



Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360

October 21, 2015

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Request for Approval of Pilgrim Relief Request (PRR)-52, "Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2) Pressure Testing of Mechanical Joints as a Result of Performance of a Repair/Replacement Activity and Use of Code Case N-795"

Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
Docket No.: 50-293
License No.: DPR-35

LETTER NUMBER: 2.15.074

Dear Sir or Madam:

Pursuant to 10 Code of Federal Regulations (CFR) 50.55a(z)(2), Pilgrim Nuclear Power Station (PNPS) hereby requests an alternative to specific portions of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for In-service Inspection of Nuclear Power Plant Components," on the basis that the proposed alternative provides an acceptable level of quality and safety. The request is summarized below. More specific details are provided in Attachment 1.

For the Fifth 10-Year Inspection Interval, Entergy is required to update the PNPS 120-month (10-Year Interval) Inservice Inspection Program in accordance with 10 CFR 50.55a(g)(4) with the latest Section XI Edition and Addenda incorporated by reference in 10 CFR 50.55a(a)(1)(ii) which is the Section XI, 2007 Edition with the 2008 Addenda of the ASME Boiler and Pressure Vessel Code, (Code of Record). Section XI repair/replacement, pressure testing and nondestructive testing activities at PNPS are being maintained to the 2001 Edition through the 2003 Addenda for the Fifth 10-Year Interval until December 31, 2017 using Alternative Request PRR-26, which was NRC approved on June 19, 2015 (TAC NO. ME5432). As such, 10 CFR 50.55a(b)(2)(xxvi) requires the use of the IWA-4540(c) of the 1998 Edition for pressure testing of Class 1, 2, and 3 mechanical joints when using the 2001 Edition through the latest edition and addenda incorporated by reference in 10 CFR 50.55a(a)(1)(ii).

The Section XI applicability for Code Case N-795 begins with the 1999 Addenda and includes applicability to the 2013 Edition. Thus, the 1998 Edition specified in the condition of 10 CFR 50.55a(b)(2)(xxvi) is not included in the published applicability of this code case. Since the code case is applicable only to Class 1 components, PNPS compared the Class 1 system leakage test pressure requirements of IWB-5221(a) from the 1998 Edition with IWB-5221(a) of the 2001 Edition with the 2003 Addenda and has determined they are compatible when the nominal operating pressure has been defined specifically for PNPS as 1035 psig as described above for the Reactor Coolant Pressure Boundary. Therefore, PNPS believes that Code Case N-795 can

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be used for the NRC condition found in 10 CFR 50.55a(b)(2)(xxvi) when pressure testing Class 1 mechanical joints following repair/replacement activities.

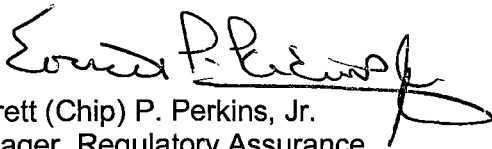
This alternative request is being submitted for authorization because the current Entergy fleet procedures that implement ASME Section XI at PNPS will not be updated from the 2001 Edition through the 2003 Addenda until after December 31, 2017.

Pursuant to 10 CFR 50.55a(z)(2), PNPS requests approval to implement an alternative to ASME Section XI, IWA-4540(c) for pressure testing of Class 1 components. See Attachment 1 for additional details.

There are no new commitments included in this document.

If you have questions concerning this letter, please contact me at 508-830-8323.

Sincerely,



Everett (Chip) P. Perkins, Jr.
Manager, Regulatory Assurance

EPP/mw

Attachment: 1. Pilgrim Nuclear Power Station 10 CFR 50.55a Request No. PRR-52, "Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2) Pressure Testing of Mechanical Joints as a Result of Performance of a Repair/Replacement Activity and Use of Code Case N-795" (7 Pages)

cc: Mr. Daniel H. Dorman
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
2100 Renaissance Blvd., Suite 100
King of Prussia, PA 19406-2713

Ms. Booma Venkataraman, Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop O-8C2A
Washington, DC 20555

USNRC Senior Resident Inspector
Pilgrim Nuclear Power Station

ATTACHMENT 1

TO

LETTER 2.15.074

**Pilgrim Nuclear Power Station 10 CFR 50.55a Request No. PRR-52,
"Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2) Pressure Testing of
Mechanical Joints as a Result of Performance of a Repair/Replacement Activity and Use
of Code Case N-795"**

(7 Pages)

Pilgrim Nuclear Power Station
10 CFR 50.55a Request No. PRR-52,
"Proposed Alternative in Accordance With 10 CFR 50.55a(z)(2)
Pressure Testing of Mechanical Joints as a Result of Performance of a
Repair/Replacement Activity and Use of Code Case N-795"

1. ASME Code Component(s) Affected

Code Class:	1
Component Numbers:	Not Applicable
Code References:	IWB-5221(a)
Examination Category:	Not Applicable
Item Number(s):	Not Applicable
Description:	Alternative to ASME Section XI, IWB-5221(a) and use of Code Case N-795
Unit/Inspection Interval:	Pilgrim / Fifth 10-Year Interval July 1, 2015 – June 30, 2025

2. Applicable Code Requirement

10 Code of Federal Regulations (CFR) 50.55a(b)(2)(xxvi) Section XI Condition: requires the use of the IWA-4540(c) of the 1998 Edition for pressure testing of Class 1, 2 and 3 mechanical joints when using the 2001 Edition through the latest edition and addenda incorporated by reference in 10 CFR 50.55a(a)(1)(ii).

For the Fifth 10-Year Interval Entergy is required to update the Pilgrim Nuclear Power Station (PNPS) 120-month (10-Year Interval) Inservice Inspection (ISI) Program in accordance with 10 CFR 50.55a(g)(4) with the latest Section XI Edition and Addenda incorporated by reference in 10 CFR 50.55a(a)(1)(ii). In lieu of the latest edition and addenda incorporated by reference in 10 CFR 50.55a(a)(1)(ii), which is the Section XI, 2007 Edition with the 2008 Addenda, the American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code (Code of Record) for Section XI Pressure Testing Activities. PNPS is maintained to the 2001 Edition through the 2003 Addenda for the Fifth 10-Year Interval until December 31, 2017 per authorization of Alternative Request PRR-26, Reference 1. The supporting requirements for pressure testing detailed in PRR-26 will be used along with modified requirements in Code Case N-795, Reference 2, which is not currently listed in Regulatory Guide 1.147, Rev. 17.

The 1998 Edition of ASME Section XI, IWA-4540(c) states: "Mechanical joints made in installation of pressure retaining items shall be pressure tested in accordance with IWA-5211(a). Mechanical joints for component connections, piping, tubing (except heat

exchanger tubing), valves, and fittings, NPS-1 and smaller, are exempt from the pressure test." PNPS understands that this means a pressure test is required for a mechanical joint when a new valve or flange greater than NPS-1 is installed as part of the repair/replacement activity and does not include those items covered by IWA-4132 "Items Rotated From Stock."

Note that the 1998 Edition, IWA-5211(a) states "a system leakage test conducted during operation at nominal operating pressure, or when pressurized to nominal operating pressure and temperature." PNPS has defined this to be 1035 psig for components within the Reactor Coolant Pressure Boundary (RCPB) and this also represents the pressure corresponding to 100% rated reactor power.

The Section XI applicability for Code Case N-795, Reference 2, begins with the 1999 Addenda and includes applicability to the 2013 Edition. Thus, the 1998 Edition specified in the condition of 10 CFR 50.55a(b)(2)(xxvi) is not included in the published applicability of this code case. Since the code case is applicable only to Class 1 components, PNPS compared the Class 1 system leakage test pressure requirements of IWB-5221(a) from the 1998 Edition with IWB-5221(a) of the 2001 Edition with the 2003 Addenda and has determined they are compatible when the nominal operating pressure has been defined specifically for PNPS as 1035 psig as described above for the RCPB. Therefore, PNPS believes that Code Case N-795, Reference 2, can be used for the NRC condition found in 10 CFR 50.55a(b)(2)(xxvi) when pressure testing Class 1 mechanical joints following repair/replacement activities.

Welded or Brazed Joints: ASME Section XI, 2001 Edition through the 2003 Addenda, IWA-4540(a) states: "Unless exempted by IWA-4540(b), repair/replacement activities performed by welding or brazing on pressure-retaining boundary shall include a hydrostatic or system leakage test in accordance with IWA-5000, prior to, or as part of, returning to service. Only brazed joints and welds made in the course of a repair/replacement activity require pressurization and VT-2 visual examination during the test."

Pressure Testing Requirements: The 2001 Edition through the 2003 Addenda, IWB-5221(a) states: "The system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power."

3. Reason for Request

At the PNPS, Class 1 pressure tests for repair/replacement activities in accordance with IWA-4540 at pressures corresponding to 100% rated reactor power when performed after Table IWA-2500-1, Category B-P testing has been completed, requires abnormal plant conditions/alignments. Testing at these abnormal plant conditions/alignments results in additional risks and delays while providing little added benefit beyond tests which could be performed at slightly reduced pressures under normal plant conditions.

Code Case N-795, Reference 2, is intended to provide alternative test pressure for certain Class 1 pressure tests. The code case would be used following repair/replacement

activities (excluding those on the reactor vessel) which occur subsequent to the periodic Class 1 pressure test required by Table IWB-2500-1, Category B-P and prior to the next refueling outage on those components that cannot be isolated. Components which can be isolated will be pressure tested at a pressure in accordance with IWB- 5221(a).

Performance of the Category B-P pressure test each refueling outage places PNPS in a position of reduced operating margin with respect to plant Technical Specification Pressure Temperature Curves and a Low Temperature Over Pressure (LTOP) condition. With strict operational control procedures, specific component alignment and operations staff training regarding LTOP, this may be considered acceptable to be at this reduced margin condition for the purpose of verifying the leakage status/integrity of the primary system in order to meet the ASME Section XI, Category B-P requirements prior to startup from a refueling outage. However, to perform this evolution more frequently would increase the overall risks to the plant.

4. Proposed Alternative and Basis for Use

Proposed Alternative

Pursuant to 10 CFR 50.55a(z)(2), this alternative request is being submitted for authorization because compliance with the specified requirements as described in this request would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

PNPS proposes to perform the system leakage testing and associated VT-2 examination following repair/replacement activities on those components that cannot be isolated in accordance with Code Case N-795, Reference 2, however using a longer hold time than specified in the code case. The system leakage test will be performed during the normal operational start-up sequence at a minimum of 900 psig (87% of the pressure required by IWB-5221(a) following a one hour hold time (for noninsulated components) and an eight hour hold time (for insulated components) in lieu of the nominal operating pressure associated with 100% reactor power of approximately 1035 psig. Note that this code case is not applicable to Class 1 pressure tests performed to satisfy the periodic requirement of Table IWB-2500-1, Category B-P and is not applicable to pressure tests required following repair/replacement activities on the reactor vessel. PNPS will continue to conduct the periodic system leakage tests required by IWB-2500-1, Category B-P at the end of each refueling outage at a pressure corresponding to 100% rated reactor power.

Basis for Use

By the end of a normal refueling outage the core decay heat has had time to decrease and some spent fuel has been removed and some new fuel has been added. The result is a much lower decay heat load and much lower heatup rates. At the end of a normal refueling outage, the rate of temperature increase is tolerated during the system leakage test. During normal performance of this system leakage test, the pressurization phase

of the test is taken at a slow and very controlled pace. The pressurization phase normally takes several hours to reach test conditions.

However, following a maintenance or forced outage, there is a much larger decay heat load from the reactor core. Once Shutdown Cooling (SDC) is removed from service, heatup starts immediately and control of the heat load is challenged. During a short term mid-cycle shutdown, the core does have a large decay heat load with projected heatup rates in the order of 0.5°F per minute. Under those conditions, the time available to pressurize up to test conditions, perform the VT-2 exam and return to SDC will be greatly reduced. The shorter time frames may create a more error-likely environment. Considering only the actions of isolating SDC from the vessel under high decay heat loads, there is some inherent risk. There would be some probability that once isolated, mechanical, control or operational problems could occur which could delay return to SDC.

The required VT-2 examinations performed following repair/replacement activities are limited to the areas affected by the work, thereby allowing for a focused exam. The VT-2 exams, therefore, have a much smaller examination boundary than the periodic test.

Indication of leakage identified through the VT-2 examinations during a test at either the 100% rated reactor power level or at 87% of that value will not be significantly different between the two tests. Higher pressure under the otherwise same conditions will produce a higher flow rate but the difference is not significant. Code Case N-795, Reference 2, proposes increased hold times, as compared to a test performed at normal operating pressure, to allow for more leakage from the pressure boundary if a through-wall or mechanical joint leakage condition exists. Further, PNPS proposes to implement longer hold times than specified by the code case. PNPS believes these longer hold times are justified to allow for additional leakage to accumulate at the area of interest so as to be more evident during the VT-2 examination, should a through-wall or mechanical joint leakage condition exist. This alternate test pressure, when combined with longer hold times, is still adequate to provide evidence of leakage, should a leak exist.

With respect to using the alternative requirements of Code Case N-795, Reference 2, to welded repair/replacement activities, the ASME concluded during the development of Code Case N-416, "Alternative Pressure Test Requirements for Welded or Brazed Repair, Fabrication Welds or Brazed Joints for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding or Brazing, Classes 1, 2, and 3" and Code Case N-498, "Alternative Requirements for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems," that the hydrostatic test (a test using pressure higher than a system leakage test) was not a structural integrity test, but a leakage test. The fact that the hydrostatic test does not verify structural integrity served as the basis for replacing it with a system leakage test. Both code cases are approved by the NRC in Regulatory Guide 1.147. It is the requirements of the construction code including the construction code nondestructive examinations used for the repair/replacement activity that ensure structural integrity of the pressure boundary and its welded or brazed connections. Based on research performed by ASME, the effect of testing at a pressure that corresponds with 87%

of rated power verses 100% of rated power is not reduced validation of structural integrity, but a potential leakage rate reduction. Therefore, PNPS believes that the alternative requirements of Code Case N-795, Reference 2, on welded or brazed repair/replacement activities are acceptable.

Research described in a White Paper developed for the Section XI Special Working Group on Pressure Testing, Reference 3 and by Argonne National Laboratory, as commissioned by the NRC, indicates that the relationship of leakage and pressure is relatively linear. Therefore, leakage rates associated with pressure at 87% of normal operating pressure would be approximately 13% less than a leakage rate at 100% of normal operating pressure. However, any reduction in leakage rate is more than compensated for by the increase in hold time (600% for noninsulated and 200% for insulated). Other research cited in the White Paper supports the conclusions of Argonne National Laboratory.

While PNPS does not expect that leakage will occur, any leakage will be related to the differential pressure at the point of leakage, or across the connection. A 13% reduction in the test pressure is not expected to result in the arrest of a leak that would occur at nominal operating pressure. In the unlikely event that leakage would occur subsequent to the VT-2 examination, at higher pressures associated with 100% rated reactor power, leakage would be detected by the drywell monitoring systems, which include drywell pressure monitoring, the Containment Atmosphere Monitoring system and the drywell floor drain sumps. Leakage monitoring is required by Technical Specifications.

Code Case N-795, Reference 2 and the PNPS proposed hold times allows for an adequate pressure test to be performed; ensuring the safety margin is not reduced due to VT-2 examination being performed at the slightly reduced pressure. There is no physical benefit withheld by testing at the slightly reduced pressure. The affected pressure boundary will be tested and will be otherwise fully capable of performing its intended safety function as part of the RCPB.

The use of Code Case N-795, Reference 2, will only be applied if the System Leakage Test required by IWB- 2500-1, Category B-P has been completed for the cycle on components that cannot be isolated and will not be implemented for any repair/replacement activity performed on the reactor pressure vessel.

PNPS submitted a similar request prior to the development and publication of Code Case N-795 that was authorized for use during the Fourth 10-Year Interval, Reference 4. The request was to allow the use of reduced pressure during a system leakage test that would be used on components following repair/replacement activities. This reference is only provided to identify that the concept of allowing a leakage test to be performed at lower pressures is not new and has been authorized prior to Code Case N-795 availability.

In summary, the proposed alternative is to perform the system leakage test and VT-2 examination in accordance with Code Case N-795, Reference 2, at 900 psig with a *minimum hold time of one hour for uninsulated components and an eight hour hold time for*

insulated components during maintenance, forced outages or following the performance of the periodic pressure test required by Table IWB-2500-1, Category B-P during refueling outages. The provisions of this alternative are not applicable to the Examination Category B-P pressure test performed during refueling outages or to pressure tests of repair/replacement activities of the reactor pressure vessel or components that can be isolated. Considering the discussion above, PNPS believes that this alternative will provide an acceptable verification of the leak integrity of the locations having repair/replacement activities performed without putting the plant in a non-conservative operational condition and without unnecessary radiation exposure and safety challenges to personnel.

5. Duration of Proposed Alternative

This request will apply to a portion of the Fifth 10-Year Interval, which starts on July 1, 2015 and will continue to December 31, 2017, which coincides with the proposed duration of the Alternative Request PRR-26, Reference 1.

6. Precedents

NRC Safety Evaluation, "Susquehanna Steam Electric Station Units 1 and 2 – Relief Requests for the Fourth 10-Year Inservice Inspection Interval, (TAC NOS. MF2705, through MF2714)," dated June 9, 2014 [ADAMS Accession No. ML14141A073]

NRC Safety Evaluation, "Columbia Generating Station – Relief Request 3ISI-12, Proposed Alternative Using Code Case N-795, (TAC NO. MF0319)," dated August 9, 2013 [ADAMS Accession No. ML13191A054]

NRC Safety Evaluation, "Monticello Nuclear Generating Plant – Relief from the Requirements of the American Society of Mechanical Engineers Code for the Fifth 10-Year Inservice Inspection Program Interval, (TAC NOS. ME8068, ME8070 and ME8071)," dated February 26, 2013 [ADAMS Accession No. ML13035A158]

7. References

1. NRC Letter to Entergy, Pilgrim Nuclear Power Station Re: Request for Alternative (PRR)-26, Fifth 10-Year Inservice Inspection Interval (TAC No. ME5432), dated June 19, 2015 [ADAMS Accession No. ML15166A401]
2. Code Case N-795, "Alternative Requirements for BWR Class 1 System Leakage Test Pressure Following Repair/Replacement Activities Section XI, Division 1," Approved by ASME on September 17, 2010, in the 2010 Edition of the ASME Code, Code Cases Nuclear Components Book, ASME Code Applicability, from the 1998 Edition with the 1999 Addenda and up to and including the 2013 Edition

3. White Paper, "Inservice Inspection Pressure Testing in Class 1, 2 and 3 Systems," Prepared for the Special Working Group Pressure Testing, Section XI, dated December 10, 1990. A copy is available as provided by Monticello Nuclear Generating Plant in their response to a Request for Additional Information (RAI) documented in Xcel Energy LTR No. L-MT-12-087, dated October 26, 2012 [ADAMS Accession No. ML12305A203]
4. NRC Safety Evaluation, PNPS Fourth Interval Relief Request No. PRR-2 (TAC NO. MC8286), dated June 29, 2006