
White Plains, NY 10601-5029
JGray4@entergy.com

Mr. Thomas G. Hurst
GE Energy
M/C A-16
3901 Castle Hayne Road
Wilmington, NC 28401
thomas.hurst@ge.com

Mr. Tim E. Abney
GE Energy
M/C A-16
3901 Castle Hayne Road
Wilmington, NC 28401
tim.abney@ge.com