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Technical Evaluation Report on the Third 10-Year Interval Inservice Inspection Program Plan: Consumers Power Company, Palisades Nuclear Plant, Docket Number 50-255

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Attachment

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ABSTRACT

This report presents the results of the evaluation of the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, submitted September 6, 1995, including the requests for relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, requirements that the licensee has determined to be impractical. The *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, is evaluated in Section 2 of this report. The inservice inspection (ISI) plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission reviews. The requests for relief are evaluated in Section 3 of this report.

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SUMMARY

The licensee, Consumers Power Company, has prepared the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, to meet the requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. The third 10-year interval began May 12, 1995, and will end on May 11, 2005.

The information in the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, submitted September 6, 1995, was reviewed. Included in the review were the requests for relief from the ASME Code Section XI requirements that the licensee has determined to be impractical. As a result of this review, requests for additional information (RAI) were prepared describing the information and/or clarification required from the licensee in order to complete the review. The licensee provided the requested information in submittals dated February 19, 1996, and June 24, 1996.

Based on the review of the Program Plan, the licensee's response to the Nuclear Regulatory Commission's RAI, and the recommendations for granting relief from the ISI examinations that cannot be performed to the extent required by Section XI of the ASME Code, no deviations from regulatory requirements or commitments were identified in the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0.

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TECHNICAL EVALUATION REPORT ON THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN: CONSUMERS POWER COMPANY, PALISADES NUCLEAR PLANT, DOCKET NUMBER 50-255

1. INTRODUCTION

Throughout the service life of a water-cooled nuclear power facility, 10 CFR 50.55a(g)(4) (Reference 1) requires that components (including supports) that are classified as American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, Class 2, and Class 3 meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, (Reference 2) to the extent practical within the limitations of design, geometry, and materials of construction of the components. This section of the regulations also requires that inservice examinations of components and system pressure tests conducted during successive 120-month inspection intervals comply with the requirements in the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein. The components (including supports) may meet requirements set forth in subsequent editions and addenda of this Code that are incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein, and subject to Nuclear Regulatory Commission (NRC) approval. The licensee, Consumers Power Company (CPC), has prepared the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, (Reference 3) to meet the requirements of the 1989 Edition of the ASME Code, Section XI. The third 10-year interval began May 12, 1995, and will end on May 11, 2005.

Pursuant to 10 CFR 50.55a(a)(3), proposed alternatives to the Code requirements may be used when authorized by the NRC. The licensee must demonstrate either that the proposed alternatives provide an acceptable level of quality and safety, or that Code compliance would result in hardship or unusual difficulty without a compensating increase in safety. Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee determines that conformance with certain Code examination requirements is impractical for its facility, the licensee shall submit information to the NRC to support that determination. Pursuant to 10 CFR 50.55a(g)(6)(i), the NRC will evaluate the licensee's determination that Code requirements are impractical. The NRC may grant relief and may impose alternative requirements that it determines to be authorized by law, will not endanger life, property, or the common defense and security, and are 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 information in the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, submitted September 6, 1995, was reviewed, including the requests for relief from the ASME Code Section XI requirements that the licensee has determined to be impractical. This review was performed using the standard review plans of NUREG-0800, Section 5.2.4, "Reactor Coolant Boundary Inservice Inspections and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components" (Reference 4).

In letters dated December 19, 1995 (Reference 5) and April 23, 1996 (Reference 6), the NRC requested additional information that was necessary to complete the review of the inservice inspection (ISI) program plan. The requested information was provided by the licensee in "Response to Request for Information - Inservice Inspection Program Plan", dated February 19, 1996 (Reference 7) and June 24, 1996 (Reference 8). In these responses, Consumers Power Company provided the requested information, revised several requests for relief, and submitted one new request for relief.

The *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant is evaluated in Section 2 of this report. The ISI program plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during the NRC's previous reviews. The requests for relief are evaluated in Section 3 of this report. Unless otherwise stated, references to the Code refer to the ASME Code, Section XI, 1989 Edition. Inservice test programs for pumps and valves and for snubbers are being evaluated in other reports.

2. EVALUATION OF INSERVICE INSPECTION PROGRAM PLAN

This evaluation consists of a review of the applicable program documents to determine whether or not they are in compliance with the Code requirements and any previous license conditions pertinent to ISI activities. This section describes the submittals reviewed and the results of the review.

2.1 Documents Evaluated

Review has been completed on the following information from the licensee:

- *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, dated September 6, 1995 (Reference 3)

- Licensee's "Response to Request for Additional Information - Inservice Inspection Program", dated February 19, 1996 (Reference 7) and

- Licensee's "Response to Request for Additional Information - Inservice Inspection Program", dated June 24, 1996 (Reference 8).

2.2 Compliance with Code Requirements

2.2.1 Compliance with Applicable Code Editions

Inservice inspection program plans are to be based on Section XI of the ASME Code editions defined in 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(b). The third interval at Palisades Nuclear Plant began May 12, 1995; therefore, the Code applicable to the third interval ISI program is the 1989 Edition. As stated in Section 1 of this report, the licensee has prepared the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant to meet the requirements of 1989 Edition of the ASME Code.

In accordance with 10 CFR 50.55a(c)(3), 10 CFR 50.55a(d)(2), and 10 CFR 50.55a(e)(2), ASME Code cases may be used as alternatives to Code requirements. Code cases that the NRC has approved for use are listed in Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability*, (Reference 9) with any additional conditions the NRC may have imposed. When used, these Code cases must be implemented in their entirety. Published Code cases awaiting approval and subsequent listing in Regulatory Guide 1.147 may be adopted only if the licensee requests, and the NRC authorizes, their use on a case-by-case basis.

The licensee's third 10-year ISI program includes the Code cases listed below. These Code cases either have been approved for use in Regulatory Guide 1.147 or are included as requests for relief.

Code Case N-311	*Alternative Examination of Outlet Nozzle on Secondary Side of Steam Generators*
Code Case N-416-1	*Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3* (Relief Request PR-01, Approved for use by NRC Safety Evaluation Report dated April 13, 1995)
Code Case N-457	*Qualification Specification Notch Location for Ultrasonic Examination of Bolts and Studs*
Code Case N-460	*Alternative Examination Coverage for Class 1 and 2 Welds*
Code Case N-461	*Alternative Rules for Piping Calibration Block Thickness*
Code Case N-463-1	*Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping that Exceed the Acceptance Standards of IWB-3514.2*
Code Case N-481	*Alternative Examination Requirements for Cast Austenitic Pump Casings*
Code Case N-489	*Alternative Rules for Level III NDE Qualification Examinations*
Code Case N-491	*Alternative Rules for the Examination of Class 1, 2, and 3 and MC Components and Supports of Light Water Cooled Power Plants*
Code Case N-494	*Pipe Specific Evaluation Procedures and Acceptance Criteria for Flaws in Class 1 Ferritic Piping that Exceed the Acceptance Standards of IWB-3514.2*
Code Case N-498-1	*Alternative Rules for 10-Year Systems Hydrostatic Testing for Class 1, 2, and 3 Systems* (Relief Request PR-03, Approved for use by NRC Safety Evaluation Report dated February 27, 1995).
Code Case N-524	*Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping* (Evaluated in Relief Request No. RR-10)

2.2.2 Acceptability of the Examination Sample

Inservice volumetric, surface, and visual examinations shall be performed on ASME Code Class 1, 2, and 3 components and their supports using sampling schedules described in Section XI of the ASME Code and 10 CFR 50.55a(b). Sample size and weld selection

procedures have been implemented in accordance with the Code and 10 CFR 50.55a(b) and appear to be correct.

2.2.3 Exemption Criteria

The criteria used to exempt components from examination shall be consistent with Paragraphs IWB-1220, IWC-1220, IWC-1230, IWD-1220, and 10 CFR 50.55a(b). The exemption criteria have been applied by the licensee in accordance with the Code, as discussed in the ISI program plan, and appear to be correct.

2.2.4 Augmented Examination Commitments

In addition to the requirements specified in Section XI of the ASME Code, the licensee has committed to perform the following augmented examinations:

- Volumetric examination of selected welds in the Regenerative Heat Exchanger every 5 years (maximum),
- Volumetric examination of the upper reactor coolant pump flywheels once each refueling outage per Regulatory Guide 1.14 (Reference 10), and
- Volumetric examination of welds in high-energy piping systems located outside containment once each inspection interval per Technical Specification 4.12.

2.3 Conclusion

Based on the review of the documents listed in Section 2.1, no deviations from regulatory requirements or commitments were identified in the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0.

3. EVALUATION OF RELIEF REQUESTS

The requests for relief from the ASME Code requirements that the licensee has determined to be impractical for the third 10-year inspection interval are evaluated in the following sections.

3.1 Class 1 Components

3.1.1 Reactor Pressure Vessel

3.1.1.1 Request for Relief No. RR-2 (Rev. 2/19/96), Examination Category B-A, Item B1.40, Reactor Pressure Vessel (RPV) Head-to-Flange Weld

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-A, Item B1.40, requires 100% surface and volumetric examination of the RPV vessel head-to-flange weld as defined by Figure IWB-2500-5.

Licensee's Code Relief Request—Relief is requested from volumetric examination of the RPV vessel head-to-flange weld to the extent required by the Code.

Licensee's Basis for Requesting Relief (as stated)—

"Due to the component design configuration (Reference Drawing 232-118)[a] relating to the weld and flange proximity, the ultrasonic examination which is performed is limited in that the Code-required volume for examination cannot be achieved in all scanning paths.

"The axial angle beam scan from the head side with the beam direction toward the flange will allow examination of approximately 90% of the required volume in region A-B-C-D as noted in Figure IWB-2500-5. Limitations which reduce the exam volume to 90% are caused by the 3 lifting lugs (Part 127-113) and by the insulation ring (Part 118-06) which are welded to the head.

"The head flange is in close proximity to the weld (6-118A), so the scan lengths are limited in the axial angle direction from the flange towards the head. The required volumetric examination in region A-B-C-D as noted in Figure IWB-2500-5 will be limited to 26% of the required volume.

"The total examination volume of region A-B-C-D as referenced in Figure IWB-2500-5 will be 26% with angle beams crossing paths in two directions when scanning in the axial direction. The transverse scans of the weld are not limited."

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a. Drawings are not included with this evaluation.

Licensee's Proposed Alternative Examination (as stated)—

"The accessible volume of the weld will be examined in lieu of the 100% volumetric examination requirements. The required surface examination will be performed on the entire weld length as required by Section XI."

Evaluation—The Code requires 100% surface and volumetric examination of the RPV head-to-flange weld. To meet this requirement, the weld must be ultrasonically examined in two axial directions and two circumferential directions. However, scanning in the axial directions to the extent required is not possible because of the flange below the weld and lifting lugs above the weld. As a result, the Code-required examination is impractical for the subject weld. To satisfy the Code requirement, the RPV head must be modified to eliminate the scanning restrictions. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee can examine 90% of the required volume in one axial direction and 26% in the second axial direction. In addition, 100% coverage can be obtained in the two circumferential directions, as well as in the surface examination. As a result, it can be concluded that patterns of degradation, if existing, will be detected, providing reasonable assurance of the structural integrity of the head-to-flange weld.

Conclusion—The licensee's proposed alternative, to examine the head-to-flange weld to the extent practical, provides reasonable assurance of the continued structural integrity of the subject weld. As a result, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.1.2 Request for Relief No. RR-8, (Rev. 2/19/96), Examination Category B-A, Item B1.21, Reactor Pressure Vessel (RPV) Closure Head Weld 6-118B

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-A, Item B1.21, requires a 100% volumetric examination, as defined by Figure IWB-2500-3, of the accessible length of all RPV circumferential head welds.

Licensee's Code Relief Request—Relief is requested from performing the Code-required volumetric examination of RPV closure head circumferential Weld 6-118B.

Licensee's Basis for Requesting Relief (as stated)—

"Weld 6-118B is located between the second and third row of Control Rod Drive Mechanism Penetrations in the dome of the reactor vessel closure head. These penetrations are approximately nine inches apart and are staggered in positions that make this weld inaccessible for any type of volumetric examination (Reference Drawings 232-118 and 232-139)[b].

"This weld was fabricated and examined prior to the installation of the CRDM penetrations and is not accessible for an inservice examination."

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b. Drawings are not included with this evaluation.

Licensee's Proposed Alternative Examination (as stated)—

"Perform VT-2 system leakage tests at each refueling outage as required. No attempt will be made to volumetrically examine this weld."

Evaluation—The Code requires volumetric examination of the accessible lengths of all RPV circumferential head welds. However, the subject head weld is located between the second and third row of control rod drive mechanisms (CRDMs) and is inaccessible for examination. Therefore, the Code-required volumetric examination is impractical for this weld. Examination from the inside surface is also impractical due to the CRDMs and the high radiation fields associated with the vessel head. To gain access for examination, the vessel head would require significant design modifications. Imposition of this requirement would create a significant burden on the licensee.

Due to the location of the weld within the CRDMs, it cannot be examined. However, the licensee is examining a significant portion of the closure head-to-flange weld and the connecting meridional closure head welds. These examinations indicate the condition of the subject head welds, providing reasonable assurance of the structural integrity of the RPV closure head circumferential weld.

Conclusion—Volumetric examination of the subject weld is impractical due to inaccessibility. Imposing the Code requirement on the licensee would necessitate modifying the vessel head, which would be a burden. The licensee is examining other RPV head welds, providing reasonable assurance of the structural integrity of the head welds. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.1.3 Request for Relief No. RR-9, Examination Category B-D, Items B3.90 and B3.100, Reactor Pressure Vessel (RPV) Nozzle-to-Vessel Welds and Inside Radius Sections

By letter dated June 24, 1996, the licensee withdrew Request for Relief No. RR-9.

3.1.1.4 Request for Relief No. RR-11 (Rev. 2/19/96), Examination Category B-A, Item B1.22, Reactor Pressure Vessel (RPV) Lower Head Meridional Welds

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-A, Item B1.22, requires a volumetric examination as defined by Figure IWB-2500-3 for the accessible length of all reactor pressure vessel meridional head welds.

Licensee's Code Relief Request—Relief is requested from performing the volumetric examination to the extent required by the Code for the following meridional welds: 1-113A at 0°, 1-113B at 60°, 1-113C at 120°, 1-113D at 180°, 1-113E at 240°, and 1-113F at 300°.

Licensee's Basis for Requesting Relief (as stated)—

"The six (6) lower head meridional welds in the reactor vessel are not fully accessible, such that, 100% of the entire length of the weld volumes can not be achieved during an ultrasonic examination from inside of the reactor vessel using remotely operated examination equipment. The limitation on the exam is caused by

an internally installed flow ring, a permanent 360° attachment in the upper part of the lower head. The flow ring covers up to the top half of the meridional welds and prevents direct access for scanning. Following are the coverages which were achieved during the past examination:

1.	Meridional Weld 113A at 0°	47%
2.	Meridional Weld 113B at 60°	53%
3.	Meridional Weld 113C at 120°	53%
4.	Meridional Weld 113D at 180°	47%
5.	Meridional Weld 113E at 240°	53%
6.	Meridional Weld 113F at 300°	53%

"Two drawings are provided to support this relief request, the first drawing (232-113)[c] is a copy from the vendor file and is the best available drawing to show the reactor vessel bottom head forming and welding.

"The second drawing (Sketch NTD-MNA-DSD9515, sheet 17 of 43) is taken from the Westinghouse final report to Palisades for the June 1995 reactor vessel examination. This cross sectional drawing details the limitations created by the flow ring and the transducers which were used for the examination of these lower head welds.

"Manual ultrasonic examination from the exterior of the vessel would not be feasible due to the large amount of dose required to set-up lighting, prep the examination areas, ultrasonically examine the portions of the weld which were inaccessible from the ID, and demobilize from the area. The contact dose on the lower head is 2.5R and the general dose levels in the room range from 1.5 to 2R. The expected dose expended to complete this scope of work could easily exceed 20R. The expected benefit of obtaining this data does not outweigh the consequences of exposing personnel to this cumulative dose.

"Additionally, there were no indications in the portions of the weld which were examined from the ID using the mechanized tool."

Licensee's Proposed Alternative Examination (as stated)—

"The accessible weld volumes of each of the 6 identified meridional welds will be ultrasonically examined from the ID using remotely operated mechanized equipment once per interval during the performance of the ten year reactor vessel examination."

Evaluation—The Code requires volumetric examination of the accessible length of the bottom head meridional welds. However, access to the subject welds from the inside surface is restricted by a flow ring that limits examination coverage to approximately 50% of the required volume. Access to these welds from the outside surface is possible, but is

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c. Drawings are not included with this evaluation.

not desirable due to ALARA considerations. The licensee estimates a dose of approximately 20 man-Rem to prepare the examination areas and perform a manual examination from the outside surface. Imposition of this requirement would create a considerable burden (in radiation exposure) on the licensee.

In lieu of performing the volumetric examination to the extent required by the Code, the licensee will examine the six meridional welds from the inside surface to the extent practical using mechanized inspection equipment. A considerable portion (~50%) of the Code-required volume will be examined, and this examination should detect significant patterns of degradation that may occur in the meridional head welds. As a result, it can be concluded that these volumetric examinations will provide reasonable assurance of the structural integrity of the subject welds.

Conclusion—Access for examination of the subject welds from the inside surface is restricted by a flow ring and manual ultrasonic examinations from the outside surface would cause excessive radiation exposure to plant personnel. Imposition of the Code coverage requirements would result in hardship without a compensating increase in quality and safety. The examinations that can be performed from the inside surface will provide reasonable assurance of structural integrity for the lower head meridional welds. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

3.1.2 Pressurizer

3.1.2.1 Request for Relief No. RR-6 (Part 1, Rev. 9/16/96), Examination Category B-B, Items B2.11, B2.21, and B2.22, Pressurizer Shell and Head Welds

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-B, Item B2.11 requires a volumetric examination as defined by Figure IWB-2500-1 for 100% of the length of both pressurizer circumferential shell-to-head welds.

Examination Category B-B, Items B2.21 and B2.22 require volumetric examination, as defined by Figure IWB-2500-1, for 100% of the length of one circumferential weld and one meridional weld on each head.

Licensee's Code Relief Request—Relief is requested from performing the 100% volumetric examination on the following pressurizer welds:

Table RR-6 (Part 1)

Item	Description	Weld #	Approximate Coverage*
B2.11	Upper shell-to-head	5-988	83%
	Lower shell-to-head	3-982	83%
B2.21	Lower head circumferential	2-984	0%
B2.22	Upper head meridional	1-983A	99%
		1-983B	60%
		1-983C	60%
		1-983D	60%
	Lower head meridional	1-984A	25%
		1-984B	25%
		1-984C	25%
		1-984D	25%

* Cumulative coverage summary based on licensee's partial coverage estimates, excluding 0° scans.

Licensee's Basis for Requesting Relief (as stated)—

"Welds 5-988 & 3-982

"Volumetric examination of Welds 5-988 and 3-982 as required to satisfy the examination region E-F-G-H (as referenced in Figure IWB-2500-1(b)) will be limited due to the transition slope from the shell to the heads. Scanning distances are limited by the insulation support rings located on the shell side 7 inches from the centerline of the welds (Reference Drawings 231-982 and 231-988)[d]. Percentage of the volumetric examination of the region E-F-G-H as referenced in IWB-2500-1(b) will be as follows:

1. 0° scanning of region E-F-G-H will examine approximately 62% of the required volume.

2. Axial angle beam examinations with the beam direction from the head towards the shell will examine approximately 81% of the required volume.

3. Axial angle beam examinations with the beam direction from the shell towards the head will examine approximately 68% of the required volume.

d. Drawings are not included with this evaluation.

4. The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain approximately 92% of the required examination volume E-F-G-H.

"Weld 2-984

"Due to the component design configuration with relation to the pressurizer heater penetrations in the lower head, Weld 2-984 is totally inaccessible for any type of a volumetric or surface examination. This weld is located inside the lower support skirt and lies between the second and third rows of heater penetrations, (Reference Drawing CE 231-988).

"The location of the support skirt which is welded to the head near the edge of Weld 2-984 does not allow access from the upper side of the weld. Due to the spacing of the heater penetrations, at approximately four inches apart, and the angle of each penetration through the lower head, examination from the bottom of the welds towards the upper side is not possible, (Reference Drawing CE 231-987). Therefore, no examinations are planned for this weld other than VT-2 system leakage tests.

"Welds 1-983A through D

"On Weld 1-983A at 180°, the total required volumetric examination of region E-F-G-H, (as referenced in Figure IWB-2500-3) will be limited to 99% due to a welded insulation support stud attached near the weld in a 1 inch area. This support stud will prevent scanning in this region with 0°, the axial angle beam scans and the transverse scans. Examination of this weld will satisfy the Section XI, Category B-B, Item Number B2.22 requirement to examine one weld within this head. As mentioned above, CPCO will also examine the remaining 3 welds within the head as a conservative measure. The following is discussion of the remaining welds and the limitations which will be encountered.

"Welds 1-983B and 1-983D are limited in total volumetric examination of region E-F-G-H due to 1 inch upper level nozzles located in the area of interest. There are two nozzles per weld, one on each side of the meridional welds 1-983B and 1-983D. These nozzles are each four inches wide at the base (Reference Drawing 231-985) and when welded into the upper head the base of the nozzles extend to approximately 6.5 inches, including the weld area of the nozzles. The centerline of each nozzle is approximately six inches from the centerline of the meridional welds.

"This nozzle limitation will affect 17% of the total length of the two meridional welds. There are no other limitations noted on the remaining 83% of these welds. Therefore, the total volumetric examination of region E-F-G-H will be all of the 83% of the weld that has no limitations.

"In the area of the 17% limitations, the total examination volume of region E-F-G-H will be 25% with two angle beams crossing paths in two different directions. The

0° scan will examine approximately 75% of the required volume. The transverse scans will examine approximately 85% of the required volume in the 17% limitation area.

"On meridional weld 1-983C, the 16 inch manway reduces the total length of the weld by approximately 12%. The 88% of the weld that does exist is limited due to two insulation support studs on the weld. These insulation support studs are located approximately 12 inches and 39 inches from the centerline of weld 5-988 and are approximately one inch in length. These limitations will cause a reduction in the total required volume of 2.5%. The total required volumetric examination in region E-F-G-H will be 97.5% of the remaining 88% of the weld length with all required scans.

"Welds 1-984A through D

"Approximately 75% of the lower head meridional Welds 1-984A through D are totally inaccessible due to the support skirt, the skirt bracket assembly and the heater penetrations (Reference Drawing 231-984).

"Approximately nine to ten inches of the lower head meridional welds are accessible from the centerline of the lower shell to the lower head weld (3-982) down to the welded support skirt. This accessible area represents 25% of the total weld length for each weld.

"Of this accessible 25% of the total weld length, the total volumetric examination of region E-F-G-H as referenced in Figure IWB-2500-3 will be 100% for all required scans. Therefore, this volume on all four lower meridional welds will be examined in lieu of the Code required 100% examination of one weld length."

Licensee's Proposed Alternative Examination (as stated)—

"The accessible volumes as identified above will be examined in lieu of the 100% volumetric examination requirements.

Evaluation—The Code requires a 100% volumetric examination of the subject pressurizer welds. However, access to these welds is restricted by physical obstructions which limit examination coverage. Examination of the shell-to-head welds is limited by the transition slope and insulation support rings, and examinations of the lower head circumferential and meridional welds are limited by the support skirt and heater penetrations. Therefore, the Code-required coverages are impractical for these welds. To meet the coverage requirements of the Code, the pressurizer would require design modifications to improve access for examination. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee proposes to perform the examinations to the extent practical. Based on the significant (~83%) percent of each of the shell-to-head welds that will be examined, degradation, if it exists, should be detected, thereby providing reasonable assurance of the continued structural integrity of the pressurizer shell-to-head welds.

For the lower head meridional welds (1-984A through D), complete examination of one weld is not possible. The licensee proposes to examine the accessible portion (~25%) of each weld; combined, this is equivalent to the length of one weld. As a result, significant patterns of degradation, if any, should be detected, thereby providing reasonable assurance of the continued structural integrity of the lower head meridional welds.

For lower head circumferential Weld 2-984, examination is completely obstructed by the support skirt and heater penetrations, which restrict access into the area. However, the upper head circumferential weld is also required to be examined, along with the accessible portions of the meridional welds on both the upper head and lower head. These examinations should detect any significant patterns of degradation that may occur in the pressurizer heads and provide reasonable assurance of the continued structural integrity for the lower head circumferential welds.

For the upper head meridional welds (1-983A through D), the licensee can examine 99% of the required volume of one weld and over 60% of each of the three remaining welds. Since the Code only requires the examination of one weld, the licensee has met the Code requirements for the upper head welds and relief is not required.

Conclusion—To perform the subject examinations to the extent required by Code is impractical due to component configuration, and in some cases, adjacent obstructions (i.e., other nozzles, insulation studs). Considering the burden associated with imposing the Code requirements and the significant portion of the pressurizer welds that will be examined, reasonable assurance of structural integrity of the subject pressurizer welds is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.2.2 Request for Relief No. RR-6 (Part 2, Rev. 9/16/96), Examination Category B-D, Item B3.110, Pressurizer Nozzle-to-Vessel Welds

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.110 requires 100% volumetric examination, as defined by Figure IWB-2500-7, of all pressurizer nozzle-to-vessel welds.

Licensee's Code Relief Request—Relief is requested from 100% volumetric examination of the following pressurizer nozzle-to-vessel welds:

Table RR-6 (Part 2)

Item	Description	Weld #	Approximate Coverage*
B3.110	Nozzle-to-shell	1-986	61%
		3-985	71%
		8-986	63%
		8-986A	63%
		8-986B	63%
		8-986C	63%

* Cumulative coverage summary based on licensee's partial coverage estimates, excluding C° scans.

Licensee's Basis for Requesting Relief (as stated)—

"Weld 1-986

"Weld 1-986, is the 4 inch spray line nozzle to upper head weld. Based on previous examination data and a thorough review of the design drawings, it has been determined that examination of this weld is limited. The limitation is due to nozzle 7-986 in the scanning area from the head side. This limitation will result in a loss of accessible examination length of 8.7 inches or approximately 24% of the total length of the weld.

"Approximately 84% of the total required examination volumes for the regions outlined in Figure IWB-2500-7(a) can be achieved with angle beam direction from the head side towards the nozzle. This takes into account the volumes that can be examined within the 8.7 inch limitation area (Reference Drawings 231-983 and 231-986)".

"Total required examination volumes that can be obtained with the 0° scan will equal approximately 54% due to the configuration of the weld and the nozzle.

"Transverse scan of the total required exam volumes with two angle beams in both the clockwise and the counter clockwise directions will equal approximately 81% of the required volume.

"Due to the configuration, no examinations can be performed from the nozzle side towards the head.

"Weld 3-985

e. Drawings are not included with this evaluation.

"Weld 3-985, is the 12 inch surge line nozzle to lower head weld. Based on previous examination data and a thorough review of the design drawings, it has been determined that examination of this weld is limited. The limitation is due to the design configuration and the inability to scan three locations of the weld due to insulation studs welded at the toe of the weld (Reference Drawings 231-984 and 231-985).

"Insulation studs result in a loss of approximately 7% of the scanning surface when scanning from the head side towards the nozzle. The 93% of the accessible examination area will be volumetrically examined from the head side towards the nozzle and will result in 100% examination of regions C-D-E-F and B-C-F-G and 84% of region A-B-G-H-I as referenced in Figure IWB-2500-7(a).

"The volumetric examination of region A-B-G-H-I from the nozzle side will examine approximately 34%, approximately 5% of region B-C-F-G will be examined in this direction and approximately 25% of exam volume C-D-E-F will be examined in this direction.

"The total required examination volume of regions referenced in Figure IWB-2500-7(a) with the transverse scan of Weld 3-985 will equal 84% with two angle beams in both the clockwise and counter clockwise directions.

"<u>Welds 8-986A, 8-986B and 8-986C</u>

"Weld 8-986 is the PORV outlet nozzle to upper head weld, Weld 8-986A, B, C are the Code safety nozzles to head welds. Volumetric examination of these welds will be limited due [to] the design configuration of the head and other limitations described below (Reference Drawings 231-983 and 231-986). The following discussion is applicable to all four welds.

"The 0° scan is limited to 10% of the total required examination volume in the attachment weld region (B-C-F-G) and the nozzle cylinder region (A-B-G-H-I). In the adjoining region (C-D-E-F) the required examination volume for the 0° scan will be 81% due to the limitations produced by insulation studs welded in the area of interest and by the interference of the adjacent nozzles.

"Based on a review of the drawings and past examination data, the angle beam scans from the head side towards the nozzle will allow examination of 81% of the examination regions identified on Figure IWB-2500-7(a). This takes into account the configuration and scanning limitations caused by the insulation studs and the proximity of the other nozzles.

"Transverse scans with two angle scanning in both the clockwise and counter clockwise directions will examine 81% of the required volume in the regions referenced in Figure IWB-2500-7(a).

"Volumetric examination from the nozzle side is limited in all cases and results in examination of 10% of the required volumes."

Licensee's Proposed Alternative Examination (as stated)—
"The accessible volumes as identified above will be examined in lieu of the 100% volumetric examination requirements."

Evaluation—The Code requires 100% volumetric examination of all pressurizer nozzle-to-vessel welds. However, complete examination of the subject nozzle-to-vessel welds is impractical due to component configuration, and in some cases, adjacent obstructions (i.e., other nozzles, insulation studs). To meet the coverage requirements of the Code, design modifications would be necessary to improve access for examination of the pressurizer. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee proposes to examine a substantial portion (60%) of the Code-required volume for each of the nozzle-to-vessel welds. Based on the significant percentages of the welds that are being examined, it is reasonable to conclude that patterns of degradation, if they exist, will be detected, thereby providing reasonable assurance of the continued structural integrity of the subject pressurizer welds.

Conclusion—To perform the subject examinations to the extent required by Code is impractical due to component configuration, and in some cases, adjacent obstructions (i.e., other nozzles, insulation studs). Considering the burden associated with imposing the Code requirements and the significant portion of weld coverage obtainable, reasonable assurance of the structural integrity of the subject pressurizer welds is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.3 Heat Exchangers and Steam Generators

3.1.3.1 Request for Relief No. RR-4 (Rev. 6/24/96), Examination Category B-D, Item B3.130, Steam Generator Nozzle-to-Shell Welds

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.130 requires a 100% volumetric examination, as defined by Figure IWB-2500-7, for primary side steam generator nozzle-to-vessel welds.

Licensee's Code Relief Request—Relief is requested from performing the 100% volumetric examination of the following steam generator nozzle-to-shell welds: 1-104-251, 1-102-251A, 1-102-251B, 2-104-351, 2-102-351A, 2-102-351B.

Licensee's Basis for Requesting Relief (as stated)—
"For purposes of discussion, Figure IWB-2500-7(a) will be used to describe the 4 required weld volumes. With the exception of the nozzle inner radius section, this figure is the closest configuration to our actual nozzles.

"CPCO working with EPRI have developed the attached package[f]. The attached information is an excerpt from the EPRI report and is intended to identify the exam volumes within the areas of limitations. The final EPRI report will identify exam volumes within the areas of limitations (attached information), exam volumes where no limitations exist and the composite exam volumes. The final composite exam volumes will be slightly higher since this will include the areas where no limitations exist. However, the code required exam volume will not be achieved and this relief request is necessary.

"The attached package includes:

1) Figure defining exam volumes.
2) Inlet nozzle inner radius coverage table followed by supporting figure.
3) Inlet nozzle-to-shell weld exam volume.
4) Axial scan coverage table for inlet nozzle-to-shell weld followed by supporting figures.
5) Transverse scan (no probe skewing) coverage for inlet nozzle-to-shell weld followed by supporting figures.
6) Transverse scan (+/-20° probe skewing) coverage table for inlet nozzle-to-shell weld followed by supporting figures.
7) Outlet nozzle inner radius coverage table followed by supporting figure.
8) Outlet nozzle-to-shell exam volume.
9) Axial scan coverage table for outlet nozzle-to-shell weld followed by supporting figures.
10) Transverse scan (no probe skewing) coverage table for outlet nozzle-to-shell weld followed by supporting figures.
11) Transverse scan (+/-20° probe skewing) coverage table for outlet nozzle-to-shell weld followed by supporting figures.

"There are 2 acronyms used in the EPRI report for identification, they are Consumers Power - Steam Generator Project Inlet Nozzle (CP-SGPIN) and Consumers Power - Steam Generator Project Outlet Nozzles (CP-SGPON).

"The computer based modeling was performed on one steam generator and this is intended to address all primary head nozzle welds in both steam generators. The steam generators are identical in design.

"The probe skew angle for the axial exams are identified as 0° and 180° within the coverage tables. The probe skew angle for the transverse exams were modeled using a 90° and then offset using a 70° and 110° skew to increase exam volume coverages.

"In summary, the examination volumes are limited and the maximum achievable volumes within areas of limitations are accurately identified. A relief request from

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f. Information provided by the licensee is not included with this evaluation.

the code required examination volumes is necessary. The final EPRI report will be on file at CPCO upon completion."

Licensee's Proposed Alternative Examination (as stated)—

"The accessible weld volumes will be examined once per interval in lieu of the 100% volumetric examination requirements."

Evaluation—The licensee is requesting relief based on estimated coverages determined from preliminary Electric Power Research Institute studies. The actual examinations are yet to be performed, and all limitations associated with the subject welds may not be included for these estimates; therefore, it is recommended that relief be denied. The licensee should request relief based on actual examination coverages obtained.

Conclusion—Because the licensee has not based this relief request on coverages actually obtained/obtainable for the subject examination areas, it is recommended that relief be denied. Relief should be requested following completion of the examinations.

3.1.3.2 Request for Relief No. RR-5 (Rev. 2/19/96), Examination Category B-D, Items B3.150 and B3.160, Regenerative Heat Exchanger (RHX) Nozzle-to-Shell Welds and Inside Radius Sections

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-D, Items B3.150 and B3.160 require 100% volumetric examination, as defined by Figure IWB-2500-7, of primary side heat exchanger nozzle-to-vessel welds and inside radius sections.

Licensee's Code Relief Request—Relief is requested from 100% volumetric examination of Regenerative Heat Removal Heat Exchanger E-56-A and E-56-B nozzle-to-shell Welds 05 and 07. Relief is also requested from 100% volumetric examination of Regenerative Heat Removal Heat Exchanger E-56-A and E-56-B nozzle inner radius sections associated with Weld 05.

Licensee's Basis for Requesting Relief (as stated)—

"Welds E-56A-05 and E-56B-05

"Welds E-56A-05 and E-56B-05 are identical in configuration and the same limitations apply to both welds. The Regenerative Heat Exchangers are vertically mounted and weld #05 is located in the lower head. The accessible area of the circumference for weld #05 is limited to four inches of the circumference. The remainder of the weld is covered by the support pads which make it inaccessible to any kind of surface or volumetric examination.

"The four inches (18%) of the circumference that is accessible can be examined as summarized below:

1. 65% of the 4 required volumes using a 45° angle beam from the shell side towards the shell [nozzle].

2. 56% of the 4 required volumes using a 60° angle beam from the shell side towards the shell [nozzle].
3. 47% of the 4 required volumes using a angle beam from the nozzle side towards the shell.
4. 35% of the 4 required volumes using a 60° angle beam from the nozzle side towards the shell.
5. 61% of the total required volumes can be examined with a 0° scan.
6. 69% of the total required examination volumes can be covered with transverse scans in the clockwise and counter clockwise scanning directions using 2 angle beams.

"Welds E-56A-07 and E-56B-07

"Welds E-56A-07 and E-56B-07 are identical in configuration and the same limitations apply to both welds. Upon thorough review of the referenced drawings and a review of previous examination data it has been determined that the required examination volumes for the examination regions referenced in IWB-2500-7(a) are limited due to the configuration of the nozzle and the shell.

1. It is not possible to scan the required examination regions from the nozzle side due to the limited scanning surface available. Therefore, 0% of the required examination volumes will [be] obtained from the nozzle side with the beam direction towards the shell for any of the required volumes listed on Figure IWA-2500-7(a).

2. Approximately 17% of the required exam volumes of the examination regions referenced in Figure IWB-2500-7(a) can be examined using two angle beams with direction going from the shell side towards the nozzle.

3. Approximately 13% of the required exam volumes can be examined with the 0° scan. No examinations can be performed on the nozzle or the weld due to the design configuration.

4. Approximately 50% of the total required examination volumes can be examined with the transverse angle beam examinations in clockwise and counter clockwise scanning directions."

(Additional information submitted June 24, 1996)

"Relief is required for the inside radius section as identified on Relief Request RR-5 for welds E-56A-05 and E-56B-05. The inside radius sections, along with the nozzle to vessel welds are limited due to the weld being covered by the support pads which make it inaccessible for any kind of a surface or volumetric examination within the area of the pads. In RR-5, the inner radius weld volume is considered as one of the 4 required weld volumes which was identified.

"The design of welds E-56A-07 and E-56B-07 do not have inside radius sections (Reference Atlas Industrial Drawings 1733-6 and 1759-4 which were supplied with Palisades' Response to Request for Additional Information - Inservice Inspection Program dated February 19, 1996)[g].

"As identified on the referenced drawings, there are two Class 1 nozzles on the Regenerative Heat Exchangers and are identified as nozzles "O" and "P". The subject welds (E-56A-07 and E-56B-07) are the cross connect between the two vessels and are more of a "stub-in" configuration. Therefore, these two welds do not have inner radius sections and are not actually nozzles.

"Based on the Regenerative Heat Exchangers being vessels (Category B-D), CPCO has identified the two welds, E-56A-07 and E56B-07, as Item Number B3.150 and scheduled these welds for examination. Item Numbers B3.160 is not applicable for this application.

"Reasonable assurance of the structural integrity will be provided for the welds identified in Relief Request RR-5 by performing examination on the accessible weld volumes along with the required VT-2 examinations which are performed each refueling outage.

"The Regenerative Heat Exchangers are downstream of control valve CV-2001. In the event of a weld failure (within these components) which creates an unidentified leak rate within the Primary Coolant System of greater than 1 gpm, Plant Technical Specification 3.1.5a requires placing the reactor in hot shutdown within 6 hours. If this were a small leak of less than 1 gpm Off Normal Procedure 23.1 would identify the charging to letdown mismatch and would close CV-2001 and isolate the leak. If one of these welds were to fail creating a large loss of coolant, Emergency Operating Procedure, EOP-4.0, "Loss of Coolant Accident Recovery", Section 4.0, Step 16 would also close CV-2001 isolating the leak.

"The ultrasonic examinations, VT-2 examinations and the ability to correctly identify and isolate a leak from any one of these welds provides reasonable assurance that structural integrity will be maintained."

Licensee's Proposed Alternative Examination (as stated)—

"The accessible volumes as identified above will be examined in lieu of the 100% volumetric examination requirements."

Evaluation—The Code requires 100% volumetric examination of Regenerative Heat Removal Heat Exchangers E-56-A and E-56-B nozzle-to-shell Welds 05 and 07, and 100% volumetric examination of Regenerative Heat Removal Heat Exchanger E-56-A and E-56-B nozzle inner radius sections associated with Weld 05. However, a review of component drawings indicates that complete examination of the subject nozzle-to-vessel welds and

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g. Drawings are not included with this evaluation.

inner radius sections is impractical due to component configurations and adjacent obstructions. To meet the coverage requirements of the Code, the regenerative heat exchanger would require design modifications to improve access for examination. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee can examine a substantial portion (approximately 60%) of the Code-required volume for each of the nozzle-to-vessel welds and the inner radius section of Weld 05. Based on the coverage obtainable, in conjunction with the VT-2 visual examinations, it is reasonable to conclude that any significant patterns of degradation, if present, will be detected, thereby providing reasonable assurance of the continued structural integrity of the subject Regenerative Heat Exchanger nozzle-to-shell weld and inner radius sections.

Conclusion—Complete examination of the subject nozzle-to-vessel welds and inner radius sections is impractical due to component configurations and adjacent obstructions. Considering the impracticality of meeting the Code requirements, the burden associated with imposing these requirements, and the significant portion of examination volumes obtainable, reasonable assurance of the structural integrity of the subject examination areas is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.4 Piping Pressure Boundary

3.1.4.1 Request for Relief No. RR-1 (Rev. 2/19/96), Examination Category B-J, Items B9.11 and B9.12, Class 1 Piping Welds

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-J, Items B9.11 and B9.12 require surface and volumetric examination of circumferential and longitudinal welds as defined by Figure IWB-2500-8.

Licensee's Code Relief Request—Relief is requested from performing the Code-required surface examination on the outside diameter (OD) for the following welds:

TABLE RR-1

Item B9.11, Component ID	Item B9.12, Component ID
PCS-42-RCL-1H-1, 2	PCS-30-RCL-1A-15LD-1, 15LD-2
PCS-42-RCL-2H-1, 2	PCS-30-RCL-1A-16LU-1, 16LU-2
PCS-30-RCL-1A-15, -16	PCS-30-RCL-1B-13LD-1, 13LD-2
PCS-30-RCL-1B-13, -14	PCS-30-RCL-1B-14LU-1, 14LU-2
PCS-30-RCL-2A-14, -15	PCS-30-RCL-2A-14LD-1, 14LD-2
PCS-30-RCL-2B-14, -15	PCS-30-RCL-2A-15LU-1, 15LU-2
	PCS-30-RCL-2B-14LU-1, 14LU-2
	PCS-30-RCL-2B-14LD-1, 14LD-2
	PCS-30-RCL-2B-15LU-1, 15LU-2

Licensee's Basis for Requesting Relief (as stated)—

"The piping welds adjacent to the reactor vessel are routed through concrete and are not accessible for OD examination by the surface or volumetric methods."

Licensee's Proposed Alternative Examination (as stated)—

"The welds will be 100% volumetrically examined (in lieu of the lower 1/3t required by Figure IWB-2500-8) from the ID with a mechanically remote device. Surface examinations will not be performed.

"The applicable Section XI 1989 Edition references for the UT examinations will be implemented for this relief request. Consumers Power Company has demonstrated that the equipment and examination procedures are capable of detecting OD defects in a laboratory test block with crack-type defects. Based on the results of that demonstration, the proposed alternative provides reasonable assurance of the continued inservice structural integrity. If new tooling or techniques are to be used, this demonstration will be performed again."

Evaluation—For the subject welds, the Code requires a volumetric examination of the inner 1/3 of the weld and adjacent base metal and a surface examination of the external surface as defined in Figure IWB-2500-8. However, the subject welds are located adjacent to the reactor vessel and their outside surfaces are not accessible for examination because they are encased in concrete. Therefore, the Code-required surface examination is impractical. To perform this surface examination, the primary coolant system would require extensive design modifications. Imposition of this requirement would cause a significant burden on the licensee.

In lieu of the Code-required surface examination, the licensee has proposed to examine the full weld volume from the inside surface using remote ultrasonic examination techniques. These techniques were successfully demonstrated in March of 1995[h] on a laboratory test block with crack-type indications, confirming that the ID ultrasonic examination is capable of detecting cracks on the outside surface and that the licensee's

h. Referenced in the licensee's response to the RAI, dated February 19, 1996.

alternative will provide reasonable assurance of structural integrity of the subject piping welds.

Conclusion—Because the subject welds are not accessible for surface examination, the Code-required examination is impractical. The licensee has proposed to perform ultrasonic examinations of the full volume of the subject weld from inside of the pipes with a mechanized system. Based on the demonstrated ability of the mechanized ultrasonic examination to detect outside surface connected flaws, reasonable assurance of structural integrity is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.5 Pump Pressure Boundary (No relief requests)

3.1.6 Valve Pressure Boundary (No relief requests)

3.1.7 General (No relief requests)

3.2 Class 2 Components

3.2.1 Pressure Vessels

3.2.1.1 Request for Relief No. RR-3, Examination Category C-A, Item C1.10, Steam Generator Shell Welds

Code Requirement—Section XI, Table IWC-2500-1, Examination Category C-A, Item C1.10 requires 100% volumetric examination, as defined by Figure IWC-2500-1, of circumferential shell welds at gross structural discontinuities.

Licensee's Code Relief Request—Relief is requested from 100% volumetric examination of steam generator upper shell-to-shell cone Welds 1-101-221 and 2-101-221.

Licensee's Basis for Requesting Relief (as stated)—

"Based on examination data obtained during the preservice ultrasonic examinations which were performed on the new steam generators in 1990, there are approximately 171 inches of documented limitations on the upper shell. These limitations are caused by welded patches, snubber attachments and the 18" feedwater nozzles. The limitations are shown on Combustion Engineering drawings 70277-371-021, 70277-221-001, 70277-201-001, and RSG90-C271-001.[i]

"The axial angle beam scan from shell cone with the beam direction towards the upper shell will allow approximately 77% of the required volume E-F-G-H as noted on Figure IWC-2500-1. Also, there is a 2% loss of coverage area in the required volume due to the configuration of the shell cone. This configuration causes an abrupt transition to exist in the examination area which results in a loss of contact

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i. Drawings are not included with this evaluation.

as the exit point of the transducer travels across this point. This condition exists for the entire circumference of the weld. The 2% loss of exam volume of area E-F-G-H exists from either the shell side or the cone side. The total examination volume of area E-F-G-H, when scanning from the shell cone side is approximately 75%.

"The examination volume with the angle beam direction going from the upper shell towards the shell cone is equal to 98% of the required volume E-F-G-H as referenced in Figure IWB-2500-1. The transverse scans are not limited. The total examination of region E-F-G-H, with axial crossing beams is limited to approximately 75%."

In the June 24, 1996, response to requests for additional information, the licensee stated:

"The factor causing a reduction in coverage are welded patches, snubber attachments, 18" feedwater nozzles and an abrupt transition (Configuration of the Shell Cone) which results in a loss of contact as the exit point of the transducer travels across this point. These limitations are shown on Combustion Engineering drawings[j] 70277-371-021, 70277-221-001, 70277-201-001, and RSG90-C271-001 which were previously submitted (Palisades' Response to Request for Additional Information - Inservice Inspection Program dated February 19, 1996).

"Examination coverage for welds at CPCO is based on the most limiting ultrasonic beam angle with two direction coverage. CPCO believes that this conservative approach is the correct way to determine the percentage of examination coverage."

Licensee's Proposed Alternative Examination (as stated)—

"The accessible volume of the welds will be examined in lieu of the 100% volumetric examination requirement."

Evaluation—The licensee has requested relief from volumetric examination of the subject steam generator upper shell-to-shell cone welds to the extent required by Code. Based on the information provided, it has been determined that the weld configuration and obstructions, such as the feedwater nozzles and welded attachments, restrict scanning, making the Code-required examination impractical. To meet the requirements of the Code, modification of the steam generators to improve access for examination would be necessary. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee proposes to examine the subject welds to the extent practical. Based on the percent of coverage obtainable, in conjunction with the VT-2 visual examinations, it is reasonable to conclude that significant patterns of degradation, if existing, will be detected, providing reasonable assurance of continued structural integrity.

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j. Drawings provided by the licensee are not included with this evaluation.

Conclusion—The licensee proposes to examine the subject welds to the extent practical. Considering the impracticality of meeting the Code requirements, the burden associated with imposing these requirements, and the significant portions of the weld volumes that will be examined, reasonable assurance of the structural integrity of the subject examination areas is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.2.1.2 Request for Relief No. RR-7, Examination Category C-A and C-B, Items C1.10, C1.30 and C2.21, Shutdown Cooling Heat Exchanger Welds

Code Requirement—Section XI, Table IWC-2500-1, Examination Category C-A, Item C1.10 requires 100% volumetric examination, as defined by Figure IWB-2500-1, of circumferential shell welds at gross structural discontinuities. Item C1.30 requires 100% volumetric examination, as defined by Figure IWC-2500-2, for all tubesheet-to-shell welds.

Examination Category C-B, Item C2.21, requires surface and volumetric examination, as defined by Figure IWC-2500-4(a) or (b), for nozzle-to-shell welds without reinforcing plates in vessels greater than 1/2 inch nominal thickness. Examinations are limited to nozzles at the terminal ends of piping runs selected for examination under Examination Category C-F. In the case of multiple vessels of similar design, size, and service (i.e., steam generators and heat exchangers), the required examinations may be limited to one vessel or distributed among the vessels.

Licensee's Code Relief Request—Relief is requested from 100% volumetric examination of the shutdown cooling heat exchanger welds listed in Table RR-7.

Table RR-7

Examination Category/Item	Description	HX/Weld #	Approximate Coverage*
C-A/C1.10	Shell-to-flange	HX E-60-B/Weld 01	83%
C-A/C1.30	Tubesheet-to-shell	HX E-60-B/Weld 02	81%
C-B/C2.21	Nozzle-to-shell	HX E-60-B/Weld 03 HX E-60-B/Weld 04	55%

* Cumulative coverage summary based on licensee's partial coverage estimates, excludes 0° scans.

Licensee's Basis for Requesting Relief (as stated)—

"Weld E-60B-01 is a flange to primary shell weld and is a Category C-A, Item Number C1.10 weld. Volumetric examination of exam volume A-B-C-D as referenced in Figure IWC-2500-1(a) is limited due to configuration and scanning limitations created by the flange bolting being in the area of interest and by the flange to weld distance.

"Upon review of the referenced drawings and previous examination data, the following examination volumes can be achieved:

"1. The 45° angle beam examination from the vessel side towards the flange will allow examination of approximately 91% of the required volume A-B-C-D. The 45° angle beam examination from the flange side towards the vessel will allow examination of approximately 60% of the required volume.

"2. The 60° angle beam from the vessel side towards the flange will allow examination of approximately 95% of the required volume A-B-C-D. The 60° angle beam scanning from the flange side towards the vessel will examine approximately 43% of the required volume.

"3. The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain 94% of the required examination volume A-B-C-D.

"4. The 0° scan of the required examination volume will obtain 96% of the required examination volume A-B-C-D.

"Weld E-60B-02 is the primary shell to tubesheet weld and is a Category C-A, Item Number C1.30 weld. Volumetric examination of exam volume E-F-G-H as referenced in Figure IWC-2500-2, is limited due to the design configuration.

"Upon review of the referenced drawings and previous examination data, the following examination volumes can be achieved:

"1. The 60° angle beam examination from the shell side towards the tubesheet will allow examination of approximately 96% of the required volume E-F-G-H. The 60° angle beam examination from the tubesheet towards the shell will allow examination of approximately 61% of the required volume.

"2. The 45° angle beam from the shell side towards the tubesheet will allow examination of approximately 92% of the required volume E-F-G-H. The 45° angle beam scanning from the tubesheet side towards the shell will examine approximately 32% of the required volume.

"3. The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain 92% of the required examination volume E-F-G-H.

"4. The 0° scan of the required examination volume will obtain 96% of the required examination volume E-F-G-H.

"Welds E-60B-03 and E-60B-04 are the primary shell inlet and outlet nozzle to shell welds and are Category C-B, Item Number C2.21 welds. Volumetric examination of exam volume C-D-E-F as referenced in Figure IWC-2500-4(b), is limited due to the

design configuration. Upon review of the referenced drawings and previous examination data, the following examination volumes can be achieved:

"1. The 45° angle beam examination from the shell side towards the nozzle will allow examination of approximately 98% of the required volume C-D-E-F. The 45° angle beam examination from the nozzle towards the shell cannot be performed due to the design configuration.

"2. The 60° angle beam from the shell side towards the nozzle will allow examination of 100% of the required volume C-D-E-F. The 60° angle beam examination from the nozzle towards the shell cannot be performed due to the design configuration.

"3. The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain 60% of the required examination volume C-D-E-F."

Licensee's Proposed Alternative Examination (as stated)—
"The accessible volumes as identified above will be examined in lieu of the 100% volumetric requirements."

Evaluation—The Code requires 100% volumetric examination of the subject shutdown cooling heat exchanger welds and 100% volumetric and surface examination of the associated nozzle-to-vessel welds. However, access to these welds is restricted by component configurations that preclude 100% volumetric examination. Therefore, the Code requirements are impractical for the subject welds. To meet these requirements, the shutdown cooling heat exchanger would require design modifications to allow access for examination. Imposition of this requirement would cause a considerable burden on the licensee.

For the shell-to-flange welds and tubesheet-to-shell welds, the licensee can complete greater than 80% of the volumetric examination of each weld. This represents a significant portion of the Code-required volume and should detect any patterns of degradation associated with these welds. For the two nozzle-to-vessel welds, the volumetric examinations are limited to 55%. However, a complete surface examination can be performed. In combination, these examinations should detect any patterns of degradation associated with the nozzle-to-vessel welds. As a result, reasonable assurance of the continued structural integrity of the shutdown cooling heat exchanger welds will be provided.

Conclusion—Access to the subject welds is restricted by the component configuration. As a result, Code-required coverage of the subject welds is impractical. Considering the Code coverage requirements, the burden associated with modifying the heat exchanger to gain access for examination, and the significant portions of the welds that will be examined, reasonable assurance of the continued structural integrity of the subject welds is provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.2.2 Piping (No relief requests)

3.2.3 Pumps (No relief requests)

3.2.4 Valves (No relief requests)

3.2.5 General (No relief requests)

3.3 Class 3 Components

3.3.1 Piping (No relief requests)

3.3.2 Pumps (No relief requests)

3.3.3 Valves (No relief requests)

3.3.4 General (No relief requests)

3.4 Pressure Tests

3.4.1 Class 1 System Pressure Tests (No relief requests)

3.4.2 Class 2 System Pressure Tests (No relief requests)

3.4.3 Class 3 System Pressure Tests (No relief requests)

3.4.4 General (No relief requests)

3.5 General

3.5.1 Ultrasonic Examination Techniques (No relief requests)

3.5.2 Exempted Components (No relief requests)

3.5.3 Other

3.5.3.1 Request for Relief No. RR-10, Use of Code Case N-524, *Alternative Examination Requirements for Longitudinal Welds in Class 1, and 2 Piping, Section XI, Division 1*

Code Requirement—Section XI, Table IWB-2500-1, Examination Category B-J, Item B9.12 requires surface and volumetric examinations of longitudinal piping welds in Class 1 piping 4-inch nominal pipe size and larger to be performed in conjunction with examination of the circumferential welds selected, as defined in Figure IWB-2500-8. The length of longitudinal weld required to be examined is at least one pipe diameter, but not more than 12 inches, from the circumferential weld intersection point.

Examination Categories C-F-1 and C-F-2, Items C5.12, C5.22, C5.52, and C5.62 require volumetric and surface examinations of longitudinal piping welds in Class 2 piping to be performed in conjunction with examination of circumferential welds selected, as defined in Figure IWC-2500-7. At least 2.5t of longitudinal weld is required to be examined. For Items C5.42 and C5.82, a surface examination is required for longitudinal piping welds intersecting circumferential welds selected for examination, as defined in Figure IWC-2500-7. At least 2.5t of longitudinal weld is required to be examined.

Licensee's Code Relief Request—The licensee requested relief from volumetric and/or surface examination of the length of longitudinal piping welds required to be examined in accordance with Tables IWB-2500 and IWC-2500. Specifically, the licensee requests to implement the alternatives to Code requirements contained in Code Case N-524, *Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping, Section XI, Division 1.*

Licensee's Basis for Requesting Relief (as stated)—

"Pursuant to 10 CFR 50.55a(a)(3) and footnote 6, the use of the following Code Case is requested as relief of the Code requirements stated.

"For Code Case N-524, when both surface and volumetric examinations are required, examination of longitudinal piping welds is not required beyond those portions of the welds within the examination boundaries of intersecting circumferential welds."

Licensee's Proposed Alternative Examination (as stated)—

"Requirements shall be met for both transverse and parallel flaws at the intersection of the welds and for that length of longitudinal weld within the circumferential weld examination volume. Therefore, surface examinations and volumetric examinations extending beyond the volume and length aforementioned will not be performed for the third inspection interval."

Evaluation—The licensee has proposed to implement the alternatives contained in Code Case N-524 for examination of Class 1 and 2 piping longitudinal welds. The licensee proposes to examine the potentially critical portions of the longitudinal welds (the portions that intersect circumferential welds) in conjunction with examination of the circumferential welds.

When implementing the alternatives contained in Code Case N-524, longitudinal welds need not be examined beyond the examination zone of the associated circumferential weld. When the longitudinal weld can be identified, only that portion of the longitudinal weld intersecting the circumferential weld is required to be examined for flaws parallel and transverse to the weld. Where the longitudinal weld cannot be identified, 100% of the circumferential weld must be examined for flaws parallel and transverse to the weld to ensure that the longitudinal/circumferential weld intersection is examined. Code Case N-524, when implemented in its entirety, requires examination of the most critical area of the longitudinal weld, and thus provides an acceptable level of quality and safety. (It should be noted that when implementing alternatives contained in Code Case N-524,

requirements for examination of longitudinal welds contained in Table IWB-2500 are superseded.)

Conclusion—An acceptable level of quality and safety is provided by the licensee's proposed alternative, use of Code Case N-524 for examination of Class 1 and 2 piping longitudinal welds. Therefore, it is recommended that the use of Code Case N-524 be authorized pursuant to 10 CFR 50.55a(a)(3)(i), provided that all requirements of Code Case N-524 are satisfied. Use of Code Case N-524 should be authorized for the current interval or until such time as the Code Case is published in a future revision of Regulatory Guide 1.147. At that time, if the licensee intends to continue to implement this Code Case, the licensee is to follow all provisions in Code Case N-524 with limitations issued in Regulatory Guide 1.147, if any.

4. CONCLUSION

Pursuant to 10 CFR 50.55a(a)(3), it is concluded that for Relief Request No. RR-10 and RR-11, the licensee's proposed alternatives will (a) provide an acceptable level of quality and safety, or (b) Code compliance will result in hardship or unusual difficulty without a compensating increase in safety. It is recommended that the proposed alternative be authorized.

Pursuant to 10 CFR 50.55a(g)(6)(i), it has been determined that certain inservice examinations cannot be performed to the extent required by Section XI of the ASME Code. In the cases of Relief Request Nos. RR-1, RR-02, RR-03, RR-05, RR-06 (Parts 1 and 2), RR-07, and RR-08 , the licensee has demonstrated that specific Section XI requirements are impractical. It is, therefore, recommended that relief be granted as requested. The granting of relief will not endanger life, property, or 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.

For Relief Request No. RR-04, the licensee did not provide information based on actual examinations. Therefore, it is recommended that relief be denied.

By letter dated June 24, 1996, the licensee withdrew Relief Request No. RR-09 and deleted it from the ISI Program Plan.

This technical evaluation has not identified any practical method by which the licensee can meet all the specific inservice inspection requirements of Section XI of the ASME Code for the existing Palisades Nuclear Plant. Compliance with all of the Section XI examination requirements would necessitate redesign of a significant number of plant systems, procurement of replacement components, installation of the new components, and performance of baseline examination for these components. Even after the redesign efforts, complete compliance with the Section XI examination requirements probably could not be achieved. Therefore, it is concluded that the public interest is not served by imposing provisions of Section XI of the ASME Code that have been determined to be impractical.

The licensee should continue to monitor the development of new or improved examination techniques. As improvements are achieved, the licensee should incorporate these techniques in the ISI program plan examination requirements.

Based on the review of the *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, the licensee's response to the NRC's request for additional information, and the recommendations for granting relief from the ISI examinations that cannot be performed to the extent required by Section XI of the ASME Code, no deviations from regulatory requirements or commitments were identified with the exception of Relief Request No. RR-04.

5. REFERENCES

1. Code of Federal Regulations, Title 10, Part 50.

2. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Division 1,1989 Edition.

3. *Third Ten-Year Inspection Interval Inservice Inspection Plan* for Palisades Nuclear Plant, Revision 0, submitted September 6, 1995.

4. NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*, Section 5.2.4, "Reactor Coolant Boundary Inservice Inspection and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components," July 1981.

5. Letter dated December 20, 1995, M. K. Gamberoni (NRC) to R. W. Smedley (Consumers Power Company) containing request for additional information.

6. Letter dated April 23, 1996, M. K. Gamberoni (NRC) to R. W. Smedley (Consumers Power Company) containing request for additional information.

7. Letter dated February 19, 1996, R. W. Smedley (Consumers Power Company) to Document Control Desk (NRC), containing response to the NRC RAI dated December 20, 1995.

8. Letter dated June 24, 1996, R. W. Smedley (Consumers Power Company) to Document Control Desk (NRC), containing response to the NRC RAI dated April 23, 1996.

9. NRC Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability*, Revision 11, October 1994.

10. NRC Regulatory Guide 1.14, *Reactor Coolant Pump Flywheel Integrity*, Revision 1, August 1975.

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10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

This report documents the results of the evaluation of the *Palisades Nuclear Plant, Third 10-Year Interval Inservice Inspection Program Plan*, Revision 0, submitted September 6, 1995, including the request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements that the licensee has determined to be impractical. The *Palisades Nuclear Plant Third 10-Year Interval Inservice Inspection Program Plan*, Revision 0, is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The request for relief is evaluated in Section 3 of this report.

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