



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 26, 2012

Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES – ONE-TIME RELIEF FROM CERTAIN REQUIREMENTS OF THE
ASME CODE CASE N-770-1 FOR THE FOURTH 10-YEAR INSERVICE
INSPECTION INTERVAL (TAC NO. ME8492)

Dear Sir:

By letter dated April 26, 2012, as supplemented by letters dated April 30, 2012, and May 1, 2012, Entergy Nuclear Operations, Inc. requested relief from certain requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code Case N-770-1, as conditioned by Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g)(6)(ii)(F)(3) for the fourth ten-year inspection interval at Palisades Nuclear Plant (PNP).

On May 3, 2012, the staff verbally authorized the licensee's proposed alternative on one-time basis only. This safety evaluation provides the basis for the staff's prior finding that the licensee's proposed alternative meets the requirements of 10 CFR 50.55a(a)(3)(ii) and the staff's authorization of the licensee's proposed alternative until the next refueling outage to perform the repair/replacement activity.

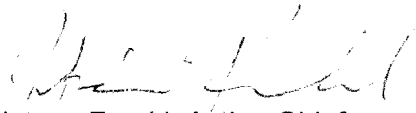
As set forth in the enclosed safety evaluation, the NRC staff determines that the proposed alternative provides reasonable assurance of structural integrity of the subject components and that complying with the requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii). Therefore, the NRC staff authorizes the use of the proposed alternative to Code Case N-770-1 examination requirements until the next refueling outage. At which time, the licensee is expected to be able to meet the examination coverage requirements for these welds.

The letter dated April 26, 2012, attachment 2, provided a commitment made by the licensee with three options for satisfying the commitment. The NRC staff does not agree with the third option regarding the submittal of a relief request, in accordance with the applicable provisions of 10 CFR 50.55a, prior to startup from the planned fall 2013 refueling outage. The NRC staff does not consider this to be an appropriate means to meet the examination coverage requirements of ASME Code Case N-770-1 for these welds during future outages. This was made clear during the verbal authorization on May 3, 2012. The commitment should be changed by the licensee, as the NRC staff does not accept this option.

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If you have any questions, please contact the Project Manager, Mahesh Chawla at 301-415-8371 or via e-mail at Mahesh.chawla@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Istvan Frankl".

Istvan Frankl, Acting Chief
Plant Licensing Branch 3-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure: Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF

FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE CASE N-770-1,

ENTERGY NUCLEAR OPERATIONS, INC

PALISADES NUCLEAR PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated April 26, 2012 (Agencywide Documents Access and Management System Accession No. ML12118A144), and supplemented by letters dated April 30, 2012 (ML121230295), and May 1, 2012 (ML12123A079), Entergy Nuclear Operations, Inc. (the licensee) requested relief from certain requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-770-1, as conditioned by Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g)(6)(ii)(F)(3) for the fourth ten-year inspection interval at Palisades Nuclear Plant (PNP).

On May 3, 2012, the staff verbally authorized the licensee's proposed alternative (ML12130A357). This safety evaluation provides the basis for the staff's prior finding that the licensee's proposed alternative meets the requirements of 10 CFR 50.55a(a)(3)(ii) and the staff's authorization of the licensee's proposed alternative until the next refueling outage to perform the repair/replacement activity.

2.0 REGULATORY EVALUATION

In this relief request, the licensee proposes to use alternatives to the requirements of ASME Code Case N-770-1.

10 CFR 50.55a(g)(6)(ii)(F)(1) requires "licensees of existing, operating pressurized water reactors as of July 21, 2011, shall implement the requirements of ASME Code Case N-770-1, subject to the conditions specified in paragraphs (g)(6)(ii)(F)(2) through (g)(6)(ii)(F)(10) of this section, by the first refueling outage after August 22, 2011."

Enclosure

10 CFR 50.55a(g)(6)(ii)(F)(3) states that baseline examinations for welds in Code Case N-770-1, Table 1, Inspection Items A-1, A-2, and B, shall be completed by the end of the next refueling outage after January 20, 2012. Previous examination of these welds can be credited for baseline examinations if they were performed within the re-inspection period for the weld item in ASME Code Case N-770-1, Table 1 using Section XI, Appendix VIII requirements and met the Code required examination volume of essentially 100 percent. Other previous examinations that do not meet these requirements can be used to meet the baseline examination requirement, provided NRC approval of alternative inspection requirements in accordance with paragraphs (a)(3)(i) or (a)(3)(ii) of this section is granted prior to the end of the next refueling outage after January 20, 2012.

10 CFR 50.55(a)(g)(6)(ii)(F)(4) states that the axial examination coverage requirements of Code Case N-770-1, -2500(c) may not be considered to be satisfied unless essentially 100 percent coverage is achieved.

10 CFR 50.55a(a)(3), states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used when authorized by the Nuclear Regulatory Commission (NRC) if the licensee demonstrates: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on the above analysis, the staff finds that regulatory authority to authorize an alternative to the ASME Code, as requested by the licensee, exists.

3.0 TECHNICAL EVALUATION

3.1 Applicable Code edition and addenda

The current code of record for Palisades Nuclear Power Plant fourth ten-year inservice inspection interval is ASME Code Section XI, 2001 Edition, through 2003 addenda, as conditioned by 10 CFR 50.55a.

3.2 Code Requirements for Which Relief is Requested

Relief is being requested from the examination volume coverage requirements in Code Case N-770-1, "Alternate Examination Requirements and Acceptance Standards for Class 1 PWR [pressurized-water reactor] Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities, Section XI, Division 1" as conditioned by 10 CFR 50.55a(g)(6)(ii)(F)(1), 10 CFR 50.55a(g)(6)(ii)(F)(3), and 10 CFR 50.55a(g)(6)(ii)(F)(4).

3.3 Affected Systems and Components

The licensee is requesting relief for Class 1 PWR pressure retaining Dissimilar Metal (DM) piping and vessel nozzle butt welds containing alloy 82/182 for which 100 percent volumetric examination was not obtained, as shown in Table 1 below.

3.4 Proposed Alternative

As an alternative to the volumetric examination coverage requirements of ASME Code Case N-770-1, the licensee proposes to perform the following:

- Periodic system pressure tests in accordance with ASME Section XI Examination Category B-P, Table IWB-2500-1
- Conduct ultrasonic examinations to the maximum extent practical
- Perform plant personnel walk downs of Class 1 systems inside containment during refueling outages
- Perform dye penetrant surface examinations of the inspection Item B welds

The licensee is considering several options to address the inability to obtain full coverage in the 2012 refueling outage, which include weld overlay, nozzle removal and weld pad with half nozzle installation, machine removal of existing heat affected zone material and installation of new primary water stress-corrosion cracking (PWSCC) resistant weld, or alternative inspection approaches.

Table 1: Inspection Coverages

Component ID	Description/NPS	Circ Scan for Axial Flaws (percent)	Axial Scan for Circ Flaws (percent)	Total Coverage (percent)
PCS-2-DRL-1A1-1	2" Nozzle to Pipe Weld	0	0	0
PCS-2-DRL-1B1-1	2" Nozzle to Pipe Weld	0	0	0
PCS-2-CHL-1A1-17	2" Nozzle to Pipe Weld	40.6	66.6	53.6
PCS-2-DRL-2A1-1	2" Nozzle to Pipe Weld	75	100	88
PCS-3-PSS-1B1-1	3" Nozzle to Elbow Weld	72.8	63.6	68.2
PCS-3-PSS-2A1-1	3" Nozzle to Elbow Weld	72.8	63.6	68.2
PCS-4-PRS-1P1-1	4" Nozzle to Safe-End	12.5	82.1	47.3

3.5 Licensee's Basis for Request

The ultrasonic testing techniques proposed for each weld were reviewed to determine the amount of examination coverage that could be achieved. Surface conditioning was performed as appropriate to obtain the maximum amount of coverage. However, due to various weld configurations, only limited examination volume coverages were possible for applicable circumferential and axial scans.

The operating temperature of a component is a primary factor influencing the initiation of PWSCC. Research by the Electronic Power Research Institute indicates that the difference in the operating temperature between hot leg locations and cold leg locations is sufficient to

significantly influence the time to initiation of PWSCC, with the susceptibility increasing with temperature. The research reports PWSCC is least likely to occur in cold leg temperature penetrations.

Other than the pressurizer weld, the welds covered by this relief are found in lower temperature regions of the system, typically at temperatures near to Tcold, which is approximately 537 degrees Fahrenheit. The licensee states that there is a lower probability of crack initiation, and a slower crack growth rate under these colder conditions.

No flaws have been found in the welds for which relief is requested. If flaws were to be found, the leak detection methodology presently used by industry is very sensitive. After a number of recent operating events, the industry imposed a Nuclear Energy Institute 03-08 "needed" requirement, to improve leak detection capability. As a result, virtually all pressurized water reactors in the United States, including Palisades, have a leak detection capability of less than or equal to 0.1 gallons per minute. All plants also monitor seven day moving averages of reactor coolant system leak rates.

Action response times following a leak detection vary, based on the action level exceeded and range up to containment entry to identify the source of the leak. The licensee has incorporated the appropriate action levels into their operating procedures.

Therefore, the licensee proposes that, with the periodic system pressure tests, outage system walk downs, and leakage monitoring, and the surface examinations performed during the 2012 refueling outage, an acceptable level of quality and safety is provided for identifying degradation from PWSCC prior to a safety significant flaw developing.

3.6 NRC Staff's Evaluation

The staff reviewed the licensee's proposed alternative under the requirements of 10 CFR 50.55a(a)(3)(ii), such that:

"Compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

Without the proposed alternative, the licensee stated that they would need to mitigate or redesign each of the subject welds. This work has not been fully designed or planned, but the licensee estimated radiological doses that range between 23-90 roentgen equivalent man (rem) for each of the welds included in the request, with a total estimated dose of 347 rem. The licensee performed an assessment of implementing Eddy Current Testing of the pressurizer nozzle to piping transition piece weld. It would require special tooling, a mockup, procedure development and qualification of the process, all of which would take significant time to develop and implement. In addition, the dose rate at the pressurizer manway is approximately 800 millirem per hour and would result in significant worker exposure. The licensee also provided information on performing an inside diameter surface examination for each of the remaining welds covered in this relief request. In all cases, performing a surface examination would require hardship, ranging from a full core offload to developing special tooling and qualification for each of the welds. The NRC staff finds this radiological dose presents an unusual difficulty in performing a volumetric examination due to the geometry of these welds and implementing a mitigation technique or repair to achieve an inspectable volume during the

2012 refueling outage to be a significant hardship in order to meet ASME Code inspection requirements. Therefore, the staff finds the licensee has identified sufficient hardship under 10 CFR 50.55a(a)(3)(ii).

The licensee proposes to address the inspection limitations for each of the welds during the current spring 2012 refueling outage by conducting a system pressure test, ultrasonic examinations to the maximum extent practical, a boric acid corrosion control program walk-down to look for indications of leakage and by performing dye penetrant surface examinations of each of the Inspection Item B welds.

In order to address the pressurizer nozzle to piping transition piece weld, the licensee also performed a postulated flaw analysis for crack growth due to PWSCC. The evaluation, provided in supplemental letter dated April 30, 2012, indicates that a postulated initial crack of a conservative size would take approximately 25 years to grow beyond the allowable flaw depth. The flaw analysis shows that even if a flaw were to have initiated when the weld was first put in service, leakage should not occur during the duration of the proposed alternative. NRC staff reviewed the licensee's flaw analysis and found it to have reasonably conservative assumptions regarding initial flaw size, residual stress profile and crack growth rate. Therefore, given the licensee's lack of coverage for axial flaws, the NRC staff finds reasonable assurance of leaktightness for this weld during the period of the proposed alternative. Additionally, the staff performed a circumferential flaw analysis that provided reasonable assurance of the weld's structural integrity through the next cycle of operation.

For the Inspection Item B welds, the NRC staff notes that the current inspection requirements were recently imposed on the licensee. These inspections required the first volumetric examination of these welds during plant life. As these inspections are required to be performed by all licensees during the first refueling outage starting after January 20, 2012, the NRC expected licensees to complete these exams across the fleet by the spring 2014 refueling outage season. The licensee's best effort inspection coverage combined with surface examinations and system walk downs provides confidence in the structural integrity and leaktightness of these component welds during this outage. As these welds are located in the cold leg of the reactor coolant system loop, the average temperature significantly lowers the susceptibility of these welds to the initiation and crack growth rate of PWSCC. Further, the licensee has not identified any indications of PWSCC in any dissimilar metal weld in the reactor coolant system, including the more temperature susceptible welds in the hot leg and pressurizer locations. Therefore, given the licensee's hardship the NRC staff finds extension of the baseline examination of the Inspection Category B welds of the licensee's proposed alternative for one cycle of operation acceptable.

The licensee committed to perform appropriate action to meet ASME Section XI Code Case N-770-1 baseline examinations for those dissimilar metal welds not meeting the examination coverage requirements during the 2012 refueling outage prior to startup from the planned fall 2013 refueling outage. These options include: 1) compliance with N-770-1 requirements, or 2) removal of the subject locations from the scope of ASME Section XI Code Case N-770-1, or 3) submittal of relief request in accordance with the applicable provisions of 10 CFR 50.55a. The NRC staff does not agree that the third option, which is submittal of a relief request, is an appropriate means to meet the examination coverage requirements of ASME Code Case N-770-1 for these welds during future outages.

In conclusion, the NRC staff's review finds the licensee's proposed alternatives will provide reasonable assurance of structural integrity until the next scheduled refueling outage, when the licensee shall perform a permanent mitigation, repair or meet ASME Section XI Code Case N-770-1 baseline examinations for the dissimilar metal welds.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the proposed alternative provides reasonable assurance of structural integrity of the subject components and that complying with the requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii). Therefore, the NRC staff authorizes the use of the proposed alternative to Code Case N-770-1 examination requirements until the next refueling outage. At which time, the licensee is expected to be able to meet the examination coverage requirements for these welds.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Margaret Audrain

Date: September 26, 2012

If you have any questions, please contact the Project Manager, Mahesh Chawla at 301-415-8371 or via e-mail at Mahesh.chawla@nrc.gov.

Sincerely,

/RA/

Istvan Frankl, Acting Chief
Plant Licensing Branch 3-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure: Safety Evaluation

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