June 27, 2008

Vice President, Operations
Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360-5508

SUBJECT: THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN REQUEST FOR RELIEF NO. PRR-42, REVISION 1 - PILGRIM NUCLEAR POWER STATION (TAC NO. MD6767)

Dear Sir or Madam:

By letter dated September 13, 2007 (Agencywide Documents and Management System (ADAMS) Accession No. ML0726200800), Entergy Nuclear Operations, Inc. (the licensee) submitted Relief Request (RR) No. PRR-42, Revision 1 for the Third 10-Year Interval Inservice Inspection (ISI) Program at Pilgrim Nuclear Power Station (PNPS).

The Nuclear Regulatory Commission (NRC) staff with the assistance of Pacific Northwest National Laboratory (PNNL) has reviewed and evaluated the information provided by the licensee and the NRC staff found RR No. PRR-42, Revision 1 acceptable, except for Part H, which is associated with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Examination Category C-F-1 requirements for piping weld GB-14-F34. In addition for RR No. PRR-42, Revision 1 for Part D, Examination Category B-H weld RPV-SBW-0, it was found that the licensee committed to examine the subject weld as part of the augmented inspection program of ASME Code Class 1 integral attachments for vessels which were not required to be inspected at Pilgrim under Examination Category B-H of 1989 Edition of ASME Code, Section XI. Since the "requirement" to inspect reactor pressure vessel (RPV) stabilizer attachment weld RPV-SBW-0 is neither an ASME Code requirement, nor a requirement specified in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, the provisions of 10 CFR 50.55a(g)(5)(iii) do not apply and relief cannot be granted for this item. The results of the NRC staff's review are provided in the enclosed safety evaluation.

If you have any questions regarding this approval, please contact the Pilgrim Project Manager, James Kim, at 301-415-4125.

Sincerely,

Douglas V. Pickett/for

Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosure:
As stated

cc w/encl: See next page

If you have any questions regarding this approval, please contact the Pilgrim Project Manager, James Kim, at 301-415-4125.

Sincerely,

Douglas V. Pickett/for

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Office of Nuclear Reactor Regulation

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Enclosure:
As stated

cc w/encl: See next page

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ADAMS ACCESSION NO.: ML081300415 *See memo dated may 05, 2008

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF PRR-42, REVISION 1

ENTERGY NUCLEAR OPERATIONS, INC.

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

1.0 INTRODUCTION

The Nuclear Regulatory Commission (NRC) staff, with technical assistance from its contractor, the Pacific Northwest National Laboratory (PNNL) has reviewed and evaluated the information provided by Entergy Nuclear Operations, Inc., (the licensee) in its letter dated June 28, 2006, which proposed its third 10-Year Interval Inservice Inspection (ISI) Program Plan Request for Relief (RR) PRR-42 for Pilgrim Nuclear Power Station (PNPS). In response to an NRC request for additional information (RAI), the licensee withdrew the original submittal for RR PRR-42 by letter dated May 16, 2007. Subsequently, the licensee submitted Revision 1 to RR PRR-42 in a letter dated September 13, 2007. The NRC staff adopts the evaluations and recommendations for granting relief contained in PNNL's Technical Letter Report (TLR) which has been incorporated into this safety evaluation (SE) and can be found in ADAMS under ML081260484.

2.0 REGULATORY REQUIREMENTS

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (ASME Code), and applicable addenda, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The licensee has determined that conformance with the code requirement of essentially 100% coverage of weld volume or area examined was impractical due to physical obstructions imposed by design, geometry and materials of typical vessel construction.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, which was incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month

interval, subject to the limitations and modifications listed therein. The ASME Code of record for PNPS Third 10-year Interval ISI Program, which began on July 1, 1995, is the 1989 Edition of Section XI of the ASME Code, with no addenda.

Note: The licensee has noted in its RAI response dated September 13, 2007, that it is revising the examination sample size for some welds in its risk informed-ISI (RI-ISI) program and ASME Code, Section XI, Examination Category B-O, Item B14.10 for the control rod drive (CRD) housing welds on the reactor pressure vessel (RPV) for the fourth 10-year ISI interval. There are no fourth 10-year ISI interval requests for relief in the licensee's letter dated September 13, 2007, nor has the NRC staff evaluated any fourth 10-year ISI interval requests for relief in this SE. The licensee also noted in its letter dated September 13, 2007, PNPS' ASME Code of record for the fourth 10-year ISI interval is the 1998 Edition through the 2000 Addenda.

3.0 STAFF EVALUATION

The information provided by the licensee in support of the request for relief from ASME Code requirements has been evaluated and the basis for disposition is documented below. For clarity, the request has been evaluated in several parts according to ASME Code Examination Category.

3.1 Request for Relief PRR-42, Revision 1 (Part A), Examination Category B-A, Items B1.12, B1.21, and B1.30, Pressure Retaining Welds in Reactor Vessel

ASME Code Requirement

ASME Code, Section XI, Examination Category B-A, Items B1.12, B1.21, and B1.30 require essentially 100% volumetric examination, as defined by ASME Code, Section XI, Figures IWB-2500-2, -3, and -4, of the length of Class 1 longitudinal shell welds, circumferential head welds, and the shell-to-flange weld, respectively, on the RPV. "Essentially 100%" as clarified by ASME Code Case N-460, *Alternative Examination Coverage for Class 1 and Class 2 Welds*, is greater than 90% coverage of the examination volume, or surface area, as applicable. ASME Code Case N-460 has been approved for use by the NRC in Regulatory Guide 1.147, Revision 14, *Inservice Inspection Code Case Acceptability* (RG 1.147).

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100% volumetric examination of ASME Code, Class 1 RPV welds shown in Table 3.1.1.

Table 3.1.1 - Examination Category B-A

Code Item	Weld ID	Weld Type
B1.12	RPV-L-1-338A	Lower Intermediate Shell Vertical Weld
B1.12	RPV-L-1-338C	Lower Intermediate Shell Vertical Weld
B1.12	RPV-L-2-338A	Lower Shell Vertical Weld
B1.12	RPV-L-2-338B	Lower Shell Vertical Weld
B1.12	RPV-L-2-338C	Lower Shell Vertical Weld

Table 3.1.1 - Examination Category B-A		
Code Item	**Weld ID**	**Weld Type**
B1.12	RPV-L-2-339A	Upper Intermediate Shell Vertical Weld
B1.12	RPV-L-2-339B	Upper Intermediate Shell Vertical Weld
B1.12	RPV-L-2-339C	Upper Intermediate Shell Vertical Weld
B1.21	RPV-BH-C1	Bottom Head-to-Shell Circumferential Weld
B1.30	RPV-C-4-339	Shell-to-Flange Weld

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.
>
> Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[1] cannot be achieved. […]
>
> As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

> The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.
>
> A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Response to RAI by Letter Dated September 13, 2007. (as stated)

> NRC approval of Pilgrim Relief Request (PRR)-28, Rev. 1 provides for the use of [Electric Power Research Institute (EPRI)] BWRVIP-05 [Boiling Water Reactor (BWR) Vessel and Internals Project-05] *BWR Pressure Vessel Shell Weld Inspection*

[1] The licensee's summary table is not included in this report.

Recommendations, dated September 1995] to exclude circumferential shell welds [Reference: NRC SER, "Pilgrim Nuclear Power Station-Pilgrim Relief Request No. 28. Relief from ASME Code, Section XI, Examinations of Reactor Pressure Vessel Circumferential Shell Welds (TAC No. MB6074), dated April 11, 2003].

Staff Evaluation

The ASME Code requires essentially 100% volumetric examination of the length of the subject ASME Code Class 1 RPV welds. However, as shown in Table 3.1.2 below, complete examinations are restricted by several factors, including the geometric configuration of the welds, adjacent interferences from internal support plates and brackets, locations of feedwater and core spray sparger piping and the proximity of RPV nozzle welds. These conditions make 100% volumetric examinations impractical to perform for these welds. To gain access for examination, the RPV would require design modifications. Imposing this requirement would create a burden on the licensee; therefore, the ASME Code-required 100% volumetric examinations are impractical.

As shown on the sketches and technical descriptions[2] included in the licensee's submittal, examinations of the subject welds have been performed to the extent practical, with the licensee obtaining volumetric coverages in the median range of 75-78% (see Table 3.1.2). For the 25% coverages on two longitudinal welds (RPV-L-1-338C and RPV-L-2-338C), severe ultrasonic scanning limitations caused by the shroud support, tie bar and gusset plates, the jet pump riser brace and surveillance capsule holder, and close proximity to nozzle N2K do not provide access to achieve additional volumetric examinations. No unacceptable indications were noted during the performance of UT on these welds.

All RPV longitudinal welds (designated RPV-L-X-33XX) and shell-to-flange Weld RPV-C-4-339 are examined from the inside surface of the RPV with a submersible robotic device that encompasses multiple ultrasonic transducers and is positioned for inspection via on-board thrust propellers. Operational control is monitored visually by independent remote video cameras. The robotic device has dimensions of approximately 30 inches in length, 23 inches in depth, and has only a 2-inch overall thickness. The device is essentially "flown-in" to the necessary inspection locations prior to adhering to the RPV wall. This must be accomplished in the presence of many core internal components. The overall size of the robotic device, while small, limits access to certain portions of the longitudinal welds where the internal appurtenances listed in Table 3.1.2 are in close proximity to the target areas. Insufficient access to the outside surface of the RPV is available for obtaining increased coverage on these welds due to the bio-shield wall and its close proximity to the insulation on the RPV outside surface.

The remaining weld, RPV-BH-C1, is accessed from the outside surface of the RPV. The weld is in close proximity to the RPV integral support skirt, which has a radius of curvature on the outside surface that limits scan access to only the upper shell side of the weld. In addition, three (3) welded thermocouple pads located intermittently along the circumference of the RPV are also in close proximity to this weld and further limit ultrasonic scanning in their immediate areas.

[2] Sketches and technical descriptions provided by the licensee are not included in this report.

Table 3.1.2 - Examination Category B-A Limitations		
Weld ID	**Limitation Description/Interference**	**Coverage**
RPV-L-1-338A	Jet pump riser brace welded to RPV wall	89%
RPV-L-1-338C	Jet pump riser brace, surveillance specimen holder and shroud tie bar	25%
RPV-L-2-338A	Shroud support and gusset plates	73%
RPV-L-2-338B	Shroud support and gusset plates	78%
RPV-L-2-338C	Shroud support and gusset plates, shroud tie bar and nozzle N2K interference	25%
RPV-L-2-339A	Feedwater and core spray spargers	81%
RPV-L-2-339B	Feedwater and core spray spargers, ID surface taper	75%
RPV-L-2-339C	Feedwater and core spray spargers	83%
RPV-BH-C1	RPV support skirt configuration and proximity, and (3) welded thermocouple pads	75%
RPV-C-4-339	Configuration, main steam nozzles and nozzle plugs, and dryer/separator guide rods	81%

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject welds due to scan limitations caused by weld design and proximity to other components. Based on the limited examinations performed, along with the full examination of ASME Code-required volumes in other pressure retaining welds, the NRC staff has concluded that if significant service-induced degradation had occurred, there is reasonable assurance that evidence of it would have been detected by the examinations that were performed. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.2 Request for Relief PRR-42 (Part B), Examination Category B-D, Item B3.90, Full Penetration Welded Nozzles in Vessels

ASME Code Requirement

ASME Code, Section XI, Examination Category B-D, Item B3.90 requires 100% volumetric examination, as defined by Figures IWB-2500-7(a) through (d), as applicable, of Class 1 nozzle-to-vessel welds on the RPV. ASME Code Case N-460, *Alternative Examination Coverage for Class 1 and Class 2 Welds*, as an alternative approved for use by the NRC in RG 1.147, Revision 14, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100% volumetric examination of Class 1 RPV nozzle-to-vessel welds RPV-N7A-NV, RPV-N7B-NV, and RPV-N8-NV.

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.
>
> Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[3] cannot be achieved. […]
>
> As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

> The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.
>
> A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Response to RAI by Letter dated September 13, 2007, (as stated)

> Welds RPV-N7A-NV, RPV-N7B-NV and RPV-N8-NV are [RPV] nozzle-to-vessel top head welds. Welds RPV-N7A-NV and RPV-N7B-NV are identical in configuration being of the same size, material and configuration. Both are situated tangential to the circumference of the top head surface. Weld RPV-N8-NV differs in that its location is at the apex or top of the RPV head.
>
> These welds were ultrasonically examined manually utilizing General Electric Energy Nuclear Procedures GE-UT-300 Version 8 and GE-UT-311, Version 10. These procedures are qualified by EPRI Performance Demonstration Initiative (PDI) to ASME [Code,] Section XI, Appendix VIII, Supplements 4, 5 and 6 for ultrasonic examination of reactor pressure vessel welds with dual- or single-side access and nozzle inner radius bore and selected nozzle-to-vessel regions.

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[3] The licensee's summary table is not included in this report.

Staff Evaluation

The ASME Code requires 100% volumetric examination of the subject ASME Code Class 1 RPV nozzle-to-vessel welds. However, complete examinations are restricted by the geometric configuration of the nozzles and their location on the RPV upper closure head. These conditions make 100% volumetric examinations impractical to perform for these welds. To gain access for examination, the RPV closure head would require design modifications. Imposing this requirement would create a burden on the licensee; therefore, the ASME Code-required 100% volumetric examinations are impractical.

As shown on the sketches and technical descriptions[4] included in the licensee's submittal, examinations of the subject nozzle-to-vessel welds have been performed to the extent practical, with the licensee obtaining volumetric coverages of approximately 57% for RPV-N7A-NV and RPV-N7B-NV and 71% for RPV-N8-NV. The licensee applied performance demonstrated ultrasonic procedures from the outside surface of the RPV head, using 60-degree shear wave methods performed in both transverse and perpendicular directions to the weld. The examinations could only be performed from the shell side of the nozzle welds due to extreme transition geometries between the nozzle forgings and the plate material of the head, and the outside surface tapers on the nozzle forgings. No unacceptable indications were noted during the volumetric examinations on these welds.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverage for the subject RPV nozzle-to-vessel closure head welds due to limited scan access caused by their design configurations. Based on the limited examinations performed, along with examinations of ASME Code-required volumes in other pressure retaining RPV nozzle welds, the NRC staff has concluded that if significant service-induced degradation had occurred, there is reasonable assurance that evidence of it would have been detected by the examinations that were performed. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.3 Request for Relief PRR-42, Revision 1 (Part C), Examination Category R-A (ASME Code Category B-F), Items R1.11 and R1.20, Risk-Informed (RI) Piping Examinations

ASME Code Requirement

The examination requirements for the subject dissimilar metal nozzle-to-safe end and piping welds at PNPS are governed by an RI-ISI program that was approved by the NRC in an SE dated May 2, 2001. As part of the NRC-approved program, the licensee has implemented inspection requirements listed in ASME Code Case N-578-1, *Risk-Informed Requirements for Class 1, 2 and 3 Piping, Method A*, with more detailed provisions contained in the Electric Power Research Institute (EPRI) Topical Report TR-112657, Revision B-A. The topical report includes a provision for requesting relief from volumetric examinations if 100% of the required volumes cannot be examined.

Table 1 of ASME Code Case N-578-1 assigns the Examination Category R-A, Item R1.11 to piping inspection elements subject to thermal fatigue and Item R1.20 to piping inspection

[4] Sketches and technical descriptions provided by the licensee are not included in this report.

elements subject to intergranular stress-corrosion cracking (IGSCC). This table requires 100% of the examination volume, as described in Figures IWB-2500-7, 8, 9, 10, or 11, as applicable, be performed for Class 1 circumferential piping welds. ASME Code Case N-460 as an alternative approved for use by the NRC in RG 1.147, Revision 14 states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

Licensee's Request for Relief

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee has requested relief from the volumetric examination coverage requirements contained in Table 1 of ASME Code Case N-578-1 for the ASME Code, Class 1 welds shown in Table 3.3.1.

Table 3.3.1 - Examination Category R-A

Code Item	Weld ID	Weld Type	Coverage Obtained
R1.20	14-A-10A	Valve-to-Pipe Weld	37.1%
R1.20	14-B-10A	Valve-to-Pipe Weld	22.1%
R1.20	2R-N1B-1	Nozzle-to-Safe End Weld	75%
R1.20	2R-N2E-1	Nozzle-to-Safe End Weld	81.2%
R1.20	2R-N2G-1	Nozzle-to-Safe End Weld	75.3%
R1.20	2R-N2J-1	Nozzle-to-Safe End Weld	75%
R1.11	6-N4A-1	Nozzle-to-Safe End Weld	87.5%
R1.11	6-N4B-1	Nozzle-to-Safe End Weld	87.5%
R1.11	6-N4C-1	Nozzle-to-Safe End Weld	88.6%
R1.11	6-N4D-1	Nozzle-to-Safe End Weld	88.6%

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.
>
> Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[5] cannot be achieved. […]

[5] The licensee's summary table is not included in this report.

As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.

A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Response to RAI by Letter Dated September 13, 2007 (as stated)

The risk-informed methodology used at Pilgrim includes all category B-F and B-J welds in the determination of the final risk-informed inspection sample of 71 Class 1 welds. There are a total of 29 Class 1 [Examination Category B-F and B-J] dissimilar metal welds at Pilgrim Station with 7 of the DM welds included in the Class 1 risk-informed inspection sample. In accordance with the EPRI risk-informed methodology, augmented programs are relied upon for the inspection of welds not wholly subsumed by the risk-informed process, including IGSCC-susceptible welds. All carbon steel and IGSCC [C]ategory A austenitic stainless steel welds are subsumed into Pilgrim's risk-informed inspection process while all IGSCC [C]ategory B, C, D, E and G welds are examined in accordance with the augmented inspection schedules and methods outlined in BWRVIP-75A [*BWR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules*].

Inspection coverage obtained for six of the seven dissimilar metal welds included in the PNPS risk-informed inspection sample exceeded 90% combined coverage. Reduced coverage for one of the seven welds, Core Spray weld No. 14-A-10A […], was caused by a severe valve-to-pipe weld profile […] that could not be modified to increase inspection coverage without reducing design margin for the configuration. Since this weld is a dissimilar metal weld made with Inconel 182 weld metal, all other similar welds are currently inspected in accordance with BWRVIP-75A Category D weld inspection schedules and methods. As a result, there are no other similarly constructed welds that are not already being inspected that could be added to the risk-informed inspection sample to account for the reduced coverage obtained on 14-A-10A. […]

There are 21 dissimilar metal welds at Pilgrim that are constructed with Inconel weld material. These welds are classified in accordance with BWRVIP-75A and Generic Letter [GL] 88-01 [*NRC Position On IGSCC In BWR Austenitic Stainless Steel Piping*, dated January 25, 1988] guidance based on their metallurgy, construction history and environmental conditions. One weld is classified as Category A, 17 welds are Category D and 3 are Category E weld overlays as discussed below. Currently, 20 of these 21 DM welds have been volumetrically examined using [ASME Code,] Appendix [VIII,

Performance] Demonstration Initiative (PDI) methods. The one weld that has not yet been examined using PDI procedures is the Category E jet pump instrumentation nozzle safe end weld (weld no. RPV-N9A-1) that was repaired by weld overlay in 1984. This overlay weld was last examined with pre-PDI UT procedures in 1999 and is currently scheduled for reexamination with PDI procedures in April 2009.

Staff Evaluation

The examination requirements for the subject piping welds at PNPS are governed by an EPRI RI-ISI program that was approved by the NRC in an SE dated May 2, 2001 (ML011020137) for the third 10-year ISI Interval. This program assigns Examination Category R-A, Item R1.11 to piping inspection elements subject to thermal fatigue, Item R1.20 to piping elements subject to IGSCC, and requires inspection of 100% of the examination location volume, as described in Figures IWB-2500-7, 8, 9, 10, or 11, as applicable, for Class 1 dissimilar metal nozzle-to-safe end and circumferential piping welds. However, the subject weld configurations and base materials severely limit volumetric examinations. In order to meet the RI-ISI program volumetric coverage requirements, these components would have to be re-designed and modified. Therefore, 100% volumetric examination is impractical for the subject welds.

The licensee has determined that certain PNPS welds had ultrasonic examination coverages of less than 100% of the ASME Code-required weld and adjacent material volume(s) for the subject dissimilar metal welds. Welds 14-A-10A and 14-B-10A are Alloy 182 welds joining carbon steel piping, buttered with Alloy 182, to stainless steel valves. As shown in the sketches[6] provided by the licensee, the weld crown and geometrical transition from the piping to the valves restricted scanning to the pipe side only, therefore limiting both transverse and perpendicular scans. This caused reduced coverages of approximately 37% and 22% for Welds 14-A-10A and 14-B-10A, respectively.

Dissimilar metal Welds 2R-N1B-1, 2RN2E-1, 2R-N2-G-1, and 2R-N2J-1 are RPV nozzle-to-safe end configurations that typically consist of forged carbon steel nozzles, buttered with Alloy 182, and joined to stainless steel safe end piping with an Alloy 182 weld. As shown on the sketches and technical descriptions[7] included in the licensee's submittal, examinations of these nozzle-to-safe end welds have been performed to the extent practical, with the licensee obtaining volumetric coverages ranging from approximately 75% to 81%. The reduced volumetric scans on these welds were due to surface contour irregularities that caused automated system transducer "lift-off" in limited areas of the welds. The licensee applied performance demonstrated ultrasonic procedures from both sides of the dissimilar metal welds, using 45-degree shear wave and 45- and 60-degree refracted longitudinal methods, performed in both transverse and perpendicular directions to the weld.

Welds 6-N4A-1, 6-N4B-1, 6-N4C-1, and 6-N4D-1 in the licensee's request for ASME Code Examination Category B-F welds are RPV nozzle-to-safe end configurations, constructed entirely of carbon steel. The licensee elected to classify these similar metal welds as B-F to ensure that all of this configuration group would be inspected. It should be noted that these welds were examined to ASME Code requirements prior to implementation of the RI-ISI program; performance demonstrated procedures were not required as of that time. However, the licensee's examiners were qualified for ferritic material examinations through the EPRI PDI. In addition, greater than 88% of the ASME Code-required examination volumes were obtained

6 Sketches and technical descriptions provided by the licensee are not included in this report.

7 Sketches and technical descriptions provided by the licensee are not included in this report.

for these welds using 45- and 60-degree ultrasonic shear wave methods performed in both transverse and perpendicular directions to the welds. The slightly reduced examination coverages were caused by welded thermocouple pads in close proximity to the welds which restricted scans in limited areas.

The licensee has examined 20 of the 21 dissimilar metal welds at PNPS using performance demonstrated methods. The remaining weld has a full structural overlay in place and is scheduled for examination during the 2009 refueling outage. The examination coverages attained for the subject welds found no recordable indications or degradation in the examined areas.

The licensee has shown that it is impractical to meet the ASME Code-required 100% volumetric examination coverages for the subject dissimilar metal welds discussed above. Based on the volumetric coverages obtained, the NRC staff has concluded that if significant service-induced degradation had occurred, there is reasonable assurance that evidence of it would have been detected by the examinations that were performed. The NRC staff further determined, that in order for the licensee to perform the ASME Code-required examinations the subject components would have to be redesigned placing a burden on the licensee. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.4 Request for Relief PRR-42, Revision 1 (Part D), Examination Category B-H, Item B8.10 Integral Attachments for Vessels

In 1995, the NRC staff reviewed the licensee's Third 10-year ISI Program Plan for PNPS. By NRC staff letter dated December 6, 1995, the staff made certain recommendations to the licensee regarding potential enhancements to their ISI Program Plan. One of these recommendations concerned the addition of augmented inspections of ASME Code Class 1 integral attachments for vessels which were not required to be inspected at PNPS under Examination Category B-H of 1989 Edition of ASME Code, Section XI (i.e., the Code of record for the PNPS's third 10-year ISI interval). In response to the NRC staff's recommendation, the licensee responded with a letter dated February 15, 1996, in which the licensee committed to examine RPV stabilizer attachment weld RPV-SBW-0 during PNPS's third 10-year ISI interval.

In Request for Relief PRR-42, Revision 1 (Part D), the licensee requested relief under the provisions of 10 CFR 50.55a(g)(5)(iii) for not having met the augmented inspection requirements in the PNPS Third 10-year ISI Program Plan for RPV stabilizer attachment weld RPV-SBW-0. In a teleconference on April 24, 2008, the NRC and licensee staff agreed that since the "requirement" to inspect RPV stabilizer attachment weld RPV-SBW-0 was neither an ASME Code requirement, nor a requirement specified in 10 CFR 50.55a, the provisions of 10 CFR 50.55a(g)(5)(iii) did not apply and relief could not be granted for this item. Rather, the NRC and licensee staff agreed that, as the inspection of RPV stabilizer attachment weld RPV-SBW-0 was associated with a commitment made by the licensee in 1996, the licensee must evaluate their control over this commitment under the appropriate regulatory mechanisms (i.e., 10 CFR 50.59 and associated guidance documents).

Therefore, the NRC staff will not evaluate PRR-42, Revision 1 (Part D) and will not discuss it further in this SE.

3.5 Request for Relief PRR-42, Revision 1 (Part E), Examination Category R-A (ASME Code Category B-J), Items R1.11 and R1.20, Piping Welds Governed by a Risk-Informed (RI) Program

ASME Code Requirement

The examination requirements for the subject piping welds at PNPS are governed by an RI-ISI program that was approved by the NRC in an SE dated May 2, 2001. As part of the NRC-approved program, the licensee has implemented inspection requirements listed in ASME Code Case N-578-1, *Risk-Informed Requirements for Class 1, 2 and 3 Piping, Method A*, with more detailed provisions contained in the EPRI Topical Report TR-112657, Revision B-A. The topical report includes a provision for requesting relief from volumetric examinations if 100% of the required volumes cannot be examined.

Table 1 of ASME Code Case N-578-1 assigns the Examination Category R-A, Item R1.11 to piping inspection elements subject to thermal fatigue and Item R1.20 to piping inspection elements subject to IGSCC. This table requires 100% of the examination volume, as described in Figures IWB-2500-7, 8, 9, 10, or 11, as applicable, be performed for Class 1 circumferential piping welds. ASME Code Case N-460, an alternative approved for use in RG 1.147, Revision 14 states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

Licensee's Request for Relief

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee has requested relief from the volumetric examination coverage requirements contained in Table 1 of ASME Code Case N-578-1 for the ASME Code, Class 1 piping welds shown in Table 3.5.1.

Table 3.5.1 - Examination Category R-A

Code Item	Weld ID	Weld Type	Coverage Obtained
R1.20	10-IA-14	Pipe-to-Flued Head Weld	50%
R1.20	10-IA-15	Pipe-to-Valve Weld	50%
R1.11	10R-IA-6	Pipe-to-Valve Weld	50%
R1.11	10R-IA-7	Pipe-to-Valve Weld	50%
R1.20	12-O-24	Penetration-to-Pipe Weld	50%
R1.20	14-A-19	Pipe-to-Valve Weld	50%
R1.20	14-B-17	Penetration-to-Pipe Weld	50%
R1.20	14-B-20	Pipe-to-Pipe Weld	50%
R1.11	1-SD-10R	Pipe-to-Valve Weld	87.5%
R1.20	2R-HB-1	Header-to-Bend Weld	50%
R1.20	2R-HB-4	Header-to-Bend Weld	50%

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments. Therefore, examination of the entire volume or area for some of the which are listed in Table 3[8] cannot be achieved. […]
>
> As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" overage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

> The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.
>
> A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Response to RAI by Letter Dated September 13, 2007 (as stated)

> There are a total of 598 Class 1 [ASME] code Category B-J (now R-A) welds at Pilgrim Station with 60 of these welds included in the Class 1 risk-informed inspection sample. In accordance with the EPRI risk-informed methodology, augmented programs are relied upon for the inspection of welds not wholly subsumed by the risk-informed process, including IGSCC-susceptible welds. All carbon steel and IGSCC category A austenitic stainless steel welds are subsumed into Pilgrim's risk-informed inspection process while all IGSCC Category B, C, D, E and G welds are examined in accordance with the augmented inspection schedules and methods outlined in BWRVIP-75A. […]
>
> [T]he examinations of seven welds in the PNPS risk-informed inspection program during the 3rd interval failed to obtain greater than 90% coverage. Of those seven welds, one is a dissimilar metal Core Spray pipe-to-valve weld (14-A-10A) [previously evaluated in Section 3.3 of this report]. All similar DM welds are already included in the BWRVIP-75A inspection sample. Another weld, Main Steam Drain carbon steel pipe-to-valve weld 1-SD-10R had obtained coverage of 87.5%, amounting to one inch of weld length that

[8] The licensee's summary table is not included in this report.

could not be obtained due to the pipe-to-valve configuration. This difference was considered insignificant when the examination of 21 additional inches of weld metal from the three new welds being added to the inspection sample are considered.

For the remaining five welds in the PNPS risk-informed inspection program that failed to obtain greater than 90% coverage, Entergy will revise the risk-informed inspection program by adding three additional weld examinations to account for the limited volumetric coverage obtained during the third interval risk-informed inspections. Three additional welds are from the same systems, are of equivalent risk ranking and have been scheduled for examination during the next refueling outage in 2009 [in the 4th 10-year ISI Interval].

Staff Evaluation

The examination requirements for the subject piping welds at PNPS are governed by an RI-ISI program that was approved by the NRC in an SE dated May 2, 2001. This program assigns Examination Category R-A, Item R1.11 to piping inspection elements subject to thermal fatigue, Item R1.20 to piping elements subject to IGSCC, and requires inspection of 100% of the examination location volume, as described in Figures IWB-2500-7, 8, 9, 10, or 11, as applicable, for ASME Code, Class 1 circumferential piping welds. However, the subject piping weld configurations and base materials severely limit volumetric examinations. In order to meet the RI-ISI program volumetric coverage requirements, these components would have to be re-designed and modified. Therefore, obtaining 100% of the ASME Code-required volumetric examination is not practical for the subject piping welds.

The licensee has shown through sketches and descriptions[9] that it is impractical to examine certain PNPS piping welds to 100% of the ASME Code-required weld and adjacent material volume(s). The limitations encountered during the performance of single-side ultrasonic examinations on welds listed in Table 3.5.1 above were caused by severe geometrical configurations such as pipe-to-valve, pipe-to-flued head, etc. In addition, a rule change in 10 CFR 50.55a(b)(2)(xv)(A)(2) restricts taking credit for single-sided examinations without qualifying a single-sided ASME Code, Section XI, Appendix VIII performance demonstration procedure, using flaws located on the opposite side of the weld. Because of the examination limitations, and rule change in 10 CFR, the licensee was only allowed to credit the typical examination coverages for the subject welds to 50% of the ASME Code-required volume(s). One exception was on pipe-to-valve weld 1-SD-10R, where 87.5% coverage was obtained. The examination coverages attained for the subject welds found no recordable indications or degradation in the examined areas.

Though previous and current ultrasonic testing (UT) examination scan paths and angles are similar, the current coverage requirements are based on using a procedure qualified to ASME Code, Section XI, Appendix VIII, Supplements 2 and 3. At the time of the examinations, no qualified procedure existed for single-side austenitic welds. The regulation of 10 CFR 50.55a(b)(2)(xv) requires that, if access is available, the weld shall be scanned in each of the four directions (parallel and perpendicular to the weld on each side of the weld centerline). Coverage credit may be taken for single-side examinations on austenitic piping if a procedure is qualified with flaws on the inaccessible side of the weld. This procedure must demonstrate single-side access examinations equivalency to "two-sided" examinations. Instead of a full single-side qualification, the industry's EPRI Performance Demonstration Initiative (PDI) offers a

[9] Sketches and technical descriptions provided by the licensee are not included in this report.

best-effort approach, intended to demonstrate that the best available technology and ultrasonic methods are applied.

Although only 50% of the ASME Code-required coverage could typically be credited, the licensee applied both 45- and 60-degree shear and refracted longitudinal wave ultrasonic methods from the accessible pipe side of these welds. These methods would have provided limited volumetric coverage for the weld fusion zone and base materials on the opposite side of the welds. Given the weld configurations encountered, the NRC staff has concluded that the ASME Code-required weld and base material volumes were examined to the maximum extent practical. Current and previous examinations on the subject welds found no recordable indications or degradation in the examined areas. Further, to account for the limited examinations on the subject welds, the licensee has added three additional Examination Category R-A piping welds to the inspection sample. These will be examined at the next refueling outage in 2009.

The licensee has shown that it is impractical to examine the ASME Code-required volumes of the subject Examination Category R-A piping welds due to severe cross-sectional configurations and access limitations. While only 50% of the ASME Code-required volumes could be credited, the licensee applied both shear and refracted longitudinal methods to the maximum extent practical, and it is expected that these techniques provided limited coverages in volumes of the welds not credited. The licensee has subsequently added three additional welds to the inspection population to account for the limited examinations. Based on the volumetric coverages obtained, the NRC staff has concluded that if significant service-induced degradation had occurred, there is reasonable assurance that evidence of it would have been detected. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.6 Request for Relief PRR-42, Revision 1 (Part F), Examination Category B-O, Item B14.10, Pressure Retaining Welds in Control Rod Housings

ASME Code Requirement

ASME Code, Section XI, Examination Category B-O, Item B14.10, requires either volumetric or surface examination, as defined by Figure IWB-2500-18, of 10% of peripheral CRD housing welds on the RPV. The examination includes the weld, buttering (if existing), and a minimum of 1/2-inch of housing base material on both sides of the weld. The licensee elected to perform surface examinations on the selected CRD housings.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100% surface examination of CRD housing welds RPV-CRD-HSG-1, -2, -3, and -4.

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this

plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.

Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.

Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[10] cannot be achieved. […]

As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even

though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd ISI Interval.

A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Response to RAI by Letter Dated September 13, 2007. (as stated)

To account for the limited surface examination coverage obtained during the 3rd Interval Inspections, Entergy will be revising the ISI program to select additional CRD housings for examination during the 4th [10-Year ISI Interval] in order to be certain that an equivalent 100% inspection of 10% of the peripheral housings is obtained. Assuming an average 55% coverage per housing, examination of three additional housings (seven total) will provide the equivalent Code-required coverage. This will satisfy the examination requirements of the 1998 ASME Code Section XI, 2000 Addenda which is utilized for the 4th [10-Year ISI Interval.]

Staff Evaluation

The ASME Code requires 100% volumetric or surface examination of 10% of CRD housing welds located on the periphery of the RPV head. The licensee elected to perform surface examinations on these CRD housings welds. However, for CRD housing welds RPV-CRD-HSG-1,-2, -3, and -4, 100% of the required inspection surface could not be obtained due to access limitations caused by confined spaces, interference from other components, and proximity of other CRDs on the bottom head of the RPV. Therefore, obtaining 100% of the

[10] The licensee's summary table is not included in this report.

ASME Code-required surface examinations are not practical for the subject CRD housing welds. The NRC staff further determined that in order for the licensee to perform the ASME Code-required examinations the subject components would have to be redesigned placing a burden on the licensee.

The CRD housings are inserted through CRD penetrations in the RPV bottom head and are welded to Alloy 600 stub tubes extending into the RPV. The housings are fabricated from Type 304 austenitic stainless steel. The licensee elected to perform a surface examination at four locations using the liquid penetrant method during the 3rd ISI Interval. Due to accessibility issues, the surface examinations of the four selected locations were limited to 50-70% of the weld areas. The area under the RPV is congested with horizontal beams, hanger rods, support bars, grids, etc. severely limiting access in this area and the available work space. This and the proximity of adjacent CRDs accounted for the limited examinations of the subject CRD housing welds.

The drawings and descriptions[11] provided by the licensee support the fact that the area under the RPV is highly congested and show that examinations of the subject welds have been performed to the extent practical. No unacceptable indications were found during these examinations. The licensee has subsequently added three additional welds to the inspection population to account for the limited examinations and ensure that an equivalent 100% inspection of 10% of the peripheral housings will be obtained.

The licensee has shown that it is impractical to examine 100% of the ASME Code-required surface examinations on 10% of peripheral CRD housing welds. Based on the 50-70% surface coverages obtained, and the licensee's alternative to examine additional CRD housing welds, the NRC staff has concluded that if significant service-induced degradation occurs, there is reasonable assurance that evidence of it will be detected. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

3.7 Request for Relief PRR-42, Revision 1 (Part G), Examination Category C-C, Item C3.20, Integral Attachments for Vessels, Piping, Pumps, and Valves

ASME Code Requirement

ASME Code, Section XI, Examination Category C-C, Item C3.20 requires 100% surface examination, as defined by Figure IWC-2500-5, of integrally welded attachments to selected Class 2 components. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 14, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100% surface examination of the following support lugs.

[11] Sketches and technical descriptions provided by the licensee are not included in this report.

Attachment Weld	Description	Coverage Obtained
EB-23-13HL1(4)	High Pressure Core Injection (HPCI) piping welded attachment	87.5%
EB-23-59HL1(4)	HPCI piping welded attachment	83.3%
HL-10-200HL1(4)	Residual Heat Removal (RHR) piping welded attachment	90%

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.
>
> Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[12] cannot be achieved. […]
>
> As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

> The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.
>
> A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Staff Evaluation

The ASME Code requires 100% surface examination of the subject integral attachment welds. However, for piping attachment welds EB-23-13HL1(4), EB-23-59HL1(4) and HL-10-200HL1(4), 100% surface examinations could not be performed due to several

[12] The licensee's summary table is not included in this report.

factors, including the geometric configuration of the components, interferences caused by instrument lines, adjacent components, and location of wall penetrations. Portions of the high-pressure coolant injection (HPCI) and residual heat removal (RHR) system piping would need to be redesigned to enable better access to these integrally welded attachments to maximize surface coverages. This would place a significant burden on the licensee; therefore, compliance with the ASME Code-required 100% surface examinations is impractical.

The licensee has shown on the sketches and technical descriptions[13] included in the submittal, examinations of the subject welds have been performed to the extent practical, with the licensee obtaining substantial surface examination coverages of approximately 83% to 90%. No unacceptable indications were noted in the examinations.

The licensee has shown that it is impractical to meet the ASME Code-required 100% surface examination coverage for the subject welds due to the design and proximity of other components. Based on the limited examinations performed, along with the full examination of ASME Code-required volumes in other integral attachments for vessels, piping, pumps and valves, the NRC staff has concluded that if significant service-induced degradation were occurring in the subject welds, there is reasonable assurance that evidence of it would be detected. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The NRC staff further determined that in order for the licensee to perform the ASME Code-required examinations, the subject components would have to be redesigned placing a burden on the licensee.

3.8 Request for Relief PRR-42, Revision 1 (Part H), Examination Category C-F-1, Item C5.11, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping

ASME Code Requirement:

ASME Code, Section XI, Examination Category C-F-1, Item C5.11, requires 100% volumetric and surface examination, as defined by Figure IWC-2500-7, of selected Class 2 circumferential piping welds greater than 4-inch NPS, and greater than or equal to 3/8-inch nominal wall thickness, in austenitic stainless steel or high alloy piping systems. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 14, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100% volumetric examination of circumferential piping Weld GB-14-F34 in the Core Spray system.

[13] Sketches and technical descriptions provided by the licensee are not included in this report.

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.
>
> Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[14] cannot be achieved. […]
>
> As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

> The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.
>
> A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

Response to RAI Dated September 13, 2007 (as stated)

> Weld GB-14-F34 is a pipe-to-valve weld in the [ASME Code,] Class 2 portion of the Core Spray system with carbon steel pipe welded to the stainless steel valve body of motor-operated valve M01400-4B. This weld is original plant construction, made in January 1972, and consists of Schedule 40 A106 Gr B carbon steel pipe welded to an A182 F316 forged stainless steel valve body using E309 weld filler metal. No Inconel weld metal or stainless steel buttering was used to make this weld. This weld is not exposed to reactor coolant as it is a [ASME Code,] Class 2 weld with normal service conditions of 80°F and 300 psig [pounds per square inch gauge] in accordance with Entergy piping specification M-300. Operating temperatures for this weld are well below the accepted IGSCC [intergranular stress corrosion cracking] initiation temperature of 200 [degrees] F as detailed in Generic Letter 88-01 *[NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping*, dated January 25, 1988] and NUREG 0313 Revision 2, ["Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," U.S. Nuclear Regulatory Commission, July 1977, (Rev. 1) July 1980, (Rev. 2)

[14] The licensee's summary table is not included in this report.

January 1988]. Consequently, IGSCC is not considered to be a potential degradation mechanism for this location. As such, ultrasonic techniques qualified for examining dissimilar metal welds are not applicable to this weld. This weld has been scheduled to be radiographed during Pilgrim's 2009 refueling outage in accordance with the 1998 [Edition through] 2000 Addenda ASME Section XI Code volumetric inspection requirements in lieu of ultrasonic methods due to the pipe-to-valve configuration which caused UT examination coverage results obtained during the 3rd interval to be less than required.

Staff Evaluation

The ASME Code requires essentially 100% volumetric and surface examination of the subject pressure retaining Examination Category C-F-1 high alloy piping welds. However, for weld GB-14-F34, the licensee states that 100% of the ASME Code required volume could not be examined because of the component pipe-to-valve configuration. Limited volumetric examination coverage was obtained, primarily because the licensee did not comply with procedural requirements to sufficiently prepare the surface condition of the weld for adequate ultrasonic accessibility.

The licensee noted in its RAI response dated September 13, 2007, that Weld GB-14-F34 is a pipe-to-valve weld in the ASME Code, Class 2 portion of the Core Spray system with carbon steel pipe welded to the stainless steel valve body of motor-operated valve M01400-4B. The licensee also noted that no Alloy 82/182 weld metal or stainless steel buttering was used in this weld. Since there was no Alloy 82/182 weld metal or stainless steel buttering used during the construction of this weld, the subject weld is not exposed to reactor coolant, and the core spray system normal operating temperature and pressure upstream of valve M01400-4B are low, Therefore, Weld GB-14-F34 is not considered to be susceptible to IGSCC.

As a result of the licensee recognizing the subject weld's design configuration and, based on the low ultrasonic coverage obtained, the licensee has elected to perform radiographic examination on Weld GB-14-F34. The radiographic examination is currently scheduled in PNPS's 4th 10-year ISI interval, 2009 refueling outage and will be performed in accordance with the 1998 Edition though 2000 Addenda of the ASME Code, Section XI. The 1998 Edition though 2000 Addenda of the ASME Code, Section XI is PBPS' ASME Code of record for the 4th 10-year ISI interval. The ASME Code lists radiographic examination as a permissible volumetric examination. The NRC staff has determined that since the licensee did not comply with procedural requirements to sufficiently prepare the surface condition of the weld for adequate ultrasonic accessibility, or provide sufficient justification for relief, request for relief for Weld GB-14-F34 is denied.

3.9 Request for Relief PRR-42, Revision 1 (Part I), Examination Category C-F-2, Items C5.51and 5.81, Pressure Retaining Welds in Carbon or Low Alloy Steel Piping

ASME Code Requirement

ASME Code, Section XI, Examination Category C-F-2, Items C5.51 and C5.81, require 100% volumetric and/or surface examination, as applicable, as defined by Figure IWC-2500-7, of selected Class 2 circumferential piping welds greater than 4-inch NPS, and greater than or equal to 3/8-inch nominal wall thickness, in carbon or low alloy steel piping systems. ASME Code Case N-460, as an alternative approved for use by in RG 1.147, Revision 14, states that a reduction in examination coverage due to part geometry or

interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10%, i.e., greater than 90% examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100% surface and/or volumetric examination of the following circumferential piping welds.

GB-10-9-2E	Weldolet in the RHR System (surface examination only required)
HE-26-F238	Valve-to-Pipe weld in the RCIC System (volumetric and surface examinations required)

Licensee's Basis for Relief Request (as stated)

> [PNPS] piping systems and associated components were designed and fabricated before the requirements of ASME [Code,] Section XI were formalized and published. Since this plant was not specifically designed to meet the requirements of ASME [Code,] Section XI, literal compliance is not feasible or practical within the limits of the current plant design.
>
> Physical obstructions imposed by design, geometry and materials of construction are typical of vessel appurtenances, biological shield wall, insulation support rings, structural and component support members, adjacent component weldments in close proximity, unique component configurations (valves and pumps), and dissimilar metal weldments.
>
> Therefore, examination of the entire volume or area for some of the components which are listed in Table 3[15] cannot be achieved. […]
>
> As a minimum, all components received the required examination(s) to the extent practical with regard to the limited or lack of access available. The examinations conducted confirmed satisfactory results evidencing no unacceptable flaws present, even though "essentially 100%" coverage was not attained. PNPS has concluded that if any active degradation mechanisms were to exist in the subject welds, those degradations would have been identified in the examinations performed.

Licensee's Proposed Alternative Examination (as stated)

> The components listed in Table 3 have already been examined by the available methods to the maximum extent practical. No additional volumetric or surface examinations will be performed on the components for the 3rd Inservice Inspection Interval.
>
> A visual inspection (VT-2) is performed by VT-2 qualified operators on the subject components during the system pressure tests (with no leakage detected) as required by [ASME] Code Category B-P (each refueling outage) and Category C-H (each period).

[15] The licensee's summary table is not included in this report.

Response to RAI by Letter Dated September 13, 2007 (as stated)

Weld GB-10-9-2E

The use of other surface examination methods such as liquid penetrant (PT) have been evaluated for the purpose of increasing coverage for this weld. The configuration of weld GB-10-9-2E consists of a vertical 12 inch diameter weldolet (16.9 inch diameter) joined to a horizontal 18 inch diameter carbon steel pipe. [This configuration is depicted on drawing ISI-1-10-4B Sheet 1 and is a branch connection using a circumferential fillet weld to connect the weldolet to the 18-inch diameter run pipe, similar to Figure IWC-2500-10. As such, this weld should have been classified as Examination Category C-F-2 Item No. C5.81 instead of Item No. C5.51. The required examination method for this weld is surface only per Table IWC-2500-1.]

No known degradation mechanism affects this weld due to being fabricated entirely of carbon steel materials and the standby operating status of this Class 2 system (RHR) eliminates fatigue as a potential failure mechanism. A heavy-duty 3-bolt 18 inch pipe clamp, a component part of pipe support H-10-1-81, is located on the downstream side of the welded pipe intersection and butts directly against the downstream toe of weld GB-10-9-2E. The pipe clamp is 4.5 inches wide and 0.875 inches thick. The horizontal centerline of the 18 inch horizontal pipe and the associated pipe clamp is 29 feet above the Torus Room floor. For the clamp to be loosened and slid upstream far enough to provide unobstructed access to weld GB-10-9-2E, cribbing or other supports would have to be installed to temporarily support the pipe. Due to the remote location of this pipe support in the ceiling of the Torus Room, no practical means exists to temporarily support this pipe so the clamp can be loosened and moved or completely removed to provide increased inspection access to weld GB-10-9-2E.

Weld HE-26-F238

Total ultrasonic examination coverage of weld HE-26-F238 is impractical due to obstructions or limiting component configuration that adversely affects the scan paths for required ultrasonic beam projections required to achieve complete coverage.

Weld HE-26-F238 is a Category C-F-2 Reactor Core Isolation Cooling (RCIC) System carbon steel pipe-to-valve weld utilizing carbon steel weld metal.

This weld was ultrasonically examined manually utilizing Entergy Nuclear Procedure ENN-NDE- 9.04, Revision 1. This procedure is the equivalent of EPRI PDI generic procedure PDI-UT-01 which meets the requirements of ASME [Code,] Section XI, Appendix VIII, Supplement 3 for ultrasonic examination of ferritic piping welds. This weld was examined in the third ISI Interval as part of an NRC directed augmented inspection requirement of thin-wall (<0.375”) piping welds since these welds were not required to be examined under the 1989 Edition of ASME [Code,] Section XI, Category C-F-2 selection criteria. The PNPS fourth Interval ISI Program Plan basis is the 1998 Edition though 2000 Addenda of ASME [Code,] Section XI. As a result of this upgrade, this weld is included in the total required count of Category C-F-2 welds, but was not selected as part of the required examination population percentage. Given this fact, PNPS believes that no further action is required for this weld.

Staff Evaluation

The ASME Code requires essentially 100% volumetric and surface examination of the subject pressure retaining Examination Category C-F-2 low alloy piping welds. However, for welds GB-10-9-2E and HE-26-F238, 100% of the ASME Code-required surface and volumetric examinations cannot be completed due to limiting obstructions and component configuration. In order to meet the ASME Code coverage requirements, these components would have to be re-designed and modified. Therefore, obtaining 100% of the ASME Code-required surface and volumetric examinations are not practical for the subject welds.

Weld GB-10-9-2E is an RHR System pipe-to-fitting branch connection (weldolet) fabricated entirely of carbon steel. The configuration of this weld consists of a 12-inch diameter weldolet joined to an 18-inch diameter carbon steel pipe. The licensee performed both ultrasonic and surface examination of the subject weld; however, after reviewing comments contained in the NRC RAI, the licensee agrees that Weld GB-10-9-2E should have been classified as ASME Code Item C5.81 instead of Item C5.51, which makes the required examination method for this weld to be surface only. The licensee's ISI tracking database has been updated to reflect the correct classification for this weld.

The licensee obtained approximately 85% surface examination coverage for Weld GB-10-9-2E using the magnetic particle method. The limited examination coverage was due to a large pipe clamp obstructing access to portions of the weld inspection boundary. Due to the remote location of the obstructing pipe support in the ceiling of the Torus Room, no practical means exists to temporarily support this pipe so that the clamp can be loosened and moved, or completely removed, to provide increased inspection access to Weld GB-10-9-2E.

Weld HE-26-F238 is a Reactor Core Isolation Cooling (RCIC) System pipe-to-valve weld fabricated entirely of carbon steel. The licensee was able to obtain approximately 69% volumetric examination of the subject weld. The pipe-to-valve configuration limits ultrasonic scanning of the component to the pipe side of the weld only. The licensee used an ultrasonic procedure that meets the requirements of ASME Code, Section XI, Appendix VIII, Supplement 3, for examination of ferritic piping welds.

There are over 1000 Examination Category C-F-2 welds at PNPS including those with wall thicknesses less than 0.375 inches (i.e., thin-wall). The C-F-2 inspection sample at PNPS consists of 82 welds that were examined with surface and/or volumetric techniques during the third 10-year inspection interval. Acceptable (>90%) ASME Code coverage was obtained for 80 of the 82 welds in the inspection sample. The two welds where less than the required coverage was obtained are GB-10-9-2E and HE-26-F238, both of which are discussed above.

The licensee has shown that it is impractical to meet the ASME Code-required 100% surface and/or volumetric examination coverages for the subject welds due to inaccessibility caused by weld configuration and the proximity of a piping clamp. Based on the limited coverages obtained, in combination with full ASME Code coverages completed for the remaining Examination Category C-F-2 welds, the NRC staff has concluded that if significant service-induced degradation were occurring in the subject welds, there is reasonable assurance that evidence of it would be detected. Therefore, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property of the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The NRC staff further determined, that in order for the licensee to perform the ASME Code-required examinations, the subject components would have to be redesigned placing a burden on the licensee.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal and concludes that ASME Code examination requirements are impractical for the subject components listed in Request for Relief PRR-42, Revision 1, Parts A, B, C, E, F, G, and I. It is further concluded that, if significant service-induced degradation had occurred, there is reasonable assurance that evidence of it would have been detected by the examinations performed by the licensee. For these reasons, in accordance with 10 CFR 50.55a(g)(6)(i), Request for Relief PRR-42, Revision 1, Parts A, B, C, E, F, G, and I, are granted for the Third 10-Year Inservice Inspection Interval at Pilgrim Nuclear Power Station.

Request for Relief PRR-42, Revision 1, Part H, is associated with ASME Examination Category C-F-1 piping Weld GB-14-F34. Limited volumetric examination coverage was obtained, primarily because the licensee did not comply with procedural requirements to sufficiently prepare the surface condition of the weld for adequate ultrasonic accessibility. The licensee stated that PNPS Procedure ENN-NDE-9.10, Revision 0, was the equivalent of EPRI PDI Procedure PDI-UT-10, developed to meet ASME XI, Appendix VIII, Supplement 10 requirements for successful ultrasonic performance demonstration of dissimilar metal welds. The EPRI procedure requires the weld crown and adjacent base material to be prepared in such a way (removed, blended, etc.) as to allow search units to be placed for optimum volumetric examination of the dissimilar metal weld from a single side.

The licensee recognizes this deficiency and has planned for the subject weld to be volumetrically examined using a radiographic technique during the next refueling outage scheduled to occur in 2009. Granting of relief for Weld GB-14-F34 would mitigate these plans and set an unwarranted precedent for licensees that elect not to follow requirements described by performance demonstrated procedures. Therefore, Request for Relief PRR-42, Revision 1, Part H, associated with Weld GB-14-F34, is denied.

The NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) for PRR-42, Revision 1, Parts A, B, C, E, F, G, and I is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Attachment: Table 1

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Date: June 27, 2008

PILGRIM NUCLEAR POWER STATION
Third 10-Year ISI Interval

TABLE 1
SUMMARY OF RELIEF REQUESTS

Relief Request Number	PNNLR R Sec.	System or Component	Exam. Category	Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Disposition
PRR-42, Revision 1 (Part A)	3.1	Pressure retaining welds in reactor vessel	B-A	B1.12 B1.21 B1.30	100% of the inspection volume as defined by Figures IWB-2500-2, -3, or -4, as applicable	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(i)
PRR-42, Revision 1 (Part B)	3.2	Full penetration welds of nozzles in vessels	B-D	B3.90	100% of the inspection volume as defined by Figure IWB-2500-7(a) through (d) as applicable	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(i)
PRR-42, Revision 1 (Part C)	3.3	Dissimilar metal nozzle-to-safe end and piping welds	R-A (former ASME Category B-F)	R1.11 R1.20	100% of the inspection volume as defined by Figures IWB-2500-7, -8, -9, -10, or -11, as applicable	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(I)
PRR-42, Revision 1 (Part E)	3.5	Piping welds governed by a risk-informed program	R-A (former ASME Category B-J)	R1.11 R1.20	100% of the inspection volume as defined by Figures IWB-2500-7, -8, -9, -10, or -11, as applicable	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(i)
PRR-42, Revision 1 (Part F)	3.6	Pressure retaining welds in control rod housings	B-O	B14.10	100% of volume or surface, as defined by Figure IWB-2500-18, of 10% of peripheral control rod drive housings	Volumetric or surface, as applicable	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(i)
PRR-42, Revision 1 (Part G)	3.7	Integral attachments for piping, pumps, and valves	C-C	C3.20	100% of the inspection surface as defined by Figure IWC-2500-5	Surface	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(i)
PRR-42, Revision 1 (Part H)	3.8	Pressure retaining welds in austenitic or high alloy piping	C-F-1	C5.11	100% volumetric and surface as defined by Figure IWC-2500-7	Volumetric and surface	Perform exams to extent practical	Denied
PRR-42, Revision 1 (Part I)	3.9	Pressure retaining welds in carbon or low alloy piping	C-F-2	C5.51	100% volumetric and surface as defined by Figure IWC-2500-7	Volumetric and surface	Perform exams to extent practical	Granted 10 CFR 50.55a(g)(6)(i)