VERMONT YANKEE
NUCLEAR POWER CORPORATION

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REPLY TO:
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September 7, 1984
FVY 84-107

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

Attention: Office of Nuclear Reactor Regulation
Mr. D. G. Eisenhut, Director
Division of Licensing

References:
(a) License No. DPR-28 (Docket No. 50-271)
(b) Letter, USNRC to VYNPC, NVY-84-166, dated July 16, 1984, received July 25, 1984
(c) Letter, VYNPC to USNRC, FVY83/123, dated December 5, 1983
(d) Letter, VYNPC to USNRC, dated May 15, 1981

Subject: NUREG-0737, Item II.K.3.28, Request for Additional Information on the Qualification of ADS Accumulators per 10CFR50.54(f)

Dear Sir:

By Reference (b) you requested additional information (Item 1) on the qualification of ADS accumulators as it pertains to the long-term cooling requirement as established in 10CFR50.46 and the Vermont Yankee FSAR. In References (c) and (d) Vermont Yankee presented its basis for the capabilities of the ADS accumulators as well as an evaluation of the original design basis for the automatic depressurization system as defined in the FSAR. We repeat relevant sections for your information:

From Reference (d):

"Original Design Basis

Section 6.5 of the FSAR states:

"Automatic depressurization is provided to automatically reduce nuclear system pressure if a break has occurred and vessel water level is not maintained by the HPCIS and the other water addition systems. Rapid depressurization of the nuclear system is desirable to permit flow from the core spray system and LPCIS to enter the vessel, so that the temperature rise in the core is limited."

After 10 minutes, operator action to place RHR into torus cooling (and shutdown cooling as needed) is assumed. After this, ADS valves

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need not remain open to keep the vessel from repressurizing, as temperature will be kept low enough by RHR cooling. Therefore, for these breaks, accumulators should provide operability for 10 minutes.

In the FSAR analysis, the ADS valves need to be actuated only once - when the automatic control signal calls for it. The original design basis for the accumulators was to provide for two operations of each ADS valve when the containment atmosphere is at accident pressure. Thus, there is a 100% conservatism in accumulator design basis. Since the Target Rock SRVs require about 28 psi difference above drywell back pressure to operate, a test done with atmospheric pressure in the drywell must show capability by an increased number of lifts (calculated as 5) to be equivalent to 2 lifts under accident drywell back pressure conditions. The 5 lift criteria shows up in many FSARs but, according to General Electric, it should be interpreted as the criteria for an atmospheric test of ADS accumulator size.

In addition, there is a 25% conservatism in ADS design basis to allow for single failure in that each relief valve provides 33 1/3% of the necessary capacity and four valves and accumulators are provided".

From Reference (c):

"Calculations were performed which provide the basis for the ADS Accumulator System allowable leakage criteria. It has been determined that an accumulator pressure of 64 psig will provide at least two (2) actuations of the ADS valves at containment atmosphere accident pressure (70% of containment design pressure).

Test procedure OP 4028 (currently Revision 1) insures that an accumulator pressure of at least 64 psig can be maintained for three hours after a loss of instrument air supply".

From Reference (c):

"As noted previously, the ADS Accumulator System is designed for seismic events and harsh environments; therefore, leakage rates should not be affected. However, the following conservatisms exist in the system:

- The system is designed to provide at least two (2) ADS valve actuations. The Vermont Yankee FSAR analysis requires only one (1) actuation per valve. This provides a 100% conservatism.

- There is another 25% conservatism in ADS Accumulator System design to account for single failure. Each ADS valve provides 33 1/3% of required capacity, and four (4) reliefs are provided.

- General Electric has specified that an accumulator of one-gallon capacity will provide a final pressure of 70 psig after five actuations, starting from 90 psig. Vermont Yankee's ADS accumulators have a capacity of over 1.4 gallons each".

The staff's conclusion about Vermont Yankee's ADS accumulators, as stated in Reference (b), is correct when they state:

> "the licensee has verified qualification of accumulators on the ADS valves only for the indicated time period of up to three hours, following an accident. Long-term capability (up to 100 days) has not been demonstrated".

Vermont Yankee has, however, demonstrated that the ADS accumulator system is capable of performing its function as defined in the original design basis as set forth in the FSAR. In our review of this issue Vermont Yankee has not been able to find any NRC Regulation that specifies a "100 day" requirement for ADS accumulator capability. In 10CFR50.46 and specifically in 10CFR50.46(b)(5) long-term cooling is defined as:

"Long-Term Cooling

After any calculated successful operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core."

Vermont Yankee can meet the long-term cooling requirement of 10CFR50.46 consistent with its original design basis and all current regulations. Vermont Yankee's capabilities for long-term cooling considering different accident scenarios are described below:

Vermont Yankee's Long-Term Core Cooling Capability

Attachment 1 describes Vermont Yankee's present long-term core cooling capability for the full spectrum of loss-of-coolant accidents. The function of the ADS valves for each accident scenario is also listed.

In summary, after the present three (3) hour ADS qualification time, only very small breaks require augmented shutdown cooling beyond the decay heat removal afforded by the break flow.

For the very small LOCA, a leak slightly greater than the capability of the Reactor Core Isolation Cooling (RCIC) System was reviewed. In this case, the decay heat would not be removed adequately by the break flow for many hours. After initial depressurization, the RHR Shutdown Cooling Subsystem would normally be placed in service. If the RHR Shutdown Cooling Subsystem is not available, and a seismic event is postulated that interrupts the non-safety class nitrogen gas supply to the ADS accumulators, there are several options available.

1. Restore RHR shutdown cooling by local repair or operator action.

2. Continue to operate the High Pressure Coolant Injection (HPCI) System as required. If normal building ventillation cannot be restored, portable fans could be utilized to provide emergency cooling to the HPCI Room.

3. Restore the nitrogen gas supply to the ADS accumulators. According to the original design, the instrument air piping in the drywell and portions outside are seismically qualified. Repairs outside the drywell could be accomplished.

Based upon the above discussion, although some operator action is relied upon for the most limiting very small break scenario, Vermont Yankee meets the long-term cooling requirement of 10CFR50.46(b)(5).

A fully qualified ADS accumulator supply system (or other backup shutdown cooling path) would only be necessary if the Reactor Building was not accessible to allow emergency action. This situation is not designed for since no core damage is predicted for small LOCAs.

Thus we have demonstrated that "the ADS valves, accumulators and associated equipment and instrumentation meet the requirements specified in the plant FSAR and are capable of performing their functions during and following exposure to hostile environments, taking no credit for non-safety-related equipment or instrumentation" (per NUREG 0737 Item II.K.3-28). We have additionally demonstrated that for design basis accidents for Vermont Yankee, we have the capability for long-term cooling. We also have demonstrated that barring an arbitrary source term assumption combined with a seismic event we have ADS capability which exceeds the "100 day" figure. Should a seismic event occur (which the plant is designed to withstand), long-term operation of the ADS can be restored if necessary, for those very small or non-LOCA situations for which ADS would be desirable, provided no arbitrary source term assumptions are made.

In conclusion, Vermont Yankee believes it has satisfied all Regulatory Requirements as promulgated by the Nuclear Regulatory Commission; that the long-term cooling requirement as defined by 10CFR50.46 has been satisfied; and that the ADS accumulators are capable of performing their intended functions as defined in the FSAR. Therefore, Vermont Yankee's position is that the "100 day" capability is not required for Vermont Yankee to assure long-term cooling capability as defined by the Code of Federal Regulations or the Vermont Yankee design basis.

In Reference (b) you also asked the following specific question on leak testing of the ADS accumulator (Item 2):

"Your letter of December 5, 1983 indicates that the last step in your leakage test procedure (OP 4028) is to return the ADS to service. This would involve the replacement of the accumulator drain plug. You are requested to confirm that the test procedure include a final leak check for this fitting."

Procedure OP 4028 requires that all mechanical joints be checked ("snooped") for leakage and tightened as necessary after the accumulator drain plug is installed.

We trust this information is acceptable, however, should you have any further questions, please contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Donald Hunter
Vice President

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Attachment

COMMONWEALTH OF MASSACHUSETTS)
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MIDDLESEX COUNTY)

Then personally appeared before me, Donald Hunter, who, being duly sworn, did state that he is a Vice President of Yankee Atomic Electric Company, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation and that the statements therein are true to the best of his knowledge and belief.

Robert H. Groce Notary Public
My Commission Expires September 14, 1984

ATTACHMENT 1

VERMONT YANKEE LONG-TERM CORE COOLING FOLLOWING ACCIDENTS

Limiting Design Assumptions:

1. Loss of off-site power (10CFR50, Appendix A, Criterion 35).
2. Seismic event concurrent or following accident (10CFR50, Appendix A, Criterion 2).
3. Worst case single active failure. For long-term core cooling, this would involve a failure such that shutdown cooling mode of RHR was not available (e.g., inboard isolation valve MOV 10-18 fails to open) (10CFR50, Appendix A, Criterion 35).

Accident	Core Cooling Options
1. DBA (LOCA) [Flow out break cools core]	- LPCI/CS only (ADS & SDC are not necessary).
2. Small Break (LOCA) (HPCI Capacity) [Flow out break cools core]	- HPCI or ADS - Short-Term. - LPCI/CS only Long-Term (ADS and SDC are not required long-term).
3a. Very Small (LOCA) No Core Damage [Leak so small that flow out hole at depressurized conditions is not enough to cool core. Another shutdown cooling path is required.	- HPCI or ADS - Short-Term. - Long-Term Options. o Enter Drywell and Open MOV10-18. o Operate HPCI until decay heat matches break flow heat loss (Note 1). o Restore ADS accumulator nitrogen gas supply.
3b. Very Small or (NON-LOCA) Core Damage - TMI Source Term	- HPCI or ADS - Short-Term. - Long-Term - Not within present design capability.

NOTE:

1. For accident (3a), the Reactor Building is accessible. Although the electrical equipment associated with HPCI is not qualified for extended turbine operation without building ventilation, portable fans could be utilized to provide emergency cooling to the HPCI Room.