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YANKEE ATOMIC ELECTRIC COMPANY

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FYR 88- 07

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Attention: Mr. Morton B. Fairtile, Project Manager
Project Directorate I-3
Division of Reactor Projects, I/II

References:
(a) License No. DPR-3 (Docket No. 50-29)
(b) Letter, YAEC to NRC, FYR 82-11, "SEP Topic Assessment Completion," dated February 1, 1982
(c) Letter, YAEC to NRC, FYR 82-38, "TMI Item II.D.1, Safety and Relief Valves," dated March 30, 1982
(d) Letter, YAEC to NRC, FYR 82-72, "TMI Item II.D.1, Safety and Relief Valves," dated July 1, 1982
(e) Letter, YAEC to NRC, FYR 82-82, "TMI Item II.D.1, Safety and Relief Valves," dated August 1, 1982
(f) Letter, YAEC to NRC, FYR 82-121, "TMI Item II.D.1, Safety and Relief Valves, dated December 28, 1982
(g) Letter, YAEC to NRC, FYR 83-36, "TMI Item II.D.1, Safety and Relief Valves," dated April 1, 1983
(h) Letter, YAEC to NRC, FYR 84-41, "TMI Item II.D.1, Safety and Relief Valves," dated April 2, 1984
(i) Letter, NRC to YAEC, NYR 85-119, "Request for Additional Information on TMI Action Plan Item II.D.1, Performance Testing of Relief and Safety Valves," dated July 16, 1985
(j) Letter, YAEC to NRC, FYR 85-132, "TMI Item II.D.1, Safety and Relief Valves," dated November 22, 1985
(k) Letter, NRC to YAEC, NYR 87-138, dated July 23, 1987
(l) Letter, YAEC to NRC, FYR 87-111, "TMI Item II.D.1, Safety and Relief Valves," dated October 27, 1987
(m) Telecopy, M. B. Fairtile to G. Papanic, dated November 23, 1987

Subject: TMI Item II.D.1, Safety and Relief Valves

Dear Sir:

Reference (1) contained the additional information requested by Reference (k). Following staff review, additional questions were raised and

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forwarded to Yankee in Reference (m). These questions and Yankee's responses to them were discussed in a conference call on December 3, 1987. As requested, written responses to the additional questions forwarded by Reference (m) are attached.

If any additional questions arise during your review of this information, please contact us as before to discuss your questions.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

G. Papanic, Jr.
Senior Project Engineer
Licensing

GP/16.257

Attachment

cc: USNRC Region I
USNRC Resident Inspector, YNPS

ATTACHMENT

Response to NRC's Additional Questions on Yankee's
October 27, 1987 Submittal on
NUREG-0737, Item II.D.1

Question No. 1

In response to Question No. 1, Yankee Atomic Electric Company (YAEC) tried to demonstrate that the Pacific Valves 2" wedge disk gate valve used at Yankee plant as a PORV block valve was similar to the tested Velan 3" wedge disk gate valve. Sufficient information was not given to justify this position. If YAEC wants to pursue this approach, it is the staff's opinion that sufficient information and discussion needs to be presented to show the design and operation of the Yankee valve and the Velan valve are nearly identical. Only if this can be shown will the Velan valve test results be considered applicable to the Yankee valve. This is the staff's opinion because the results of the EPRI block valve tests showed the torque requirements to close valves of similar design but different manufacturers varied considerably. This indicates that factors not readily apparent from a design drawing, such as friction factors, have a significant influence on valve operability. Alternative approaches to the above would include performing a full flow test on the Yankee valve in-situ, perhaps as part of the IE Bulletin 85-03 Testing Program, or replacing the Yankee valve with one tested in the EPRI Program.

Response

The staff did not accept Yankee's response based on the results of the EPRI block valve tests. In the staff's opinion, these tests showed the torque requirements to close valves of similar design but different manufacturers varied considerably. Yankee reviewed the information in the EPRI Block Valve Test Program and based on it and additional information obtained for some of these valves, found design differences that could explain the differences in required closing torque. The remaining valves showed closing torque values that concurred with Yankee's position.

In addition, Yankee has found original plant data showing that the Yankee PORV block valve had been successfully cycled full open and closed at normal system operating pressure. While the valve torque switch setting could not be verified, the original motor operated was limited to a maximum closing torque of approximately 50 ft/lbs. This corresponds to the calculated required closing torque.

As a result of the EPRI block valve tests, Yankee re-evaluated the required closing torque of the valve. When it was found that the motor operator could deliver a maximum torque close to the required value, a design modification was implemented to increase the torque available from the motor operator. Following this modification, the closing torque was increased to provide a closing torque over 15% higher than the calculated value. (This new closing torque is also more than 15% higher than the maximum torque the motor operator could deliver when the valve was successfully cycled early in plant life.)

Based on the information above, discussed during the telephone conference call, it was agreed that this issue was closed.

Question No. 2

In response to Question No. 6, YAEC stated that due to the higher peak pressure in the latest overpressure protection report and the fact that the Dresser 31719A safety valve at Yankee plant could pass 128% of rated flow, the safety valve flow rate used in the piping thermal hydraulic analysis could be 30% too low. From this, YAEC concluded the fluid transient forces could also be off by 30%. To account for this, YAEC multiplied the fluid forces by 1.3 and concluded code allowables were still met for the piping and supports. However, because the fluid forces are due to the momentum term, the fluid forces do not vary linearly with the flow increase, but rather by the square of the flow increase. Thus, the multiplier should have been 1.69, not 1.3. With the larger multiplier, it is not clear whether the piping and supports still meet code allowables from the information provided in October 27, 1987 submittal. Review the structural analysis results after including the effects of the 1.69 multiplier. Provide a comparison of calculated loads or stresses versus code allowables for the most highly loaded piping and supports. Identify any overstressed locations and provide a schedule for completing any needed modifications.

Response

As discussed during the telephone conference call, increasing the piping transient forces directly proportional to the increase in flow was justified since the analysis had shown choked flow at the safety valves and at the pipe exit, at the rupture disk inside containment. (The staff was not aware of this.) In a choked flow condition, the velocity term remains constant, and the increase in steam flow is accommodated by higher flowing steam densities.

To verify this position, the analysis was rerun with the 30% increase in steam flow. The results of this analysis showed an average increase in transient forces of approximately 26%. Only two locations showed increases of greater than the 30% assumed. The first was at the outlet of the safety valves. The forces at these points increased by 40% and 34%, respectively. However, since the original forces were very low, this increase was insignificant. The second location was at the rupture disk where the transient forces increased by 33%. This location is insignificant since the rupture disk is designed to burst and release the steam which will reduce the forces.

Question No. 3

The submittal indicated three codes were used in the support analysis: STAAD-III, GTSTRUDL, and BASEPLATE-II. GTSTRUDL and BASEPLATE-II, if accessed from CDC Corporation, via the CYBERNET System, were reviewed as part of

another plant's submittal. Clarify whether these codes were, in fact, accessed through the CYBERNET System. If not, provide the additional information requested for STAAD-III, below. The NRC staff is not familiar with STAAD-III and, therefore, additional information on its verification and use is needed. Provide a brief description of the code and how it was applied in the support analysis. Also, provide for review verification results where the problem analyzed was similar to the STAAD-III's application at Yankee plant.

Response

(a) GTSTRUDL and BASEPLATE-II were accessed via CDC's CYBERNET System.

(b) STAAD-III is a general purpose structural analysis program similar to GTSTRUDL. STAAD-III was used by Teledyne Engineering Services for the evaluation of two supports (BRL-H-3B and BRL-A-11) on the pressurizer safety and relief valve discharge piping.

These two supports have been subsequently re-evaluated using GTSTRUDL. The load combinations and acceptance criteria are the same as described in the response to Question No. 11 in Reference 1. The evaluation results are presented below.

Support No.	Maximum Ratio Actual/Allowable	Maximum Anchor Bolt Interaction Ratio
BRL-H-3B	0.74*	0.96*
BRL-A-11	0.73	0.85

* All loads (DW, TH, FRIC, SRV, SSE) multiplied by 1.3

REFERENCES

1. Letter, YAEC to USNRC, "TMI Item II.D.1, Safety and Relief Valves," dated October 27, 1987.