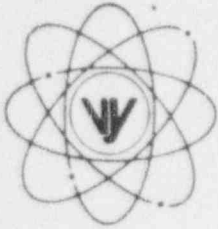


# VERMONT YANKEE NUCLEAR POWER CORPORATION



Ferry Road, Brattleboro, VT 05301-7002

REPLY TO:  
ENGINEERING OFFICE

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November 16, 1995  
BVY 95-123

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

- References:
- (a) License No. DPR-28 (Docket No. 50-271)
  - (b) NRC Bulletin 95-02, "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode."
  - (c) NRC Bulletin 93-02 and Supplement 1, "Debris Plugging of Emergency Core Cooling Suction Strainers."

Subject: 30-Day Response to NRC Bulletin 95-02

In Reference (b), NRC alerted licensees to Residual Heat Removal (RHR) strainer clogging experienced during a recent event at another US BWR facility. This clogging occurred when suppression pool cooling was initiated in response to a stuck open safety relief valve. Fluctuations in RHR pump motor current and flow required the operators to remove the loop from service. The utility subsequently determined that the clogging of the suction strainer resulted from foreign materials (i.e. sludge and fibers) in the suppression pool. This concern had been previously identified by NRC in a number of generic communications, including Reference (c). The major concern of this Bulletin is that Emergency Core Cooling System (ECCS) strainer clogging occurred during normal operation while cooling the suppression pool. Vermont Yankee has followed this issue closely through the Boiling Water Reactor Owners Group (BWROG) ECCS Suction Strainer Committee.

Enclosure 1 documents Vermont Yankee's position on all requested actions identified in Reference (b). Vermont Yankee intends to implement requested actions 1, 3, 4, and 5 as outlined by this Bulletin. For requested action 2, Vermont Yankee has already confirmed, by inspection, the operability of the ECCS and Reactor Core Isolation Cooling (RCIC) strainers during our recent refueling outage (April 1995) and plans to re-inspect these strainers during our August 1996 refueling outage. Additionally, we:

- a) thoroughly cleaned/desludged our torus during the 1995 refueling outage,
- b) utilized our Foreign Material Exclusion (FME) and Drywell/Torus closeout procedures during the 1995 refueling outage,
- c) benchmarked the debris found in the Vermont Yankee torus against a video tape of the impacted BWR and found no similarities (i.e. no significant fibrous, friable debris found on the strainers),

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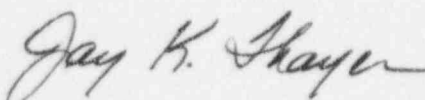
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- d) previously upgraded our strainer design which more than doubled our RHR strainer surface area, and more than tripled our Core Spray (CS) strainer surface area.
- e) repeatedly used our RHR system, both in normal testing and during an actual operational transient (with 2 loops of torus cooling operating) without any indication of strainer clogging.

Based on the above and the additional details provided in Enclosure 1, Vermont Yankee believes that the intent of Bulletin 95-02 has been met and that these actions will ensure that Vermont Yankee will continue to operate safely. We are also available to meet with NRC staff at your convenience to further explore our basis for compliance with the requested actions. We trust this information is responsive to your concerns; however, should you have additional questions, please do not hesitate to contact us.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION



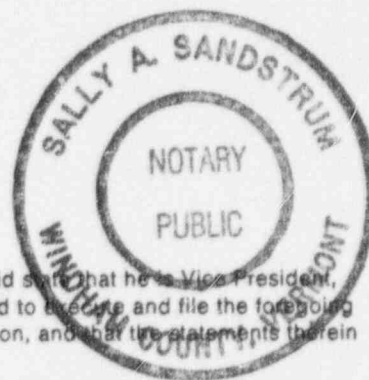
Jay K. Thayer  
Vice President, Engineering

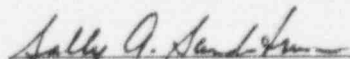
Enclosure

cc: USNRC Region I Administrator  
USNRC Resident Inspector - VYNPS  
USNRC Project Manager - VYNPS

STATE OF VERMONT     )  
                                  )ss  
WINDHAM COUNTY     )

Then personally appeared before me, Jay K. Thayer, who, being duly sworn, did state that he is Vice President, Engineering, of Vermont Yankee Nuclear Power Corporation, 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.



  
Sally A. Sandstrum, Notary Public  
My Commission expires February 10, 1999

## ENCLOSURE 1

### Vermont Yankee Response to Requested Actions in NRC Bulletin 95-02, "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Cooling Mode"

#### Requested Action 1

Verify the operability of all pumps which draw suction from the suppression pool when performing their safety functions (e.g., ECCS, containment spray, etc.), based on an evaluation of suppression pool and suction strainer cleanliness conditions. This evaluation should be based on the pool and strainer conditions during the last inspection or cleaning and an assessment of the potential for the introduction of debris or other materials that could clog the strainers since the pool was last cleaned.

#### Vermont Yankee Response

At Vermont Yankee, the Core Spray (CS) and Residual Heat Removal (RHR) system suctions are aligned to the torus when performing their safety function. Reactor Core Isolation Cooling (RCIC) and High Pressure Injection Cooling (HPCI) systems use torus suction as an alternate to the Condensate Storage Tank (CST). The RHR system modes which take suction from the torus are the torus cooling, torus spray, containment spray, and low pressure coolant injection modes of operation. The active components of these systems are currently tested quarterly per Technical Specifications requirements.

Vermont Yankee completed a thorough inspection and cleaning of the torus bays during the 1995 refueling outage (March/April 95). During this inspection, each bay of the torus was cleaned using underwater vacuum equipment. The torus was previously cleaned at Vermont Yankee in 1984. Additionally, during this inspection/cleaning the suction strainers for the systems identified above were inspected. These inspections documented that the as-found strainers were free from any clogging which may have caused pump concerns during normal plant operations. Additionally, Vermont Yankee benchmarked the debris found in the torus against a video tape of the impacted BWR and found no similarities (i.e. no significant fibrous, friable debris found on the strainer).

Vermont Yankee Procedure AP 6024, "Plant Housekeeping and Foreign Material Exclusion/Cleanliness Control," establishes documented controls for ANSI N.45.2.3, Zone III areas for Foreign Material Exclusion (FME) from critical systems. This plant housekeeping procedure requires that Zone III housekeeping controls be established when opening any portion of a plant system where the potential exists to introduce foreign material into the reactor vessel. Appendix A of this procedure identifies all systems that potentially communicate with the reactor vessel, including the torus. This procedural control ensures that FME requirements have been in place since the last cleaning of the pool.

A visual inspection of the torus interior, including water line regions and ECCS suction screens is performed prior to torus closeout during each refueling outage. Within the scope of this inspection, any floating or loose debris would be removed. This inspection would also note any degradation in the torus interior area. The inspection was last completed in April of 1995. (Reference OP 4115, "Primary Containment Surveillance," Surveillance test #8003).

Vermont Yankee performs In-Service Testing (IST) pump operability testing on the RHR and CS pumps using suction from the torus. During this testing, the pump suction pressure is measured and documented while there is flow through the suction strainers. An evaluation of these results for the last five years has not identified any adverse trends that could be attributed to clogging of the strainers. These results are supported by the inspections completed during the last two refueling outages.

Vermont Yankee has been alerted to potential ECCS suction strainer clogging since the issuance of Regulatory Guide 1.82, Revision 1 in 1985. Based on calculations completed at that time, the original suction strainers for the RHR pumps were replaced with basket strainers which more than doubled the available strainer surface area. Additionally, in 1993, the original CS suction strainers were also replaced which more than tripled their available strainer surface area. The modifications to the original suction strainers for these ECCS systems has ensured that Vermont Yankee's strainer area is significantly greater than the Mark I plant evaluated in the current Draft of NUREG/CR-6224 for suction strainer clogging.

In response to NRC Bulletin 93-02, Supplement 1, "Debris Plugging of Emergency Core Cooling Suction Strainers", Vermont Yankee committed to a number of actions to ensure that operators were aware of the potential for ECCS suction strainer clogging. These actions included an instruction module and simulator scenario utilized during operator re-qualification training and a new event-based off-normal (ON) operating procedure. Additionally, VY operators will receive training on the recent BWR event during normal operator training.

In April, 1991 Vermont Yankee had a loss of offsite power event. This event is described in detail in the NRC AIT Inspection Report (50-271/91-13) dated June 6, 1991. During this event, SRVs were cycled to reduce reactor pressure in conjunction with 2 loops of torus cooling in operation. Operation in this mode continued for approximately eighteen (18) hours with no identified detrimental effects on pump suction pressures. At the time of this event, Vermont Yankee had operated for approximately seven (7) years since cleaning the torus. As noted above, the CS strainers were modified in 1993, at which time an inspection of the RHR, HPCI and RCIC strainers found them to be free of any blockage. At the time of this inspection, the Vermont Yankee torus had not been cleaned for nine (9) years, but no accumulation of material had occurred during either normal operation of torus cooling during surveillances or during the operation of the safety relief valves (SRVs) in conjunction with torus cooling during the 1991 Loss of Normal Power (LNP).

Based on the thorough cleaning of the torus bays completed in 1995, the results of strainer inspections during this cleaning, controls in place for FME requirements during and subsequent to the outage, training, and torus cooling operation, Vermont Yankee concludes that operability of the safety systems which take suction from the torus to perform their safety function has been assured.

#### Requested Action 2

The operability evaluation in requested action 1 above should be confirmed through appropriate test(s) and strainer inspection(s) within 120 days of the date of this bulletin.

#### Vermont Yankee Response

RHR and CS pump suction pressures are documented during IST testing. An evaluation of this data over the last five years of testing has identified no significant adverse trends, nor can changes in the results be attributed to strainer clogging. Vermont Yankee is evaluating additional testing of the pumps, as requested in this action. Trending of the RHR pump suction pressure while operating RHR system in torus cooling mode in conjunction with the next scheduled HPCI pump surveillance is currently planned during the 120 days after issuance of this Bulletin. Additional testing is specified in Requested Action 5. This testing will meet the intent of the requested actions for testing.

As documented in response to requested action 1 above, Vermont Yankee is confident that operability of the systems which take suction from the torus to perform their safety function has been assured by the inspections and cleaning completed during the recent 1995 refueling outage. In addition, Vermont Yankee will reconfirm operability by inspection of the suction strainers during the August, 1996 refueling outage.



### Requested Action 3

Schedule a suppression pool cleaning. The schedule for cleaning the pool should be consistent with the operability evaluation in requested action 1 above. In addition, a program for periodic cleaning of the suppression pool should be established, including procedures for the cleaning of the pool, criteria for determining appropriate cleaning frequency, and the criteria for evaluating the adequacy of the pool cleanliness.

### Vermont Yankee Response

As documented in this response, Vermont Yankee completed a torus cleaning effort during the recent 1995 refueling outage. This effort was controlled by diving/cleaning procedures which thoroughly vacuumed up underwater torus debris. The Plant Operating Review Committee (PORC) reviewed all vendor related procedures utilized for this activity. Maintenance then inspected the torus (OP 5250 "Maintenance/Inspection Of Primary Containment Interior Surfaces" which implements Technical Specification 4.7.A.1) which was followed by an operations inspection (OF 4115 "Primary Containment Surveillance, "). Based on this recent cleaning, inspection, and current FME controls, Vermont Yankee is confident that operability of the systems which take suction from the torus to perform their safety function has been assured.

Vermont Yankee has scheduled a torus cleaning for the 1996 refueling outage, which is scheduled to begin in August, 1996. Results of this cleaning will be used to develop a continuing pool cleaning program at Vermont Yankee. By cleaning in two consecutive outages, a rate of sludge/debris accumulation will be documented. The rate of accumulation will be used as input to the long term resolution of the ECCS suction strainer concerns and the establishment of a program for periodic cleaning of the pool. This program will incorporate appropriate criteria for frequency and acceptance criteria, as required by this requested action.

### Requested Action 4

Review FME procedures and their implementation to determine whether adequate control of materials in the drywell, suppression pool, and systems that interface with the suppression pool exists. This review should determine if comprehensive FME controls have been established to prevent materials that could potentially impact ECCS operation from being introduced into the suppression pool, and whether workers are sufficiently aware of their responsibilities regarding FME. Any identified weaknesses should be corrected. In addition, the effectiveness of the FME controls since the last time the suppression pool was cleaned and the ECCS strainers inspected, and the impact that any weaknesses noted may have on the operability of the ECCS should be assessed.

### Vermont Yankee Response

Vermont Yankee Procedure AP 6024, "Plant Housekeeping and Foreign Material Exclusion/Cleanliness Control," establishes documented controls for ANSI N.45.2.3, Zone III areas for FME from critical systems. This plant housekeeping procedure requires that Zone III housekeeping controls be established when opening any portion of a plant system where the potential exists to introduce foreign material into the reactor vessel. Appendix A of this procedure identifies all systems that potentially communicate with the reactor vessel, including the torus.

Zone III controls require installation of barricades/barriers around the zone boundaries, posting the area as a Zone III area, the use of material and personnel accountability log to control people and materials that come into the area, and a documented close-out inspection prior to system closure.

During the course of the work, the Job Supervisor is required to ensure that good housekeeping practices are maintained at all times, debris is removed in a timely manner, and that accountability logs are maintained current.

Upon completion of the work effort all tools, materials and debris must be picked up and removed from the area. The documented close-out inspection is performed and accountability logs are balanced and closed out. Contingencies are included if there is missing material. The work site is required to be in a condition equal to or better than the condition it was in prior to the work effort.

AP 6024 also requires each individual to be responsible for following good housekeeping practices during the performance of work activities at Vermont Yankee. During initial certification and annual re-certification for General Employee Training (GET) a section for Housekeeping (20 computer screens) is presented that explains the plant housekeeping procedure. These screens display general housekeeping requirements, ownership, definitions and the individual requirements for each housekeeping zone. There is also a presentation of selected Event Reports relating to housekeeping errors that are used as examples of the consequences of not following required practices. The responsibilities of work supervisors, as defined in AP 6024, are explained as well as the housekeeping requirements prior to work initiating, during the job, and at job close-out.

During work package preparation, housekeeping practices are required to be specifically considered in the planning process and identified in the package. Housekeeping requirements are a separate check-off on the "Planning/Work Package Sheet", Form VYAPF 0048.02.

During the 1995 outage the Torus was open for maintenance and inspection activities. A QA surveillance of the housekeeping activities was performed (QA Surveillance Report 95-76) and found that the Zone III requirements of the program were being effectively implemented. This report stated that "... Housekeeping Zone III controls were established for the work performed inside the torus. Personnel and material accountability was being performed and an associated log was maintained. Postings indicating that the torus interior is a Housekeeping Zone III were in place and the manway not being used at the time of the inspection was appropriately covered to prevent the inadvertent entry of foreign material."

A visual inspection of the torus interior, including water line regions and ECCS suction screens is performed prior to torus closeout during each refueling outage. Within the scope of this inspection, any floating or loose debris would be removed. This inspection would also note any degradation in the torus interior area. The inspection was last completed in April of 1995. (Reference OP 4115, "Primary Containment Surveillance," Surveillance test #8003).

#### Requested Action 5

Consider additional measures such as suppression pool water sampling and trending of pump suction pressure to detect clogging of ECCS suction strainers.

#### Vermont Yankee Response

As identified above, the RHR and CS pump suction pressures are documented during pump surveillance testing. Based on the concerns identified in this Bulletin, Vermont Yankee will trend the RHR pump suction pressures during the HPCI pump surveillance scheduled for December, 1995. During this surveillance, the RHR system is operated in the torus cooling mode. For this test, both loops of RHR (1 pump per loop) will be operated, monitored, and trended hourly using temporary monitoring devices with sufficient sensitivity and accuracy. Specific details of the test, monitoring devices and acceptance criteria are still being developed.

Additionally, Vermont Yankee has identified a potential means of obtaining water samples during this testing for trending purposes. The sample location is in the vicinity of the RHR 'B' loop suction strainer. A Temporary Modification and 10CFR50.59 review is required prior to implementation of this sampling method. Our preliminary investigation indicates that this is achievable.

This completes the summary actions taken and planned by Vermont Yankee in response to the actions requested within 30 days in NRC Bulletin 95-02 "Unexpected Clogging Of A Residual Heat Removal (RHR) Pump Strainer While Operating In Suppression Pool Cooling Mode."