Tennessee Valley Authority, Post Office Box 2000, Soddy Daisy, Tennessee 37384-2000

February 19, 2009

10 CFR 50.50a(g)(5)(iii)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Gentleman:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

SEQUOYAH NUCLEAR PLANT (SQN) - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI INSERVICE INSPECTION (ISI) PROGRAM - RELIEF REQUESTS

Pursuant to 10 CFR 50.55a(g)(5)(iii), TVA is submitting 11 requests for relief from ASME code requirements. The relief requests are associated with ISI activities performed and identified during the third period of SQN's ASME Section XI Second 10-Year Inservice Inspection Interval. The relief requests are based on limitations that preclude full code examination coverage for ASME code welds and components. Full code examination of the welds and components is limited because of design configurations.

The relief requests are submitted in accordance with 10 CFR 50.55a(g)(5)(iii). TVA requests that NRC provide approval in accordance with 10 CFR 50.55a(g)(6)(i). The original relief request was prepared for submittal on January 27, 2007; however, the request was inadvertently not submitted to NRC.

TVA has no specific milestones or schedule for requesting NRC review and approval of the enclosed relief requests. The enclosed relief requests are being submitted solely for the closure of SQN's Second 10-Year Inservice Inspection Interval that completed on May 31, 2006. SQN's Third 10-year inspection interval started on June 1, 2006.

Enclosure 1 provides five requests for relief for both units and a single relief request specific to Unit 2 (2-ISI-33). Enclosure 2 provides examination data reports for 2-ISI-33. Enclosure 3 provides ISI drawings. Enclosure 4 provides TVA's procedure for calculation of the ASME code coverage for Section XI nondestructive examinations. Enclosure 5 provides examination data reports (area coverage) for the balance of relief requests involving volumetric examination.

There are no commitments contained in this letter.

If you have any questions about this change, please telephone me at (423) 843-7170.

Sincerely,

Beth A. Wetzel
Manager, Site Licensing and
Industry Affairs

Enclosures
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ENCLOSURE 1

SEQUOYAH NUCLEAR PLANT (SQN)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
INSERVICE INSPECTION PROGRAM (ISI)
REQUESTS FOR RELIEF

UNITS 1 AND 2

1/2-ISI-28
1/2-ISI-29
1/2-ISI-30
1/2-ISI-31
1/2-ISI-32
2-ISI-33

Request For Relief 1/2-ISI-28

Summary:

TVA is requesting relief from the ASME Section XI Code to address the Units 1 and 2 reactor pressure vessel (RPV) bottom head-to-lower shell welds. The design configuration of the RPV core support lugs precludes a 100 percent ultrasonic examination of the required examination volume of each bottom head-to-lower shell weld. These physical examination limitations occur when the 1989 Edition Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant physical designs. Based on the date of Sequoyah Nuclear Plant's (SQN) construction permit (May 27, 1970), SQN is exempt from the code requirements for examination access as allowed in 10 CFR 50.55a(g)(4).

An inservice ultrasonic examination was performed on accessible areas to the maximum extent practical, given the physical limitations of the RPV bottom head-to-lower shell weld (W02-03) on both units. The design configuration limits the best effort ultrasonic examination to approximately 77 percent of the RPV bottom head-to-lower shell weld on both units. Performance of an ultrasonic examination of essentially 100 percent of the full penetration welds is impractical because of the location of the reactor vessel core support lugs. The best effort ultrasonic examination and the required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provides reasonable assurance of an acceptable level of quality and safety, because the information and data obtained from the volume examined provides sufficient information to judge the overall integrity of the weld.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Units:	1 and 2
System:	Reactor Coolant System - System 68
Components:	RPV Bottom Head-to-Lower Shell Weld, Full Penetration Weld
ASME Code Class:	ASME Code Class 1 (Equivalent)
Section XI Edition:	1989 Edition (1995 Edition with 1996 Addenda for Non-Destructive Examination (NDE)
Code Table:	IWB-2500-1
Examination Category:	B-A, Pressure Retaining Welds in Reactor Vessel
Examination Item Number:	B1.11, Circumferential Shell Welds
Code Requirement:	ASME Section XI, Table IWB-2500-1, Examination Category B-A, Item Number B1.11, Requires Volumetric Examination of the RPV Bottom Head-to-Lower Shell Weld
Code Requirement From Which Relief Is Requested:	Volumetric Examination of Essentially 100 percent of the RPV Bottom Head-to-Lower Shell Weld
List of Items Associated With The Relief Request:	W02-03 RPV Bottom Head-to-Lower Shell Welds on Units 1 and 2

Request for Relief 1/2-ISI-28 (continued)

Basis for Relief:

The design configuration of the RPV precludes a complete volumetric examination of the required volume for the bottom head-to-lower shell weld W02-03 on both units. The limitation is due to the location of the reactor vessel core support lugs. This design configuration limits the volumetric (ultrasonic) examination to approximately 77 percent of the weld on both units. The calculated results are provided in Enclosure 5.

Alternative Examination:

In lieu of the code required 100 percent volumetric examination, an ultrasonic examination will be performed on accessible areas to the maximum extent practical given the physical limitations of the bottom head-to-lower shell weld. Refer to Enclosure 5 for the Units 1 and 2 examination area coverage reports.

Justification for the Granting of Relief:

The design configuration used in the fabrication of the RPV bottom head-to-lower shell weld and location of the reactor vessel core support lugs precludes volumetric examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the code requirement, the RPV would require extensive design modifications. The physical arrangement of bottom head-to-lower shell weld W02-03 and location of the reactor vessel core support lugs limit access for a complete volumetric examination. A total of six-core support lugs are welded to the reactor vessel equally spaced circumferently adjacent to the weld along the axial direction of the reactor vessels. Each core support lug attachment is approximately 15.75 inches in width and 23.78 inches in length (plus the weld blend radius) and covers the examination areas adjacent to the bottom head-to-lower shell weld. The design configuration of the RPV limits the ultrasonic examination to approximately 77 percent for both welds. Examinations were performed using qualified performance demonstration initiative (PDI) techniques.

Radiographic examination as an alternative volumetric examination method was determined to be impractical because of the inaccessibility from the inside diameter (ID) and the presence of water in the vessel.

Performing an ultrasonic volumetric or a surface examination from the RPV outside surface was determined to be impractical because of the physical design of the building. The physical limitations include the biological shield and insulation, which does not allow access to the weld without significant modification of the structure.

Performance of an ultrasonic volumetric examination of essentially 100 percent of the required volume of the bottom head-to-lower shell weld W02-03 on each RPV is impractical. As previously discussed, TVA determined that it would be impractical to attempt other volumetric examinations in order to increase examination coverage. The percentage (77 percent) of a volumetric (ultrasonic) examination of the subject weld and adjacent basemetal volumes and a code required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provides reasonable assurance of an acceptable level of quality and safety. Significant degradation, if present, would be detected during the ultrasonic and VT-3 examinations that are performed on the subject welds. As a result, reasonable assurance of structural integrity of these welds is provided by the performance of these examinations.

Request for Relief 1/2-ISI-28 (continued)

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Implementation Schedule:

This request for relief is applicable to the second inspection interval for SQN Units 1 and 2. The examinations of weld W02-03 for both Units 1 and 2 were performed in the third period.

Background Information:

Requests for relief for volumetric examination coverage limitations was submitted for SQN's RPV bottom head-to-lower shell welds in SQN's first ISI interval (Relief Request 1-ISI-25 for Unit 1 and Relief Request 2-ISI-30 for Unit 2) and was approved by the reference letter below.

References:

1) Letter from David E. LaBarge, NRC, to O.D. Kingsley, Jr., TVA, dated February 7, 1996 (TAC Nos. M92454 and M92455)

2) Enclosure 3 - SI Program Drawing: ISI-0504-C-02 for Unit 1 and ISI-0298-C-02 for Unit 2

3) Enclosure 5 – ISwT Examination Area Coverage Reports for SQN Units 1 and 2

Request for Relief 1/2-ISI-29

Summary:

TVA is requesting relief from the ASME Section XI Code to address the Units 1 and 2 RPV bottom head welds. The design configuration of the RPV instrumentation tubes, which penetrate the bottom head, precludes a 100 percent ultrasonic examination of the required examination volume of each bottom head weld. These physical examination limitations occur when the 1989 Edition Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant physical designs. Based on the date of SQN's construction permit (May 27, 1970), SQN is exempt from the code requirements for examination access as allowed by 10 CFR 50.55a(g)(4).

An inservice ultrasonic examination was performed on accessible areas to the maximum extent practical, given the physical limitations of the RPV bottom head weld (W01-02) on both units. The design configuration limits the best effort ultrasonic examination to approximately 52 percent (Unit 1) and 54 percent (Unit 2) of the RPV bottom head weld. Performance of an ultrasonic examination of essentially 100 percent of the full penetration welds are impractical due to the location of the of the reactor vessel instrumentation tubes, which penetrate the bottom head. The best effort ultrasonic examination and the required VT-3 examination of the interior of the RPV (Examination Category B-N-1) provides reasonable assurance of an acceptable level of quality and safety, because the information and data obtained from the volume examined provides sufficient information to judge the overall integrity of the weld.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Units:	1 and 2
System:	Reactor Coolant System - System 68
Components:	RPV Bottom Head Weld, Full Penetration Weld
ASME Code Class:	ASME Code Class 1 (Equivalent)
Section XI Edition:	1989 Edition (1995 Edition with 1996 Addenda for NDE)
Code Table:	IWB-2500-1
Examination Category:	B-A, Pressure Retaining Welds in Reactor Vessel
Examination Item Number:	B1.21, Circumferential Head Welds
Code Requirement:	ASME Section XI, Table IWB-2500-1, Examination Category B-A, Item Number B1.21 Requires Volumetric Examination of the RPV Bottom Head Weld
Code Requirement From Which Relief Is Requested:	Volumetric Examination of Essentially 100 percent of the RPV Bottom Head Weld
List of Items Associated With The Relief Request:	W01-02 RPV Bottom Head Welds on Units 1 and 2

Request for Relief 1/2-ISI-29 (continued)

Basis for Relief:

The design configuration of the RPV precludes a complete volumetric examination of the required volume for bottom head weld W01-02 on both units. The limitation is due to instrumentation tubes, which penetrate the bottom head. This design configuration limits the volumetric (ultrasonic) examination to approximately 52 percent (Unit 1) and 54 percent (Unit 2) of the weld. The calculated results are provided by Enclosure 5.

Alternative Examination:

In lieu of the code required 100 percent volumetric examination, an ultrasonic examination will be performed on accessible areas to the maximum extent practical given the physical limitations of the bottom head weld. Refer to Enclosure 5 for the Units 1 and 2 examination area coverage reports.

Justification for the Granting of Relief:

The design configuration used in the fabrication of the RPV bottom head weld and location of the reactor vessel instrumentation, which penetrate the bottom head, precludes volumetric examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the code requirement, the RPV would require extensive design modifications. The physical arrangement of bottom head weld W01-02 and location of the reactor vessel instrumentation tubes, which penetrate the bottom head, limits access for a complete volumetric examination on each weld. A total of 58 instrumentation tubes penetrate the bottom head. These instrumentation tubes limit the access to the bottom head weld. The design configuration limits the best effort ultrasonic examination to approximately 52 percent (Unit 1) and 54 percent (Unit 2) of the welds. The subject welds were examined using application of the qualified PDI techniques.

Radiographic examination as an alternative volumetric examination method was determined to be impractical because of the inaccessibility from the outside diameter (OD) of the vessel and also because of the presence of water in the vessel.

Performance of an ultrasonic volumetric examination of essentially 100 percent of the required volume of bottom head weld W01-02 on each RPV is impractical. As previously discussed, TVA determined that it would be impractical to attempt other volumetric examinations in order to increase examination coverage. The percentage (52 percent Unit 1 and 54 percent Unit 2) of a volumetric (ultrasonic) examination of the subject weld and adjacent basemetal volumes and a code required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provides reasonable assurance of an acceptable level of quality and safety. Significant degradation, if present, would be detected during the ultrasonic and VT-3 examinations that are performed on the subject welds. As a result, reasonable assurance of structural integrity of these welds is provided by the performance of these examinations.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Request for Relief 1/2-ISI-29 (continued)

Implementation Schedule:

This request for relief is applicable to the second inspection interval for SQN Units 1 and 2. The examinations of weld W01-02 for both units were performed in the third period.

Background Information:

A request for relief for volumetric examination coverage limitations was submitted for W01-02 as 1-ISI-5 for Unit 1 and 2-ISI-5 for Unit 2 in the first inspection interval and was approved by the reference letters below.

References:

1) Letter from Frederick J. Hibdon, NRC, to Oliver D. Kingsley, Jr., TVA, dated February 7, 1991 (TAC No. 59457)

2) Letter from Suzanne Black, NRC, to Oliver D. Kingsley, Jr., TVA, dated April 19, 1990 (TAC No. 59458)

3) Enclosure 3 - ISI Program Drawing: ISI-0504-C-02 for Unit 1 and ISI-0298-C-02 for Unit 2

4) Enclosure 5 – ISwT Examination Area Coverage Reports for SQN Units 1 and 2

Request for Relief 1/2-ISI-30

Summary:

TVA is requesting relief from the ASME Section XI Code to address the Units 1 and 2 RPV outlet nozzle-to-vessel welds. The design configuration of the RPV, the outlet nozzle integral extensions, and the location of the adjacent nozzles preclude a 100 percent ultrasonic examination of the required examination volume of the outlet nozzle-to-vessel welds. These physical examination limitations occur when the 1989 Edition Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant physical designs. Based on the date of SQN's construction permit (May 27, 1970), SQN is exempt from the code requirements for examination access as allowed in 10 CFR 50.55a(g)(4).

An inservice ultrasonic examination was performed on accessible areas to the maximum extent practical, given the physical limitations of the RPV outlet nozzle-to-vessel welds. The design configuration limits the best effort ultrasonic examination to approximately 81 percent (Unit 1) and 72 percent (Unit 2) of each of the RPV outlet nozzle-to-vessel welds. Performance of an ultrasonic examination of essentially 100 percent of the full penetration welds is impractical because of the integral extensions and the location of the adjacent nozzles. The best effort ultrasonic examination and the required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provide reasonable assurance of an acceptable level of quality and safety, because the information and data obtained from the volume examined provides sufficient information to judge the overall integrity of the weld.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Units:	1 and 2
System:	Reactor Coolant System - System 68
Components:	RPV Outlet Nozzle-to-Vessel Weld, Full Penetration Weld
ASME Code Class:	ASME Code Class 1 (Equivalent)
Section XI Edition:	1989 Edition (1995 Edition with 1996 Addenda for NDE)
Code Table:	IWB-2500-1
Examination Category:	B-D, Pressure Retaining Welds in Reactor Vessel
Examination Item Number:	B3.90, Reactor Vessel Nozzle-to-Vessel Welds
Code Requirement:	ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item Number B3.90 Requires Volumetric Examination of the Outlet Nozzle-to-Vessel Welds
Code Requirement From Which Relief Is Requested:	Volumetric Examination of Essentially 100 percent of the Outlet Nozzle-to-Vessel Welds
List Of Items Associated With The Relief Request:	N-15, N-16, N-17, and N-18 Outlet Nozzle-to-Vessel Welds on Units 1 and 2

Request for Relief 1/2-ISI-30 (continued)

Basis for Relief:

The design configuration of the RPV precludes a complete volumetric examination of the required volume for outlet nozzle-to-vessel welds N-15, N-16, N-17, and N-18 on both units. The limitation is because of the physical arrangement of outlet nozzle-to-vessel weld, nozzle integral extensions and the location of the adjacent nozzles. This design configuration limits the volumetric (ultrasonic) examination to approximately 81 percent (Unit 1) and 72 percent (Unit 2) for these welds. The calculated results are provided in Enclosure 5.

Alternative Examination:

In lieu of the code required 100 percent volumetric examination, an ultrasonic examination will be performed on accessible areas to the maximum extent practical given the physical limitations of the outlet nozzle-to-vessel welds. Refer to Enclosure 5 for the Units 1 and 2 examination area coverage reports.

Justification for the Granting of Relief:

The design configuration used in the fabrication of the RPV outlet nozzle-to-vessel weld, the outlet nozzle integral extensions, and the location of the adjacent nozzles precludes volumetric examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the code requirement, the RPV would require extensive design modifications. The physical arrangement of outlet nozzle-to-vessel welds N-15, N-16, N-17, and N-18; the nozzle integral extensions; and the location of the adjacent nozzles limit access for a complete volumetric examination. Because of the design of the RPV nozzle-to-vessel weld configuration, ultrasonic examination conducted from the vessel interior surface provides more examination coverage than if conducted from the vessel exterior surface due to limited access. The design configuration limits the best effort ultrasonic examination to approximately 81 percent (Unit 1) and 72 percent (Unit 2) for these welds. The subject welds were examined using application of the qualified PDI techniques.

Radiographic examination as an alternative volumetric examination method was determined to be impractical because of the inaccessibility from the OD of the vessel and also due to the presence of water in the vessel.

Performance of an ultrasonic volumetric examination of essentially 100 percent of the required volume of outlet nozzle-to-vessel welds N-15, N-16, N-17, and N-18 on each RPV is impractical. As previously discussed, TVA determined that it would be impractical to attempt other volumetric examinations in order to increase examination coverage. The percentage (81 percent Unit 1 and 72 percent Unit 2) of a volumetric (ultrasonic) examination of the subject weld and adjacent basemetal volumes and a code required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provides reasonable assurance of an acceptable level of quality and safety. Significant degradation, if present, would be detected during the ultrasonic and VT-3 examinations that are performed on the subject welds. As a result, reasonable assurance of structural integrity of these welds is provided by the performance of these examinations.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Request for Relief 1/2-ISI-30 (continued)

Implementation Schedule:

This request for relief is applicable to the second inspection interval for SQN Units 1 and 2. The examination of welds N-15, N-16, N-17, and N-18 for both Units 1 and 2 were performed in the third period.

Background Information:

A request for relief for volumetric examination coverage limitations was submitted for welds N-15, N-16, N-17 and N-18 as 1-ISI-27 for Unit 1 and 2-ISI-29 for Unit 2 in the first inspection interval and was approved with the reference letter below.

References:

1) Letter from David E. LaBarge, NRC, to O.D. Kingsley, Jr., TVA, dated February 7, 1996 (TAC NOS. M92454 and M92455)

2) Enclosure 3 - ISI Program Drawing: ISI-0504-C-02 for Unit 1 and ISI-0298-C-02 for Unit 2

3) Enclosure 5 – ISwT Examination Area Coverage Reports for SQN Units 1 and 2

Request for Relief 1/2-ISI-31

Summary:

TVA is requesting relief from the ASME Section XI Code to address the Units 1 and 2 reactor pressure vessel (RPV) bottom head meridional welds. The design configuration of the RPV instrumentation tubes, which penetrate the bottom head, precludes a 100 percent ultrasonic examination of the required examination volume of the bottom head weld. These physical examination limitations occur when the 1989 Edition Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant physical designs. Based on the date of SQN's construction permit (May 27, 1970), SQN is exempt from the code requirements for examination access as allowed in 10 CFR 50.55a(g)(4).

An inservice ultrasonic examination was performed on accessible areas to the maximum extent practical, given the physical limitations of the RPV bottom head meridional welds. The design configuration limits the best effort ultrasonic examination of the meridional welds. Performance of an ultrasonic examination of essentially 100 percent of the full penetration welds are impractical due to the location of the of the reactor vessel instrumentation tubes, which penetrate the bottom head. The best effort ultrasonic examination and the required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provide reasonable assurance of an acceptable level of quality and safety, because the information and data obtained from the volume examined provide sufficient information to judge the overall integrity of the weld.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Units:	1 and 2
System:	Reactor Coolant System - System 68
Components:	Reactor Pressure Vessel Bottom Head Meridional Welds, Full Penetration Weld
ASME Code Class:	ASME Code Class 1 (Equivalent)
Section XI Edition:	1989 Edition (1995 Edition with 1996 Addenda for NDE)
Code Table:	IWB-2500-1
Examination Category:	B-A, Pressure Retaining Welds in Reactor Vessel
Examination Item Number:	B1.22, Head Meridional Welds
Code Requirement:	ASME Section XI, Table IWB-2500-1, Examination Category B-A, Item Number B1.22 Requires Volumetric Examination of the RPV Bottom Head Meridional Welds
Code Requirement From Which Relief Is Requested:	Volumetric Examination of Essentially 100 percent of the RPV Bottom Head Meridional Welds
List of Items Associated With The Relief Request:	W2C RPV Bottom Head Weld on Unit 1 Only W2E and W2F RPV Bottom Head Welds on Units 1 and 2

Request for Relief 1/2-ISI-31 (continued)

Basis for Relief:

The design configuration of the RPV precludes a complete volumetric examination of the required volume for the bottom head meridional welds (W2E and W2F) on both units and W2C (Unit 1 only). The limitation is due to instrumentation tubes, which penetrate the bottom head. This design configuration limits the volumetric (ultrasonic) examination to approximately 87 percent (Unit 1 only) for W2C, 86 percent (Unit 1) and 90 percent (Unit 2) for W2E and 81 percent (Unit 1) and 80 percent (Unit 2) for W2F, as calculated by TVA approved vendor procedures (Enclosure 5).

Alternative Examination:

In lieu of the code required 100 percent volumetric examination, an ultrasonic examination will be performed on accessible areas to the maximum extent practical given the physical limitations of the bottom head meridional welds. Refer to Enclosure 5 for the Units 1 and 2 examination area coverage reports.

Justification for the Granting of Relief:

The design configuration used in the fabrication of the RPV bottom head meridional welds and location of the reactor vessel instrumentation, which penetrates the bottom head, precludes volumetric examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the code requirement, the RPV would require extensive design modifications. The physical arrangement of bottom head meridional welds W2C (Unit 1 only), W2E, and W2F and location of the reactor vessel instrumentation tubes, which penetrate the bottom head, limits access for a complete volumetric examination. A total of 58 instrumentation tubes penetrate the bottom head. The design configuration limits the best effort ultrasonic examination to approximately 87 percent for W2C (Unit 1 only), 86 percent (Unit 1) and 90 percent (Unit 2) for W2E, and 81 percent (Unit 1) and 80 percent (Unit 2) for W2F welds. The subject welds were examined using application of the qualified PDI techniques.

Radiographic examination as an alternative volumetric examination method was determined to be impractical because of the inaccessibility from the vessel ID and also because of the presence of water in the vessel.

TVA performed a review in order to assess the differences in the percent of coverage between Units 1 and 2. Even though the head configurations are designed to be the same, some of these welds are limited on the upper end by the core barrel support lugs, some are limited on the lower end by the lower head penetrations, and some are limited on both ends.

Performance of an ultrasonic volumetric examination of essentially 100 percent of the required volume of bottom head meridional welds W2E and W2F on each RPV and W2C on Unit 1 only are impractical. As previously discussed, TVA determined that it would be impractical to attempt other volumetric examinations in order to increase examination coverage. The percentage (87 percent [Unit 1 only] on W2C, 86 percent [Unit 1] and 90 percent [Unit 2] on W2E and 81 percent [Unit 1] and 80 percent [Unit 2] on W2F) of a volumetric (ultrasonic) examination of the subject weld and adjacent basemetal volumes and a code required VT-3 visual examination of the interior of the RPV (Examination Category B-N-1) provide reasonable assurance of an acceptable level of quality and safety. Significant degradation, if present,

Request for Relief 1/2-ISI-31 (continued)

would be detected during the ultrasonic and VT-3 examinations that are performed on the subject welds. As a result, reasonable assurance of structural integrity of these welds is provided by the performance of these examinations.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Implementation Schedule:

This request for relief is applicable to the second inspection interval for SQN Units 1 and 2. The examination of weld W2C (Unit 1 only), and welds W2E and W2F for both Units 1 and 2, were performed in the third period.

References:

1) Enclosure 3 - ISI Program Drawing: ISI-0504-C-02 for Unit 1 and ISI-0298-C-02 for Unit 2

2) Enclosure 5 - ISwT Examination Area Coverage Reports for SQN Units 1 and 2.

Request for Relief 1/2-ISI-32

Summary:

TVA is requesting relief from the ASME Section XI Code to address the Units 1 and 2 reactor pressure vessel support RVH-1. The design configuration of the subject support and the location preclude a 100 percent visual examination of the required support area. These physical examination limitations occur when the 1989 Edition Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant physical designs. Based on the issue date of SQN's construction permit (May 27, 1970), SQN is exempt from the code requirements for providing original design and examination access as allowed in 10CFR 50.55a(g)(4).

An inservice VT-3 visual examination was performed on accessible areas to the maximum extent practical, given the design and location limitations of the subject support. The design configuration and location limit the visual examination to one side of the support. Performance of a visual examination of essentially 100 percent of the subject support would be impractical. The maximum extent practical visual examination of the subject support provides reasonable assurance of an acceptable level of quality and safety, because the information obtained from the area examined provides sufficient information to judge the overall integrity of the support.

Therefore pursuant to 10 CFR50.55a(g)(5)(iii), it is requested that relief be granted, for the second inspection interval.

Units:	1 and 2
System:	System Reactor Coolant System – System 68
Component:	RPV Support
ASME Code Class:	ASME Code Class 1 (Equivalent)
Section XI Edition:	1989 Edition (1995 Edition with 1996 Addenda for NDE)
Code Table:	ASME Section XI Code Case N-491-1, Table 2500-1
Examination Category:	F-A, Supports
Examination Item Number:	F1.40, Supports Other Than Piping Supports (Class 1, 2, 3, and MC)
Code Requirement:	ASME Section XI, Code Case N-491-1, Table 2500-1, Examination Category F-A, Item F1.40, Requires VT-3 Visual Examination for the RPV Support
Code Requirement From Which Relief Is Requested:	VT-3 Visual Examination of Essentially 100 Percent of the RPV Support
List of Items Associated With The Relief Request:	RVH-1, RPV Support

Request for Relief 1/2-ISI-32 (continued)

Basis for Relief:

The design configuration of the reactor vessel support and the support location precludes a VT-3 visual examination of the required area of the subject support RVH-1. A limited VT-3 visual examination was performed on the accessible portions of the subject support to the maximum extent practical. Removable portions of the insulation were removed from the piping and RPV nozzle areas in order to maximize the VT-3 visual examination of the RPV nozzle to support interface. Typical access for each support was determined to allow less than 50 percent of the support areas requiring examination to be examined. Insulation and flashing on the RPV nozzle and the RPV, which remained in place, would require extensive modifications to remove. However, a maximum extent VT-3 visual examination of the area was performed, which included an examination of the insulation for any evidence of disturbance or degradation that may be attributed to abnormal support disturbance.

Alternative Examinations:

In lieu of the Section XI essentially 100 percent VT-3 visual examination, a best effort VT-3 visual examination was performed on accessible areas to the maximum extent practical, given the location and configuration of the support.

Justification For The Granting Of Relief:

The support assembly at four of the eight reactor vessel nozzles consists of a nozzle pad and steel plates positioned between a steel support structure. Additionally, the majority of each support is encased in permanent insulation panels from the reactor vessel and vessel nozzles and piping. Insulation panels were removed around the piping and nozzles to the extent practical in order to access the support. These design features make the VT-3 visual examination of the reactor vessel supports impractical to perform to the extent required by Section XI. The design configuration restricts visual access to a majority of stiffener welds and structural steel.

However, structural and mechanical integrity was verified by observing no signs of mechanical or structural inservice related conditions of the accessible areas. To meet Section XI requirements, the permanent insulation would be required to be removed and redesigned to allow access for complete examination. The design configuration used in the fabrication of the subject support, in conjunction with the confined space to access the support, precludes visual examination of essentially 100 percent of the required examination area. The support is designed to function as a vertical restraint primarily loaded in compression. The majority of each support is encased in the permanent insulation panels of the RPV and RPV nozzles. Portions of the steel support structure and associated welds are accessible for a limited VT-3 visual examination. In order to examine the support in accordance with Section XI requirements, extensive modification would be required to access all regions of the support. Access to the RPV support is limited because of confined access below the nozzle inspection covers, nozzle insulation and the permanent liner steel plates for the cavity wall.

Request for Relief 1/2-ISI-32 (continued)

In addition to difficult access, radiation levels in the area are approximately 35- to 80-millirem per hour. It is estimated that the removal and reinstallation of the permanent insulation in this confined space would result in additional exposure of approximately 4.0 man-rem and achieve a minimum increase in examination coverage. Based on the access restrictions, high radiation levels and support design, relief is requested from performing the VT-3 visual examination of the inaccessible portions of these supports. The design configuration limits the best effort visual examination to the accessible side of the four nozzles for support RVH-1. The subject support was remotely examined using a video camera and direct visual examination in order to achieve maximum coverage.

Performance of a VT-3 visual examination of essentially 100 percent of the required area of RPV support RVH-1 is impractical. The maximum extent practical visual examination of the support will provide reasonable assurance of an acceptable level of quality and safety. Significant degradation, if present, would have been detected during the visual examination on the subject support. As a result, reasonable assurance of structural integrity for this support is provided by the examination that was performed.

Therefore pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted, for the second inspection interval.

Implementation Schedule:

This request for relief is applicable to SQN's second inspection interval for SQN Units 1 and 2. The examinations of the RPV support, RVH-1, were performed for both units in the third period.

Request for Relief 2-ISI-33

Summary:

TVA is requesting relief from the ASME Section XI Code to address the circumferential pressure retaining piping weld SIF-170 in the safety injection system. The design configuration, elbow-to-valve, of the subject piping precludes a 100 percent ultrasonic examination of the required weld volume. These physical examination limitations occur when the 1989 Edition Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant physical designs. Based on the issue date of SQN's construction permit (May 27, 1970), SQN is exempt from the code requirements for providing original design and examination access as allowed in 10 CFR 50.55a(g)(4).

An inservice ultrasonic examination was performed on accessible areas to the maximum extent practical, given the physical limitations of the subject weld. The design configuration, elbow-to-valve, limits the best effort ultrasonic examination to approximately 50 percent. Performance of an ultrasonic examination of essentially 100 percent of the subject circumferential pressure retaining weld would be impractical. The maximum extent practical ultrasonic examination of the subject weld provides reasonable assurance of an acceptable level of quality and safety because the information and data obtained from the volume examined provides sufficient information to judge the overall integrity of the welds.

Therefore pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted, for the second inspection interval.

Unit:	2
System:	Safety Injection System - `System 63
Component:	One Pressure Retaining Circumferential Pipe Weld
ASME Code Class:	ASME Code Class 1 (Equivalent)
Section XI Edition:	1989 Edition (1995 Edition with 1996 Addenda for NDE), 10 CFR 50.55a(b)(2)(xv)(A), WCAP-14572, Revision 1-NP-A, and WCAP-14572, Revision 1-NP-A, Supplement 1
Code Table:	WCAP-14572, Table 4.1-1
Examination Category:	R-A, Risk - Informed Piping Examinations
Examination Item Number:	R1.11, Elements Subject to Thermal Fatigue R1.16, Elements Subject to Intergranular Stress Corrosion Cracking (IGSCC)
Code Requirement:	WCAP-14572, Table 4.1-1, Examination Category R-A, Item Numbers R1.11 and R1.16, Requires Volumetric Examination of Elements Subject to Thermal Fatigue and IGSCC
Code Requirement From Which Relief Is Requested:	Volumetric Examination Coverage of Essentially 100 Percent of Elements Thermal Fatigue and IGSCC

Request for Relief 2-ISI-33 (continued)

List of Items Associated With The Relief Request: SIF-170, Circumferential Pipe Weld

Basis for Relief:

The design configuration, elbow-to-valve, of the safety injection piping precludes an ultrasonic examination of the required volume of the subject weld SIF-170 because of the design of the valve. The design configuration limits ultrasonic examination to approximately 50 percent of the required examination volume as calculated in accordance with TVA Procedure N-GP-28 (Enclosure 4).

Alternative Examinations:

In lieu of the code required 100 percent volumetric examination, a best effort ultrasonic examination was performed on accessible areas to the maximum extent practical given the physical limitations of the subject weld. Refer to (Enclosure 2) attached examination data report.

Justification for Granting Of Relief:

The design configuration, elbow-to-valve, precludes ultrasonic examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the code requirements, the safety injection system pipe-to-valve configuration would require extensive modification. SIF-170 is limited due to the elbow-to-valve configuration, which limits scanning on the elbow side only. The design configuration limits the best effort ultrasonic examination to approximately 50 percent for weld SIF-170. The subject weld was examined using application of PDI qualified techniques with PDI qualified examiners.

The risk informed segment, which includes weld SIF-170, is classified high safety significant. The postulated failure mechanisms for the segment are thermal fatigue, thermal stratification/striping and stress corrosion cracking (SCC). All welds in this segment that are subject to SCC must be examined every 10 years. Weld SIF-170 is the only weld in this segment that is subject to SCC. Therefore, there are no welds available for substitution.

Performance of an ultrasonic volumetric examination of essentially 100 percent of the required volume of pressure retaining circumferential weld SIF-170 (pipe to valve) in the safety injection piping is impractical. As indicated above, this ultrasonic volumetric examination was performed in accordance with Performance Demonstration Initiative (PDI). The maximum extent practical ultrasonic examination of the weld and adjacent material and the code required VT-2 examination for leakage would provide reasonable assurance of an acceptable level of quality and safety. Significant degradation, if present, would be detected during the ultrasonic and VT-2 examinations that are performed on the subject weld. As a result, reasonable assurance of structural integrity for this weld is provided by the examinations that were performed.

Request for Relief 2-ISI-33 (continued)

Radiographic examination as an alternate volumetric examination method was determined to be impractical due the material thickness variation. The radiographic density variation does not lend for compliance with Section V requirements without extensive radiographic exposures to obtain the density for the base material on the valve side. Radiography required would increase personnel radiation exposure for minimal increase in examination coverage.

Therefore pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second inspection interval.

Implementation Schedule:

This request for relief is applicable to SQN's second inspection interval for SQN Unit 2. Weld SIF-170 for Unit 2 was examined in the third period.

References:

1) Enclosure 2 - Examination Data Report: R6693 and R6694

2) Enclosure 3 - ISI Program Drawings: ISI-0002-C-06

3) Enclosure 4 - Non Destructive Examination Procedure N-GP-28 "Calculation of ASME Code Coverage for Section XI NDE Examinations"

ENCLOSURE 2

EXAMINATION DATA REPORTS

Request for Relief Number	Examination Data Reports
2-ISI-33	R6693 and R6694

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND	REPORT NUMBER: R-6693

PROJECT: *SQN* UNIT: *2* CYCLE: *13* COMPONENT ID: *SIF-170*

DESCRIPTION/ ~~ALT SS~~
LOCATION: TFM 5/12/05

EXAMINATION METHOD				SYSTEM: SIS	ISI DWG NO: *ISI-0002-C-06*
MT ☐	PT ☐	UT ☑	VT ☐	CONFIGURATION	CATEGORY
PROCEDURE: *N-UT-64*		REV: *7*	TC *N/A*	*PC,VLV TO PE,EL*	*R-A*

EXAMINER:	EXAMINER:	EXAMINER:	EXAMINER:
JASON POLISENSKY	LESLIE JOHNSON	N/A	N/A
LEVEL: II	LEVEL: II Limited	LEVEL:	LEVEL:

Total coverage calculated to be approximately *50* %

The above mentioned weld was ultrasonically inspected. A 1/2 V path calibration with a primary angle of 45 shear wave. This was a single sided exam, due to valve configuration, and a 60 RL 1/2 V path calibration was also utilized.

Counterbore geometry was recorded with the 60 RL on the intradose of the elbow.

No rejectable indicatins observed.

This examination meet the requirments of Risk Informed item R1.11

RESOLUTION BY	REVIEWED BY	ANII:
Jason Polisensky-POI	T. R. McDermott	James N. Meghan
LEVEL II DATE 4/29/05	LEVEL: III DATE 5/1/05	DATE 5/14/05
		Page: 1 OF 6

ACCESS FORMS DATABASE R-3/18/03

TENNESSEE VALLEY AUTHORITY

DIGITAL ULTRASONIC CALIBRATION DATA SHEET

REPORT NUMBER: R-6693

PROJECT: SQN UNIT/CYCLE 2 / 13
PROCEDURE: N-UT-64 REV: 7 TC:

TRANSDUCER

MANUFACTURER: KBA
MODEL: COMP-G S/N: 00D8KH
SIZE: .375" FREQ: 1.5 MH
SHAPE: Round # ELEMENTS: 1 # CONS: 0
CABLE TYPE: RG-174 LENGTH: 6'
EXAM TYPE ☑ SHEAR ☐ LONG ☐ RL

CALIBRATION DATE: 4/29/05
CALIBRATION BLOCK NO.: SQ-117 TEMP: 75 °F
SIMULATOR BLOCK: Rompas 792770
THERMOMETER S/N 573203 DUE DATE 8-9-05
COUPLANT: Ultragel II BATCH: 01225

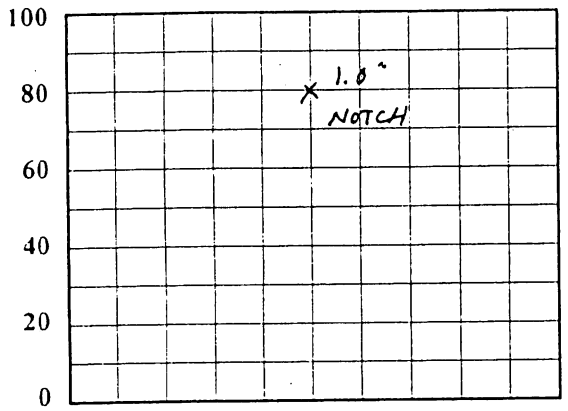
ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 792770
NOMINAL ANGLE: 45° ACTUAL ANGLE: 45 °

INSTRUMENT

MANUFACTURER: Krautkramer DUE DATE: 7/28/05
MODEL NO.: USN-60 M&TE: 36302

DAC



DISPLAY WIDTH 2.9 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☑	☐	31 dB	1#SS45°
CIRC.	☐	☐	N/A dB	

*FREQ 2.0 MHz *REJECT: 0 %
ANGLE: 45 deg *DAMPING: 1000 ohms
DELAY 0.000 msec *PULSER SINGLE
ZERO: 8.0469 msec *PRR/PRF: AUTO HIGH
VELOCITY .1257 msec TOF: PEAK
RANGE: 2.9 inches POWER: BATTERY
*DISP. MODE: F W ENERGY HIGH TCG: ☐ ON ☑ OFF

REF. REFLECTOR: FAR SDH GAIN: 43 dB
AMPLITUDE: 55 % METAL PATH: 1.096

CALIBRATION TIMES

INITIAL TIME: 1040 FINAL TIME: 1410

VERIFICATION TIMES 1) 1315 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*PDI QUALIFIED INSTRUMENT SETTINGS:
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE!

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	
ATTENUATOR	GAIN	SET	-6 dB		-12dB		SET	+12		SET	+6
	AMP	80%	32 TO 48		16 TO 24		20%	64 TO 96		40%	64 TO 96
			40		20			80			80

COMMENTS

DISPLAY START 1P

WELD / ITEMS EXAMINED

SIF-170

EXAMINER: Jason Rohaus - POR LVL.: II
EXAMINER: Gaylen B Johnson LVL.: II LIMITED
REVIEWER: R R McDermott LVL.: III DATE 5/1/05

ANII: J. Mayhan
DATE 5/14/05
PAGE 2 OF 6

ACCESS FORMS DATABASE 10-02-03

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER R-6693

PROJECT: SQN UNIT/CYCLE 2/13
PROCEDURE: N-UT-64 REV: 7 TC:

TRANSDUCER

MANUFACTURER: RTD
MODEL: TRLA S/N: 99-431
SIZE: 8x14mm FREQ: 2 MH
SHAPE: RECT # ELEMENTS: 2 # CONS: 0
CABLE TYPE: RG-174 LENGTH: 6'
EXAM TYPE ☐ SHEAR ☐ LONG ☑ RL

CALIBRATION DATE: 4/29/05
CALIBRATION BLOCK NO.: SQ 117 TEMP: 75 °F
SIMULATOR BLOCK: Rompas 792770
THERMOMETER S/N 573203 DUE DATE 8-9-05
COUPLANT: Ultragel II BATCH: 01225

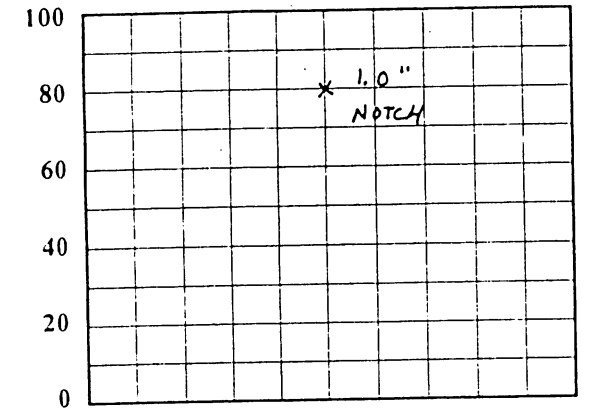
ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 792770
NOMINAL ANGLE: 60° ACTUAL ANGLE: 60 °

INSTRUMENT

MANUFACTURER: Krautkramer DUE DATE: 7/28/05
MODEL NO.: USN-60 M&TE: E36302

DAC



DISPLAY WIDTH 3.5 inches

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTC	SDH		
AXIAL	☑	☐	62 dB	1#SS60°
CIRC.	☐	☐	N/A dB	

*FREQ 2.0 MHz *REJECT: 0 %
ANGLE: 60 deg *DAMPING: 1000 ohms
DELAY 0.000 msec *PULSER DUAL
ZERO: 8.5591 msec *PRR/PRF: AUTO HIGH
VELOCITY .2329 msec TOF: PEAK
RANGE: 3.500 inches POWER: BATTERY
*DISP. MODE: F W ENERGY HIGH TCG: ☐ ON ☑ OFF

REF. REFLECTOR: FAR SDH GAIN: 62 dB
AMPLITUDE: 90 % METAL PATH: 1.531

CALIBRATION TIMES

INITIAL TIME: 1045 FINAL TIME: 1412

VERIFICATION TIMES 1) 1330 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*PDI QUALIFIED INSTRUMENT SETTINGS:
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE!

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	
ATTENUATOR	GAIN SET	-6 dB		-12dB		SET		+12		SET	+6
	AMP 80%	32 TO 48		16 TO 24		20%		64 TO 96		40%	64 TO 96
		40		20				80			80

COMMENTS	WELD / ITEMS EXAMINED
DISPLAY START IP	SIF-170

EXAMINER: Jason Polsonby -POI LVL.: II
EXAMINER: Leslie Johnson LVL.: II LIMITED
REVIEWER: J. McDermott LVL.: III DATE 5/1/05

ANII: J. Mayhan
DATE 5/14/05
TPH 5/15/05
PAGE 3 OF 6

ACCESS FORMS DATABASE 10-02-03

E2-4

TENNESSEE VALLEY AUTHORITY

MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET

REPORT NUMBER R-6693

PROJECT: SQN UNIT/CYCLE 2 / 13
SYSTEM SIS
EXREQ: 89E-02 CAT: R-A ITEM NO: R1.11
WELD I.D.: SIF-170
CONFIG.: PC.VLV TO PE.EL
FLOW
PROCEDURE: N-UT-64 REV: 7 TC: N/A
Wo REFERENCE: WELD CENTER LINE
Lo REFERENCE: TDC

EXAMINATION DATE 4/29/05
START TIME: 1315 END TIME: 1345
EXAM SURFACE: ☐ ID ☑ OD
MATERIAL TYPE: ☐ CS ☑ SS ☐ CSCL ☐ CCSS
SURFACE TEMP. 80 PYRO NO. 573203

EXAMINATION ANGLE	45 DEG.	60RL DEG.
AXIAL SCAN SENSITIVITY	43 dB	62 dB
CIRC. SCAN SENSITIVITY	43 dB	N/A dB

IND NO.	L (in) FROM REF. L1	L Max	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP % DAC	EXAM NO. 3-14	NOM. ANG.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								4	45	☑	
								5	45	☑	
1	15"	18"	21"	1.10	1.1	N/A	100	4	60	☐	Counterbore
								6	45	☑	

REMARKS/LIMITATIONS
No scan 3 due to Valve configuration. Mainatined 10% ID roll No Rejectable Indications

SCAN 5 & 6 PERFORMED ON ELBOW SIDE ONLY

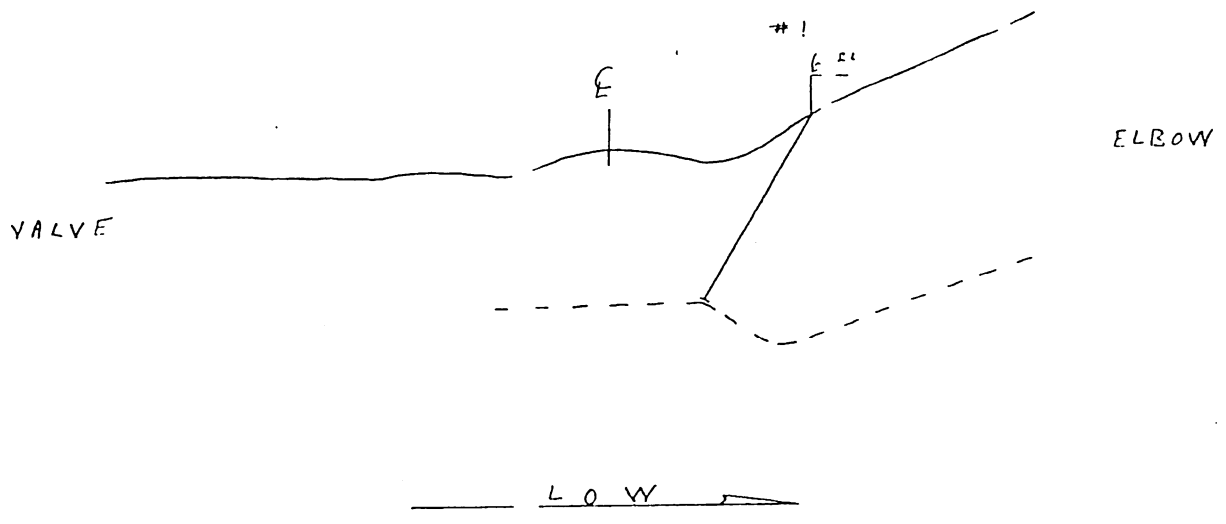
EXAMINER: Jason Polvinen-POS LEVEL: II
EXAMINER: Gabe Johnson LEVEL: II Limited
REVIEWED BY: T. F. McDermott LEVEL: III DATE 5/1/05

ANII: J. Mynatt
DATE 5/14/05
PAGE 4 OF 6 TPM 5/11/05

ACCESS FORMS DATABASE 10/02/03

TVA Office of Nuclear Power	PROJECT: SQN SYSTEM: SIS Unit: 2 WELD NO.: SIF-170	REPORT NO.: R-~~6694~~ [FFN 5/11/05] 6693

INDICATION PLOT



E2-6

Orm 5/19/05

BY: Jason Polhemus Jason Polhemus-PDF LEVEL: III DATE: 4/29/05 PAGE 5 OF 6

TVA

WALL THICKNESS PROFILE SHEET

REPORT NO: R-6693

PROJECT: SQN

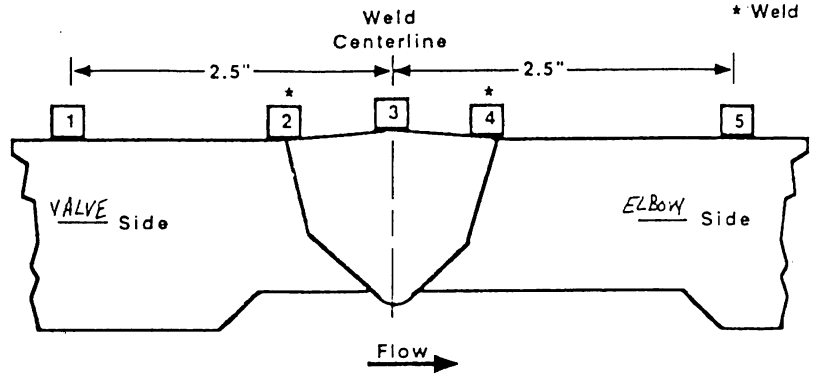
UNIT: 2

WELD NO: SIF-170

SYSTEM: SIS

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1		N/A		
2	A	N/A		A
3	N	1.09	N	
4		1.08		
5		1.12		

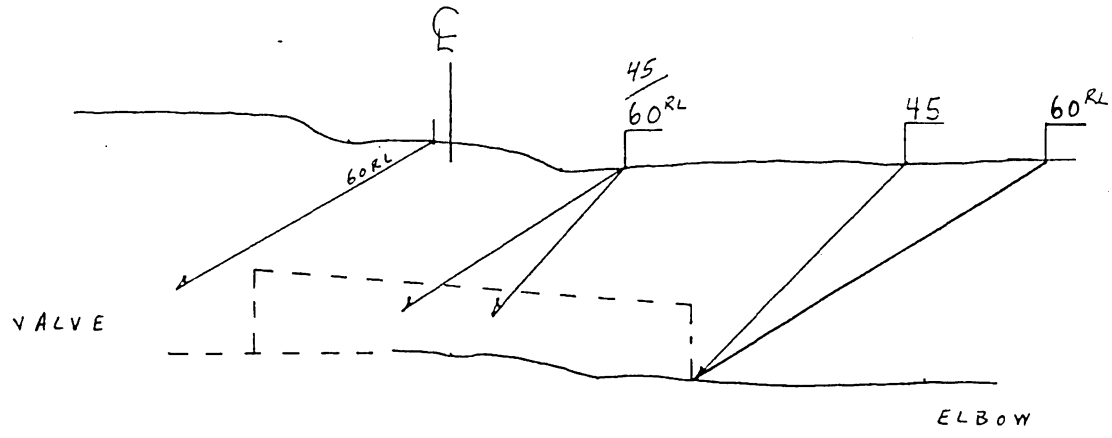


CROWN HEIGHT: .10"

CROWN WIDTH: 1.1"

DIAMETER: 10"

WELD LENGTH: 34.25"



EXTENT OF COVERAGE — FLOW

SCAN 3 (VALVE SIDE) = 0%

SCAN 4 (ELBOW SIDE) = 25%

SCAN 5&6 (VALVE SIDE) = 0%

SCAN 5&6 (ELBOW SIDE) = 25%

TOTAL COVERAGE = 50%

T.F. McDaniel LEVEL III 5/1/05

EXAMINER: Jason Polasek - PDI

LEVEL: II

DATE: 4/29/05

REVIEWED BY: T.F. McDaniel

LEVEL: III DATE: 5/1/05

ANII: J McGraw

DATE: 5/19/05

PAGE 6 OF 6

TVA 19668 (NP-5-89) 1-108

E2-7

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND	REPORT NUMBER: R-6694

PROJECT: SQN UNIT: 2 CYCLE: 13 COMPONENT ID: SIF-170

DESCRIPTION/ ~~ALT SS~~
LOCATION: TPM 5/12/05

EXAMINATION METHOD				SYSTEM: SIS	ISI DWG NO: ISI-0002-C-06
MT ☐	PT ☐	UT ☑	VT ☐	CONFIGURATION	CATEGORY
PROCEDURE: N-UT-64		REV: 7	TC N/A	PC,VLV TO PE,EL	R-A

EXAMINER:	EXAMINER:	EXAMINER:	EXAMINER:
JASON POLISENSKY	LESLIE JOHNSON	N/A	N/A
LEVEL: II	LEVEL: II LIMITED	LEVEL:	LEVEL:

Total coverage calculated to be approximately 50 %

The above mentioned weld was ultrasonically inspected. A 1/2 V path calibration with a primary angle of 45 shear wave. This was a single sided exam, due to valve configuration, and a 60 RL 1/2 V path calibration was also utilized.

Counterbore geometry was recorded with the 60 RL on the intradose of the elbow.

No rejectable indicatins observed.

This examination meet the requirments of Risk Informed item R1.16

RESOLUTION BY	REVIEWED BY	ANII:
Jason Polisensky POF	T. R. McDermott	James N. Wyman
LEVEL II DATE 4/29/05	LEVEL III DATE 5/1/05	DATE 5/14/05
		Page: 1 OF 6

ACCESS FORMS DATABASE R-3/18/03

TENNESSEE VALLEY AUTHORITY

DIGITAL ULTRASONIC CALIBRATION DATA SHEET

REPORT NUMBER R-6694

PROJECT: SQN UNIT/CYCLE 2 / 13
PROCEDURE: N-UT-64 REV: 7 TC: N/A

TRANSDUCER

MANUFACTURER: KBA
MODEL: COMP-G S/N: 00D8KH
SIZE: .375" FREQ: 1.5 MH
SHAPE: Round # ELEMENTS: 1 # CONS: 0
CABLE TYPE: RG-174 LENGTH: 6'
EXAM TYPE ☑ SHEAR ☐ LONG ☐ RL

CALIBRATION DATE: 4/29/05
CALIBRATION BLOCK NO.: SQ 117 TEMP: 75 °F
SIMULATOR BLOCK: Rompas 792770
THERMOMETER S/N 573203 DUE DATE 8-9-05
COUPLANT: Ultragel II BATCH: 01225

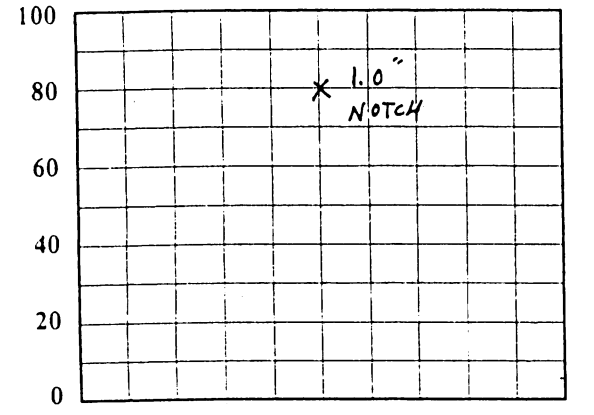
ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 792770
NOMINAL ANGLE: 45° ACTUAL ANGLE: 45°

INSTRUMENT

MANUFACTURER: Krautkramer DUE DATE: 7/28/05
MODEL NO.: USN-60 M&TE: E 36302

DAC



DISPLAY WIDTH 2.9 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☑	☐	31 dB	1#SS45°
CIRC.	☐	☐	N/A dB	

*FREQ 2.0 MHz *REJECT: 0 %
ANGLE: 45 deg *DAMPING: 1000 ohms
DELAY 0.000 msec *PULSER SINGLE
ZERO: 8.0469 msec *PRR/PRF: AUTO HIGH
VELOCITY .1257 msec TOF: PEAK
RANGE: 2.9 inches POWER: BATTERY
*DISP. MODE: F W ENERGY HIGH
TCG: ☐ ON ☑ OFF

REF. REFLECTOR: FAR SDH GAIN: 43 dB
AMPLITUDE: 55 % METAL PATH: 1.096

CALIBRATION TIMES

INITIAL TIME: 1040 FINAL TIME: 1410

VERIFICATION TIMES 1) 1315 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*PDI QUALIFIED INSTRUMENT SETTINGS:
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE!

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	
ATTENUATOR	GAIN SET	-6 dB		-12dB		SET		+12	SET	+6	
	AMP 80%	32 TO 48		16 TO 24		20%		64 TO 96	40%	64 TO 96	
	.	40		20				80		80	

COMMENTS	WELD / ITEMS EXAMINED
	SIF-170
DISPLAY START ID	

EXAMINER: Jason Polasek -POF LVL.: II
EXAMINER: Leslie Johnson LVL.: II LIMITED
REVIEWER: T. R. McDermott LVL.: III DATE 5/11/05

ANII: J. Mayhan
DATE 5/14/05
PAGE 2 OF 6

ACCESS FORMS DATABASE 10-02-03

TENNESSEE VALLEY AUTHORITY

DIGITAL ULTRASONIC CALIBRATION DATA SHEET

REPORT NUMBER R-6694

PROJECT: SQN UNIT/CYCLE 2/13

PROCEDURE: N-UT-64 REV: 7 TC: N/A

TRANSDUCER

MANUFACTURER: RTD

MODEL: TRLA S/N: 99-431

SIZE: 8x14mm FREQ: 2 MH

SHAPE: RECT # ELEMENTS: 2 # CONS: 0

CABLE TYPE: RG-174 LENGTH: 6'

EXAM TYPE ☐ SHEAR ☐ LONG ☑ RL

CALIBRATION DATE: 4/29/05

CALIBRATION BLOCK NO.: SQ-117 TEMP: 75 °F

SIMULATOR BLOCK: Rompas 792770

THERMOMETER S/N 573203 DUE DATE 8-9-05

COUPLANT: Ultragel II BATCH: 01225

ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 792770

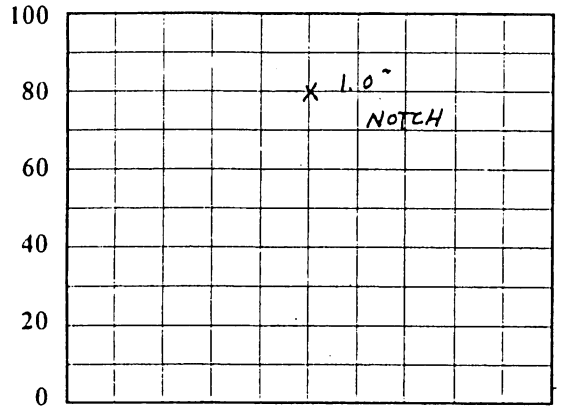
NOMINAL ANGLE: 60° ACTUAL ANGLE: 60 °

INSTRUMENT

MANUFACTURER: Krautkramer DUE DATE: 7/28/05

MODEL NO.: M&TE: E36302

DAC



DISPLAY WIDTH 3.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☑	☐	62 dB	1#SS60*
CIRC.	☐	☐	N/A dB	

*FREQ 2.0 MHz *REJECT: 0 %

ANGLE: 60 deg *DAMPING: 1000 ohms

DELAY 0.000 msec *PULSER DUAL

ZERO: 8.5591 msec *PRR/PRF: AUTO HIGH

VELOCITY .2329 msec TOF: PEAK

RANGE: 3.500 inches POWER: BATTERY

*DISP. MODE: F W ENERGY HIGH TCG: ☐ ON ☑ OFF

REF. REFLECTOR: FAR SDH GAIN: 62 dB

AMPLITUDE: 90 % METAL PATH: 1.531

CALIBRATION TIMES

INITIAL TIME: 1045 FINAL TIME: 1412

VERIFICATION TIMES 1) 1330 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*PDI QUALIFIED INSTRUMENT SETTINGS:
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE!

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	
ATTENUATOR	GAIN SET	-6 dB		-12dB		SET		+12	SET	+6	
	AMP 80%	32 TO 48		16 TO 24		20%		64 TO 96	40%	64 TO 96	
		40		20				80		80	

COMMENTS	WELD / ITEMS EXAMINED
	SIF-170
DISPLAY START ID	

EXAMINER: Jason Polivka - PDI LVL.: II

EXAMINER: Leslie Johnson LVL.: II Limited

REVIEWER: T.A. McDaniel LVL.: III DATE 5/1/05

ANII: J. Mayfield

DATE 5/14/05

PAGE 3 OF 6

ACCESS FORMS DATABASE 10-02-03

TENNESSEE VALLEY AUTHORITY

MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET

REPORT NUMBER R-6694

PROJECT: SQN UNIT/CYCLE 2 / 13
SYSTEM SIS
EXREQ: 89E-02 CAT: R-A ITEM NO: R1.16
WELD I.D.: SIF-170
CONFIG.: PC,VLV TO PE,EL
FLOW
PROCEDURE: N-UT-64 REV: 7 TC: N/A
Wo REFERENCE: WELD CENTER LINE
Lo REFERENCE: TDC

EXAMINATION DATE 4/29/05
START TIME: 1315 END TIME: 1345
EXAM SURFACE: ☐ ID ☑ OD
MATERIAL TYPE: ☐ CS ☑ SS ☐ CSCL ☐ CCSS
SURFACE TEMP. 80 PYRO NO. 573203

EXAMINATION ANGLE	45 DEG.	60RL DEG.
AXIAL SCAN SENSITIVITY	43 dB	62 dB
CIRC. SCAN SENSITIVITY	43 dB	N/A dB

IND NO.	L (in) FROM REF.			AT MAX AMP			MAX AMP % DAC	EXAM NO. 3-14	NOM. ANG.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
	L1	L Max	L2	W MAX	MP MAX	D MAX					
								5	45	☑	
								6	45	☑	
1	15"	18"	21"	1.10	1.1	N/A	100	4	60	☐	counterbore
								4	45	☑	

REMARKS/LIMITATIONS
No scan 3 due to Valve configuration. Mainatined 10% ID roll No Rejectable Indications
SCAN 5&6 PERFORMED ON ELBOW SIDE ONLY

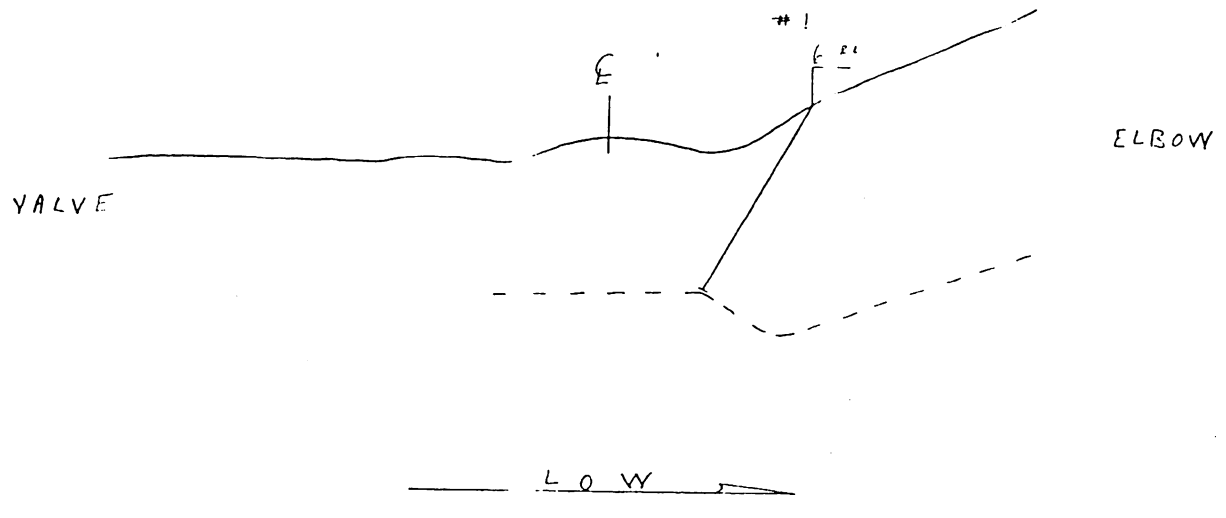
EXAMINER: Jason Pokorny -POF LEVEL: II
EXAMINER: Gabriel Johnson LEVEL: II Limited
REVIEWED BY: T.F. McDermott LEVEL: III DATE 5/11/05

ANII: J. Mayhew
DATE 5/14/05
PAGE 4 OF 6

ACCESS FORMS DATABASE 10/02/03

TVA Office of Nuclear Power	PROJECT: SQN SYSTEM: SIS	REPORT NO.: R-6694
	Unit: 2 WELD NO.: SIF-170	

INDICATION PLOT



E2-12

drawn 5/14/05

BY: Jason Polyanek - PDI LEVEL: III DATE: 4/29/05 PAGE 5 OF 6

TVA 19669 (ONP-6-88)

TVA

WALL THICKNESS PROFILE SHEET

REPORT NO: R-6694 TR. ~~R-6693~~ 5/1

PROJECT: SQN

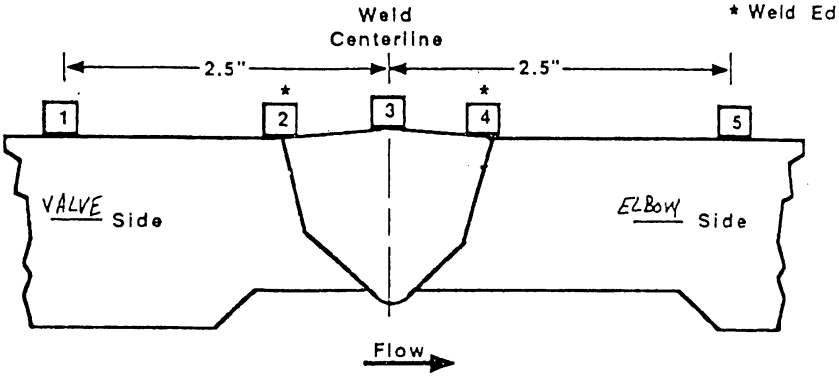
UNIT: 2

WELD NO: SIF-170

SYSTEM: SIS

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1		N/A		
2	A	N/A		A
3	N	1.09	N	
4		1.08		
5		1.12		

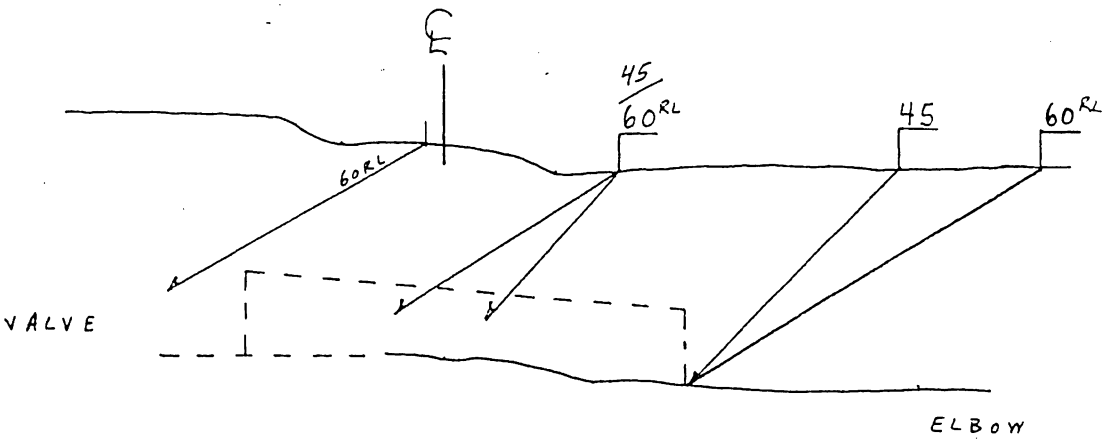


CROWN HEIGHT: .10"

CROWN WIDTH: 1.1"

DIAMETER: 10"

WELD LENGTH: 34.25"



EXTENT OF COVERAGE — FLOW →

SCAN 3 (VALVE SIDE) = 0%

SCAN 4 (ELBOW SIDE) = 25%

SCAN 5&6 (VALVE SIDE) = 0%

SCAN 5&6 (ELBOW SIDE) = 25%

TOTAL COVERAGE = 50%

F.F. Mundell LEVEL III 5/1/05

EXAMINER: Jason Polvino - POI (Jason Polvino)

LEVEL: II

DATE: 4/29/05

REVIEWED BY: F.F. Mundell

LEVEL: III DATE: 5/1/05

ANII: J. Ulgram

DATE: 5/14/05

PAGE 6 OF 6

TVA 19668 (NP-5-89)

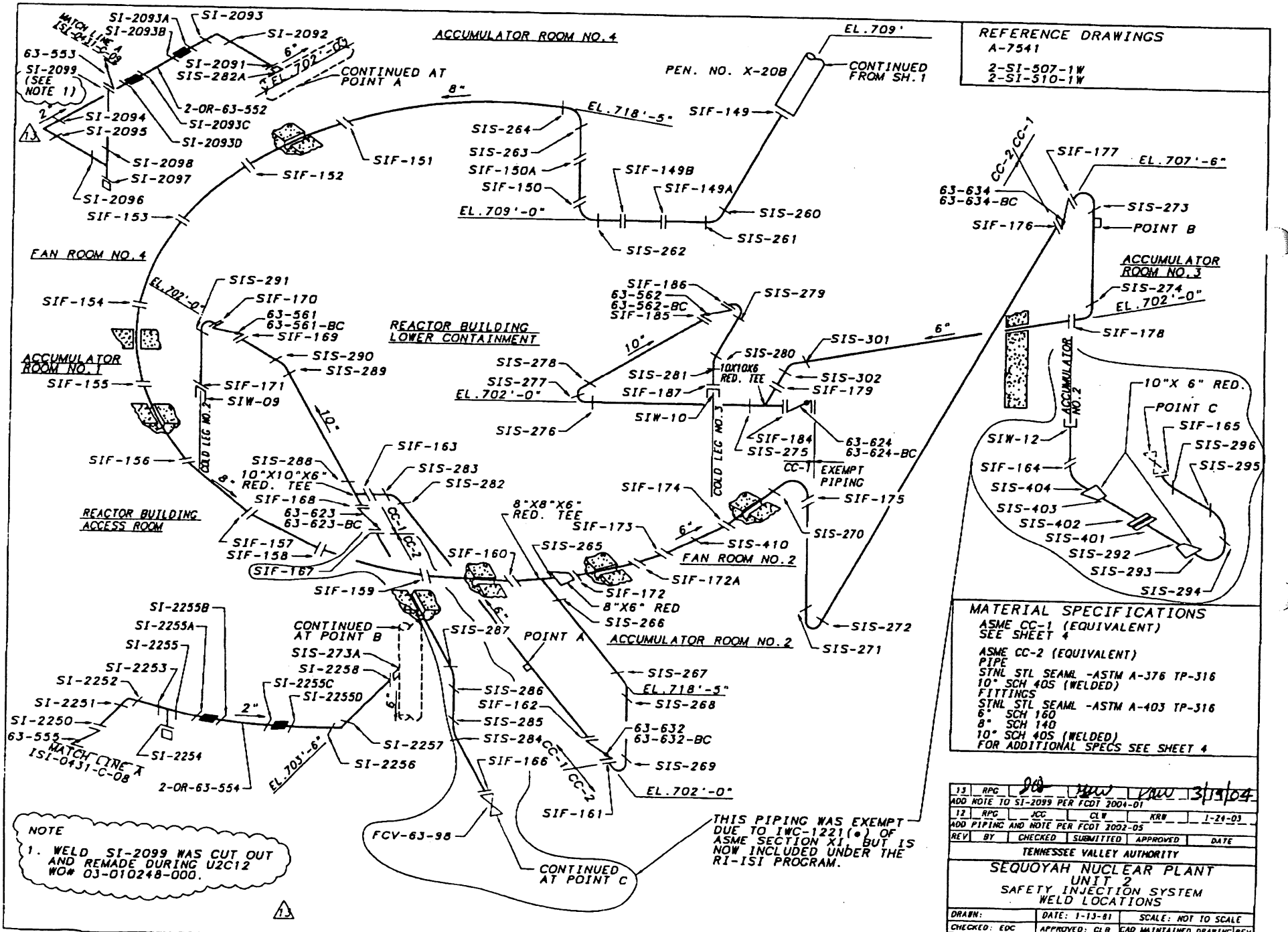
1-12

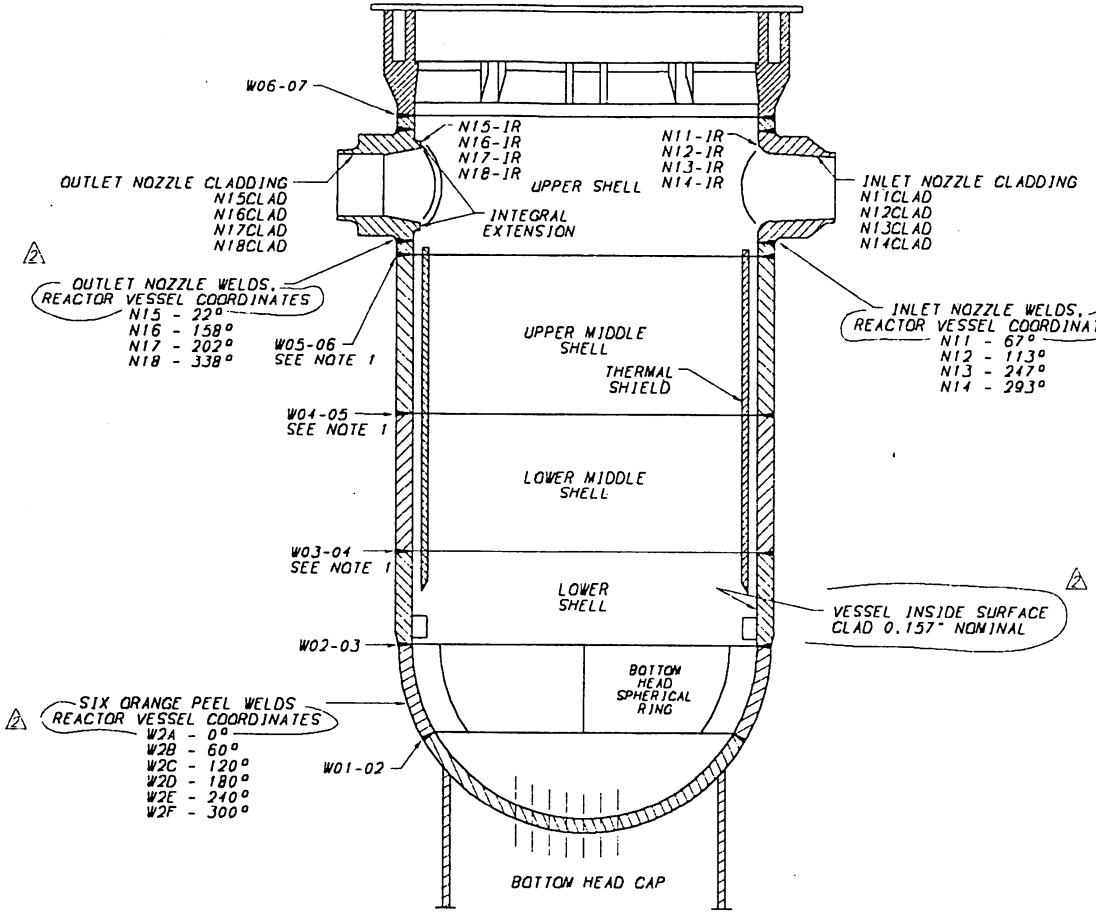
E2-13

ENCLOSURE 3

ISI PROGRAM DRAWINGS

Request for Relief Number	ISI Program Drawings
1-ISI-28	ISI-0504-C-02
2-ISI-28	ISI-0298-C-02
1-ISI-29	ISI-0504-C-02
2-ISI-29	ISI-0298-C-02
1-ISI-30	ISI-0504-C-02
2-ISI-30	ISI-0298-C-02
1-ISI-31	ISI-0504-C-02
2-ISI-31	ISI-0298-C-02
2-ISI-33	ISI-0002-C-06


REFERENCE DRAWINGS
A-7541
2-SI-507-1W
2-SI-510-1W
MATCH LINE A ISI-0431-C-08
SI-2093A
SI-2093B
SI-2093
SI-2092
SI-2091
SIS-282A
6"
EL. 702'-0"
CONTINUED AT POINT A
63-553
SI-2099 (SEE NOTE 1)
SI-2094
SI-2095
SI-2098
SI-2097
SI-2096
2-OR-63-552
SI-2093C
SI-2093D
ACCUMULATOR ROOM NO. 4
EL. 709'
CONTINUED FROM SH. 1
PEN. NO. X-20B
8"
EL. 718'-5"
SIF-149
SIS-264
SIS-263
SIF-150A
SIF-150
EL. 709'-0"
SIF-149B
SIF-149A
SIS-260
SIS-261
SIS-262
SIF-151
SIF-152
SIF-153
FAN ROOM NO. 4
SIF-154
EL. 702'-0"
SIS-291
SIF-170
63-561
63-561-BC
SIF-169
SIS-290
SIS-289
ACCUMULATOR ROOM NO. 1
SIF-155
SIF-171
SIW-09
COLD LEG NO. 2
10"
SIF-156
SIS-288
10"X10"X6" RED. TEE
8"
SIF-168
63-623
63-623-BC
SIF-157
SIF-158
SIF-167
SIF-163
SIS-283
SIS-282
CC-1
CC-2
REACTOR BUILDING ACCESS ROOM
REACTOR BUILDING LOWER CONTAINMENT
SIF-186
63-562
63-562-BC
SIF-185
SIS-279
10"
SIS-278
SIS-277
EL. 702'-0"
SIS-276
SIS-280
10X10X6 RED. TEE
SIS-281
SIF-187
SIW-10
SIS-301
6"
SIS-302
SIF-179
SIF-184
SIS-275
63-624
63-624-BC
CC-1 EXEMPT PIPING
COLD LEG NO. 3
SIF-174
SIF-175
SIS-270
8"X8"X6" RED. TEE
SIF-173
6"
SIS-410
FAN ROOM NO. 2
SIF-172A
SIF-172
8"X6" RED
SIS-266
SIS-265
SIF-160
SIF-159
6"
ACCUMULATOR ROOM NO. 2
SIS-272
SIS-271
SIS-267
EL. 718'-5"
SIS-268
63-632
63-632-BC
SIS-269
EL. 702'-0"
SIF-161
CC-1
CC-2
SIS-287
POINT A
SIS-286
SIF-162
SIS-285
SIS-284
SIF-166
FCV-63-98
CONTINUED AT POINT C
CONTINUED AT POINT B
SIS-273A
SI-2258
SI-2255C
SI-2255D
SI-2257
SI-2256
2"
EL. 703'-6"
2-OR-63-554
SI-2255B
SI-2255A
SI-2255
SI-2253
SI-2252
SI-2251
SI-2250
63-555
SI-2254
MATCH LINE A ISI-0431-C-08
SIF-177
EL. 707'-6"
CC-2
CC-1
63-634
63-634-BC
SIS-273
SIF-176
POINT B
ACCUMULATOR ROOM NO. 3
SIS-274
EL. 702'-0"
SIF-178
ACCUMULATOR NO. 2
10"X 6" RED.
POINT C
SIF-165
SIS-296
SIS-295
SIW-12
SIF-164
SIS-404
SIS-403
SIS-402
SIS-401
SIS-292
SIS-293
SIS-294
MATERIAL SPECIFICATIONS
ASME CC-1 (EQUIVALENT)
SEE SHEET 4
ASME CC-2 (EQUIVALENT)
PIPE
STNL STL SEAML -ASTM A-376 TP-316
10" SCH 40S (WELDED)
FITTINGS
STNL STL SEAML -ASTM A-403 TP-316
6" SCH 160
8" SCH 140
10" SCH 40S (WELDED)
FOR ADDITIONAL SPECS SEE SHEET 4
NOTE
1. WELD SI-2099 WAS CUT OUT AND REMADE DURING U2C12 WO# 03-010248-000.
THIS PIPING WAS EXEMPT DUE TO IWC-1221(e) OF ASME SECTION XI BUT IS NOW INCLUDED UNDER THE RI-ISI PROGRAM.
13 RPC 3/19/04
ADD NOTE TO SI-2099 PER FCDT 2004-01
12 RPC JCC CLW KRW 1-24-03
ADD PIPING AND NOTE PER FCDT 2002-05
REV BY CHECKED SUBMITTED APPROVED DATE
TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT
UNIT 2
SAFETY INJECTION SYSTEM
WELD LOCATIONS
DRAWN: DATE: 1-13-81 SCALE: NOT TO SCALE
CHECKED: EDC APPROVED: CLB CAD MAINTAINED DRAWING REV
SUBMITTED: EDC ISI-0002-C-06 13



REFERENCE DRAWINGS

ISI-0297-A OUTLET NOZZLE
ISI-0392-A INLET NOZZLE

CONTRACT NO. 68C60-91934
(N2M-2-3)
FIG. 7-25
DWG NO. 30616-1050(FIG 7.18)

MATERIAL SPECIFICATIONS 2

THE VESSEL SHELL SECTIONS ARE MACHINED FORGINGS FABRICATED OF A-508, CLASS 2, MANGANESE-MOLYBDENUM STEEL AND ARE CLAD WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

THE VESSEL FLANGE SECTION IS FABRICATED OF A-508, CLASS 2, MANGANESE-MOLYBDENUM STEEL AND IS CLAD INTERNALLY AND ON THE GASKET FACE WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

THE LOWER-HEAD SECTIONS ARE FABRICATED OF A-533, GR.B, CLASS 1, MANGANESE-MOLYBDENUM STEEL, AND ARE CLAD WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

THE NOZZLE FORGINGS ARE FABRICATED OF A-508, CLASS 2, MANGANESE-MOLYBDENUM STEEL AND ARE CLAD WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

EACH NOZZLE SAFE END WELD IS A STAINLESS STEEL TYPE 304 WELD BUILD UP (BUTTERING).

ASME CC-1 (EQUIVALENT)

NOTES:

1. W03-04, W04-05, & W05-06 ARE BELTLINE REGION WELDS
2. FOR UNIT 1 DWG. SEE CHW-2343-C. 2

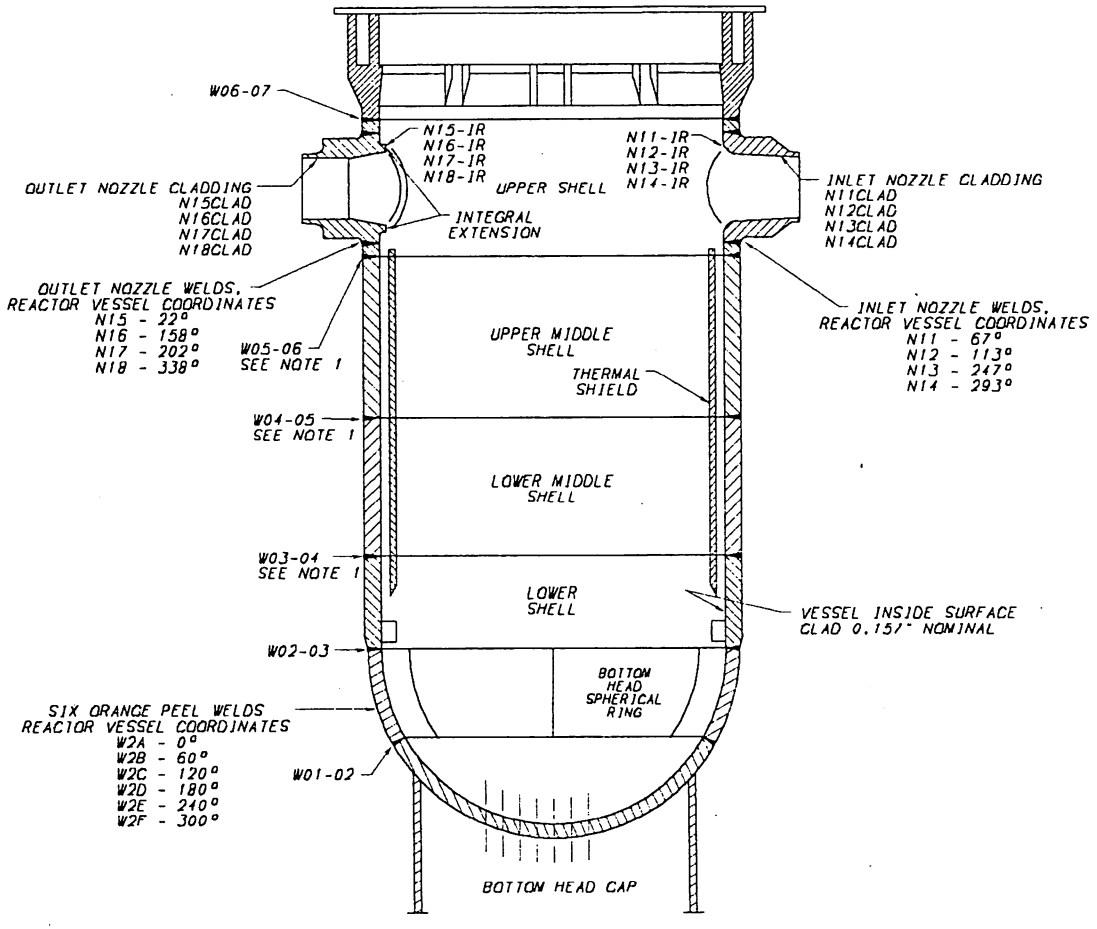
REV.	BY	CHECKED	SUBMITTED	APPROVED	DATE
2	RPG				
CHANGE DRAWING NO. AND SIZE FROM B TO C, ADD MAT'L SPECS, CLAD DIMENSION, AND ADD "REACTOR VESSEL COORDINATES" TO NOZZLE WELDS					
1	RPG	PHB	JCG	GLB	5-28-92
ADD CLADDING IDENTIFIERS, AND ADD NOZZLE REFERENCE DRAWINGS					

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT
UNIT 2
REACTOR VESSEL
SEAM WELDS

DRAWN: RPG	DATE: 12-7-91	SCALE: NOT TO SCALE
CHECKED: PHB	APPROVED: GLB	CAD MAINTAINED DRAWING
SUBMITTED: JCG	ISI-0298-C-02	REV 02

E3-3



REFERENCE DRAWINGS

CONTRACT NO. 68C60-91931 (N2M-2-3)
FIG. 7-25
DWG NO. 30616-1050(FIG 7.18)

MATERIAL SPECIFICATIONS

THE VESSEL SHELL SECTIONS ARE MACHINED FORGINGS FABRICATED OF A-508, CLASS 2, MANGANESE-MOLYBDENUM STEEL AND ARE CLAD WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

THE VESSEL FLANGE SECTION IS FABRICATED OF A-508, CLASS 2, MANGANESE-MOLYBDENUM STEEL AND IS CLAD INTERNALLY AND ON THE GASKET FACE WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

THE LOWER-HEAD SECTIONS ARE FABRICATED OF A-533, GR.B, CLASS 1, MANGANESE-MOLYBDENUM STEEL, AND ARE CLAD WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

THE NOZZLE FORGINGS ARE FABRICATED OF A-508, CLASS 2, MANGANESE-MOLYBDENUM STEEL AND ARE CLAD WITH WELD DEPOSITED AUSTENITIC STAINLESS STEEL.

EACH NOZZLE SAFE END WELD IS A STAINLESS STEEL TYPE 304 WELD BUILD UP (BUTTERING).

ASME CC-1 (EQUIVALENT)

NOTES:

1. W03-04, W04-05, & W05-06 ARE BELTLINE REGION WELDS
2. FOR UNIT 2 DWG. SEE ISI-0298-C
3. THIS DWG SUPERCEDES CHM-2343-C-02

REV.	BY	CHECKED	SUBMITTED	APPROVED	DATE

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT
UNIT 1
REACTOR VESSEL
SEAM WELDS

DRAWN: RMG	DATE:	SCALE: NOT TO SCALE	
CHECKED:	APPROVED:	CAD MAINTAINED DRAWING	REV
SUBMITTED:	ISI-0504-C-02		00

E3-4

ENCLOSURE 4

TVA'S PROCEDURE FOR CALCULATION OF THE
ASME CODE COVERAGE FOR SECTION XI

REQUEST FOR RELIEF 2-ISI-33

W47 031219 000

QA RECORD

CALCULATION OF ASME CODE COVERAGE FOR SECTION XI NDE EXAMINATIONS

"QUALITY RELATED"

Prepared By: Robert E. Hardaway Date: 12/18/03

Technical Review: Joel W. Whitaker NDE Level III, Date: 12/18/03

ISO Approval: W. Ed Freeman Date: 12/18/03

Rev. No.	Date	Description
0	4/3/96	Initial issue.
1	8/15/97	Incorporate TC 97-09.
2	10/18/00	General revision to incorporate 10CFR50.55a ruling change which implements Appendix VIII
3	5/24/01	Revised to upgrade procedure to ASME Section XI 1995 Edition with Addenda through 1996
4	12/18/03	Revised to incorporate corrective actions from PER 03-014859-000.

1.0 Scope

The scope of this procedure is to provide generic guidelines for calculating the ASME Section XI code coverage and augmented examination coverage obtained during volumetric and surface examinations. This procedure incorporates the requirements of Code Case N-460 and NRC Information Notice 98-42. This procedure is not applicable for calculating the examination coverage for RPV examinations performed in accordance with Appendix VIII.

2.0 Purpose

This procedure applies to the calculation of ASME Section XI Code coverage for vessel welds (excluding the RPV welds performed in accordance with Appendix VIII) piping welds, and integral attachments. This procedure applies when performing surface, volumetric or visual examinations and may be used as a guide when calculating the examination coverage for preservice and inservice examinations. Coverage limitations may be due to an obstruction, interference, geometric configuration or other applicable reason.

3.0 References

3.1 ASME Code Case N-460

3.2 10CFR 50.55a, as amended by the Federal Register Notice, Vol. 64, No. 183, dated September 22, 1999 (Final Rule)- Implementation of Appendix VIII as executed by the Performance Demonstration Initiative (PDI) Program Description Document, Rev. 1, Change 1.

3.3 Guideline for the Implementation of Appendix VIII and 10CFR 50.55a, Rev. D, April 18, 2000

3.4 NRC Information Notice 98-42

3.5 SQN PER 03-014859-000

4.0 Definitions

4.1 Examination Coverage- The percentage of the examination surface or volume obtained during the performance of the examination.

4.2 Examination Surface- The surface of the weld and base material required to be examined by ASME Section XI or other requirement using a surface and/or visual examination method as applicable.

4.3 Examination Volume- The volume of weld and base material required to be examined by ASME Section XI or other requirement using a volumetric examination method.

4.4 Scan Limitation- the inability to scan the surface(s) as required by procedure due to interferences.

4.5 Surface Limitation- the inability to perform a surface examination of the required surface(s) because of an interference.

4.6 Volumetric Limitation- the inability to examine the required volume because of the geometric configuration, a physical interference, or a metallurgical condition of the material being examined.

5.0 General

5.1 During the performance of inservice inspections, ASME Section XI requires examination coverage to be essentially 100% of the weld area or volume. For examination coverage less than 100%, TVA has implemented ASME Code Case N-460 which states that when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage for Class 1 or Class 2 welds may be accepted provided the reduction in coverage for that weld is less than 10%. (NRC Information Notice 98-42 further defines the >90% rule to include all welds and other areas required by ASME Section XI.

5.2 Surface and/or visual examinations are typically conducted on the weld area plus a defined amount of base material on each side of the weld. Volumetric examinations specify a particular volume to be examined. The Section XI required examination volume or surface examination area for each type of weld is depicted in figures of IWB-2500, IWC-2500 and IWD-2500 as applicable. As depicted for piping welds, volume width generally constitutes the weld plus 1/4t on each side while volume thickness generally constitutes the lower 1/3 of the piping thickness for the length of the weld. The exception normally includes code category B-O which includes the weld plus 1/2 inch and full volume for the length of the weld. As depicted, for vessel welds, the volume width generally constitutes the weld plus 1/2t on each side of the weld while volume thickness generally constitutes the entire component thickness (i.e. full volume). The volume changes with variations in weld configuration (e.g. transition between different pipe thickness or vessel weld configurations).

Note: Risk-Informed (RI) programs require larger volumes in certain areas.

5.3 The required examination volume or area shall be verified prior to calculation of the limitation.

6.0 Documenting and Calculating Examination Coverage

6.1 While performing a visual, surface or ultrasonic examination, the NDE Examiner shall make every attempt to examine 100 percent of the examination area or volume.

6.2 When practical, the two beam path directions for ultrasonic examinations should be performed from two sides of the weld or additional angles employed in order to maximize coverage.

6.3 If 100% percent of the examination surface or volume cannot be examined, the NDE Examiner should perform the following under the direction of the inspection coordinator or the NDE Level III:

6.3.1 Perform additional examinations with higher angles in order to maximize cover for ultrasonic exams.

6.3.2 Perform another surface method (i.e., PT in lieu of MT) in order to maximize coverage.

6.3.3 Perform alternative NDE methods if applicable.

6.4 The examiner shall accurately document all limitations, obstructions, interferences, geometric configurations or other applicable reasons for not obtaining the required code coverage. This information shall be validated and verified by the assisting examiner or independent verifier and documented in the NDE data report.

6.5 The examiner shall document the limitation on a sketch. Examination coverage estimates may be performed by the examiner or the reviewer.

7.0 Calculation Basis

7.1 Volumetric Examinations- Piping Welds and Vessels 2 inches and less in thickness

a) Examination volume coverage may be increased as previously discussed or by use of refracted longitudinal wave techniques on stainless steel or dissimilar metal welds. Use of refracted longitudinal waves to penetrate stainless steel weld material will increase the examination volume coverage by the amount depicted on the examination coverage drawing.

b) Estimates shall be derived by estimating coverage based on two-beam path direction coverage of the complete examination. Each scan direction equals 25% (downstream, up-steam, clockwise, counterclockwise.) (Reference Figure 1)

c) The effects of adjacent component interferences (e.g. welded lug attachments) along the weld length are also taken into account with the reduction in coverage identified as a percentage of reduced volume.

8.0 Visual and Surface Examinations - Piping Welds And Integral Attachments

8.1 Examination area coverage calculations are based upon one of the following suppositions:

a) The total examination area is calculated, typically length x width, then the total area of limitation or interference is subtracted from the total examination area.

b) The area of achieved coverage is divided by the total examination area for percentage of examination achieved.

9.0 Ultrasonic Examinations - Vessel Welds

NOTE: THIS IS NOT APPLICABLE FOR APPENDIX VIII EXAMINATIONS 0F THE RPV WELDS.

9.1 Examination volume coverage calculations are based upon the following suppositions:

a) To achieve full examination coverage nine different scans are required for a typical vessel weld or nozzle examination. The following may be used for other vessel configurations:

1) 0 degree (weld metal scan)
2) 45 degree Transverse-scan from vessel side of the weld
3) 45 degree Transverse-scan from nozzle side of the weld
4) 60 degree Transverse-scan from vessel side of the weld
5) 60 degree Transverse-scan from nozzle side of the weld
6) 45 degree Parallel-scan CW direction
7) 45 degree Parallel-scan CCW direction
8) 60 degree Parallel-scan CW direction
9) 60 degree Parallel-scan CCW direction

9.2 The examination volume achieved for each above examination scan shall be obtained and documented on a percentage basis. This calculation considers the required examination volume required per the ASME Section XI Code.

a) The total examination coverage may be calculated by averaging the exam volume coverage for all nine scans.

10.0 PDI Implementation for Piping Welds

10.1 Where examination from both sides is not possible, full coverage credit may be claimed from a single side for ferritic welds provided the examiner is qualified for single sided examination. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld for configurations common to US nuclear applications. Therefore, examination of austenitic material welds shall be performed from both sides or a scan limitation shall be documented.

10.2 The NDE Level III shall make an evaluation in the Weld Resolution document regarding total examination coverage (best effort) as calculated above in Section 7.0. In addition, a coverage evaluation which considers the PDI Implementation Guideline shall also be indicated in the Weld Resolution sheet. These two coverage evaluations shall be reported to the ISI Programs Engineer for incorporation into the Relief Request.

10.3 Typically a one-sided austenitic weld examination with no circumferential restrictions would be indicated as 75% examination coverage or 50% if circumferential scans were limited to one side.

NOTE: These requirements do not apply to augmented examinations of piping welds.

11.0 Responsibilities

11.1 The examiner, assisting examiner or designee shall document the amount of code coverage obtained after all necessary steps to perform additional examinations has been completed in order to maximize coverage. The documentation including verification of limitations shall become part of the examination weld data package.

11.2 The documentation may be reviewed by another individual with the same or higher NDE certification.

11.3 The NDE Level III or data reviewer may review the calculations in order to verify that the information is accurate and correct.

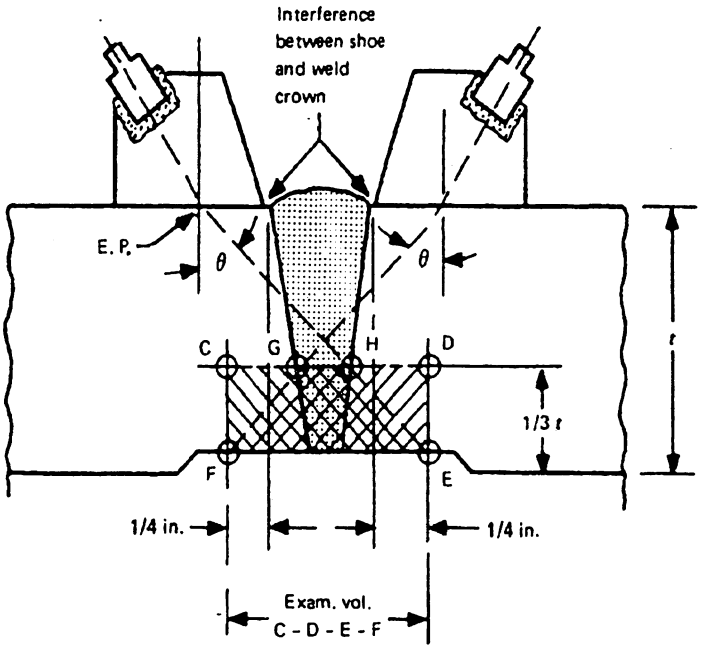
11.4 The NDE Level III may recalculate the examination coverage to obtain a more accurate value of the examination surface or volume examined. The calculation shall be documented on the exam report.

11.5 The NDE Level III may require an alternate examination technique or method, or request that the interference be removed. For nozzle examinations, supplemental scans from the nozzle bore or flange face may provide complete coverage of the weld.

11.6 If the examination coverage indicates less than 90 percent of the required examination volume or surface, the site ISI Program Engineer shall be notified.

11.7 The site ISI supervisor shall ensure that examination results are accurately documented and incorporate results into a Request for Relief if necessary.

III-3230 APPENDIX III — MANDATORY III-3310



GENERAL NOTE:
For this example of interference with a ½V examination applied from both sides, only the E-F-G-H portion of the examination volume receives two direction coverage, while volumes C-G-F and H-D-E receive one direction coverage. In this case, the examination beam path shall be increased to ¾V (O.D. to I.D. and back towards O.D. for ½*t*) to provide the required two direction coverage over the examination volume. Use of a ¾V examination beam path (O.D. to I.D. to ½*t*) provides additional beam path (past ½*t*) to help in obtaining required coverage when examination part thickness *t* increases.

FIG. III-3230-1 EXAMPLE OF PHYSICAL RESTRICTIONS TO THE WELD EXAMINATION

Figure 1

ENCLOSURE 5

ISwT EXAMINATION AREA COVERAGE REPORT FOR
SQN UNITS 1 AND 2 REACTOR VESSEL WELDS
REQUESTS FOR RELIEF
1,2-ISI-28, 1,2-ISI-29, 1,2-ISI-30 AND 1,2-ISI-31

Request for Relief Number	Area of Coverage Report
1-ISI-28	R8386
2-ISI-28	R6761
1-ISI-29	R8386
2-ISI-29	R6761
1-ISI-30	R8386
2-ISI-30	R6761
1-ISI-31	R8386
2-ISI-31	R6761

R6761

APPENDIX E

RPV EXAMINATION COVERAGE REPORT

EXAMINATION AREA COVERAGE REPORT FOR SEQUOYAH NUCLEAR PLANT UNIT 2

This appendix describes examination coverage achieved during the 2005 in-service inspection of the Sequoyah Nuclear Plant Unit 2 (SQN2) reactor pressure vessel (RPV). The examinations were performed using automated ultrasonic (AUT) scanning equipment and AUT data recording/analysis systems. The target scope of the RPV examinations included 100 percent of the accessible weld and/or component length of the following:

1) Circumferential shell welds, including the vessel shell to flange weld
2) Lower head meridional shell welds
3) Nozzle to shell welds
4) Nozzle to Safe End and Safe End to Nozzle Welds

Limitations were encountered at SQN2 while examining the vessel, nozzle to shell, and lower head shell welds due to various physical conditions, such as the bottom head penetrations, the core barrel lugs, the outlet nozzle integral extensions, the inlet nozzle inner radii, and the flange configuration. Typically, limitations are not encountered on the nozzle to safe end and safe end to nozzle welds, except for severe inside surface contour variations, which were not encountered at SQN2.

1 Examination Coverage Requirements for Vessel Circumferential and Meridional Welds

The ISwT procedures for shell weld examinations are qualified for both single- and double-sided examinations. The double-sided technique, requiring two examination angles and four search units, is used when access is not restricted. The single-sided examination technique, requiring three examination angles and four search units, is utilized to provide additional coverage when access is restricted. The examination coverage requirements for these techniques are described below.

<u>Single-Sided Examination (Reflectors Oriented Parallel and Transverse to the Weld)</u>

1) The **inner 3.25 inches including the weld metal and adjacent base metal for ½ t either side of the weld fusion line** must be completely scanned with both SLIC40 (50 and 70 degrees, shear and longitudinal waves) search units.
2) The **weld metal and adjacent base material in the outer volume beyond 3.25 inches** must be completely scanned with both 45° and 55° Duplex (45 and 55 degrees shear wave) search units.

<u>Double-Sided Examination (Reflectors Oriented Parallel and Transverse to the Weld)</u>

1) The **inner 3.25 inches including the weld metal and adjacent base metal for ½ t either side of the weld fusion line** must be completely scanned with both SLIC 40 search units.
2) The **weld metal and adjacent base material in the outer volume beyond 3.25 inches** must be completely scanned with both 55° Duplex search units.

2 Examination Coverage Requirements for Nozzle to Shell Welds

Examination of the nozzle to shell welds is performed using the techniques described above from the vessel inside surface plus a PDI-qualified Phased Array examination performed from the nozzle bore. Coverage requirements for nozzle to shell weld examinations conducted from the vessel inside surface are similar to those described above, except that **the weld metal and adjacent base material for ½" beyond the weld fusion line** must be scanned with the applicable search units. The Phased Array procedure was designed to sweep two sets of sound beam angles (5 through 40 degrees longitudinal wave and 35 through 45 degrees shear wave) through the examination volume from the nozzle bore and achieve full coverage.

3 Examination Coverage Requirements for Nozzle to Safe End and Safe End to Nozzle Welds (Dissimilar Metal Welds)

Examination of the Safe End (Dissimilar Metal) welds is performed using a PDI-qualified Phased Array procedure that is designed to sweep one set of sound beam angles (60-88 degrees longitudinal wave) through the examination volume from the inside surface of the weld to achieve full coverage in four directions.

EXAMINATION COVERAGE CALCULATION

The following contains a description of the examination coverage calculation process:

1. Determine the examination scan ("x" and "y") coordinates necessary to obtain 100% of the required weld coverage (reference the examination planned "x" and "y" coordinates).

2. Multiply the delta difference of the planned "x" and "y" coordinates by each other to determine the planned scan area necessary to obtain 100% of the required weld coverage for both transverse and parallel examinations.

3. Multiply the delta difference of the actual "x" and "y" coordinates by each other to determine the actual scan area for both transverse and parallel examinations.

4. Divide the parallel actual scan area by the parallel planned scan area and the transverse actual scan area by the transverse planned scan area to determine the coverage percentage for each type of examination.

5. Compute the average of the parallel and the transverse examination values for the final coverage percentage.

Sequoyah Nuclear Power Station, Unit 2
2005 Reactor Vessel Inservice Examination
UT Coverage

Summary Number	Weld Number	Exam Area Identification	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
000100	W03-04	Lower Shell -to- Lower Middle Shell	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
000200	W04-05	Lower Middle Shell -to- Upper Middle Shell	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
000300	W05-06	Upper Middle Shell -to- Upper Shell	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	82% 100% 91%	Limited examination due to the outlet nozzle integral extensions and inlet nozzle bore radii.
000400	W02-03	Bottom Head -to- Lower Shell	SLIC 40/55° SLIC 40/55°	Parallel Parallel	2 directions 2 directions Average	79% 75% 77%	Limited examination due to the proximity of the core barrel stabilizing lugs.
000500	W01-02	Bottom Head Cap -to- Bottom Head Spherical Ring	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	51% 57% 54%	Limited examination due to the bottom head penetrations.
000600	W06-07	Upper Shell -to- Flange	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	91% 95% 93%	Limited examination due to the flange design.
000900	W2A	Lower Head Meridional @ 0°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100% 85% 93%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001000	W2B	Lower Head Meridional @ 60°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100% 81% 91%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001100	W2C	Lower Head Meridional @ 120°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100% 81% 91%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001200	W2D	Lower Head Meridional @ 180°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100% 83% 92%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001300	W2E	Lower Head Meridional @ 240°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	94% 86% 90%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001400	W2F	Lower Head Meridional @ 300°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	84% 75% 80%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.

Sequoyah Nuclear Power Station, Unit 2
2005 Reactor Vessel Inservice Examination
UT Coverage

Summary Number	Weld Number	Exam Area Identification	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
001900	N-15	Outlet Nozzle -to- Shell @ 22°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	78% 54% 100% 72%	Limited examination due to the nozzle integral extension.
001500	N-11	Inlet Nozzle -to- Shell @ 67°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	84% 100% 100% 96%	Limited examination due to the nozzle inner radius.
001600	N-12	Inlet Nozzle -to- Shell @ 113°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	84% 100% 100% 96%	Limited examination due to the nozzle inner radius.
002000	N-16	Outlet Nozzle -to- Shell @ 158°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	78% 55% 100% 72%	Limited examination due to the nozzle integral extension.
002100	N-17	Outlet Nozzle -to- Shell @ 202°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	78% 55% 100% 72%	Limited examination due to the nozzle integral extension.
001700	N-13	Inlet Nozzle -to- Shell @ 247°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	88% 100% 100% 97%	Limited examination due to the nozzle inner radius.
001800	N-14	Inlet Nozzle -to- Shell @ 293°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	82% 90% 100% 91%	Limited examination due to the nozzle inner radius.
002200	N-18	Outlet Nozzle -to- Shell @ 338°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	78% 55% 100% 72%	Limited examination due to the nozzle integral extension.

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Sequoyah Nuclear Power Station, Unit 2
2005 Reactor Vessel Inservice Examination
UT Coverage

Summary Number	Weld Number	Exam Area Identification	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
003500	RC-09-SE	Outlet Nozzle -to-Pipe @ 22°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
003600	RC-16-SE	Elbow -to- Inlet Nozzle @ 67°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
003700	RC-08-SE	Elbow -to- Inlet Nozzle @ 113°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
003800	RC-01-SE	Outlet Nozzle -to-Pipe @ 158°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
003900	RC-25-SE	Outlet Nozzle -to-Pipe @ 202°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
004000	RC-32-SE	Elbow -to- Inlet Nozzle @ 247°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
004100	RC-24-SE	Elbow -to- Inlet Nozzle @ 293°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	
004200	RC-17-SE	Outlet Nozzle -to-Pipe @ 338°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100% 100% 100%	

Prepared by: Carl M. Bauer

SNT Level: III

Date: 14 May 2005

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R 8386

APPENDIX E

RPV EXAMINATION COVERAGE REPORT

EXAMINATION AREA COVERAGE REPORT FOR SEQUOYAH NUCLEAR PLANT UNIT 1

This appendix describes examination coverage achieved during the 2006 in-service inspection of the Sequoyah Nuclear Plant Unit 1 (SQN1) reactor pressure vessel (RPV). The examinations were performed using automated ultrasonic (AUT) scanning equipment and AUT data recording/analysis systems. The target scope of the RPV examinations included 100 percent of the accessible weld and/or component length of the following:

1) Circumferential shell welds, including the vessel shell-to-flange weld
2) Lower head meridional shell welds
3) Nozzle-to-shell welds
4) Nozzle-to-Pipe and Elbow-to-Nozzle Welds

Limitations were encountered at SQN1 while examining the vessel, nozzle-to-shell, and lower head shell welds due to various physical conditions, such as the bottom head penetrations, the core barrel lugs, the outlet nozzle integral extensions, the inlet nozzle inner radii, and the flange configuration. Typically, limitations are not encountered on the nozzle-to-pipe and elbow-to-nozzle welds, except for severe inside surface contour variations, which were not encountered at SQN1.

1 Examination Coverage Requirements for Vessel Circumferential and Meridional Welds

The ISwT procedures for shell weld examinations are qualified for both single- and double-sided examinations. The double-sided technique, requiring two examination angles and four search units, is used when access is not restricted. The single-sided examination technique, requiring three examination angles and four search units, is utilized to provide additional coverage when access is restricted. The examination coverage requirements for these techniques are described below.

Single-Sided Examination (Reflectors Oriented Parallel and Transverse to the Weld)

1) The **inner 3.25 inches including the weld metal and adjacent base metal for ½ t either side of the weld fusion line** must be completely scanned with both SLIC40 (50 and 70 degrees, shear and longitudinal waves) search units.
2) The **weld metal and adjacent base material in the outer volume beyond 3.25 inches** must be completely scanned with both 45° and 55° Duplex (45 and 55 degrees shear wave) search units.

Double-Sided Examination (Reflectors Oriented Parallel and Transverse to the Weld)

1) The **inner 3.25 inches including the weld metal and adjacent base metal for ½ t either side of the weld fusion line** must be completely scanned with both SLIC 40 search units.
2) The **weld metal and adjacent base material in the outer volume beyond 3.25 inches** must be completely scanned with both 55° Duplex search units.

2 Examination Coverage Requirements for Nozzle-to-Shell Welds

Examination of the nozzle-to-shell welds is performed using the techniques described above from the vessel inside surface plus a PDI-qualified Phased Array examination performed from the nozzle bore. Coverage requirements for nozzle to shell weld examinations conducted from the vessel inside surface are similar to those described above, except that **the weld metal and adjacent base material for ½" beyond the weld fusion line** must be scanned with the applicable search units. The Phased Array procedure was designed to sweep two sets of sound beam angles (5 through 40 degrees longitudinal wave and 35 through 45 degrees shear wave) through the examination volume from the nozzle bore and achieve full coverage.

3 Examination Coverage Requirements for Nozzle-to-Pipe and Elbow-to-Nozzle Welds (Dissimilar Metal Welds)

Examination of the Pipe (Dissimilar Metal) welds is performed using a PDI-qualified Phased Array procedure that is designed to sweep one set of sound beam angles (60-88 degrees longitudinal wave) through the examination volume from the inside surface of the weld to achieve full coverage in four directions.

EXAMINATION COVERAGE CALCULATION

The following contains a description of the examination coverage calculation process:

1. Determine the examination scan ("x" and "y") coordinates necessary to obtain 100% of the required weld coverage (reference the examination planned "x" and "y" coordinates).

2. Multiply the delta difference of the planned "x" and "y" coordinates by each other to determine the planned scan area necessary to obtain 100% of the required weld coverage for both transverse and parallel examinations.

3. Multiply the delta difference of the actual "x" and "y" coordinates by each other to determine the actual scan area for both transverse and parallel examinations.

4. Divide the parallel actual scan area by the parallel planned scan area and the transverse actual scan area by the transverse planned scan area to determine the coverage percentage for each type of examination.

5. Compute the average of the parallel and the transverse examination values for the final coverage percentage.

Sequoyah Nuclear Power Station, Unit 1
2006 Reactor Vessel Inservice Examination
UT Coverage

Summary Number	Weld Number	Exam Area Identification	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
000100	W03-04	Lower Shell -to- Lower Middle Shell	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
000200	W04-05	Lower Middle Shell -to- Upper Middle Shell	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
000300	W05-06	Upper Middle Shell -to- Upper Shell	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	81.5% 100.0% 90.8%	Limited examination due to the outlet nozzle integral extensions and inlet nozzle bore radii.
000400	W02-03	Bottom Head -to- Lower Shell	SLIC 40/55° SLIC 40/55°	Parallel Parallel	2 directions 2 directions Average	83.5% 69.6% 76.6%	Limited examination due to the proximity of the core barrel stabilizing lugs.
000500	W01-02	Bottom Head Cap -to- Bottom Head Spherical Ring	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	49.7% 53.5% 51.6%	Limited examination due to the bottom head penetrations.
000600	W06-07	Upper Shell -to- Flange	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	95.8% 90.1% 93.0%	Limited examination due to the flange design.
000900	W2A	Lower Head Meridional @ 0°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100.0% 83.7% 91.9%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001000	W2B	Lower Head Meridional @ 60°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100.0% 80.1% 90.1%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001100	W2C	Lower Head Meridional @ 120°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	98.5% 75.7% 87.1%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001200	W2D	Lower Head Meridional @ 180°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	100.0% 80.9% 90.5%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001300	W2E	Lower Head Meridional @ 240°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	95.4% 76.6% 86.0%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.
001400	W2F	Lower Head Meridional @ 300°	SLIC 40/55° SLIC 40/55°	Parallel Transverse	2 directions 2 directions Average	90.7% 71.6% 81.2%	Limited examination due to the bottom head penetrations and core barrel stabilizing lugs.

E5-11

Sequoyah Nuclear Power Station, Unit 1
2006 Reactor Vessel Inservice Examination
UT Coverage

Summary Number	Weld Number	Exam Area Identification	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
001900	N-15	Outlet Nozzle -to- Shell @ 22°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	86.2% 69.5% 100.0% 81.3%	Limited examination due to the integral extension.
001500	N-11	Inlet Nozzle -to- Shell @ 67°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	100.0% 100.0% 100.0% 100.0%	
001600	N-12	Inlet Nozzle -to- Shell @ 113°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	100.0% 100.0% 100.0% 100.0%	
002000	N-16	Outlet Nozzle -to- Shell @ 158°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	86.2% 69.5% 100.0% 81.3%	Limited examination due to the integral extension.
002100	N-17	Outlet Nozzle -to- Shell @ 202°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	86.2% 69.5% 100.0% 81.3%	Limited examination due to the integral extension.
001700	N-13	Inlet Nozzle -to- Shell @ 247°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	100.0% 100.0% 100.0% 100.0%	
001800	N-14	Inlet Nozzle -to- Shell @ 293°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	100.0% 100.0% 100.0% 100.0%	
002200	N-18	Outlet Nozzle -to- Shell @ 338°	SLIC 40 SLIC 40/55° PA-16	Parallel Transverse Parallel (Bore)	2 directions 2 directions 1 direction Average	86.2% 69.5% 100.0% 81.3%	Limited examination due to the integral extension.

Sequoyah Nuclear Power Station, Unit 1
2006 Reactor Vessel Inservice Examination
UT Coverage

Summary Number	Weld Number	Exam Area Identification	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
003500	RC-09-SE	Outlet Nozzle -to-Pipe @ 22°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
003600	RC-16-SE	Elbow -to- Inlet Nozzle @ 67°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
003700	RC-08-SE	Elbow -to- Inlet Nozzle @ 113°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
003800	RC-01-SE	Outlet Nozzle -to-Pipe @ 158°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
003900	RC-25-SE	Outlet Nozzle -to-Pipe @ 202°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
004000	RC-32-SE	Elbow -to- Inlet Nozzle @ 247°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
004100	RC-24-SE	Elbow -to- Inlet Nozzle @ 293°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	
004200	RC-17-SE	Outlet Nozzle -to-Pipe @ 338°	PA 22 PA 22	Parallel Transverse	2 directions 2 directions Average	100.0% 100.0% 100.0%	

Prepared by: [signature]

SNT Level: III

Date: 03 May 2006

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