VERMONT YANKEE
NUCLEAR POWER CORPORATION

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FVY 88-17

REPLY TO:

ENGINEERING OFFICE
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March 2, 1988

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

References:
a) License No. DPR-28 (Docket No. 50-271)
b) Letter, VYNPC to USNRC, FVY 86-34, "Proposed Technical Specification Change for New and Spent Fuel Storage", dated 4/25/86
c) Letter, VYNPC to USNRC, FVY 87-87, "Vermont Yankee Proposed Change No. 133 - Spent Fuel Pool Expansion", dated 9/1/87
d) Letter, USNRC to VYNPC, NVY 88-05, "Forthcoming Meeting with Vermont Yankee Nuclear Power Station", dated 1/21/88

Dear Sir:

Subject: Vermont Yankee Proposed Change No. 133 - Spent Fuel Pool Expansion

Pursuant to the NRC staff's letter of January 21, 1988 [Reference d)], a meeting was held on February 9, 1988 during which Vermont Yankee responded to the remaining NRC staff technical information requirements associated with the subject spent fuel pool expansion amendment request [Reference b)]. In accordance with the NRC staff's request, Attachments 1 and 2 to this letter provide the documentation and information presented by Vermont Yankee and requested by the NRC staff at the February 9, 1988 meeting.

In order to expedite the NRC staff's review of the subject license amendment request and definitively resolve all remaining staff review issues, and in an attempt to resolve the issues pending before the Atomic Safety and Licensing Board, Vermont Yankee has committed to design, install, test and make operational, a redundant seismically designed Spent Fuel Pool Cooling System prior to the time Vermont Yankee exceeds the existing 2,000 spent fuel assembly storage limit in the Vermont Yankee spent fuel pool. This system will be operational no later than the end of Cycle 16 (Projected to be 1993). This commitment is reflected in Attachment 1 and 2. Attachment 1 specifies the design and performance criteria for the enhanced system. The design, installation and testing of the enhanced system will be in accordance with 10 CFR 50.59 and the NRC's normal inspection program.

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Attachment 2 to this letter documents the information presented by Vermont Yankee at the February 9, 1988 meeting which directly addressed each of the NRC staff's remaining open technical issues as described in the January 21, 1988 status report [Reference d)] of the staff's review of Vermont Yankee's spent fuel pool expansion amendment request. As documented in Attachment 2, each of the remaining open technical issues is addressed for both the existing Vermont Yankee Spent Fuel Pool System and the proposed enhanced Spent Fuel Pool Cooling System.

On the basis of the information submitted in support of the subject amendment request since April 1986 and the commitments and information presented herein, Vermont Yankee requests that you expeditiously complete your review of the spent fuel pool expansion application allowing Vermont Yankee to rerack the spent fuel pool to 2,870 assemblies.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Warren P. Murphy

Warren P. Murphy
Vice President and
Manager of Operations

/dm

cc: Office of Nuclear Reactor Regulation
Mr. Steven A. Varga, Director
Division of Reactor Projects I/II

U.S.N.R.C.
Region I
Mr. William T. Russell, Regional Administrator

U.S.N.R.C.
Resident Inspector
Vermont Yankee Nuclear Power Corporation

ASLB Service List

ATTACHMENT 1

Design and Performance Criteria for the Enhanced Vermont Yankee Spent Fuel Pool Cooling System

Vermont Yankee has committed to providing spent fuel pool cooling capacity via an Enhanced Fuel Pool Cooling System.

The Enhanced Fuel Pool Cooling System will be designed and installed in accordance with Vermont Yankee's Operational Quality Assurance Program.

The functional and performance criteria for the system are as follows:

1. Cooling from spent fuel pool to ultimate heat sink will be available from Seismic Category 1 equipment, independent of the RHR System.

2. System will be Safety Class 3 and single active failure proof.

   - o System will be designed to ensure that heat removal capacity assuming the maximum normal heat load and a single active failure, will be sufficient to preclude any restriction on plant operation. The system will also address the following in accordance with FSAR criteria and Technical Specifications:

     - Detection and isolation of leaks
     - Flooding
     - Missiles
     - Inservice testing capability
     - Fire Protection

   - o The spent fuel pool cooling pumps and all other essential electrical equipment will be environmentally qualified per the Vermont Yankee EQ Program, seismically qualified per the FSAR criteria and powered from safety class electrical emergency power sources.

   - o System layout and installation will take into account ALARA considerations in accordance with the Vermont Yankee ALARA Program.

   - o Fuel pool temperature monitoring will be provided for all plant operating modes.

The structural and mechanical design of the piping will be in accordance with ASME/ANSI B31.1-1977, which is consistent with the Seismic Reanalysis Program and Recirculation System replacement designs. Seismic input will be the appropriate Reactor Building spectra, based on USNRC Regulatory Guide 1.60 and ASME Code Case N-411 criteria, as was approved by the NRC for the Seismic Reanalysis Program and the Recirculation System replacement.

Material selection and processing will use NUREG 0313, Rev. 2, as guidance. However, the maximum operating temperature for the system is only 150°F, which is below the temperature at which IGSCC is a concern. It is Vermont Yankee's policy to use IGSCC resistant material unless significant cost or schedule penalties would result.

The installation will be performed under ASME Section XI repair program using the Engineering Design Change Request (EDCR) process, as was used in the Seismic Reanalysis Program and Recirculation System replacement project.

Post-installation pressure testing will be in accordance with ASME/ANSI B31.1 for isolable portions and ASME Section XI for portions of new piping unisolable from existing piping or components.

Start-up testing will be performed to ensure that the system meets specified performance criteria.

Vermont Yankee will continue to comply with the Administrative Guidelines as described in our September 1, 1987 submittal [Reference c)] until such time that the Enhanced Fuel Pool Cooling System is operable.

ATTACHMENT 2

Vermont Yankee Response to NRC Staff Technical Issues Identified in the January 21, 1988 Status Report

INTRODUCTION

This attachment documents and expands upon the information presented by Vermont Yankee at the February 9, 1988 public meeting and directly addresses each of the NRC staff's remaining open technical issues as described in the January 21, 1988 status report of the staff's review of Vermont Yankee's spent fuel pool expansion amendment request. Additionally, Vermont Yankee wishes to clarify two points with respect to the information contained in your letter of January 21, 1988 (NVY 88-05). Specifically, two items discussed in the attachment under Section A, Background, should be corrected.

First, to date, Vermont Yankee has installed racks of the current design sufficient to store 1,690 fuel bundles, not 1,680 as stated. This discrepancy is due to a typographical error contained in Vermont Yankee's original amendment request submittal (FVY 86-34, dated April 25, 1986).

Second, the proposed enhanced high density storage racks would increase the storage capacity of the spent fuel pool to 2,870 fuel bundles and are projected to provide storage capacity while maintaining full core reserve discharge capability until 2001, not 1999 as stated. The date of 2001 was documented in a letter dated November 24, 1986 (FVY 86-107) in response to Question No. 10 and is a realistic projection based on Vermont Yankee's extended fuel cycle management plan (i.e., eighteen-month fuel cycles).

RESPONSE TO NRC QUESTIONS
VY SPENT FUEL POOL EXPANSION

OPEN ISSUES:

No. 1 HEAT REMOVAL CAPABILITY

ITEMS:

1A. 1971 ANS DRAFT STANDARD USED

1B. 9.1 MBTU/HR USED AS HEAT LOAD

1C. FSAR LISTS 2.23 MBTU/HR

1D. SINGLE FAILURE

RESPONSE:

1A. NOT USED FOR SFP DECAY HEAT;
USED FOR REACTOR VESSEL DECAY HEAT

1B. CONSERVATIVE VALUE FOR A SPECIFIC SCENARIO

1C. DESIGN VALUE NOT ACTUAL PERFORMANCE CAPABILITIES

1D. VY IS SINGLE ACTIVE FAILURE PROOF (VY HEAT EXCHANGERS CAN BE CROSS CONNECTED)

CONCLUSION:

ITEMS A,B,C AND D FULLY ADDRESSED BY EXISTING SFP SYSTEM HEAT REMOVAL CAPABILITY. PROPOSED UPGRADE ALSO FULLY ADDRESSES ITEMS B,C AND D.

DISCUSSION

1A. Vermont Yankee has performed heat load calculations for fuel stored in the spent fuel pool in accordance with the guidance of Standard Review Plan, Section 9.1.3. Reference to the 1971 ANS draft standard and 9.1 MBtu/hr are specific only to the scenario described in Attachment 1 of the September 1, 1987 submittal. This scenario describes how torus cooling and spent fuel pool cooling can be accomplished by the RHR System only. The initial conditions established an operating reactor and recently discharged spent fuel (ten days). These conditions are essentially impossible to achieve since an actual refueling at Vermont Yankee could not be done in less than ten days, thus, these conditions establish a very conservative analysis. The 1971 ANS draft standard was used in determining the heat load from the reactor vessel just after scram, not the SFP heat load. The heat load in the SFP was determined by using the SRP methodology.

1B. The 9.1 MBtu/hr is a conservative value picked because it is the heat transfer capability of one pump and two heat exchangers. It is not the maximum normal heat generation rate. Using SRP guidance, the analysis performed by Vermont Yankee shows the heat load at 150 hours (six days) is approximately 10.3 MBtu/hr, which is in agreement with the analysis done by the NRC staff.

1C. Table 10.5.1 of the Vermont Yankee FSAR lists the original design heat transfer rate of the heat exchanger. The original design heat transfer rate was used to purchase the equipment but does not limit the actual heat transfer rate of 2.23 MBtu/hr in the FSAR does not limit the heat exchangers performance to just 2.23 MBtu/hr. Based on the conservation of energy, as the inlet parameters change so does the heat transfer rate. In the Vermont Yankee SFP cooling analysis, the original heat exchanger data sheet inlet parameters were analyzed as a bench mark. The analysis yielded the same outlet parameters as listed on the heat exchanger data sheet, showing that the original design is just another point within the heat exchanger performance capabilities.

1D. Single failure for Vermont Yankee is defined as "single active failure." The definition is contained in SRP 9.1.3 and the response to Interrogatory 26; "NRC Staff Response to NECNP's First Set of Interrogatories and Document Request to the NRC Staff", dated August 5, 1987. Based on this, Vermont Yankee is single active failure proof with one pump in standby and one pump operating with two heat exchangers operating in parallel. The Vermont Yankee SPFCS piping is arranged in such a way to provide easy pump discharge cross connnection allowing the two heat exchangers to be operated in parallel (refer to FSAR Figure 10.5-1). Considering only one pump to be in operation, and the cross connection valve open, the piping to each heat exhanger is routed in such a manner to provide a relatively equal flow resistance. This provides a fairly equal division of flow from the running pump to each heat exchanger. Figure No. 1 summarizes the Vermont Yankee pool temperature capability for all combinations of existing SFPCS equipment. As can be seen from the one pump and two heat exchanger curve (middle curve), the pool temperature can be held to less than 150°F after 11 days of fuel decay. This figure is based on SRP heat load analysis methods that yield results comparable to heat loads calculated by NRC staff and attached to the "NRC Staff Response To NECNP's First Set Of Interrogatories And Document Request To The NRC Staff", dated August 5, 1987. Figure No. 2 makes a comparison of NRC staff and Vermont Yankee calculated heat loads at several days of decay. The heat loads at these points compare very well with each other, so it can be concluded that Vermont Yankee calculated heat loads are not in disagreement with the NRC calculated heat loads.

CONCLUSION

The design of the existing Spent Fuel Pool Cooling System heat generation calculation methods, heat removal requirements, and single failure requirements comply with Standard Review Plan 9.1.3.

The Vermont Yankee commitment of February 9, 1988 to provide an enhanced SFPCS that meets the applicable requirements of SRP 9.1.3 would, therefore, be qualified for a seismic event, be single active failure proof, and powered by a safety class electrical emergency power source. As such, reliance on the RHR System to provide seismic spent fuel pool cooling would not be necessary. The enhanced system would acceptably close Open Issue No. 1 also, since it would meet the applicable SRP 9.1.3 requirements for single active failure and heat removal capabilities.

1/3 CORE OFFLOAD "SRP" HEATLOADING

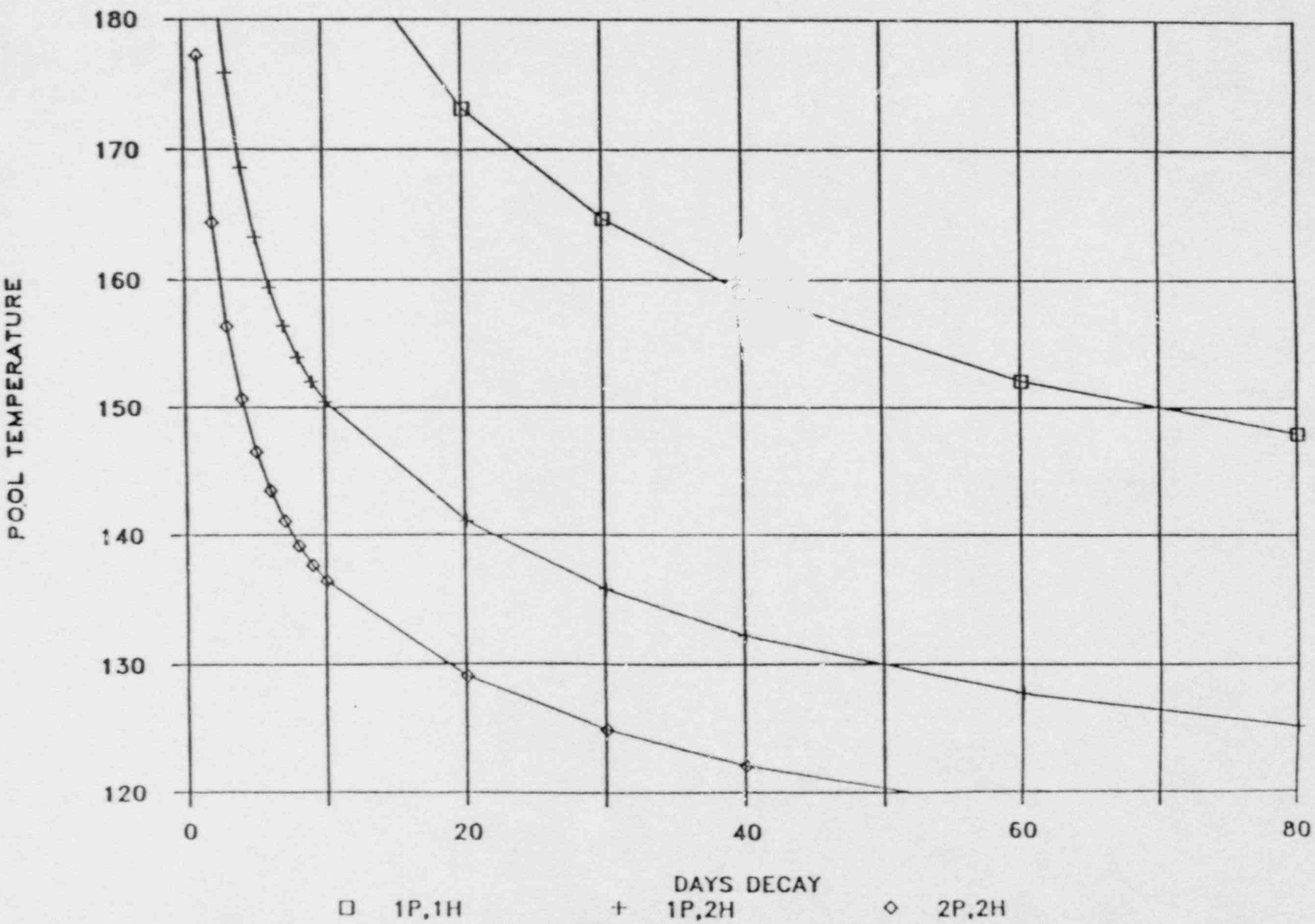

FIGURE 1

HEAT LOAD COMPARISON

NRC		VY	
DAYS	HEAT LOAD	DAYS	HEAT LOAD
6.25	10.17 MBTU/HR	6	10.35 MBTU/HR
6.92	9.91	7	9.93
7.92	9.58	8	9.59
8.92	9.31	9	9.32
9.92	9.09	10	9.1

FIGURE #2

RESPONSE TO NRC QUESTIONS
VY SPENT FUEL POOL EXPANSION

OPEN ISSUES:

No. 2 SPENT FUEL POOL TEMPERATURE LIMIT

ITEM:

NO FUEL POOL TEMPERATURE MONITOR WITH SFPCS NOT OPERATING

RESPONSE:

POOL TEMPERATURE MONITORING IS PROVIDED FOR ALL PLANT CONDITIONS AS DOCUMENTED IN VY LETTER 9-1-87

CONCLUSION:

EXISTING VY POOL TEMPERATURE MONITORING SYSTEM ACCEPTABLE AND ADEQUATE.

PROPOSED SYSTEM WILL ADDITIONALLY PROVIDE SFP TEMPERATURE MONITORING FOR ALL PLANT CONDITIONS.

DISCUSSION

As detailed in Vermont Yankee's letter of September 1, 1987, spent fuel pool temperature is continuously monitored when the system is in operation. A Control Room alarm will sound when temperature exceeds an administrative limit of 125°F.

In recognition of the fact that the temperature monitors would not provide accurate temperature indication of the Fuel Pool if the Fuel Pool Cooling System was inoperable, Vermont Yankee has committed to directly monitor fuel pool temperature every four hours if one or both fuel pool cooling trains were inoperable (see Vermont Yankee letter, dated September 1, 1987, Attachment 2) until the enhanced Fuel Pool Cooling System is operable. Even at the maximum heat-up rate of 3°F/hr ample time would exist for operator action to secure the demineralizer before the inlet temperature exceeds the NRC imposed limit of 140°F.

In the refueling mode, when the Spent Fuel Pool Cooling System components could be out of service for maintenance, the spent fuel pool and refueling cavity temperature is monitored by the Residual Heat Removal System temperature indicators.

CONCLUSION

Based on the above, Vermont Yankee concludes that appropriate temperature monitoring exists for all operating modes, satisfying the requirements of Standard Review Plan 9.1.3.

The Vermont Yankee commitment of February 9, 1988 to provide an enhanced SPFCS that meets the applicable requirements of SRP 9.1.3 would, therefore, provide temperature monitoring under all plant conditions thus the enhanced system would acceptably close Open Issue No. 2 also, since pool temperature monitoring would be provided under all plant conditions.

RESPONSE TO NRC QUESTIONS
VY SPENT FUEL POOL EXPANSION

OPEN ISSUES:

No. 3 POOL COOLING FOLLOWING SEISMIC EVENTS

ITEM:

3A. FIRE WATER SYSTEM CONNECTION TO SERVICE WATER NOT SEISMIC CAT.I

3B. ALT. COOLING CELL PIPING SEISMIC CAT.I NOT DEMONSTRATED

3C. RHRSW TO RHR CROSS-CONNECT SEISMIC CAT.I NOT DEMONSTRATED

RESPONSE:

3A. SWS PIPING IS SEISMIC CAT.I PER FSAR App.A THROUGH A NORMALLY CLOSED MANUAL FIRE WATER SYSTEM ISO. VALVE

3B. PIPING IS SEISMIC CAT.I PER FSAR App.A

3C. PIPING IS SEISMIC CAT.I PER FSAR App.A

CONCLUSION:

EXISTING VY SW PIPING AND CROSS-CONNECTION ARE SEISMIC CATEGORY I. PROPOSED FPC SYSTEM UPGRADE WILL BE SEISMIC CATEGORY I.

DISCUSSION

3A. The Fire Water System is not a seismically qualified system and is isolated from the Service Water System by a normally closed manual valve. The fire water piping and valve making the connection to the Service Water System is seismically qualified Category I in accordance with the Vermont Yankee FSAR, Appendix A to prevent degradation of the Service Water System in a seismic event.

3B. The cooling tower deep basin alternate cooling cell piping connecting to the Service Water System is seismically qualified as noted in the Vermont Yankee FSAR, Appendix A.

3C. The Vermont Yankee service water pumps are powered from an on-site emergency electrical source and meet Seismic Category I requirements. The Vermont Yankee service water path to the fuel pool meets Seismic Category I requirements from the service water pump suction in the river through the RHR service water connection into the RHR System and through the FPC connection into the spent fuel pool.

CONCLUSION

Based on the above, Vermont Yankee concludes that the existing service water piping and cross connections are Seismic Category I as described in Appendix A to the Vermont Yankee FSAR, Standard Review Plan, Section 9.1.3 is satisfied.

The Vermont Yankee commitment of February 9, 1988 to provide an enhanced SFPCS that meets the applicable requirements of SRP 9.1.3 would, therefore, be qualified for a seismic event.

RESPONSE TO NRC QUESTIONS
VY SPENT FUEL POOL EXPANSION

OPEN ISSUES:

No. 4 RADIOLOGICAL CONSEQUENCES OF BOILING

ITEM:

4A. PROVIDE ASSUMPTIONS FOR OFF-SITE DOSE

4B. PROVIDE ASSUMPTIONS FOR ON-SITE DOSE

4C. PROVIDE ON-SITE DOSE

RESPONSE:

4A. ASSUMPTIONS CAN BE PROVIDED

4B. ASSUMPTIONS CAN BE PROVIDED

4C. ON-SITE DOSE CAN BE PROVIDED

CONCLUSION:

10CFR20 REQUIREMENTS MET DURING POOL BOILING FOR OFF-SITE AND ON-SITE DOSES.

PROPOSED NEW SYSTEM WILL PRECLUDE POOL BOILING FOR ALL PLANT CONDITIONS.

DISCUSSION

In order to assess the on-site and off-site radiological impact of a postulated boiling spent fuel pool, a scenario was developed to maximize the release of fission products through boiling. The scenario assumes that the plant is shut down for refueling with a normal 136 bundle fuel load. The 136 spent fuel bundles discharged completely fill the spent fuel pool to its capacity of 2,870. Just before the start of the outage, maximum Technical Specification activity levels are assumed to be present in the Reactor Coolant System while normal activity levels (as determined from Plant Chemistry data) are assumed to be present in the spent fuel pool water. The two volumes and their activities are then mixed at the start of the outage when the refueling gates are removed.

The length of the outage is assumed to be 21 days. This is consistent with the shortest refueling outage in Vermont Yankee's history. At 21 days, the refueling gates are reinstalled, the fuel pool volume is segregated from the Reactor Coolant System volume, and the fuel pool is on spent fuel pool cooling. All spent fuel pool cooling is then assumed to be lost and the pool is allowed to heat up. The heat load in the pool is then determined based upon Standard Review Plan methodology and uncertainties assuming the spent fuel operated at 1,665 MWt with a 100% capacity factor. The rate of heat up and subsequent boiling were then determined assuming a spent fuel pool bulk temperature of 150°F when all cooling is lost. The resulting boil-off rate is then calculated as a function of time. Only the maximum boil-off rate is used in the radiological calculations.

The following assumptions were used to evaluate the on-site and off-site radiological conditions resulting from a spent fuel pool boiling incident.

ASSUMPTIONS FOR SOURCE TERM

1. Constant maximum boil-off rate if 16.6 gpm.

2. The volatile elements in the spent fuel pool (iodine, tritium) are released during boiling.

3. Tritium concentration in water equals 2×10^{-2} micro Ci/ml.

4. Initial concentration of I-131 dose equivalent (DE) at minimum detectable level (MDL) (i.e., 4×10^{-7} micro Ci/ml) in spent fuel pool.

5. At t=0, reactor coolant at long-term Technical Specification limit of 1.1 micro Ci/ml I-131 DE.

6. Partition Factor (PF) of 100 for iodine during boiling. Based on SRP 15.6.3, Radiological Consequences of Steam Generator Tube Failure (PWR), establishes a partition factor of 100 between the steam generator water and steam phases.

7. No credit taken for fuel pool cleanup of iodine via the spent fuel pool demineralizers prior to initiation of pool boiling.

8. Recovery operations restore spent fuel pool cooling within thirty days.

ASSUMPTIONS FOR OFF-SITE CONDITIONS

1. Blow out panels are not present; ground level unfiltered release assumed.

2. Maximum off-site accident X/Q value for release from Reactor Building equals 6.83×10^{-4} sec/m^3.

3. For tritium, adult dose conversion factor and breathing rate which combine for most conservative dose rate (from Regulatory Guide 1.109).

   Adult Inhalation Dose Factor = 1.58×10^{-7} mrem/pCi inhaled @ 8,000 m^3 year.

4. For I-131, infant thyroid dose conversion factor is most conservative

   $1.62 \frac{R/hr}{uCi/m^3}$ (EPA-520/1-75-001)

   (Infant Breathing Rate of 2.5×10^{-5} m^3/sec)

RESULTS OFF-SITE IODINE

Maximum I-131 DE off-site concentration = 1.5×10^{-10} micro Ci/cc.

Maximum dose rate thyroid = 2.5×10^{-1} mrem/hr.

30 days dose at maximum rate = 1.8×10^{2} mrem or 0.06% of Part 100 Limit (300 rem) and 6% of Part 20 Limit (3 rem/yr implied).

RESULTS OFF-SITE TRITIUM

Maximum tritium concentration = 1.4×10^{-8} micro Ci/cc.

Maximum adult whole body dose rate = 2.1×10^{-3} mrem/hr.

30 day dose at maximum rate = 1.5 mrem or 0.01% of Part 100 Limit (25 rem) and 0.3% of Part 20 Limit (0.5 rem/yr).

ASSUMPTIONS FOR ON-SITE CONDITIONS

1. For on-site evaluation, assume the activity is released into a closed volume (blow-out panels remain intact) equivalent to the top floor of the Reactor Building.

2. Assume 90°F and 100% relative humidity in the SFP area as a result of boiling (for tritium concentration).

3. Assume the concentration of tritium in the water vapor in the SFP area is the same as the concentration in the SFP water (2×10^{-2} micro Ci/ml).

4. Allow the iodine to be released into a closed volume equivalent to the Reactor Building top floor and compute the time it takes to reach 10,000 x MPC. This is based on an assumed protection factor of 10,000 for supplied air to a worker in the building.

RESULTS FOR ON-SITE

For I-131 DE with very conservative bounding assumptions and credit for supplied air, recovery operations could take place for a 30-day period without exceeding the limits of 10 CFR, Part 20. The iodine concentration never reaches 10,000 MPC in the Reactor Building.

H-3 concentration will remain below the limits of Part 20. 7.2×10^{-7} micro ci/cc calculated tritium concentration as compared to MPC for restricted area = 5×10^{-6} micro Ci/ml.

CONCLUSION

This calculation has shown that boiling of the SFP at Vermont Yankee could occur without exceeding the off-site dose limits of 10 CFR, Part 20 (0.5 rem whole body and 3 rem thyroid). The airborne tritium concentrations in the SFP area should not exceed the limits of Part 20. Using conservative assumptions and taking credit for supplied air, the airborne I-131 concentrations should not exceed the limits of 10 CFR, Part 20.

Therefore, considering a complete loss of spent fuel pool cooling by both the SFPCS and the RHR System the radiological releases associated with postulated spent fuel pool boiling are below the limits established for an operating plant by 10 CFR, Part 20.

The Vermont Yankee commitment of February 9, 1988 to provide an enhanced SFPCS that meets the applicable requirements of SRP 9.1.3 would, therefore, be qualified for a seismic event, be single active failure proof, and powered by a safety class electrical emergency power source. As such, spent fuel pool cooling would be available under all plant conditions and spent fuel pool boiling would not occur.

The enhanced system would acceptably close Open Issue No. 4 also, since it would provide spent fuel pool heat removal under all plant conditions and prevent pool boiling.

RESPONSE TO NRC QUESTIONS
VY SPENT FUEL POOL EXPANSION

OPEN ISSUES:

No. 5 SUPPLEMENTAL COOLING

ITEM:

5A. PROVIDE ADDITIONAL INFORMATION ON PARALLEL HEAT EXCHANGER OPERATION

5B. SWITCHING RHR BETWEEN TORUS COOLING AND SFP COOLING IS UNACCEPTABLE

RESPONSE:

5A. ADDITIONAL INFORMATION CAN BE PROVIDED

5B. SWITCHING RHR BACK AND FORTH FROM TORUS COOLING TO SFP COOLING IS WITHIN THE CAPABILITIES OF THE PLANT

CONCLUSION:

EXISTING VY SFP SUPPLEMENTAL COOLING SYSTEM IS ADEQUATE AND ACCEPTABLE. PROPOSED NEW SYSTEM ALSO FULLY ADDRESSES THESE ISSUES.

DISCUSSION

5A. Additional information concerning SFPCS operation using one pump and two heat exchangers was previously supplied within the Vermont Yankee response to Open Issue No. 1.

5B. For a seismic event during power operation, Vermont Yankee's method, presented within the September 1, 1987 submittal, of using one train of RHR to cool both the spent fuel in the fuel pool and the residual heat in the reactor is not considered appropriate by NRC staff since too many operator actions and RHR pump starts are involved.

This scenario describes how torus cooling and spent fuel pool cooling can be accomplished by the RHR System only. The initial conditions assumed the reactor was operating and recently discharged (ten days) spent fuel. These conditions are essentially impossible to achieve since an actual refueling at Vermont Yankee could not be done in less than ten days; thus, these conditions establish a very conservative analysis.

The RHR cycle involves six hours of torus cooling and one hour of Augmented Spent Fuel Pool Cooling (AFPC), with 20 minutes allowed for valve realignment between modes. This conservative scenario is within system capability and is well within the RHR pump's starting limitations listed in plant Operating Procedure OP 2124, Rev. 19, "Limit RHR pump starts to 3 in 5 minutes followed by a 20 minute run or a 45 minute shutdown for cooling."

If realistic spent fuel pool heat loads were used (i.e., less conservative than those required by SRP 9.1.3), the spent fuel pool heat up would be slower, which would allow a longer duration on torus cooling, thus limiting the cycle frequency and reduce operator actions.

CONCLUSION

It is Vermont Yankee's conclusion that using RHR to ensure cooling of the spent fuel pool considering a seismic event is within the capabilities of the plant, even if conservative scenarios and heat loads are used.

The Vermont Yankee commitment of February 9, 1988 to provide an enhanced SFPCS that meets the applicable requirements of SRP 9.1.3 would, therefore, be qualified for a seismic event, be single active failure proof, and powered by a safety class electrical emergency power source. As such, reliance on the RHR System to provide seismic spent fuel pool cooling would not be necessary.

The enhanced system would acceptably close Open Issue No. 5 also, since it would meet the applicable SRP 9.1.3 requirements, operate under all plant conditions and, therefore, eliminate switching of one RHR train between the fuel pool and the reactor for heat removal.