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FYR 83-34

March 16, 1983

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

References: (a) License No. DPR-3 (Docket No. 50-29)
(b) YAEC Letter to USNRC, dated December 23, 1982 (FYR 82-120)

Subject: Additional Information on SEP Topic VI-4, Containment Isolation

Dear Sir:

In Reference (b), Yankee supplied a partial response to the Staff's assessment of SEP Topic VI-4, Containment Isolation. The attachment has been prepared which provides our evaluation of the remaining topic differences. This information completes our assessment of Topic VI-4.

If you have any questions, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. A. Kay

J. A. Kay
Senior Engineer - Licensing

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ATTACHMENT A

TOPIC VI-4, Containment Isolation System

The Yankee SEP Integrated Assessment, dated December 1982, responded to the majority of the NRC's conclusions on this topic. However, various penetrations were left requiring further evaluation. The results of this evaluation follows. In addition, a valve-impact assessment is also provided for those penetrations assessed from a probabilistic perspective.

1. Penetration Nos. 1 and 2 (Shutdown Cooling System)

Both Penetrations 1 and 2 have two remote manual valves inside containment. In order to meet the specific requirements of General Design Criteria (GDC) 55, one valve would have to be relocated outside containment. Yankee does not intend to relocate one valve outside containment since that would leave only one valve between the reactor coolant pressure boundary and outside containment.

A walkdown of piping inside the Vapor Container (VC) was performed from the motor-operated valves to the VC penetration to evaluate the potential for this piping being ruptured from another line break. The shutdown cooling piping is normally depressurized, and has a design pressure of 425 psig. Based on this walkdown, Yankee believes that this piping is not susceptible to a failure that would compromise containment integrity. Therefore, no modifications are required.

2. Penetration No. 3 (Low Pressure Safety Injection)

This penetration was previously evaluated; however, the purification tie-in to this line was overlooked. The need for this connection has been evaluated, and it is not required. Therefore, this line will be cut and capped, removing PU-V-649 (check valve) as an isolation valve.

3. Penetration No. 4 (Pressurizer Safety Valve Discharge)

This line is being modified as part of removing the Low Pressure Surge Tank (LPST) from the containment boundary.

Yankee has previously modified this piping by installing a rupture disk in the piping inside the VC so that the discharge from the pressurizer safety and relief valves would discharge directly to the containment atmosphere and not to the LPST. The other end of this line was blank flanged. This piping still carries any discharge from the loop safety valves, charging header relief valve and safety injection relief valves to the LPST. Yankee intends to remove the blank flange and install an additional rupture disk in the piping so that these safety and relief valves will no longer discharge to the LPST. With this modification, this line will no longer have to discharge to the LPST. Therefore, the line will be cut and capped outside of the VC, and a small line added to bypass the cut-out section to collect any safety valve leakage in the LPST. This line will contain a single automatic containment isolation valve. Justification for the use of a single valve is contained in Item 13, Penetration No. 96.

4. Penetration No. 5 (Main Coolant Drain)

Yankee has performed a separate assessment of this penetration to determine the probability of a failure of this penetration. The failure probability of this penetration, in its present configuration, is on the order of 10^{-6}. This assessment has also determined that modifying this penetration to comply with current requirements would decrease risk by approximately three orders of magnitude; however, Yankee believes that the modification of this penetration to meet the explicit redundancy requirement of GDC 55 is not warranted based on the costs associated with such a modification and the relatively low probability of penetration failure. Therefore, modifications to this penetration are not required. (See the attached value-impact assessment.)

5. Penetration No. 6 (Main Coolant Feed or Charging)

The charging line is used as the hot leg injection flow path post-accident, and can also be used as an alternate means of supplying water to the Main Coolant System. The line is presently isolated with check valves inside and outside containment. In addition to this, the system outside of containment is a Safety Class 2, closed system, and backflow of water through the three-stage positive displacement charging pumps is not possible. Also, the line is assured of a water supply to maintain it full and pressurized above containment pressure in excess of 30 days.

Based upon the above discussion, Yankee believes that modifications to this line are not required.

6. Penetration Nos. 7 and 8 (Neutron Shield Tank Sample); 9 (Main Coolant Vent); 10 (Valve Stem Leak-off), 11 (Main Coolant Sample); 20, 21, 22, 23, 25 and 27 (Component Cooling Return Lines); 46, 47, 48 and 49 (Service Water Return Lines); and 54, 55, 56 and 57 (VC Heater Condensate Return Lines)

Yankee has evaluated each penetration to determine its probability of failure. In their present configuration, the failure probability of each line is on the order of 10^{-6}. This assessment has also determined that modifying these penetrations to comply with current requirements would decrease risk by approximately three orders of magnitude; however, Yankee believes that modification of these penetrations to meet the explicit redundancy requirements of GDC 55 is not warranted because of the costs associated with such modifications and the relatively low probability of penetration failure. Therefore, modifications to these penetrations are not required. (See the attached value-impact assessment.)

7. Penetration No. 37 (LPST Safety Valve Discharge)

This line is being modified as part of removing the LPST from the containment boundary.

With the modifications described above to Penetration No. 4, all major safety valves will discharge directly to the VC. Therefore, the six safety valves on the LPST which discharge to the VC via this penetration are no longer necessary. Yankee intends to remove five of the six safety valves and seal off these connections. The remaining safety valve will

become the boundary valve for this penetration. The setpoint of this valve is greater than 1.5 times the containment design pressure. It is therefore an acceptable isolation valve in accordance with Section 6.2.4 of NUREG-0800.

8. Penetration Nos. 40 and 41 (Containment Pressure Sensing)

Automatic isolation valves were originally installed in these lines since some of the downstream equipment had a design pressure less than the VC design of 35 psig. This equipment has since been replaced with equipment having a design pressure of 35 psig or higher. Yankee therefore intends to remove CA-TV-211 and 212 from the Containment Isolation System (CIS), and add an excess flow check valve inside containment to meet the isolation requirements of Regulatory Guide 1.11.

9. Penetration Nos. 64 and 65 (Air Particulate Monitor)

Yankee intends to relocate the air particulate monitor inside the VC. These penetrations will still be used to draw containment air samples. Each penetration will, therefore, have a locked, closed, and capped manual isolation valve.

10. Penetration Nos. 29, 30, 31, and 32 (Steam Generator Blowdown); 79, 80, 81, and 82 (Main Steam Lines); 83, 84, 85, and 86 (Main Feedwater Lines)

Yankee agrees with the recommendation of the NRC's own consultant, the Franklin Research Center (FRC), in their report TER-C5257-56, as attached to USNRC letter No. L505-82-09-020, dated September 2, 1982.

The FRC evaluation of these lines was as follows:

"Generally, the isolation valves of systems on the secondary side of a steam generator are not relied upon to prevent the escape of containment air to outside atmosphere. This is because the systems are either closed systems inside containment which do not rupture as a result of a LOCA or remain liquid-filled after an accident because of the water level in the steam generator. For this reason, Appendix J specifically requires Type C testing of the main steam and feedwater system of BWRs while making no mention of these systems in PWRs. Furthermore, by definition, a containment isolation valve, for purposes of Appendix J, must be relied upon to prevent the escape of containment air to outside atmosphere."

Based on this evaluation, the only recommendation is that Yankee have a post-accident procedure in effect to require the steam generators be filled above the level of the tubes and pressurized to greater than the absolute pressure of the containment to ensure no possibility of leakage from these lines.

11. Penetration Nos. 87 and 88 (VC Bottom Drains)

Penetration No. 88 consists of the component cooling surge tank safety valve which is essentially a branch line off of Penetration No. 87. The isolation provisions for this penetration are presently listed as a single check valve. Yankee intends to utilize the component cooling surge tank safety valve as the isolation valve for this penetration. The

setpoint of this valve is greater than 1.5 times the containment design pressure. It is therefore an acceptable isolation valve in accordance with Section 6.2.4 of NUREG-0800.

Yankee has performed an assessment of Penetration No. 87 to determine its probability of failure. In its present configuration, the failure probability of this line is on the order of 10^{-6}. This assessment has also determined that modifying this penetration to comply with current requirements would decrease risk by approximately three orders of magnitude; however, Yankee believes that modifications to this penetration to meet the explicit redundancy requirements of GDC 56 is not warranted because of the costs associated with such modifications and the relatively low probability of penetration failure. Therefore, modifications to this penetration are not required. (See the attached value-impact assessment.)

12. Penetration No. 94 (Containment Sump Suction for ECCS Recirculation)

Yankee has evaluated the need for the branch line off of this penetration to the purification system, and has determined it is valuable as a redundant method of taking a suction on water collected in the containment sump. Yankee's PRA has also shown the value of maintaining this connection. However, the connection to the purification system is only utilized as a flow path to the charging pump suction header. Yankee intends to cut and cap the line to the purification pumps, and to connect the charging pumps suction directly to the sump suction line. This will replace PU-V-543 and 544 as containment isolation valves with PU-V-651. PU-V-651 will therefore be locked closed and administratively controlled to prevent inadvertent opening. The addition of a closed manual valve inside containment is not possible based on the safety function of this piping, and also because the penetration inside containment is only a sump drain. The addition of a valve inside containment is not practical.

13. Penetration No. 96 (Main Coolant Bleed Line)

This line is being modified as part of removing the LPST from the containment boundary.

The bleed line trip valve, LCV-222, presently trips on low pressurizer level. This valve will be added to the CIS system so that it will also trip on a containment isolation actuation signal. A manual isolation valve and test tap will be added to allow for Type C testing of this valve. Yankee has performed an assessment of the failure probability of this modified penetration. The resulting failure probability of this modified line is on the order of 10^{-6}. This assessment has also determined that modifying this penetration to comply with current requirements would decrease risk by about three orders of magnitude; however, Yankee believes that no additional modifications are required to meet the explicit redundancy requirements of GDC 55 because of the costs associated with such modifications and the relatively low probability of penetration failure. With the modifications to LCV-222, the low pressure sample isolation valve, SA-TV-213, is now outside of the containment boundary and can be removed from the CIS system. (See the attached value-impact assessment.)

14. Test, Vent and Drain Lines

All lines reviewed meet the minimum requirements of at least one sealed-closed valve per line, any line not meeting this requirement will be modified to do so.