APR 14 1983

Docket No. 50-271

Mr. J. B. Sinclair
Licensing Engineer
Vermont Yankee Nuclear Power
Corporation
1671 Worcester Road
Framingham, Massachusetts 01701

Dear Mr. Sinclair:

SUBJECT: MARK I CONTAINMENT LONG TERM PROGRAM - PLANT UNIQUE ANALYSIS REPORT STRUCTURAL EVALUATION

Re: Vermont Yankee Nuclear Power Station

The NRC staff and its consultant Franklin Research Center (FRC) are reviewing the structural aspects of your plant unique analysis report. As a result of our review to date we have prepared the enclosed request for additional information.

It is requested that you provide a response within 45 days of receipt of this letter. If you determine there is a need to meet with or to have a conference call with the staff and FRC to discuss this request prior to responding, please contact your project manager. In addition, if you cannot meet this response date, please notify your project manager within seven days of receipt of this letter.

This request for information was approved by the Office of Management and Budget under clearance number 3150-0091 which expires October 31, 1985.

Sincerely,

Original signed by
D. B. Vassallo

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosure: As stated

cc w/enclosure
See next page

DIST: Docket File, NRC PDR, LPDR, SNorris, DEisenhut, BSiegel, OELD, ACRS-10, ASLAB, Gray, ORB#2 Rdg, JHeltemes, AEOD, ELJordan, JMTaylor, HShaw, VRooney

OFFICE	DL:ORB#2	DL:ORB#2	DL:ORB#2		DL:ORB#2		
SURNAME	SNorris	VRooney	Siegel:pob:P-22		DVassallo		
DATE	4/14/83	4/14/83	4/14/83		4/14/83		

cc:

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REQUEST FOR INFORMATION
VERMONT YANKEE NUCLEAR POWER STATION
TORUS, VENT SYSTEM, AND PIPING SYSTEM

Item 1: Provide a summary of the analysis and the results for the following penetrations:

- o vent pipe torus intersection
- o vacuum breaker line and RCIC torus penetration.

Item 2: Comment on the effect of the neglected loads indicated on page 66 of Reference 4 on the stress results for the drywell-to-vent penetration.

Item 3: Provide evidence that the fatigue criteria for the bellows as required by para. NE-3365-2, Section III of the ASME B&PV code are met.

Item 4: Provide a summary of the analysis with regard to the vacuum breaker valves; indicate whether they are considered Class 2 components as required by the criteria [1].

Item 5: Provide analyses of the piping systems not included within the report.

Item 6: Provide details of the construction of the SRV line as it exists in the Vermont Yankee plant, specifically in the region of the elbow support (if any).

Item 7: Describe the end conditions assumed for the beam model of the vent header deflector shown in page 4-5, how these were derived, and the sensitivity of maximum calculated stresses to boundary assumptions.

Item 8: Provide a detailed sketch of the actual diagonal brace-catwalk attachment, together with its stress analysis results.

Item 9: Provide the results of the buckling analysis including the margin of safety for the catwalk components, i.e., the 4-inch diameter Schedule 80 pipe supports and the 2-inch pipe brace.

Item 10: Provide full justification for the stress values shown as representative of those that may occur in the containment shell miter joint. Establish limits of maximum possible error.

Item 11: Provide a list of the component materials and their corresponding metal temperatures used for the stress limit selection.

Item 12: Indicate whether each torus attached piping and its supports have been classified as Class 2 or Class 3 piping, Class 2 or Class 3 component supports, and essential or non-essential piping systems.

Also, indicate whether a pump or valve associated with the piping mentioned above is an active or inactive component, and is considered operable.

Item 13: With reference to Table 1 of Appendix B, indicate whether all loads have been considered in the analysis and/or provide justification if any load has been neglected.

Item 14: Provide a summary of the analyses for the new modifications yet to be supplied; these include Items 5, 6, 10, 12, and 15 of the key for Figures 2.3 and 2.4 of Reference 4. In addition, if the final configuration of the catwalk is to be changed, update the analysis accordingly.

Item 15: Provide details of fatigue analysis for piping systems.

Indicate whether the fatigue usage factors for the SRV piping and the torus attached piping are sufficiently small that a plant-unique fatigue analysis is not warranted for piping. The NRC is expected to review the conclusions of a generic presentation [6] and determine whether it is sufficient for each plant-unique analysis to establish that the expected usage factors for piping are small enough to obviate a plant-unique fatigue analysis of the piping.

Item 16: Submit a summary of the analysis for the miscellaneous internal piping.

Item 17: The ASME Code provides an acceptable procedure for computing fatigue usage when a member is subject to cyclic loadings of random occurrence, such as might be generated by excitations from more than one type of event (SSE and SRV discharge, for example). This procedure requires correction of the stress-range amplitudes considered and the associated number of cycles in order to account for the interspersion of stress cycles of unlike character. State whether or not the reported usages reflect use of this method. If not, indicate the effect on reported results.

Item 18: Justify the reason for not considering skew symmetric boundary conditions in the analysis of the torus shown in Figure 3.1. Evaluate the effect of the thus-neglected modes.

Item 19: Specific comments addressing the method of summation used and its compliance with the probability of non-exceedance (PNE) criteria of 84% stated in para. 6.3b of Reference 1 should be incorporated into the text.

Item 20: Provide justification for analyzing only one SRV discharge line, as shown in Section 6.0 of Reference 4. Indicate whether all discharge lines are identical in configuration to the one modeled, and whether the model investigated is conservative enough to represent all lines.

Item 21: Submit a summary of the analysis for the vacuum breaker and its penetration.

Item 22: Justify that the 45° model of the vent header and downcomer used in the analysis is adequate to meet the intent of the criteria which requires at least 180°.

Justify the reasons for not considering skew symmetric boundary conditions to evaluate the effect of the resulting modes.

GENERAL

Item G1: Describe fully the procedures used to assess cumulative fatigue damage. In particular, address:

1. Where departures from standard code procedure were introduced.

2. How critical points were selected and how stress (or stress intensity) ranges were computed.

3. Whivh cyclic loads were omitted, if any, in these computations. For example, were thermal transients given consideration?

4. Whether cyclic amplitudes and the associated number of cycles were adjusted to account for the interspersion of cycles of unlike character.

5. How the cumulative usage factor was computed.

6. What impact departures from code procedures have on the margins of safety shown for each component for which cumulative usage was computed.

Item G2: Is the method described in Section 4.3.6 of Reference 4 for assessing thermal stress typical of all evaluations made in the report?

Please discuss the tacit assumption that either:

1. Thermal equilibrium is achieved before other significant mechanical loads are experienced by the structure.

or

2. Maximum transient thermal stresses are conservatively bounded by the assumptions made.

Table 1. Structural Loading (from Reference 3)

Loads	Structures: Torus Shell	Structures: Torus Support System	Structures: Main Vents	Structures: Vent Header	Structures: Downcomers	Structures: SRV Piping	Other Wetwell Interior Structures: Above Norm Water Level	Other Wetwell Interior Structures: Above Bottom of Downcomers and Below Norm Water Level	Other Wetwell Interior Structures: Below Bottom of Downcomers
1. Containment Pressure and Temperature	X	X	X	X	X	X	X	X	X
2. Vent System Thrust Loads			X	X	X				
3. Pool Swell									
3.1 Torus Net Vertical Loads	X	X							
3.2 Torus Shell Pressure Histories	X	X							
3.3 Vent System Impact and Drag			X	X	X				
3.4 Impact and Drag on Other Structures			X			X	X		
3.5 Froth Impingement	X	X	X			X	X		
3.6 Pool Fallback						X	X	X	
3.7 LOCA Jet						X			X
3.8 LOCA Bubble Drag						X		X	X
4. Condensation Oscillation									
4.1 Torus Shell Loads	X	X							
4.2 Load on Submerged Structures						X		X	X
4.3 Lateral Loads on Downcomers				X	X				
4.4 Vent System Loads			X	X					
5. Chugging									
5.1 Torus Shell Loads	X	X							
5.2 Loads on Submerged Structures						X		X	X
5.3 Lateral Loads on Downcomers				X	X				
5.4 Vent System Loads			X	X					
6. T-Quencher Loads									
6.1 Discharge Line Clearing						X			
6.2 Torus Shell Pressures	X	X							
6.4 Jet Loads on Submerged Structures					X	X		X	X
6.5 Air Bubble Drag					X	X		X	X
6.6 Thrust Loads on T-Quencher Arms						X			
6.7 S/RVDL Environmental Temperature						X			
7. Ramshead Loads									
7.1 Discharge Line Clearing						[X]			
7.2 Torus Shell Pressures	[X]	[X]							
7.4 Jet Loads on Submerged Structures					[X]	[X]		[X]	[X]
7.5 Air Bubble Drag					[X]	[X]		[X]	[X]
7.6 S/RVDL Environmental Temperature						[X]			

X Loads required by NUREG-0661[2] and included in PUA report.

[X] Not applicable.

REFERENCES FOR APPENDIX B

1. NEDO-24583-1
   "Mark I Containment Program Structural Acceptance Criteria Plant Unique Analysis Application Guide"
   General Electric Co., San Jose, CA
   October 1979

2. NUREG-0661
   "Safety Evaluation Report, Mark I Containment Long-Term Program Resolution of Generic Technical Activity A-7"
   Office of Nuclear Reactor Regulation
   July 1980

3. NEDO-21888 Revision 2
   "Mark I Containment Program Load Definition Report"
   General Electric Co., San Jose, CA
   November 1981

4. Vermont Yankee Nuclear Power Station
   Plant Unique Analysis Report, Mark I Containment Program
   Vermont Yankee Nuclear Power Corporation
   November 30, 1982, TR-5319-1, Revision 0

5. NRC
   "Damping Values for Seismic Design of Nuclear Power Plants"
   October 1973
   Regulatory Guide 1.61

6. P. M. Kasik
   "Mark I Piping Fatigue," Presentation at the NRC Meeting, Bethesda, MD
   September 10, 1982

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