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BVY 07-071

U.S. Nuclear Regulatory Commission
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References:
1) Letter, Entergy Nuclear Operations, Inc. to USNRC, "Relief Request No. ISI-PT-01, Alternate Pressure Testing for Buried Piping Components, Fourth Inservice Inspection (ISI) Interval," BVY 07-017, dated April 20, 2007
2) Letter, Entergy Nuclear Operations, Inc. to USNRC, "License Renewal Application," and enclosed Appendix B, "Aging Management Programs and Activities," BVY 06-009, January 25, 2006

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
Re-submittal of Relief Request No. ISI-PT-01, Alternate Testing for Buried Piping Components, Fourth Inservice Inspection (ISI) Interval

Pursuant to 10 CFR 50.55a(g)(5)(iii), Entergy Nuclear Operations, Inc. (Entergy) hereby requests relief from certain Inservice Inspection Program requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 1998 Edition with 2000 Addenda, for the Vermont Yankee Nuclear Power Station (VY). This request is a re-submittal of Relief Request No. ISI-PT-01 (originally submitted with Reference 1) in response to questions from the staff technical reviewer.

In accordance with the requirements of 10CFR50.55a(g)(5)(iii), if a licensee determines that conformance to certain ASME Code requirements is impractical for the facility, the licensee shall notify the Commission and submit, as specified in 10CFR50.4, information to support the determination. The attached Relief Request (RR) No. ISI-PT-01 requests relief from specific ASME Section XI requirements for inservice pressure tests that are considered impractical. RR ISI-PT-01 shall apply for the remaining duration of the Fourth ISI Interval.

There are no new regulatory commitments contained within this letter.

If there are any questions regarding this submittal, please contact Mr. David Mannai at (802) 258-5422.

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NRR

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 18th day of October, 2007

Sincerely,

Ted A. Sullivan
Site Vice President
Vermont Yankee Nuclear Power Station

Attachment

cc: Mr. Samuel J. Collins
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Attachment 1

Vermont Yankee Nuclear Power Station

Relief Request No. ISI-PT-01

Alternate Testing for Buried Piping Components
Fourth Inservice Inspection Interval

Relief Request No. ISI-PT-01
Alternate Testing for Buried Piping Components
Fourth Inservice Inspection Interval

Proposed Alternative in Accordance with 10 CFR 50.55a(g)(5)(iii)
Inservice Inspection Impracticality

1. ASME Code Component(s) Affected

Code Classes:	3
Examination Categories:	D-B
Item Numbers:	D2.10
Component Numbers:	Buried Class 3 Pressure Retaining Components Subject to System Pressure Testing in the Service Water System

2. Applicable Code Edition and Addenda

ASME Code Section XI, 1998 Edition with 2000 Addenda

3. Applicable Code Requirement

IWA-5244(b)(1)

Article IWA-5000, "System Pressure Tests," Sub-subarticle 5240, "Visual Examination," Paragraph IWA-5244, "Buried Components," states:

(b) For buried components where a VT-2 visual examination cannot be performed, the examination requirement is satisfied by the following:

(1) The system pressure test for buried components that are isolable by means of valves shall consist of a test that determines the rate of pressure loss. Alternatively, the test may determine the change in flow between the ends of the buried components. The acceptable rate of pressure loss or flow shall be established by the Owner.

4. Impracticability of Compliance

A. Pursuant to 10CFR50.55a, "Codes and Standards," Paragraph (g)(5)(iii), relief is requested from the requirements of ASME Code Section XI, 1998 Edition with 2000 Addenda, IWA-5244(b)(1), because the isolation valves are not capable of performing a sufficiently leak-tight pressure isolation function for the purpose of this test.

1. Service Water System

a. The Service Water (SW) System consists of two redundant headers supplying cooling water to safety-related components (e.g., two Residual Heat Removal Service Water trains, two Reactor Equipment Cooling heat exchangers, two Emergency Diesel Generators, two Standby Fuel Pool Cooling trains, and

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miscellaneous Reactor Building cooled loads) and non-safety related components (e.g., turbine lube oil coolers, generator hydrogen cooler, and miscellaneous Turbine Building cooled loads). Each redundant Service Water header is cross-connected on the header inlets and outlets.

b. For the buried portion of the redundant SW supply headers, isolation valves are installed in the system. These valves are located in the Intake Structure building and the Reactor Building. The three main valves that isolate each header are large (20" and 24" NPS) gate valves that are not capable of performing a sufficiently leak-tight pressure isolation function without upgrade or modification. These valves were not required by the original Procurement Specification to be leak-tight and would therefore provide multiple leakage paths that would make it difficult to differentiate between through-wall leakage and seat leakage via pressure loss testing. Additionally, the operating header pressure can not be removed from the isolation valves serving as the boundary for the header being tested (i.e., the valves can not be placed in leak-off to relieve system pressure from the back side of the valve seats and facilitate sealing under test pressure).

2. Alternate Cooling System

   a. The Alternate Cooling System (ACS) mode of the Service Water System provides an alternate decay heat removal process if the Service Water Intake Structure, the Service Water pumps, or the Vernon Pond on the Connecticut River (the ultimate heat-sink) become unavailable.

      1. The ACS uses a buried suction header from safety-related Cooling Tower cell CT-2-1 to supply either train of the Residual Heat Removal Service Water System (RHRSW). The RHRSW pumps provide cooling for the two Emergency Diesel Generators, a Residual Heat Removal train, Standby Spent Fuel Pool Cooling trains, and miscellaneous Reactor Building cooled loads. This header is normally isolated and periodically checked and treated with biocide to limit the formation of micro-biologically induced corrosion.

      2. The return of water to the Cooling Tower via the buried return header is accomplished by isolating the normal Service Water discharge to the Vernon Pond and opening valves near cell CT-2-1, thereby diverting flow to that cell. Pressure testing of the buried ACS return piping that is upstream of the Cooling Tower isolation valves and communicates directly with the Service Water discharge header would require isolation of a major portion of that header, resulting in shutdown of both RHRSW trains and removal of the safety-related Service Water supply to both Emergency Diesel Generators and both Fuel Pools Cooling heat exchangers, as well as a number of non-safety-related loads.

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b. For the buried portion of the ACS, isolation valves are installed in the system. These valves are located in the Reactor Building and in a piping man-way near the safety-related cell of the Cooling Tower system. The two main isolation valves for the ACS suction piping are large (24" NPS) gate valves. The ACS return piping isolation valves include six large (20", 12" and 10" NPS) gate valves, three large (8" NPS) butterfly valves and numerous smaller isolation valves. Due to their size and type, the larger valves are not capable of performing a sufficiently leak-tight pressure isolation function without upgrade or modification, and would therefore provide multiple leakage paths that would make it difficult to differentiate between through-wall leakage and seat leakage via pressure loss testing. Additionally, the Service Water System operating pressure can not be removed from the isolation valves serving as the test boundary in the suction and return piping (i.e., the valves can not be placed in leak-off to relieve system pressure from the back side of the valve seats and facilitate sealing under test pressure).

B. IWA-5244(b)(1) also allows for test by determining the change in flow between the ends of the buried components. No flow instrumentation is installed in the systems. Accurate flow measurements using temporary flow instrumentation such as ultrasonic flow meters are not possible due to insufficient runs (i.e., specified pipe diameters) of straight pipe on each side of the accessible meter locations.

5. <u>Burden Caused by Compliance</u>

A. Leakage testing of the buried portion of the Service Water redundant supply headers to determine the rate of pressure loss would require upgrade or modification of the isolation valves. As a minimum, that effort would involve refurbishing or altering the seating area of the valves. This would consist of either in-situ machining or removal from the system for re-machining at a valve facility, and may not provide conclusive test results when completed. Isolation valve replacement would be similarly impracticable and a hardship due to cost.

B. Leakage testing of the buried ACS suction and return headers to determine the rate of pressure loss would require upgrade or modification of the isolation valves. As a minimum, that effort would involve refurbishing or altering the seating area of the valves. This would consist of either in-situ machining or removal from the system for re-machining at a valve facility, and may not provide conclusive test results when completed. Isolation valve replacement would be similarly impracticable and a hardship due to cost.

C. The installation of permanent flow instruments to implement the alternative flow measurement provisions of IWA-5244(b)(1) would require significant system modifications. The cost of these modifications is not justifiable when weighed against

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the benefits. The following proposed alternative would provide reasonable assurance that any significant through-wall leakage from the buried piping will be detected.

6. Proposed Alternative and Basis for Use

In lieu of performing a system pressure test or an alternative flow test in accordance with IWA-5244(b)(1), Vermont Yankee will use the following alternative program of internal visual inspections and continuous monitoring to ensure that any significant through-wall leakage from the buried portions of this piping does not remain undetected.

Primary Alternate Test Method for Service Water and Alternate Cooling System Piping:

Both the Service Water System and the ACS sub-system will be subjected to an internal inspection program to visually examine the buried piping in accordance with Vermont Yankee's License Renewal Aging Management Program, as stipulated in Reference 2). The program will use a remotely controlled crawler-mounted camera for visual inspection of the piping interior by qualified individuals. Approximately 95% of the piping will be available for inspection in this manner. One common segment must remain in service under all modes of operation, and one short (~10 foot) vertical run is not amenable to robotic inspection using current technology. These sections will be subjected to the supplemental verifications described below.

The initial inspection will be completed no later than the end of the Fourth ISI Interval. This activity will have an initial periodicity of once every ten years, but the frequency may be increased if conditions warrant, and inspections will continue through the period of extended operation (i.e., through the Fifth and Sixth Ten-Year Intervals). Relief to use the interior inspection method in lieu of a pressure loss test or alternative flow test will be requested during those intervals, if testing is still specified by the Code of Record.

Supplemental Alternate Verification Methods for Service Water Piping:

In addition to this inspection program, the Service Water System instrumentation at Vermont Yankee continuously monitors the buried header piping for through-wall leakage by two independent methods. Using these methods, plant operators can determine if a header pressure drop has occurred that would indicate a pressure boundary failure and take compensatory actions such as isolation of that section of piping.

During on-line operation and plant shutdown there are typically no abrupt changes in cooling water flow since there are no routine automatic component activations that would rapidly increase the demand for cooling water. Increases in demand associated with planned operation of the Emergency Diesel Generators or the Residual Heat Removal Service Water sub-systems are compensated for by manually starting an additional Service Water pump.

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The normal cooling loads on the safety-related and non-safety-related sub-systems of the Service Water System remain relatively constant. The Service Water System typically operates with less than four pumps running. In this condition, at least one pump is placed in standby operation to immediately support any unanticipated increase in cooling water demand. When safety-related sub-system header pressure decreases to 90 psi (as sensed at the discharge of the Service Water pumps at the Intake Structure) the standby pump will auto-start to provide compensating flow. The auto-start of the standby pump alarms in the Control Room to alert operators of the increased flow demand and the pump start. The buried header piping that extends from the Intake Structure to the Reactor Building is fully redundant and each header is provided with individual pressure instrumentation in the Control Room. Therefore, this auto-start feature continuously monitors for header pressure loss that could be indicative of large breaks in the buried piping between the Intake Structure and the Reactor Building.

Concurrently, if operating pressure in the safety-related sub-system headers decreases, the connected non-safety-related sub-system header pressure will also decrease. If the non-safety-related sub-system header pressure decreases to 87 psig independently of the safety-related header pressure, a timer is activated to auto-isolate the non-safety-related sub-system after three minutes. The timer activation is alarmed in the Control Room to alert operators of the potential auto-isolation and the need to start a Service Water pump if the standby pump does not auto-start. This isolation delay allows the operators to recover the header pressure through operation of an additional Service Water pump. After three minutes, if the header pressure is not recovered, the non-safety-related sub-system isolates to preserve the cooling water supply to the safety-related sub-system. The non-safety-related sub-system also has pressure instrumentation in the Control Room to allow operators to monitor header pressure and take appropriate compensatory actions.

Supplemental Alternate Verification Methods for Alternate Cooling System Piping:

The ACS sub-system was tested during Refueling Outage 26 (Spring of 2007) to verify adequate system performance. The test demonstrated that the RHRSW pumps, the ACS suction and return headers, and the SW valves used to facilitate the ACS sub-system mode of operation could meet the design and functional requirements for supply of adequate component cooling. Had significant pipe leakage been present, the sub-system would not have been capable of meeting the acceptance criteria.

During normal station operation, the buried ACS sub-system suction piping from the designated Cooling Tower cell (CT-2-1) is placed in a standby, wet lay-up condition and is treated with an anti-fouling agent. This treated piping is periodically sampled to ensure that an adequate concentration of the anti-fouling agent remains. A reduction in concentration could indicate a leak in the piping header causing a concurrent dilution of the agent by Service Water system make-up. A significant reduction would require action under the station's Corrective Action Program to determine the cause of the reduction. Soil subsidence resulting from any significant pressure-boundary breach would also be observable by roving operators during normal rounds.

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During the warm season, the ACS sub-system return piping to the CT-2-1 cell is dead-headed. Since this header is parallel to the normal Service Water discharge outflow and only experiences flow during the winter months as described below, only soil subsidence observations can be employed when it is not in operation. The piping header is routed under an area that is heavily trafficked by station personnel in the course of daily business, which would provide a detection capability in addition to normal operator rounds.

During the cold season, the outflow of the Service Water system is directed via the ACS sub-system return header to the CT-2-1 cell basin in order to maintain the basin warm and available for the ACS mode of operation, if required. The flow is then discharged to the river. If a break occurs in the buried portion of this piping, the level and temperature in the CT-2-1 cell basin would decrease. This condition would be apparent to operators, both in the Control Room and during roving operator rounds.

7. Duration of Proposed Alternative

These proposed alternatives will be used for the remaining duration of the fourth ten-year interval for the VY ISI program.

8. Precedents

Similar relief requests were granted to Cooper Nuclear Station (TAC NO. MD 0286), and Byron Station Units 1 and 2 and Braidwood Station Units 1 and 2 (TAC NOs. MD 1757, MD 1758, MD 1759 and MD 1760). These precedents are cited to support the Impracticability of Compliance statements for the requested relief (inability to sufficiently isolate the systems using installed isolation valves); however, the alternative testing methodologies approved by the NRC in those cases cannot be duplicated at Vermont Yankee due to existing design configuration and system capability limitations, and are not being proposed for use.