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March 12, 1996

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Gentlemen: ULNRC-03346

**CALLAWAY PLANT**
**DOCKET NUMBER 50-483**
**ADDITIONAL INFORMATION CONCERNING THE**
**CALLAWAY PLANT INSERVICE INSPECTION PROGRAM PLAN**

Reference: 1) ULNRC-1457 dated March 3, 1987
2) ULNRC-3106 dated November 30, 1994
3) G. H. Marcus ltr to D. F. Schnell dated March 24, 1995

This letter transmits Relief Requests R-1a, E-3a, E-4a, E-6 and E-7 to the Callaway Plant Inservice Inspection Program Plan. These relief requests are submitted based on inspection results from Refuel 7 and represent the final relief requests for the Callaway Plant first ten-year inspection interval.

Relief Request R-1a, originally submitted as R-1 and subsequently withdrawn from consideration by Reference 2, represents the results of extended beam path inspections of Weld 2-EE101A-SEAM-1-W. During a conference call held October 4, 1994, the NRC staff requested this inspection technique be attempted to increase the weld volumetric coverage. This relief request is resubmitted because the examination, augmented by the extended beam path technique, failed to obtain 90% of the required volume.

Please note that Relief Request E-6 also satisfies the reactor pressure vessel augmented shell weld inservice inspections as required by 10 CFR 50.55a(g)(6)(ii)(A)(5).



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If you have any questions concerning this information, please contact us.

Very truly yours,

Donald F. Schnell

Donald F. Schnell

WEK/

Attachment

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# CALLAWAY ISI
# RELIEF REQUEST R-1a



| | |
|---|---|
| System: | Residual Heat Removal System |
| Examination Category: | C-A |
| Item Number: | C1.10 |
| Component Description: | Residual Heat Removal (RHR) Heat Exchanger channel (i.e., shell section below the tube sheet) -to-tube sheet flange weld. This is a stainless steel double bevel groove weld with a wall thickness of approximately 0.88 inches. The Callaway weld identification number is 2-EEJ01A-SEAM-1-W. |
| Code Requirement: | ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWC-2500-1, Examination Category C-A, Item Number C1.10, requires 100% volumetric (ultrasonic) examination of the weld plus 1/2 the wall thickness of adjacent base metal on each side of the weld crown. ASME Section V, 1980 Edition through Winter 1981 Addenda, Article 4, T-441.4, specifies that this volume be examined with two angle beam scans (i.e., 45° and 60° nominal) for reflectors transverse to the weld seam, with two angle beam scans for reflectors parallel to the weld seam, and with a straight (0°) beam scan for planar and laminar reflectors. |
| Areas for Relief: | Relief is requested from the 100% coverage requirement for angle beam scans performed for reflectors transverse to the weld seam. Examination of weld 2-EEJ01A-SEAM-1-W is obstructed by 48-1 1/4" heavy hex nuts used on the tube sheet flange connection.<br><br>Of the total required examination volume, 41.6% was examined with angle beam scans (i.e., 45° & 60°) for reflectors transverse to weld seam, 100% was examined with angle beam scans for reflectors parallel to the weld seam and, 100% was examined with a 0° scan. Extended angle beam path ultrasonic techniques were used to obtained the maximum coverage possible. |
| Basis for Relief: | Industry experience has shown no identified inservice failure of RHR Heat Exchanger tube sheet flange welds. Heat exchangers similar to Callaway's have been in operation for over 20 years with no recorded inservice induced flaws or potential degradation mechanisms associated with this type weld.<br><br>Due to weld morphology the most likely direction for inservice flaw initiation would be in a direction parallel with the weld seam. The examination coverage for reflectors oriented in this parallel direction was 100%. |
| Alternate Testing: | The extent of the ultrasonic examination performed and the ASME Section XI visual VT-2 examination for leakage performed once every 40-month period will verify the weld integrity. |

# CALLAWAY ISI
# RELIEF REQUEST E-3a



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|---|---|
| System: | Reactor Pressure Vessel |
| Examination Category: | B-A |
| Item Number: | B1.30 |
| Component Description: | Reactor Pressure Vessel (RPV) flange-to-upper shell circumferential weld. This is a carbon steel double bevel full penetration groove weld with a nominal wall thickness of approximately 11.75 inches. The inside surface has a stainless steel welded clad approximately 0.22 inch thick. The Callaway weld identification number is 2-RV-101-121. |
| Code Requirement: | ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWB-2500-1, Examination Category B-A, Item Number B1.30, requires 100% volumetric (ultrasonic) examination of the weld plus 1/2 the wall thickness of adjacent base metal on each side of the weld crown. ASME Section V, 1980 Edition through Winter 1981 Addenda, Article 4, T-441.4, specifies that this volume be examined with two angle beam scans (i.e., $45^{\circ}$ and $60^{\circ}$ nominal) for reflectors transverse to the weld seam, a straight (~ $0^{\circ}$) beam scan from the vessel flange mating surface for reflectors parallel to the weld seam, and a straight ($0^{\circ}$) beam scan from the vessel inside surface for planar and laminar reflectors. |
| Areas for Relief: | Relief is requested from the 100% coverage requirement of the specified examination volume. The angle beam scan for transverse reflectors and $0^{\circ}$ scan for planar and laminar reflectors were performed with automated tooling and limited by the flange inside diameter taper. The manual examination performed from the flange mating surface for parallel reflectors was limited by the RPV stud holes and the flange upper internals support ledge.<br><br>Of the total required examination volume, 26.1% was examined with angle beam scans (i.e., $45^{\circ}$ & $60^{\circ}$) for reflectors transverse to weld seam, 90.0% was examined from the flange mating surface for reflectors parallel to the weld seam and, 26.1% was examined from the vessel inside surface for planar and laminar reflectors. |
| Basis for Relief: | Radiation levels at the vessel inside surface prohibit use of alternate manual scanning techniques from inside the vessel.<br><br>Due to weld morphology the most likely direction for inservice flaw initiation would be in a direction parallel with the weld seam. The examination coverage for reflectors oriented in this parallel direction was 90.0%. |

# CALLAWAY ISI
# RELIEF REQUEST E-3a



Basis for Relief: (Cont.)

Industry experience has shown no identified inservice failure of Pressurized Water Reactor (PWR) vessel upper shell flange welds. Reactor vessels similar to Callaway's have been in operation for over 20 years with no recorded inservice induced flaws or potential degradation mechanisms.

Union Electric considers the high cost to design and manufacture specialized tooling to achieve a modest increase in coverage in areas of unusual geometry and the refueling outage costs to perform such specialized examinations to be impractical without a compensating increase in safety.

Alternate Testing:

The extent of the ultrasonic examination performed and the Reactor Coolant System leakage detection system will verify the weld integrity.

# CALLAWAY ISI
# RELIEF REQUEST E-4a



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|---|---|
| System: | Reactor Pressure Vessel |
| Examination Category: | B-D |
| Item Number: | B3.90 |
| Component Description: | Reactor Pressure Vessel (RPV) outlet nozzle-to-shell welds. These nozzle welds are carbon steel double bevel full penetration butt welds with a nominal wall thickness of approximately 11.75 inches. The inside surface has a stainless steel welded clad approximately 0.22 inch thick. The Callaway weld identification numbers are: 2-RV-107-121-A, 2-RV-107-121-B, 2-RV-107-121-C, and 2-RV-107-121-D. |
| Code Requirement: | ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWB-2500-1, Examination Category B-A, Item Number B1.30, requires 100% volumetric (ultrasonic) examination of the weld plus 1/2 the wall thickness of adjacent base metal on each side of the weld crown. ASME Section V, 1980 Edition through Winter 1981 Addenda, Article 4, T-441.4, specifies that this volume be examined with two angle beam scans (i.e., 45° and 60° nominal) for reflectors transverse to the weld seam, with two angle beam scans for reflectors parallel to the weld seam, and with a straight beam scan (0°) for planar and laminar reflectors. |
| Areas for Relief: | Relief is requested from the 100% coverage requirement of the specified examination volume. Examination of the outlet nozzle-to-vessel welds was limited by the outlet nozzle protrusions.<br><br>Of the total required examination volume for each outlet nozzle weld, 43.2% was examined with angle beam scans (45° and 60°) for reflectors transverse to weld seam, 99.7% was examined with angle beam scans (combination of 10°, 30°, and 50°) from the nozzle bore for reflectors parallel to the weld seam and, 43.2% was examined with a 0° scan from the vessel inside surface. |
| Basis for Relief: | Radiation levels at the vessel inside surface prohibit use of alternate manual scanning techniques from inside the vessel.<br><br>Due to weld morphology the most likely direction for inservice flaw initiation would be in a direction parallel with the weld seam. The examination coverage for reflectors oriented in this parallel direction was 99.7%.<br><br>Industry experience has shown no identified inservice failure of Pressurized Water Reactor (PWR) vessel nozzle welds. Reactor vessels similar to Callaway's have been in operation for over 20 years with no recorded inservice induced flaws or potential degradation mechanisms. |

# CALLAWAY ISI
# RELIEF REQUEST E-4a



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|---|---|
| Basis for Relief (Cont.): | Union Electric considers the high cost to design and manufacture specialized tooling to achieve a modest increase in coverage in areas of unusual geometry and the refueling outage costs to perform such specialized examinations to be impractical without a compensating increase in safety. |
| Alternate Testing: | The extent of the ultrasonic examination performed and the Reactor Coolant System leakage detection system will verify the weld integrity. |

# CALLAWAY ISI
# RELIEF REQUEST E-6



System: Reactor Pressure Vessel

Examination Category: B-A

Item Number: B1.12

Component Description: Reactor Pressure Vessel (RPV) upper shell longitudinal welds. These are carbon steel double bevel full penetration groove welds with a nominal wall thickness of approximately 11.75 inches. The inside surface has a stainless steel welded clad approximately 0.22 inch thick. The Callaway weld identification numbers are: 2-RV-101-122-A, 2-RV-101-122-B, and 2-RV-101-122-C.

Code Requirement: ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWB-2500-1, Examination Category B-A, Item Number B1.30, requires 100% volumetric (ultrasonic) examination of the weld plus 1/2 the wall thickness of adjacent base metal on each side of the weld crown. ASME Section V, 1980 Edition through Winter 1981 Addenda, Article 4, T-441.4, specifies that this volume be examined with two angle beam scans (i.e., $45^{\circ}$ and $60^{\circ}$ nominal) for reflectors transverse to the weld seam, with two angle beam scans for reflectors parallel to the weld seam, and with a straight ($0^{\circ}$) beam scan for planar and laminar reflectors.

Areas for Relief: Relief is requested from the 100% coverage requirement of the specified examination volume. Examination of welds 2-RV-101-122-A and 2-RV-101-122-B was limited by the outlet nozzle protrusions and weld 2-RV-101-122-C was limited by the inside radius blend of two inlet nozzles. In addition, examination of the upper portion of each weld was limited by the vessel flange inside diameter taper.

The percentage of examination volume covered for each of the subject welds for angle beam scans (i.e., $45^{\circ}$ & $60^{\circ}$) for reflectors transverse to weld seam, angle beam scans for reflectors parallel to the weld seam and, for a $0^{\circ}$ scan is listed below.

| | Transverse | Parallel | $0^{\circ}$ |
|---|---|---|---|
| 2-RV-101-122-A | 55.1% | 53.3% | 50.5% |
| 2-RV-101-122-B | 72.6% | 100% | 91.4% |
| 2-RV-101-122-C | 52.8% | 78.0% | 69.2% |

Basis for Relief: Radiation levels at the vessel inside surface prohibit use of alternate manual scanning techniques from inside the vessel.

# CALLAWAY ISI
# RELIEF REQUEST E-6



Basis for Relief (Cont.): Industry experience has shown no identified inservice failure of Pressurized Water Reactor (PWR) vessel upper shell longseam welds. Reactor vessels similar to Callaway's have been in operation for over 20 years with no recorded inservice induced flaws or potential degradation mechanisms.

Union Electric considers the high cost to design and manufacture specialized tooling to achieve a modest increase in coverage in areas of unusual geometry and the refueling outage costs to perform such specialized examinations to be impractical without a compensating increase in safety.

Alternate Testing: The extent of the ultrasonic examination performed and the Reactor Coolant System leakage detection system will verify the weld integrity.

# CALLAWAY ISI
# RELIEF REQUEST E-7



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|---|---|
| System: | Reactor Pressure Vessel |
| Examination Category: | B-D |
| Item Number: | B3.90 |
| Component Description: | Reactor Pressure Vessel (RPV) inlet nozzle-to-shell welds. These nozzle welds are carbon steel double bevel full penetration butt welds with a nominal wall thickness of approximately 11.75 inches. The inside surface has a stainless steel welded clad approximately 0.22 inch thick. The Callaway weld identification numbers are: 2-RV-105-121-A, 2-RV-105-121-B, 2-RV-105-121-C, and 2-RV-105-121-D. |
| Code Requirement: | ASME Section XI, 1980 Edition through Winter 1981 Addenda, Table IWB-2500-1, Examination Category B-A, Item Number B1.30, requires 100% volumetric (ultrasonic) examination of the weld plus 1/2 the wall thickness of adjacent base metal on each side of the weld crown. ASME Section V, 1980 Edition through Winter 1981 Addenda, Article 4, T-441.4, specifies that this volume be examined with two angle beam scans (i.e., 45° and 60° nominal) for reflectors transverse to the weld seam, with two angle beam scans for reflectors parallel to the weld seam, and with a straight (0°) beam scan for planar and laminar reflectors. |
| Areas for Relief: | Relief is requested from the 100% coverage requirement of the specified examination volume. Examination of the inlet nozzle-to-vessel welds was limited by the nozzle inside diameter taper.<br><br>Of the total required examination volume for each inlet nozzle weld, 56.3% was examined with angle beam scans (45° and 60°) for reflectors transverse to weld seam, 81.9% was examined with angle beam scans (combination of 10°, 30°, and 50°) from the nozzle bore for reflectors parallel to the weld seam and, 56.3% was examined with a 0° scan from the vessel inside surface. |
| Basis for Relief: | Radiation levels at the vessel inside surface prohibit use of alternate manual scanning techniques from inside the vessel.<br><br>Due to the weld morphology the most likely direction for inservice flaw initiation is in a direction parallel with the weld seam. The examination coverage for reflectors oriented in this parallel direction was 81.9%. |

# CALLAWAY ISI
# RELIEF REQUEST E-7



Basis for Relief (Cont.): Industry experience has shown no identified inservice failure of Pressurized Water Reactor (PWR) vessel nozzle welds. Reactor vessels similar to Callaway's have been in operation for over 20 years with no recorded inservice induced flaws or potential degradation mechanisms.

Union Electric considers the high cost to design and manufacture specialized tooling to achieve a modest increase in coverage in areas of unusual geometry and the refueling outage costs to perform such specialized examinations to be impractical without a compensating increase in safety.

Alternate Testing: The extent of the ultrasonic examination performed and the Reactor Coolant System leakage detection system will verify the weld integrity.