



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SIX RELIEF REQUESTS TO THE SECOND TEN YEAR INSERVICE INSPECTION PLAN

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

Inservice inspection (ISI) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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. Section 50.55a(g)(6)(i) states that the Commission may grant relief from code requirements where they are impractical and may impose such alternative requirements as it determines is authorized by law and will not endanger life or 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.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. For Callaway, Unit 1, the applicable edition of Section XI of the ASME Code for the second 10-year ISI is the 1989 Edition.

By letter dated July 10, 1998, Union Electric Company (the licensee) submitted six requests for relief from the requirements of Section XI of the 1989 Edition of the ASME Code, for the second 10-year interval ISI at Callaway, Unit 1. The relief requests are numbered ISI-13 through ISI-18. Additional information was provided in the licensee's letter of June 11, 1999, that was in response to the staff's request for additional information of May 6, 1999.

ENCLOSURE

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2.0 EVALUATION

The Idaho National Engineering and Environmental Laboratory (INEEL) review of the subject requests for relief is documented in the attached technical letter report (TLR). Based on the staff's review of the contractor's work in the TLR, the staff adopts the contractor's conclusions and recommendations in the TLR.

The information provided by the licensee in support of the requests for relief from ASME Code requirements has been evaluated and the basis for disposition of the six relief requests, ISI 13 through ISI-18, from the contractor's TLR is given below:

Request for Relief No. ISI-13: ASME Code, Examination Category B-J, Item B9.11 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining circumferential piping welds NPS 4 or greater, as defined by Figure IWB-2500-8.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code's volumetric coverage requirements for pipe-to-pressurizer surge line nozzle safe end Weld 2-BB-01-F004. A composite coverage of 82.47 percent of the weld volume was achieved for Weld 2-BB-01-F004.

The staff has determined that due to four lugs welded to the pipe, examination of the ASME Code-required volume is impractical for Weld 2-BB-01-F004. To obtain complete volumetric coverage, the lugs would have to be removed, causing a significant burden for the licensee.

The licensee examined approximately 82.5 percent of the required weld volume. The combination of the substantial volumetric examination, 100 percent surface examination, VT-2 visual examination as required by the ASME Code, and examination of other Examination Category B-J welds provides reasonable assurance of structural integrity of the subject weld. Therefore, relief is granted pursuant to 10 CFR 55.55a(g)(6)(i) and no other alternative examination is required.

Request for Relief No. ISI-14: ASME Code, Section XI, Examination Category B-F, Item B5.130 requires 100 percent surface and volumetric examination of all Class 1 dissimilar metal welds in piping NPS 4 or greater, as defined in Figure IWB-2500-8.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from 100 percent volumetric examination of steam generator inlet nozzle-to-elbow Weld 2-BB-01-F304 and steam generator (SG) outlet nozzle-to-elbow Weld 2-BB-01-F305. A composite coverage of 69.7 percent of the weld volume was achieved for Weld 2-BB-01-F304 and 77 percent for Weld 2-BB-01-F305.

The staff determined that the geometry of these welds and the attenuative nature of SA-351 CF8A stainless steel makes the volumetric examination, to the extent required by the ASME Code, impractical. To volumetrically examine Welds 2-BB-01-F304 and 2-BB-01-F305 to the extent required by the ASME Code, the system would have to be redesigned and modified to provide an extended beam path for ultrasonic coverage in two directions. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee has examined a significant portion of the subject welds. Composite ultrasonic examination coverages of 69.7 percent for Weld 2-BB-01-F304 and 77 percent for Weld 2-BB-01-F305 have been achieved. The licensee is proposing to use the volumetric examinations performed, the ASME Code-required 100 percent liquid penetrant examination, and the VT-2 visual examination in conjunction with the system leakage test as an alternative to the 100 percent volumetric examination. The combination of these examinations provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and no other alternative examination is required.

Request for Relief No. ISI-15: ASME Code, Section XI, Examination Category B-J, Item B9.11 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining circumferential piping welds NPS 4 or greater, as defined by Figure IWB-2500-8.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100 percent volumetric examination of inlet pipe-to-reactor coolant pump Weld 2-BB-01-F301 and reactor coolant pump-to-outlet pipe Weld 2-BB-01-F307. A composite coverage of 83 percent of the weld volume was achieved for Weld 2-BB-01-F301 and 65 percent for Weld 2-BB-01-F307.

The staff determined that the profile of the reactor coolant pump-to-inlet and outlet pipe welds and the attenuative nature of SA-351 CF8A stainless steel makes the volumetric examination impractical to perform to the extent required by the ASME Code. To volumetrically examine Welds 2-BB-01-F301 and 2-BB-01-F307 to the extent required by the ASME Code, the system would have to be redesigned and modified to allow ultrasonic coverage in two beam path directions. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee has examined a significant portion of the subject welds. Composite ultrasonic examination coverages of 83 percent for Weld 2-BB-01-F301 and 65 percent for Weld 2-BB-01-F307 have been achieved. The licensee is proposing to use the volumetric examinations performed to the extent practical, the ASME Code-required 100 percent liquid penetrant examination, and the VT-2 visual examination performed in conjunction with the system leakage test as an alternative to the 100 percent volumetric examination. The completed examinations provide reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and no other alternative examination is required.

Request for Relief No. ISI-16: ASME Code, Section XI, Examination Category B-J, Item B9.31 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining branch pipe connection welds NPS 4 or greater, as defined by Figure IWB-2500-11.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the volumetric examination to the extent required by the ASME Code for residual heat removal suction-to-RCS loop 1 cold leg branch connection Weld 2-BB-01-S302-3. A composite coverage of 23.35 percent of the weld volume was achieved.

The staff determined that, the configuration of the RHR suction-to-RCS cold leg branch connection weld and the attenuative nature of SA-351 CF8A stainless steel make the volumetric examination impractical to perform to the extent required by the ASME Code. To

volumetrically examine Weld 2-BB-01-S302 to the extent required by the ASME Code, the system would have to be redesigned and modified. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee has examined 23.35 percent of the subject weld. The licensee is proposing to use the volumetric examinations performed to the extent practical, the ASME Code-required 100 percent liquid penetrant examination, and the VT-2 visual examination performed in conjunction with the system leakage test, as an alternative to the 100 percent volumetric examination. These examinations, and the examinations of other Examination Category B-J welds, provide reasonable assurance of the structural integrity of the subject welds. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and no other alternative examination is required.

Request for Relief No. ISI-17: ASME Code, Section XI, Examination Category B-B, Item B2.40 requires 100 percent volumetric examination of SG tubesheet-to-head welds each inspection interval as defined by Figure IWB-2500-6.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from 100 percent volumetric examination of SG bottom head-to-tubesheet Weld 2-EBB01A-SEAM-1-W. Approximately 76.6 percent of the ASME Code-required examination has been completed.

The staff determined that, the examination is restricted by four integral support lugs that obstruct 100 inches of the 427 inches total weld length. The volumetric examination is, therefore, impractical to perform to the extent required by the ASME Code. To obtain 100 percent volumetric coverage, design modifications would be required, which would create a considerable burden on the licensee, if imposed.

The licensee has examined a significant portion of the tubesheet-to-head weld. Composite ultrasonic examination coverage of 76.6 percent has been achieved. The licensee is proposing to use the volumetric examination performed to the extent practical and the VT-2 visual examination performed in conjunction with the system leakage test as an alternative to the 100 percent volumetric examination. The staff concludes that these examinations provide reasonable assurance of structural integrity of the subject weld. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and no other alternative examination is required.

Request for Relief No. ISI-18: ASME Code, Section XI, Examination Category B-J, Item B9.11 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining circumferential piping welds NPS 4 or greater, as defined by Figure IWB-2500-8.

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required 100 percent surface and volumetric examinations of loop 2 accumulator safety injection pipe-to-valve Weld 2-EP-02-F007. A composite coverage of 59.8 percent of the weld volume was achieved and 70.4 percent of the surface examination was performed.

The staff determined that the examination is restricted by a permanent energy absorption chamber that obstructs 10.5 inches of the 35.5 inches total weld length. The volumetric examination is impractical to perform to the extent required by the ASME Code. To obtain 100

percent volumetric coverage, design modifications would be required, which would cause a considerable burden on the licensee, if imposed.

The licensee has examined a significant portion of the pipe-to-valve weld. Composite ultrasonic examination coverage of 59.8 percent has been achieved and 70.4 percent of the liquid penetrant surface examination was completed. The licensee is proposing to use the volumetric and surface examinations performed to the extent practical and the VT-2 visual examination performed in conjunction with the system leakage test as an alternative to the 100 percent volumetric and surface examinations. The staff concluded that the examinations completed provide reasonable assurance of structural integrity of the subject weld. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and no other alternative examination is required.

3.0 CONCLUSION

The staff concludes that certain inservice examinations contained in Requests for Relief ISI-13 through ISI-18, are impractical and cannot be performed to the extent required by the ASME Code at the Callaway, Unit 1. To obtain 100 percent volumetric coverage, design modifications would be required, which would cause a considerable burden on the licensee, if imposed. The alternative examinations provided by the licensee provide reasonable assurance of structural integrity of the subject welds.

The completed examinations contained in Requests for Relief ISI-13 through ISI-18, provide reasonable assurance of structural integrity of the subject welds. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the staff has concluded that certain inservice examinations cannot be performed to the extent required by Section XI of the ASME Code. The licensee has demonstrated that specific Section XI requirements are impractical for Relief Requests ISI-13, ISI-14, ISI-15, ISI-16, ISI-17, and ISI-18. Therefore, relief is granted as requested pursuant to 10 CFR 50.55a(g)(6)(i) for the current inspection interval for Callaway, that ends December 19, 2004, and no other alternative examination is required. The granting of this relief is authorized by law and 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.

Attachment: Technical Letter Report

Principal Contributor: T. McLellan

Date: August 10, 1999

TECHNICAL LETTER REPORT
ON SECOND 10-YEAR INTERVAL INSERVICE INSPECTION
REQUEST FOR RELIEF NOS. ISI-13 THROUGH ISI-18
FOR
UNION ELECTRIC COMPANY
CALLAWAY, UNIT 1
DOCKET NUMBER: 50-483

1.0 INTRODUCTION

By letter dated July 10, 1998, Union Electric Company (the licensee), submitted Requests for Relief Nos. ISI-13 through ISI-18 seeking relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel (P&BV) Code, Section XI, for Callaway, Unit 1 for the second 10-year inservice inspection (ISI) interval. By letter dated June 11, 1999, the licensee responded to the NRC's request for additional information regarding issues in Request for Relief ISI-16. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluations of the subject requests for relief are in the following section.

2.0 EVALUATION

The information provided by the licensee in support of the requests for relief from the Code requirements has been evaluated and the bases for disposition are documented below. The Code of record for Callaway, Unit 1, second 10-year ISI interval, which is scheduled to end in December 2004, is the 1989 Edition of Section XI of the ASME B&PV Code.

a. Request for Relief No. ISI-13, Examination Category B-J, Item B9.11, Pipe-to-Pressurizer Nozzle Safe End Weld

Code Requirement: Examination Category B-J, Item B9.11 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining circumferential piping welds NPS 4 or greater, as defined by Figure IWB-2500-8.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code's volumetric coverage requirements for pipe-to-pressurizer surge line nozzle safe end Weld 2-BB-01-F004. A composite coverage of 82.47 percent of the weld volume was achieved for Weld 2-BB-01-F004.

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

"The limitation to the axial scan is due to four lugs welded to the pipe within the examination volume. The lugs were formerly used as anchors for a snubber that has since been removed from this line under modification package CMP 94-1019. Actual coverage achieved in each direction is listed below.

Attachment

2-BB-01-F004

Axial Scan Coverage in two directions	64.95%
Circumferential Coverage in two directions	100%

"The code required surface exams were also performed on these welds at this time and yielded no indications with 100 percent coverage.

"In addition to the code required 45°F scan, a 60°F shear wave scan was performed on both sides of the weld to compensate for the beam redirection. The estimated coverage achieved is conservatively based on this nominal 60°F angle. With beam redirection, the actual examination angle is estimated to be closer to 45°F and thus yields a greater weld volume examined than was recorded. Examination results can be found in Callaway file E170.0100 reports 6226-98-23 and 6106-98-23."

Licensee's Proposed Alternative Examination (as stated):

"None. The best possible examination was performed using a combination of 60°F and 45°F shear wave transducers. The extent of this ultrasonic examination, the liquid penetrant surface examination, the Section XI VT-2 (visual) examination for leakage performed once every refueling outage, and the reactor coolant leakage detection system verify weld integrity."

Evaluation: The Code requires 100 percent volumetric and surface examinations of the pipe-to-pressurizer surge line nozzle safe end weld each interval. The INEEL staff has reviewed the information provided by the licensee that describes the limitations associated with examination of the subject weld. Due to the four lugs welded to the pipe, examination of the Code-required volume is not practical for Weld 2-BB-01-F004. To obtain complete volumetric coverage, the lugs would have to be removed, causing a significant hardship for the licensee.

The licensee examined approximately 82.5 percent of the required weld volume. The combination of the substantial volumetric examination, 100 percent surface examination, VT-2 visual examination as required by the Code, and examination of other Examination Category B-J welds assures that existing patterns of degradation would have been detected. As a result, reasonable assurance of the structural integrity of the pipe-to-pressurizer surge line nozzle safe end weld has been provided. Therefore, it is recommended that relief be granted pursuant to 10 CFR 55.55a(g)(6)(i).

b. Request for Relief No. ISI-14, Examination Category B-F, Item B5.130, Piping-to-Steam Generator Nozzle Welds

Code Requirement: Examination Category B-F, Item B5.130 requires 100 percent surface and volumetric examination of all Class 1 dissimilar metal welds in piping NPS 4 or greater, as defined in Figure IWB-2500-8.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from 100 percent volumetric examination of SG inlet nozzle-to-elbow Weld 2-BB-01-F304 and SG outlet nozzle-to-elbow Weld 2-BB-01-F305. A composite coverage of 69.7 percent of the weld volume was achieved for Weld 2-BB-01-F304 and 77 percent for Weld 2-BB-01-F305.

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

"Scanning of the subject welds is limited to the elbow side by a steep outside diameter taper on the steam generator outlet and inlet nozzles. The elbow material is cast stainless steel (SA-351 CF8A). Due to the high attenuative nature of this material, a refracted longitudinal sound wave is necessary to get a meaningful ultrasonic examination. A longitudinal sound wave cannot be extended to provide coverage in two beam path directions.

"Achieved Coverage:

2-BB-01-F304

Parallel Scan in Two Directions	71%
Axial Scan in Two Directions	37.02%
Axial Scan in One Direction	62.98%

2-BB-01-F305

Parallel Scan in Two Directions	71.87%
Axial Scan in Two Directions	65.03%
Axial Scan in One Direction	34.97%

"These welds were approved for relief in the first 10 year interval under Callaway ISI Relief Requests P-2 and P-3 submitted May 20, 1994.

"Based on the fact that no indications were detected, the weld integrity has been assured. Furthermore, a liquid penetrant surface examination was performed over the entire surface of the weld, which yielded no relevant indications. It is impractical to achieve any additional weld coverage at this time, therefore relief is requested pursuant to 10 CFR 50.55a(g)(5)(iii)."

Licensee's Proposed Alternative Examination (as stated):

"None. The maximum possible volume was examined as practical. The extent of this ultrasonic examination, the liquid penetrant surface examination, the Section XI VT-2 (visual) examination for leakage performed once every refueling outage, and the reactor coolant leakage detection system verify weld integrity."

Evaluation: The Code requires 100 percent volumetric and surface examination of the subject SG inlet and outlet nozzle-to-elbow welds. However, the geometry of these welds and the attenuative nature of SA-351 CF8A stainless steel makes the

volumetric examination, to the extent required by the Code, impractical. To volumetrically examine Welds 2-BB-01-F304 and 2-BB-01-F305 to the extent required by the Code, the system would have to be redesigned and modified to provide an extended beam path for ultrasonic coverage in two directions. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee has examined a significant portion of the subject welds. Composite ultrasonic examination coverages of 69.7 percent for Weld 2-BB-01-F304 and 77 percent for Weld 2-BB-01-F305 have been achieved. The licensee is proposing to use the volumetric examinations performed, the Code-required 100 percent liquid penetrant examination, and the VT-2 visual examination in conjunction with the system leakage test as an alternative to the 100 percent volumetric examination. These examinations will provide reasonable assurance that degradation, if present, would have been detected and will confirm that the structural integrity of the subject welds is maintained. Therefore, based on the licensee's completed examinations, and the impracticality of complying with the Code requirements, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

c. Request for Relief No. ISI-15, Examination Category B-J, Item B9.11, Reactor Coolant Pump-to-Pipe Welds

Code Requirement: Examination Category B-J, Item B9.11 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining circumferential piping welds NPS 4 or greater, as defined by Figure IWB-2500-8.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent volumetric examination of inlet pipe-to-reactor coolant pump Weld 2-BB-01-F301 and reactor coolant pump-to-outlet pipe Weld 2-BB-01-F307. A composite coverage of 83 percent of the weld volume was achieved for Weld 2-BB-01-F301 and 65 percent for Weld 2-BB-01-F307.

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

"Scanning of the subject welds is limited due to the weld profile and the large search unit footprint. The 1-inch 1 MHz longitudinal transducer required to project the sound through the cast stainless steel (SA-351 CF8A) is limited by the pump to pipe configuration. Furthermore, due to the high attenuative nature of this material, a refracted longitudinal sound wave is necessary to get a meaningful ultrasonic examination. A longitudinal sound wave cannot be extended to provide coverage in two beam path directions.

"Achieved Coverage:

2-BB-01-F301

Parallel Scan in Two Directions	84.28%
Axial Scan in Two Directions	63.72%
Axial Scan in One Direction	36.28%

2-BB-01-F307

Parallel Scan in Two Directions	82.76%
Axial Scan in Two Directions	4.19%
Axial Scan in One Direction	86.57%

"Based on the fact that no indications were detected, the weld integrity has been assured. Furthermore, a liquid penetrant surface examination was performed over the entire surface of the weld, which yielded no relevant indications. It is impractical to achieve any additional weld coverage at this time, therefore, relief is requested pursuant to 10 CFR 50.55a(g)(5)(iii)."

Licensee's Proposed Alternative Examination (as stated):

"None. The maximum possible volume was examined as practical. The extent of this ultrasonic examination, the liquid penetrant surface examination, the Section XI VT-2 (visual) examination for leakage performed once every refueling outage, and the reactor coolant leakage detection system verify weld integrity."

Evaluation: The Code requires 100 percent volumetric and surface examination of all terminal end welds NPS 4 or greater, larger once each inspection interval. However, the profile of the reactor coolant pump-to-inlet and outlet pipe welds and the attenuative nature of SA-351 CF8A stainless steel makes the volumetric examination impractical to perform to the extent required by the Code. To volumetrically examine Welds 2-BB-01-F301 and 2-BB-01-F307 to the extent required by the Code, the system would have to be redesigned and modified to allow ultrasonic coverage in two beam path directions. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee has examined a significant portion of the subject welds. Composite ultrasonic examination coverages of 83 percent for Weld 2-BB-01-F301 and 65 percent for Weld 2-BB-01-F307 have been achieved. The licensee is proposing to use the volumetric examinations performed to the extent practical, the Code-required 100 percent liquid penetrant examination, and the VT-2 visual examination performed in conjunction with the system leakage test, as an alternative to the 100 percent volumetric examination. The completed examinations provide reasonable assurance that degradation, if present, would have been detected and that the structural integrity of the subject welds has been maintained. Therefore, based on the licensee's completed examinations, and the

impracticality of complying with the Code requirements, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

d. Request for Relief No. ISI-16, Examination Category B-J, Item B9.31, RHR Suction-to-RCS Loop Cold Leg Branch Connection Weld

Code Requirement: Examination Category B-J, Item B9.31 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining branch pipe connection welds NPS 4 or greater, as defined by Figure IWB-2500-11.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the volumetric examination to the extent required by the Code for residual heat removal suction-to-RCS loop 1 cold leg branch connection Weld 2-BB-01-S302-3. A composite coverage of 23.35 percent of the weld volume was achieved.

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

"Weld 2-BB-01-S302-3 can be examined from the RCS pipe side only due to the nozzle-to-pipe branch configuration. The RCS piping material is SA-351 CF8A (cast stainless steel). Due to the highly attenuative nature of this material, a refracted longitudinal wave is necessary to get a meaningful ultrasonic examination. A longitudinal sound wave can not be extended to provide coverage in two beam path directions.

"Achieved Coverage:

2-BB-01-S302-3

Axial Scan in One Direction	93.4%
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"Additionally, a 35°F refracted longitudinal scan was attempted to detect reflectors transverse to the weld. Even though the weld itself could not be examined from this direction, no indications were detected.

In the licensee's RAf response dated June 11, 1999, the following was stated:

"Examination of this weld is limited to one side only due to the geometry of the nozzle. Due to the coarse grain structure of CCSS the only viable examination technique utilizes focused low frequency dual longitudinal wave transducers, limiting the examination to half vee path only. Attempts were made to use higher angles but the three to one signal to noise ratio required by ASME Code could not be achieved in this material."

When asked to explain the difference in reported volumetric coverage obtained during the first ISI interval and the current coverage of 23.35 percent, the licensee stated:

"In the examination performed in refuel six, 75 percent of the weld volume was reported to have been examined. This is documented on Request for Relief ISI-1. In the section entitled 'Basis for Relief', 100 percent of the volume was reported to be examined with a 45° refracted longitudinal wave transducer in two beam path directions for reflectors transverse to the weld seam. This is the crux of the difference between ISI-1 and ISI-16. The circumferential examination was interpreted at that time to be complete. It was recognized at the time that the examination could not be performed directly by scanning on the weld crown. However, credit was taken for the circumferential examination by skewing sound in from the adjacent base material. Although the skewing process was performed during refuel nine, a more conservative approach was used to determine examination coverage.

"The difference between the ISI-1 and ISI-16 relief requests is due therefore to the difference in interpretation of results. Callaway believes that the results reported in ISI-16 better reflect the percentage of weld volume examined.

"The refuel nine examination of Weld 2-BB01-S302-3 resulted in successfully examining essentially 100 percent of the required weld volume from a position axial to the weld. Additionally, a PT examination was performed on the weld with no relevant indications noted. The Section XI VT-2 (visual) examination for leakage performed every refueling outage and the reactor coolant leakage detection system also verifies weld integrity. Considering the exceptional operating experience in the use of centrifugally cast stainless steels by the nuclear industry, it is felt that the examination performed is adequate to ensure quality and safety is maintained. Therefore, relief is requested pursuant to 10CFR50.55a(g)(5)(iii)."

Licensee's Proposed Alternative Examination (as stated):

"None. The maximum possible volume was examined as practical. The extent of this ultrasonic examination, the liquid penetrant surface examination, the Section XI VT-2 (visual) examination for leakage performed once every refueling outage, and the reactor coolant leakage detection system verify weld integrity."

Evaluation: The Code requires 100 percent volumetric and surface examination of certain pressure-retaining branch connection welds NPS 4 or greater, once each inspection interval. However, the configuration of the RHR suction-to-RCS cold leg branch connection weld and the attenuative nature of SA-351 CF8A stainless steel make the volumetric examination impractical to perform to the extent required by the Code. To volumetrically examine Weld 2-BB-01-S302 to the extent required by the Code, the system would have to be redesigned and modified. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee has examined 23.35 percent of the subject weld. The licensee is proposing to use the volumetric examinations performed to the extent practical, the Code-required 100 percent liquid penetrant examination, and the VT-2 visual

examination performed in conjunction with the system leakage test, as an alternative to the 100 percent volumetric examination. These examinations, and the examinations of other examination category B-J welds, assure that existing patterns of degradation would have been detected, if present. Therefore, reasonable assurance of the structural integrity of the subject welds has been provided. Based on the licensee's completed examinations, and the impracticality of complying with the Code requirements, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

e. Request for Relief No. ISI-17, Examination Category B-B, Item B2.40, Steam Generator Tubesheet-to-Head Weld

Code Requirement: Examination Category B-B, Item B2.40 requires 100 percent volumetric examination of SG tube sheet-to-head welds each inspection interval as defined by Figure IWB-2500-6.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from 100 percent volumetric examination of SG bottom head-to-tubesheet Weld 2-EBB01A-SEAM-1-W. Approximately 76.6 percent of the Code-required examination has been completed.

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

"Scanning of the subject welds is limited due to four lugs that obstruct 100 inches of the 427.07 inches circumferential distance of the weld.

"Achieved Coverage:

0°F Scan	76.6%
45°F Axial Scan	76.6%
60°F Axial Scan	76.6%
45°F Circumferential Scan	76.6%
60°F Circumferential Scan	76.6%

"Based on the fact that no indications were detected, the weld integrity has been assured. It is impractical to achieve any additional weld coverage at this time; therefore, relief is requested pursuant to 10 CFR 50.55a(g)(5)(iii)."

Licensee's Proposed Alternative Examination (as stated):

"None. The maximum possible volume was examined as practical. The extent of this ultrasonic examination, the Section XI VT-2 (visual) examination for leakage performed once every refueling outage, and the reactor coolant leakage detection system verify weld integrity."

Evaluation: The Code requires 100 percent volumetric examination of SG tubesheet-to-bottom head Weld 2-EBB01A-SEAM-1-W each ISI interval. However, the examination is restricted by four integral support lugs that obstruct 100 inches of the 427 inches total weld length. The volumetric examination is, therefore, impractical to perform to the extent required by the Code. To obtain 100

percent volumetric coverage, design modifications would be required, which would create a considerable burden on the licensee, if imposed.

The licensee has examined a significant portion of the tubesheet-to-head weld. Composite ultrasonic examination coverage of 76.6 percent has been achieved. The licensee is proposing to use the volumetric examination performed to the extent practical and the VT-2 visual examination performed in conjunction with the system leakage test as an alternative to the 100 percent volumetric examination. Based on these examinations, it is reasonable to conclude that degradation, if present, would have been detected. This provides reasonable assurance of continued inservice structural integrity. Therefore, based on the licensee's completed examinations, and the impracticality of complying with the Code requirements, it is recommended that relief be granted as requested pursuant to 10 CFR 50.55a(g)(6)(i).

f. Request for Relief No. ISI-18, Examination Category B-J, Item B9.11, Pipe-to-Valve Circumferential Weld

Code Requirement: Examination Category B-J, Item B9.11 requires 100 percent surface and volumetric examination of Class 1 pressure-retaining circumferential piping welds NPS 4 or greater, as defined by Figure IWB-2500-8.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100 percent surface and volumetric examinations of Loop 2 Accumulator Safety Injection pipe-to-valve Weld 2-EP-02-F007. A composite coverage of 59.8 percent of the weld volume was achieved and 70.42 percent of the surface examination was performed.

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

"Scanning of the subject welds is limited due to a permanent energy absorption chamber that obstructs 10.5 inches of the 35.5 inches circumferential distance of the weld.

"Achieved Coverage:

2-EP-02-F007

Parallel Scan in Two Directions	70.5%
Axial Scan in Two Directions	28%
Axial Scan in One Direction	42.5%

"This weld also required a surface examination of 100 percent of the circumference. 70.42 percent of the surface could be examined using dye penetrant method due to the obstruction of the permanent energy absorption chamber.

"Based on the fact that no indications were detected, the weld integrity has been assured. It is impractical to achieve any additional weld coverage at this time, therefore relief is requested pursuant to 10 CFR 50.55a(g)(5)(iii)."

Licensee's Proposed Alternative Examination (as stated):

"None. The maximum possible volume was examined as practical. The extent of this ultrasonic examination, the liquid penetrant surface examination, the Section XI VT-2 (visual) examination for leakage performed once every refueling outage, and the reactor coolant leakage detection system verify weld integrity."

Evaluation: The Code requires 100 percent surface and volumetric examination of pipe-to-valve Weld 2-EP-02-F007. However, the examination is restricted by a permanent energy absorption chamber that obstructs 10.5 inches of the 35.5 inches total weld length. The volumetric examination is, therefore, impractical to perform to the extent required by the Code. To obtain 100 percent volumetric coverage, design modifications would be required, which would create a considerable burden on the licensee, if imposed.

The licensee has examined a significant portion of the pipe-to-valve weld. Composite ultrasonic examination coverage of 59.8 percent has been achieved and 70.42 percent of the liquid penetrant surface examination was completed. The licensee is proposing to use the volumetric and surface examinations performed to the extent practical and the VT-2 visual examination performed in conjunction with the system leakage test as an alternative to the 100 percent volumetric and surface examinations. Based on the examinations completed, it is reasonable to conclude that degradation, if present, would have been detected. This provides reasonable assurance of continued inservice structural integrity. Therefore, based on the licensee's examinations completed, and the impracticality of complying with the Code requirements, it is recommended that relief be granted as requested pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 CONCLUSION

The INEEL staff evaluated the licensee's submittal and concluded that certain inservice examinations cannot be performed to the extent required by the Code at the Callaway, Unit 1. For Requests for Relief ISI-13 through ISI-18, the completed examinations provide reasonable assurance of continued structural integrity and, based on the impracticality of complying with the Code requirements as well as the burden on the licensee if the Code requirements were imposed, it is recommended that relief be granted as requested pursuant to 10 CFR 50.55a(g)(6)(i).