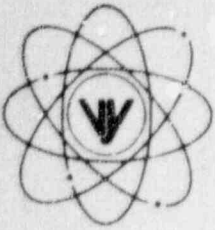


VERMONT YANKEE NUCLEAR POWER CORPORATION



Ferry Road, Braintree, VT 05301-0002

REPLY TO
ENGINEERING OFFICE

580 MAIN STREET
BOLTON, MA 01740
(508) 779-6711

January 30, 1995
BVY 95-13

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

References: See Attachment A

Subject: Submittal of Safety Evaluation Responses and Revised Program Plan for Vermont Yankee Nuclear Power Corporation Third-Interval Inservice Testing Program

With this letter, Vermont Yankee submits our responses to the items identified in the Safety Evaluation of the Inservice Test Program Relief Requests for Pumps and Valves as Attachment B. In addition, a copy of the revised Third-Interval IST Program Plan Revision 16 is provided as Attachment C. Included within the revised IST Program Plan is a new relief request RR-P10 Rev. 0 and a revised relief request RR-P01 Rev. 1. Since these relief requests require NRC approval prior to their implementation, it is requested that your review and approval be completed by June 1, 1995.

We trust that the enclosed information is satisfactory; however, should you so desire, we would be happy to meet with you to discuss any questions or comments which you may have.

Very truly yours,

VT YANKEE NUCLEAR POWER CORP.

James P. Pelletier
Vice President - Engineering

Attachments

cc: (with attachments)
USNRC Region I Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS

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ATTACHMENT A

REFERENCES

- (a) License No. DPR-28 (Docket No. 50-271)
- (b) Code of Federal Regulations, Title 10 Chapter 1, Part 50, Section 50.55a, 56 Fed. Reg. 4666, dated 08/06/92
- (c) ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (d) ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (e) ASME/ANSI Standard OMa-1988 Addenda to ASME/ANSI OM-1987, "Operation and Maintenance of Nuclear Power Plants"
- (f) Letter, Mr. P.M. Sears, USNRC, to Mr. L.A. Tremblay, VYNPC, "Vermont Yankee Nuclear Power Station, Approval of the Use of ASME/ANSI Standard OMa-1988 With Clarification," Nvy 92-161, dated 09/02/92
- (g) Letter, Mr. J.P. Pelletier, VYNPC, to Document Control Desk, USNRC, "Vermont Yankee Nuclear Power Corporation Inservice Testing Program Update," BVY 92-98, dated 08/13/92
- (h) Letter, Mr. V. Nerses, USNRC, to Mr. L.A. Tremblay, VYNPC, "Safety Evaluation - Inservice Testing (IST) Program Relief Requests - Vermont Yankee Nuclear Power Corporation, Vermont Yankee Nuclear Power Station (TAC No. M82229)," Nvy 92-79, dated 05/13/92
- (i) Letter, Mr. W.P. Murphy, VYNPC, to Document Control Desk, USNRC, "Response to USNRC Generic Letter 89-04: Guidance on Developing Acceptable Inservice Testing Programs", BVY 89-90, dated 10/03/89
- (j) Letter, Mr. S.A. Varga, USNRC, to All Holders of Light Water Reactor Operating Licenses and Construction Permits, "Guidance on Developing Acceptable Inservice Testing Programs (Generic Letter 89-04)", Nvy 89-75, dated 04/03/89
- (k) Letter, Mr. D.H. Dorman, USNRC to Mr. D.A. Reid, Safety Evaluation of the Inservice Test Program Relief Requests for Pumps and Valves, Vermont Yankee Nuclear Power Station (TAC No. M85067) dated, September 3, 1993.

ATTACHMENT B

RESPONSE TO USNRC SAFETY EVALUATION

1. Item:

TER Section 2.1.1, Anomaly No. 1

"P01 requests relief from establishing reference flow rate or differential pressure during testing for the SSW pump. The licensee proposes to determine differential pressure quarterly and compare it and a flow value that is obtained from comparing the calculated differential pressure to a computerized pump characteristic curve, to the requirements of Table 4-2 of the IST program. Flow rate will be measured each refueling outage and this measured flow will be evaluated against the calculated differential pressure and compared to the acceptance criteria of OM-6 and Table 4-2 of the IST program.

"Regarding determination of differential pressure; it is impractical to directly measure the differential pressure of these submerged pumps because there are no installed inlet pressure instruments. OM-6 does not require measurement of pump inlet pressure and allows differential pressure to be determined. Therefore, the proposal to determine differential pressure is consistent with the requirements of OM-6 provided that the calculations yield an acceptable level of accuracy.

"Regarding establishing reference flow rate or differential pressure; the SSW pumps supply a system consisting of multiple heat exchangers with automatic temperature control valves that independently modulate flow through each heat exchanger. It is impractical to control this type of system to allow repeatability of reference values. Testing these pumps in the "as found" condition and comparing values to an established reference curve may be an acceptable alternative. The following elements would enhance development or validation of reference pump curves for curve testing:

- "a. Curves are developed, or manufacturer's pump curves are validated, when the pumps are known to be operating acceptably.
- "b. The reference points used to develop or validate the curves are measured using instruments at least as accurate as required by the Code.
- "c. Curves are based on an adequate number of data points, with a minimum of five.
- "d. Points are beyond the "flat" position (low flow rates) of the curve in a range which includes or is as close as practicable to design basis flow rates.

- "e. Acceptance criteria based on the curves does not conflict with TS or Facility Safety Analysis Report operability criteria, for flow rate and differential pressure, for the affected pumps.
- "f. If vibration levels vary significantly over the range of pump conditions, a method for assigning appropriate vibration acceptance criteria should be developed for regions of the pump curve.
- "g. When the reference curve may have been affected by repair, replacement, or routine service, a new reference curve shall be determined or the previous curve revalidated by an inservice test.

"The licensee should follow the eight guidelines identified above for using reference curves, if practicable. Where it is not practicable to follow these guidelines, the licensee should identify the specifics of their alternative and justify the deviations and show the adequacy of their proposed testing.

"Regarding not measuring flow rate during quarterly testing; it is impractical to measure pump flow rates because there are no installed pump header flow instruments or test loops. The only practical quarterly test appears to be to determine differential pressure and measure vibration. Comparing the differential pressure to the values in Table 4-2 of the licensee's IST program may not permit detection of pump hydraulic degradation or require corrective actions for pumps with significant degradation. Therefore, the Code acceptance criteria should be used to evaluate the quarterly test data if practicable. Where it is not practicable to use the Code criteria, the licensee should identify the specifics of their alternatives and justify the deviations by showing the adequacy of the alternatives. In addition, the licensee should perform a study of the maintenance history of these pumps to determine if they are subject of frequent failures where the degradation has not been detected by the quarterly shutoff head testing. If these pumps are subject to such failures, the licensee should develop a test method capable of detecting degradation that can be performed more frequently than the proposed yearly pump flow test. (Refer to TER Section 2.1.1.1)"

Response:

Relief Request RR-P01 has been revised to more clearly define the testing alternatives for the Service Water Pumps.

Part 1 of this relief request dealt with the use of the pump intake structure water level to determine pump suction pressure and calculate pump differential pressure. It was determined in TER Section 2.1.1.1 that Code relief was not required provided that the calculation used to determine pump differential pressure was sufficiently accurate to meet the requirements of the Code. Relief from the code for measuring differential pressure has been deleted from revision 1 of this relief request.

Part 2 and 3 of this relief request dealt with the use of a computer generated head curve to calculate a pump flow rate on a refueling outage basis. It is was not the intention of Vermont Yankee to utilize a reference head curve to evaluate the proposed quarterly as-found test to the Code acceptance limits as indicated in Anomaly No. 1. The head curve was used to calculate pump flow based on the observed pump differential pressure. It was expected that this information could be used to analyze possible changes in pump performance of the service water pumps during the quarterly as-found test to the degree possible.

During each refueling outage, pump flow, differential pressure and vibration will be measured at a reference condition which will meet or exceed the required design conditions for the pump. A temporary flow test loop installed on the plant fire protection system will be utilized to directly measure pump flow. This will provide a mechanism to assess the hydraulic condition of the pump and to detect pump degradation against the code required limits. An additional reference condition will be established with the pump at a dead head condition where pump vibration and differential pressure can be measured for comparison to the code limits, in the event that maintenance is required to be performed between refueling outages.

A review of the operating history of these pumps has shown that they are highly reliable and have not been susceptible to frequent failures. In order to provide additional assurance of proper pump operation and mechanical condition, an enhanced maintenance/monitoring program for these pumps will be established which will include the following:

1. Service water pump motor amperage will be monitored on a once per shift frequency during periods when the pumps are in operation.
2. Full spectrum vibration signatures will be obtained and analyzed on a quarterly basis.
3. At least one service water pump will be disassembled, inspected and refurbished as required every operating cycle. Additionally, in no case shall a service water pump exceed a period of 4 cycles of operation without being partially disassembled, inspected and refurbished as required.

2. Item:

TER Section 2.5.1, Anomaly No. 2

"P07 requests relief from establishing reference flow rate or differential pressure during testing for the RBCCW pumps. The licensee proposes to measure as-found pump vibration, differential pressure, and flow rate during quarterly testing and to measure all Code parameters at a reference condition once a year. An adequate method has not been proposed for evaluating quarterly test data, therefore, the quarterly testing may not be capable of monitoring pump condition and detecting degradation. Where it is impractical to test at a reference point, pump testing at as-found conditions can be found to be acceptable if performed in a manner that allows an adequate assessment of pump condition. When reference conditions cannot be established, one means of evaluating pump condition is to compare measured test parameters to reference pump curves established or validated when the pump is known to be operating acceptably. If a reference curve is used to test these pumps it should be developed or validated in accordance with the guidelines given in Section 2.1.1.1.2 of the TER.

"Deferral of meaningful pump test until once every year may be found to be acceptable, however, insufficient information is provided to support using this test frequency. To determine the adequacy of a yearly test frequency, more information would be necessary about the pump failure rates, maintenance history, and types of degradation. In addition, more detailed information would be necessary about the yearly test and its ability to detect pump degradation. Interim relief should be granted from the Code for one year or until the end of the next refueling outage, whichever is longer. At the end of this interim period, the licensee should implement a test method that adequately evaluates the condition of these pumps quarterly or they should have submitted for approval technical basis demonstrating the adequacy of the proposed yearly testing. (Refer to TER Section 2.5.1.1)"

Response:

Relief request RR-P07 has been withdrawn in Revision 16 of the Vermont Yankee Inservice Test Program Plan. The RBCCW pumps are being tested in accordance with the Part 6 of the Code.

3. Item:

TER Section 2.6.1, Anomaly No. 3

"P09 requests relief from the flow rate measurement requirements for the diesel fuel oil transfer pumps. The licensee proposes to observe that each pump provides flow greater than is used by the operating EDG, measure pump discharge pressure, and perform full spectrum vibration analysis quarterly. In addition, once every operating cycle the licensee will determine flow rate by measuring the change in day tank level over time. The proposed quarterly testing verifies pump operation but provides little information to permit detection of hydraulic degradation. However, the testing performed once every cycle should permit detection of degradation provided the flow rate determination is sufficiently accurate. The licensee indicated that the accuracy of the flow rate determination would be comparable to the OM-6 accuracy requirements. It is assumed that the determination is as accurate as data that could be obtained from instruments meeting the Code requirements. If the determination is less accurate, the adequacy of the less accurate information should be justified in the IST program. Relief should be granted from the Code requirements. (Refer to TER Section 2.6.1.1)"

Response:

Relief request RR-P09 was granted as stated in TER Section 2.6.1.1. The level instrument used to measure the change in fuel oil day tank level meets the equivalent accuracy required for flow instruments in accordance with Part 6 of the Code.

4. Item:

TER Sections 3.1.1 and 3.2.1, Anomaly No. 4

"V01 and V10 request relief from the Code stroke time measurement requirements for the specified valves and propose to verify valve operational readiness by observing proper valve response during system testing. This test does not provide indication of valve condition or permit detection of degradation. Long term relief should not be granted for testing that is incapable of monitoring valve condition. Interim relief should be granted for one year or until the end of the next refueling outage, whichever is longer. The licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. This testing should be performed quarterly if practicable, however, if quarterly testing is impractical the alternate frequency should be justified in the IST program. This testing might involve non-intrusive diagnostic techniques such as acoustics, magnetics, ultrasonics, thermography, or radiography. If it is determined that it is impractical to use testing methods effectively, an enhanced maintenance program or periodic replacement may be acceptable. (Refer to TER Sections 3.1.1.1 and 3.2.1.1)"

Response:

Relief requests RR-V01 and RR-V10 have been withdrawn from revision 16 of the Vermont Yankee Inservice Test Program Plan. These valves shall be tested in accordance with Part 10 of the Code.

5. Item:**TER Section 3.10.1, Anomaly No. 5**

"V05 requests relief from the relief valve testing requirements of OM-1 for the main steam safety valves and dual function (ADS) relief valves. The licensee proposes to bench-check or replace 1/2 of the valves from both groups every refueling outage but resumption of power generation may begin prior to obtaining test as-found data and the sample size will not be expanded based on test failures. The licensee is testing or replacing more of these valves than required by the Code. This partially offsets the need for an increased test sample should a failure occur. However, the licensee's proposal would require no further testing even if all of the tested valves failed to function properly. Because of the possibility of common mode failures, the licensee's proposal to not perform additional testing based on test failures is not conservative and may not be warranted.

"Because of the history of low failure rates and the lack of common mode failures for these valves at Vermont Yankee and other nuclear facilities, the proposal should provide a reasonable level of quality and safety for an interim period. However, there is always the possibility of common mode failures. Therefore, for the upcoming refueling outage, if one of these valves fails a test, the licensee should expeditiously perform the required root cause analysis to determine if there could be a common mode or generic failure concern. If it is determined that the cause of the test failure is generic or common with the other group valves, the remaining valves should be immediately tested, even if this requires a plant shutdown. Relief should be granted from the Code requirement for an interim period until the refueling outage following the August 1993 refueling outage. In the interim, the licensee should assess the testing requirements for these valves. The assessment may include TS changes and Code inquiries. (Refer to TER Section 3.10.1.1)"

Response:

Relief request RR-V05 has been withdrawn in revision 16 of the Vermont Yankee Inservice Test Program Plan. These valves shall be tested in accordance with Part 1 of the Code.

6. Item:

TER Section 3.6.1, Anomaly No. 6

"V09 requests relief from the leak rate testing requirements of OM-10 for the RHR shutdown cooling suction and discharge header outboard containment isolation valves. The licensee proposes to verify valve leak tight closure capabilities by observing downstream pressure indication during power operation. Since there are two closed valves in series, observation of a downstream pressure instrument does not provide assurance that each series valve is leak-tight. Since the proposed testing does not verify the leak-tightness of the subject valves and leak rate testing them in accordance with the Code has not been shown to be impractical or to be an unusual hardship without a compensating increase in the level of quality and safety, long term relief should not be granted. Interim relief should be granted for one year or until the next refueling outage, whichever is longer. By the end of the interim period, the licensee should develop and implement procedures to leak rate test valves V10-17, -27A, and 27B in accordance with 4.2.2.3. (Refer to TER Section 3.6.1.1)"

Response:

Relief request RR-V09 has been withdrawn in revision 16 of the Vermont Yankee Inservice Test Program. These valves will be tested in accordance with the requirements of Part 10 of the Code.

7. Item:

TER Section 3.9.1, Anomaly No. 7

"Relief request V04 proposes to test the specified valve by disassembly, inspection. Disassembly and inspection is a maintenance procedure that provides much information about valve condition. However, due to hazards associated with this procedure, it should not be routinely used in lieu of testing if a test method is practicable. Some test method may be feasible to verify closure of this valve. The licensee should consider methods such as using non-intrusive techniques (e.g., acoustics, ultrasonics, magnetics, radiography, and thermography) to verify closure of the subject check valve. This testing may only be practical at cold shutdowns or refueling outages. The licensee should perform their investigation and if a test method is found to be practicable, the applicable valves should be tested instead of using disassembly and inspection. The licensee should respond to this concern within one year from receipt of this report. (Refer to TER 3.9.1.1)"

Response:

Vermont Yankee acknowledges the NRC's concern with disassembling and inspection technique of check valves in lieu of flow exercise testing. The use of non-intrusive testing techniques such as acoustics and magnetics has been evaluated and determined to be impractical for this valve. These non-intrusive testing techniques require the establishment of substantial flow to monitor valve condition. This valve is located in the oil fill line of the fuel oil storage tank. This valve is normally closed during plant operation. Flow is only introduced through the fill line when the fuel oil tank is required to be filled and when flow is recirculated to the tank. The safety function of this valve is to remain closed to act as a boundary between the Safety Class 3 and NNS portions of the fill line and tank. Relief request RR-V04 has been withdrawn from revision 16 of the Vermont Yankee Inservice Test Program. This valve will be disassembled and inspected in accordance with section 4.3.2.4(c) of Part 10 of the Code.

ATTACHMENT C

VERMONT YANKEE THIRD-INTERVAL INSERVICE TESTING PROGRAM PLAN

REVISION 16

Relief Request Status Summary:

Pump IST Program Plan:

<u>Relief Request No.</u>	<u>Status</u>
RR-P01, Rev. 1	Interim Relief Approved (TER Section 2.1.1.1) Awaiting Approval of Revised Relief Request (Rev.16)
RR-P02, Rev. 0	Relief Request Approved (TER Section 2.2.1.1)
RR-P03, Rev. 0	Relief Request Approved (TER Section 2.2.2.1)
RR-P04, Rev. 0	Relief Request Approved (TER Section 2.2.3.1)
RR-P05, Rev. 0	Relief Request Approved (TER Section 2.3.1.1)
RR-P06, Rev. 0	Relief Request Approved (TER Section 2.4.1.1)
RR-P07, Rev. 0	Relief Request Withdrawn (Rev.16)
RR-P08, Rev. 0	Relief Request Approved (TER Section 2.5.2.1)
RR-P09, Rev. 0	Relief Request Approved (TER Section 2.6.1.1)
RR-P10, Rev. 0	Awaiting USNRC Approval (Rev. 16)

Valve IST Program Plan.

<u>Relief Request No.</u>	<u>Status</u>
RR-V01, Rev. 1	Relief Request Withdrawn (Rev.16)
RR-V02, Rev. 1	Relief Request Withdrawn (Rev. 16)
RR-V03, Rev. 1	Relief Request Approved (TER Section 3.8.1.1)
RR-V04, Rev. 1	Relief Request Withdrawn (Rev. 16)
RR-V05, Rev. 1	Relief Request Withdrawn (Rev. 16)
RR-V06, Rev. 0	Relief Request Approved (TER Section 3.3.1.1)
RR-V07, Rev. 2	Relief Request Withdrawn (Rev. 15). Refer to ROJ-V12.
RR-V08, Rev. 0	Relief Request Approved (TER Section 3.5.1.1)
RR-V09, Rev. 1	Relief Request Withdrawn (Rev.16)
RR-V10, Rev. 0	Relief Request Withdrawn (Rev.16)
RR-V11, Rev. 0	Relief Request Approved (TER Section 3.7.1.1)