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Michael A. Krupa  
Director  
Nuclear Safety & Licensing

CNRO-2003-00063

December 2, 2003

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

SUBJECT: Entergy Operations, Inc.  
Requests for Relief from ASME Section XI Volumetric Examination  
Requirements

Arkansas Nuclear One, Unit 1  
Docket No. 50-313  
License No. DPR-51

Dear Sir or Madam:

Pursuant to 10 CFR 50.55a(g)(6)(i), Entergy Operations, Inc. (Entergy) requests relief from the requirements of ASME Section XI pertaining to volumetric examination of pressure-retaining welds for Arkansas Nuclear One, Unit 1. In several locations, the required coverage cannot be obtained due to interference or geometry. Relief Requests ANO1-ISI-001, -002, -003, and -004 are provided in Enclosures 1 - 4, respectively.

Entergy requests that the NRC staff grant the enclosed relief requests on or before December 2, 2004.

This letter contains no commitments.

Should you have any questions regarding these requests, please contact Guy Davant at (601) 368-5756.

Very truly yours,

A handwritten signature in black ink that reads "M. A. Krupa".

MAK/GHD/bal

- Enclosures:
1. Relief Request ANO1-ISI-001
  2. Relief Request ANO1-ISI-002
  3. Relief Request ANO1-ISI-003
  4. Relief Request ANO1-ISI-004

A047

CNRO-2003-00063

Page 2 of 2

cc:

Mr. W. A. Eaton (ECH)  
Mr. J. S. Forbes (ANO)

Mr. R. W. Deese, NRC Senior Resident Inspector (ANO)  
Dr. B. S. Mallett, NRC Region IV Regional Administrator  
Mr. J. L. Minns, NRR Project Manager (ANO-1)

**ENCLOSURE 1**

**CNRO-2003-00063**

**RELIEF REQUEST  
ANO1-ISI-001**

**ENTERGY OPERATIONS, INC.  
RELIEF REQUEST  
ANO1-ISI-001**

**I. ASME COMPONENTS**

Components/Numbers: Pressurizer and steam generator nozzles listed in Table 1

ASME Code Class: 1

- References:
1. ASME Section XI 1992 Edition, Table IWB-2500-1
  2. ASME Section XI 1980 Edition with the Winter 1981 Addenda
  3. Letter from the NRC to Entergy Operations, Inc., *Evaluation of Entergy Operations, Inc. Request for Authorization to Update Inservice Inspection Programs to the 1992 and Portions of the 1993 ASME Boiler and Pressure Vessel Code, Section XI for Arkansas Nuclear One, Units 1 and 2, Grand Gulf Nuclear Station, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. M94472, M94471, M94454, M94473, and M94488)*, dated December 12, 1996
  4. ASME Code Case N-460 – Alternative Examination Coverage for Class 1 and 2 Welds, Section XI, Division 1

Examination Category: B-D

Item Numbers: B3.110, B3.130, B3.140

Unit / Inspection Interval Applicability: Arkansas Nuclear One Unit 1 – third (3<sup>rd</sup>) 10-year interval

**II. ASME CODE REQUIREMENT(S)**

ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.110 requires essentially 100% volumetric examination of the pressurizer nozzle-to-vessel welds.

ASME Section XI, Table IWB-2500-1, Examination Category B-D, Items B3.130 and B3.140 require essentially 100% volumetric examination of the steam generator nozzle-to-vessel welds and inner radius sections.

ASME Code Case N-460 allows a reduction in coverage for Class 1 and 2 welds due to interference or geometry as long as the overall coverage is greater than 90%.

### III. RELIEF REQUESTED

Pursuant to 10 CFR 50.55a(g)(6)(i), Entergy Operations, Inc. (Entergy) requests relief from achieving the Code-required coverage when performing volumetric examinations of the components identified in Table 1, below.

Table 1 Limited B-D Examinations				
Item #	Item ID	Description	Coverage (%)	Reason for Limitation
B3.110	05-012	Pressurizer relief valve nozzle-to-vessel weld	45	Nozzle Configuration
B3.110	05-013	Pressurizer spray nozzle-to-head weld	38	Nozzle Configuration
B3.130	03-008	Steam generator outlet nozzle-to-head weld (Reactor Coolant Pump D cold leg)	40.4	Nozzle Configuration and Support Skirt
B3.140	03-009	Steam generator outlet nozzle-to-lower head inner radius (Reactor Coolant Pump C cold leg)	90.7	Steam Generator Support Skirt

### IV. BASIS FOR RELIEF

During the ultrasonic examination of the pressurizer and steam generator nozzle welds (ID #s 05-012, 05-013, and 03-008) and the inner radius section (ID #03-009) listed in Table 1 above, 100% coverage of the required examination volume could not be obtained due to nozzle configuration. Specifically for the nozzle welds, effective volumetric examination can only be performed from the shell side of the welds. In addition, the steam generator support skirt limits accessibility to the steam generator outlet nozzle inner radius sections. Examination coverage calculation sheets provided in the attachment of this relief request show the nozzle configuration, limitations, and beam plots of the different examination angles used. The weld volume was scanned using 0°, 45°, 60°, and 70° beam angles.

Nozzle inner radius limitations of ID #03-009 are caused by the ratio of the nozzle outside diameter (OD) to the vessel thickness. When the nozzle OD is small in relation to vessel thickness, more coverage can be obtained when scanning from the vessel side. Conducting examinations from the nozzle boss and OD blend is not practical, due to the complex beam angles and skews that must be calculated and then maintained during manual scanning in order to achieve an effective examination. To maximize coverage, the volume was scanned using 60° and 70° beam angles.

Radiography is not practical because of the geometry of the components, which prevents proper placement of the film and exposure source. To perform the Code-required examination would require modifying and/or replacing the components. The examinations performed on the subject items, in addition to the examination of other

nozzle-to-vessel welds and inner radius sections contained in the program, would detect generic degradation, if it existed, demonstrating an acceptable level of integrity.

**V. PROPOSED ALTERNATIVE EXAMINATIONS**

Entergy has examined the subject components to the extent practical and will continue to perform pressure testing on the pressurizer as required by the Code.

**VI. CONCLUSION**

10 CFR 50.55a(g)(6)(i) states:

The Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Due to design configuration, it is impractical to obtain greater than 90% coverage on ID #s 03-008, 05-012, and 05-013 and 100% of the inner radius section of ID #03-009. To obtain the required coverage would necessitate modifying and/or replacing components. Examinations performed on the subject components, in addition to examinations of similar welds and inner radius sections contained in the program, would detect generic degradation, if it existed, thereby demonstrating an acceptable level of integrity. Therefore, Entergy requests the NRC staff authorize the proposed alternative pursuant to 10 CFR 50.55a(g)(6)(i).

**ATTACHMENT**  
**RELIEF REQUEST**  
**ANO1-ISI-001**  
**EXAMINATION COVERAGE CALCULATION SHEETS**



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

<input checked="" type="checkbox"/> ANO 1	<input type="checkbox"/> ANO 2	<input type="checkbox"/> Grand Gulf	<input type="checkbox"/> River Bend	<input type="checkbox"/> Waterford 3
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Component ID: 03-008

Report No.: 198ISIUT060

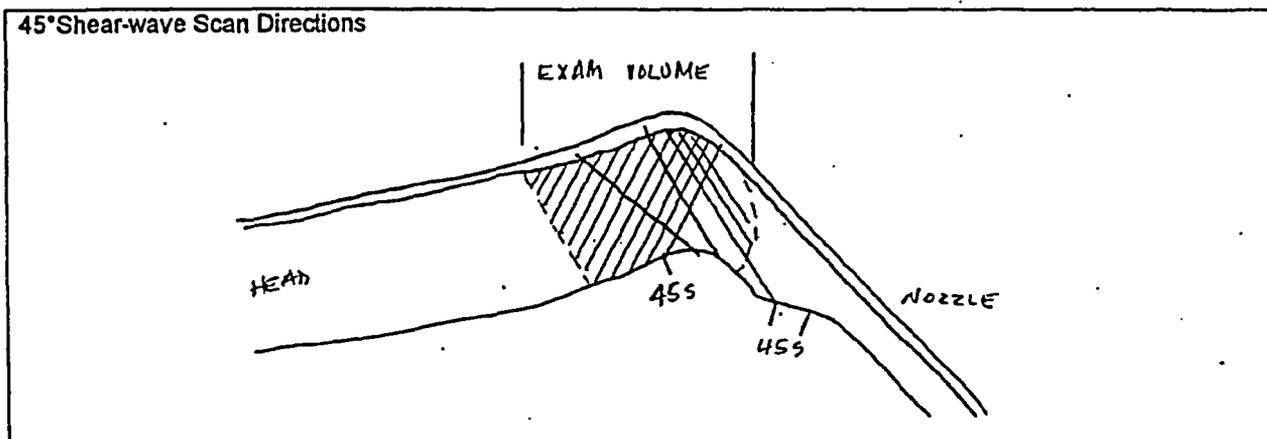
Material Type: CS clad

Vessel Weld T: ~9.0"

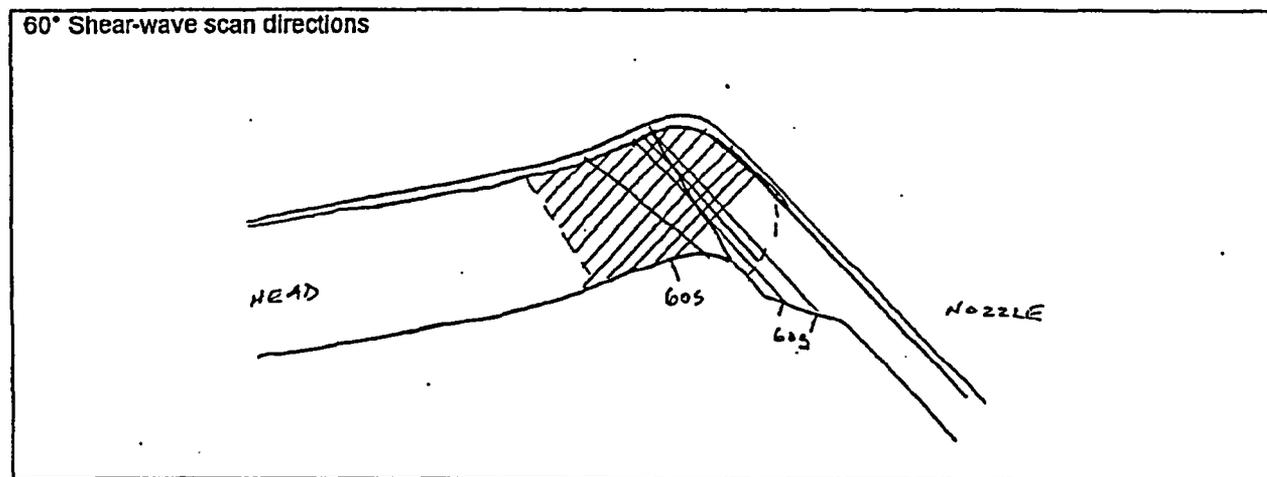
Angles Used: 45° 60° 70° S - 1/2 V, 0° L

### NOTES:

- 1 The 1/2T dimension on each side of the weld is for Class 1 vessel volume.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.



No Coverage      Direction #1      Direction #2

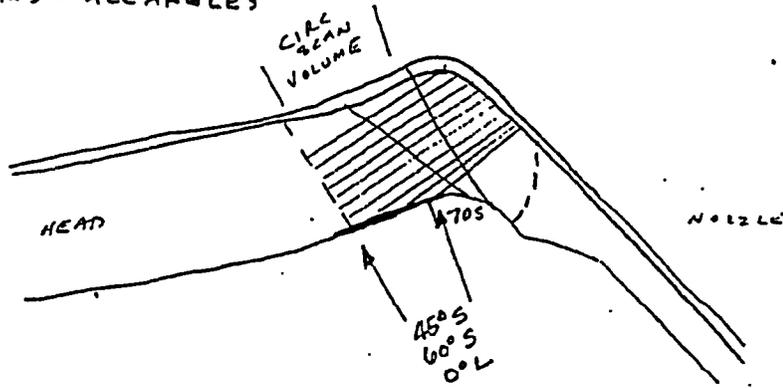


No Coverage      Direction #1      Direction #2

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1/18/02  
7/24/02

### 70° Shear-wave Scan directions

AND CIRC-SCANS - ALL ANGLES  
0° L-WAVE



No Coverage



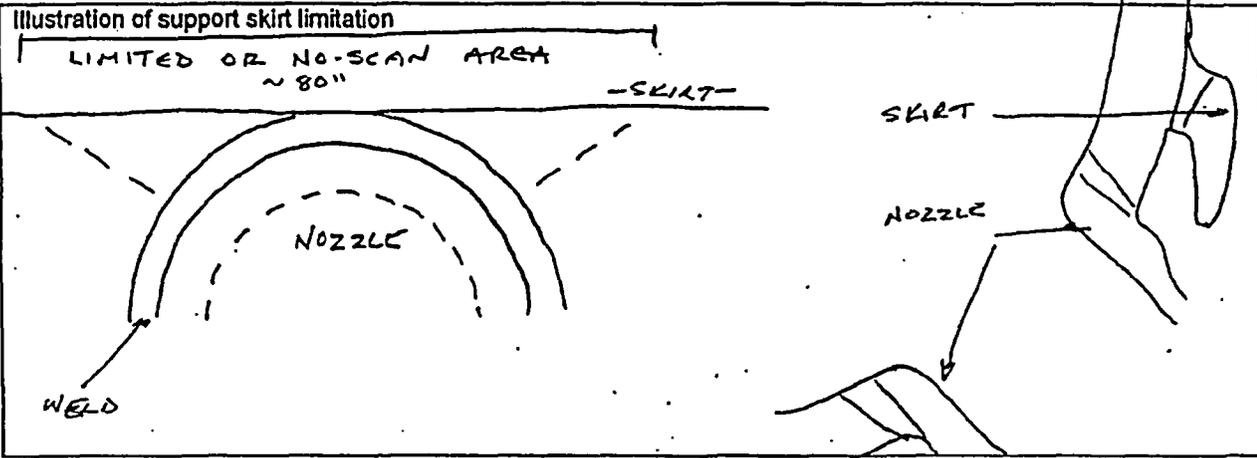
Direction #1



Direction #2

### Illustration of support skirt limitation

LIMITED OR NO-SCAN AREA  
~ 80"



No Coverage



Direction #3



Direction #4

Required scan coverage:

Weld ~30.2%, Base material head side ~68.7%, Base material nozzle side ~22.3%

**TOTAL EXAM VOLUME OBTAINED: 40.4%**

**COMMENTS:** Steam generator cold leg nozzle to lower head. This is primarily a single sided examination. Scans were performed from the nozzle side to supplement coverage with minimal effect. The support skirt prevented scanning around the total circumference of the nozzle. The cumulative coverage estimation includes the code required base metal coverage adjacent to the weld and the factor of multiple angles from multiple directions.

*Randley*  
7/24/02



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: **A**

<input checked="" type="checkbox"/> ANO 1	<input type="checkbox"/> ANO 2	<input type="checkbox"/> Grand Gulf	<input type="checkbox"/> River Bend	<input type="checkbox"/> Waterford 3
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Component ID: 03-009

Report No.: 198ISIUT062.063

Material Type: CS clad

Vessel Weld T: -9.0°

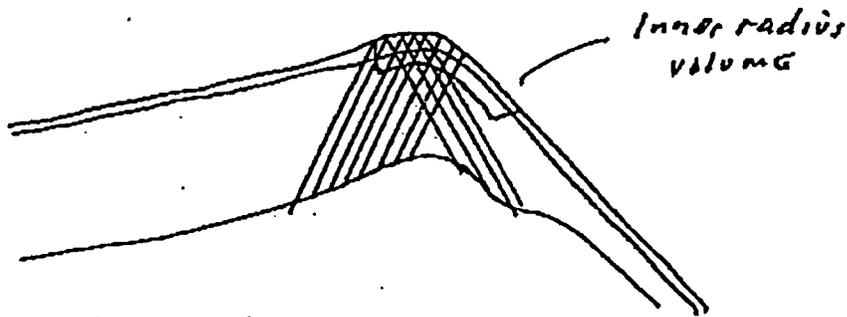
Angles Used: 45° 60° 70° S - 1/2 V

### NOTES:

- 1 The examination volume for Class 1 nozzles includes 1/2" radial distance into the nozzle from the inside radius (see figure IWB-2500-7(b)).
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.

45° Shear-wave Scan Directions

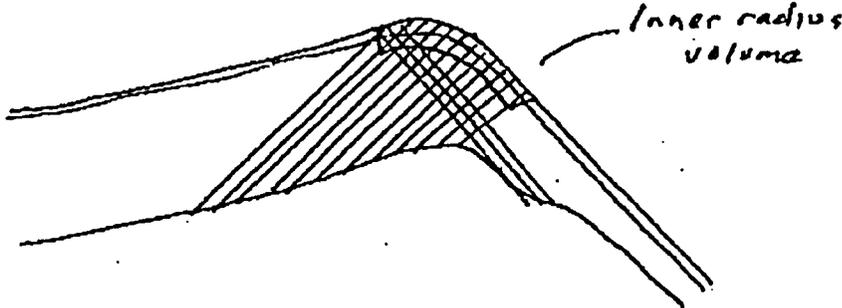
03-009



No Coverage     
  Direction #1     
  Direction #2

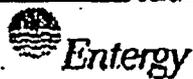
60° Shear-wave scan directions

03-009



No Coverage     
  Direction #1     
  Direction #2

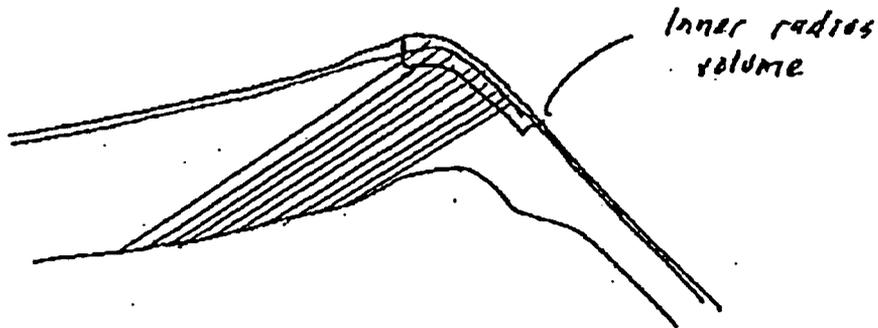
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 P5182  
 6/25/03



# EXAMINATION COVERAGE CALCULATION SHEET

70° Shear-wave Scan directions

03-009

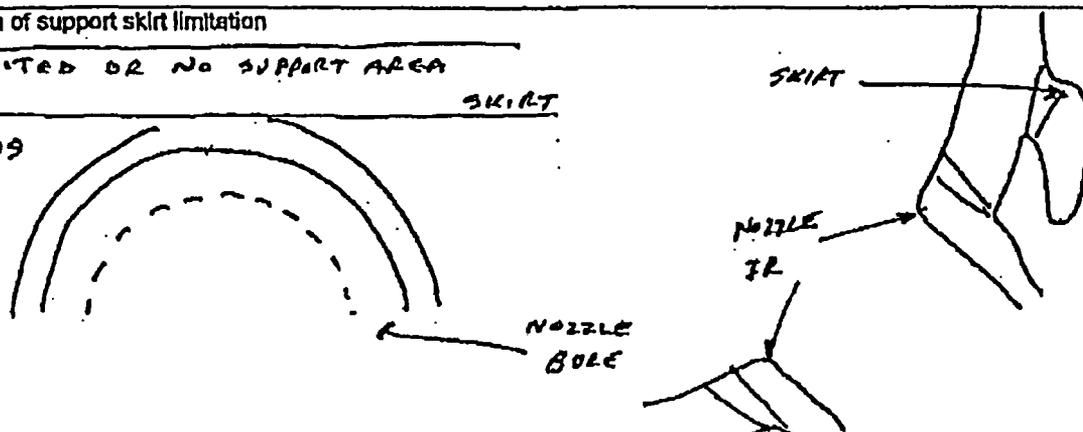


No Coverage     
  Direction #1     
  Direction #2

Illustration of support skirt limitation

LIMITED OR NO SUPPORT AREA

03-009



No Coverage     
  Direction #3     
  Direction #4

Required scan coverage obtained:

**CUMULATIVE TOTAL EXAM VOLUME OBTAINED: 90.7%**

**COMMENTS:** Steam generator cold leg nozzle to lower head. This is primarily a single sided examination. Scans were performed from the nozzle side to supplement coverage with minimal effect. The support skirt prevented scanning around the total circumference of the nozzle. The cumulative coverage estimation includes a summary of the scans with multiple angles from the accessible directions.

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 PG 282  
 6/29/07



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

ANO 1

ANO 2

Grand Gulf

River Bend

Waterford 3

Component ID: 05-012

Report No.: 198ISIUT010, 030, 031, 038

Material Type: CS clad

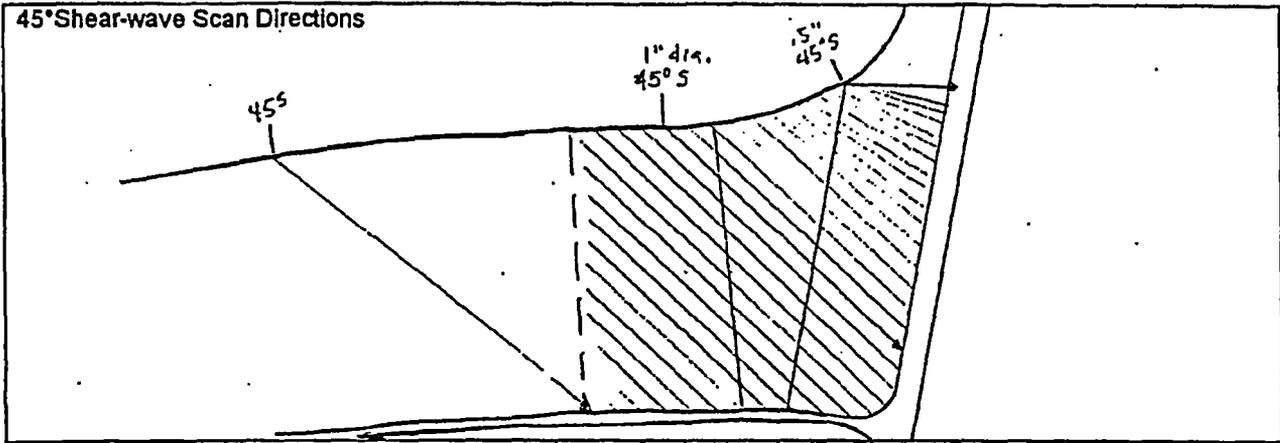
Vessel Weld T: ~5.0"

Angles Used: 45°, 60°, 70° S - 1/4 V, 0° L

### NOTES:

- 1 The 1/2T dimension on each side of the weld is for Class 1 vessel volume.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.

45° Shear-wave Scan Directions



No Coverage

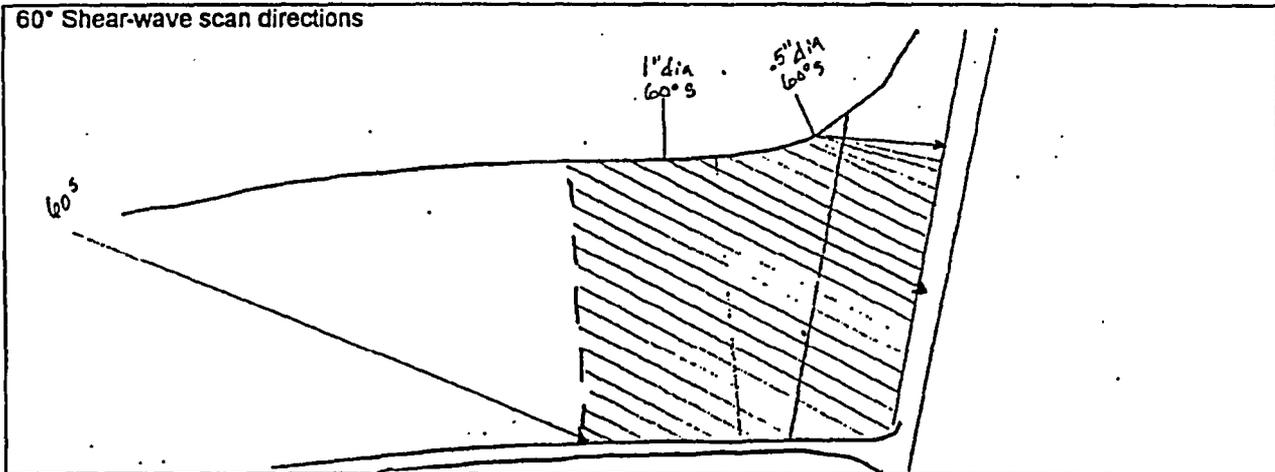


Direction #1



Direction #2

60° Shear-wave scan directions



No Coverage



Direction #1

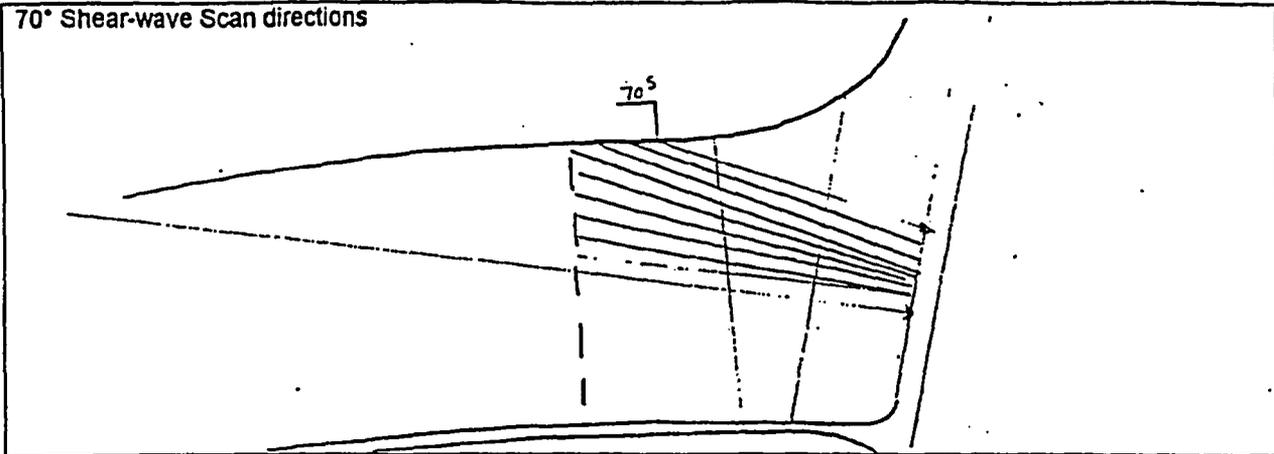


Direction #2



# EXAMINATION COVERAGE CALCULATION SHEET

70° Shear-wave Scan directions



No Coverage

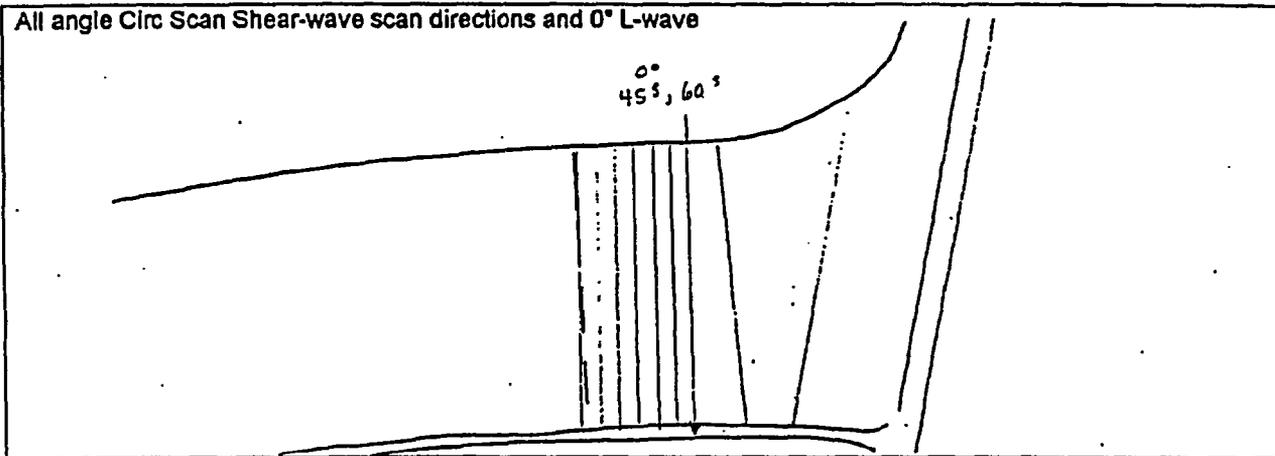


Direction #1



Direction #2

All angle Circ Scan Shear-wave scan directions and 0° L-wave



No Coverage



Direction #3



Direction #4

Required scan coverage obtained:

Weld ~ 18.6 %, Base material head side ~ 92.9 %, Base material nozzle side ~ 22.1 %

**TOTAL EXAM VOLUME OBTAINED: 45%**

**COMMENTS:** Pressurizer spray nozzle to head weld. This is a single sided examination. The cumulative coverage estimation includes the code required base metal coverage adjacent to the weld and the factor of multiple angles from multiple directions. Coverage illustrations depict added scans with .5" diameter transducers to increase coverage, 1" diameter transducers were used for the primary examination.



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

ANO 1

ANO 2

Grand Gulf

River Bend

Waterford 3

Component ID: 05-013

Report No.: 199ISIUT018\_019

Material Type: CS clad

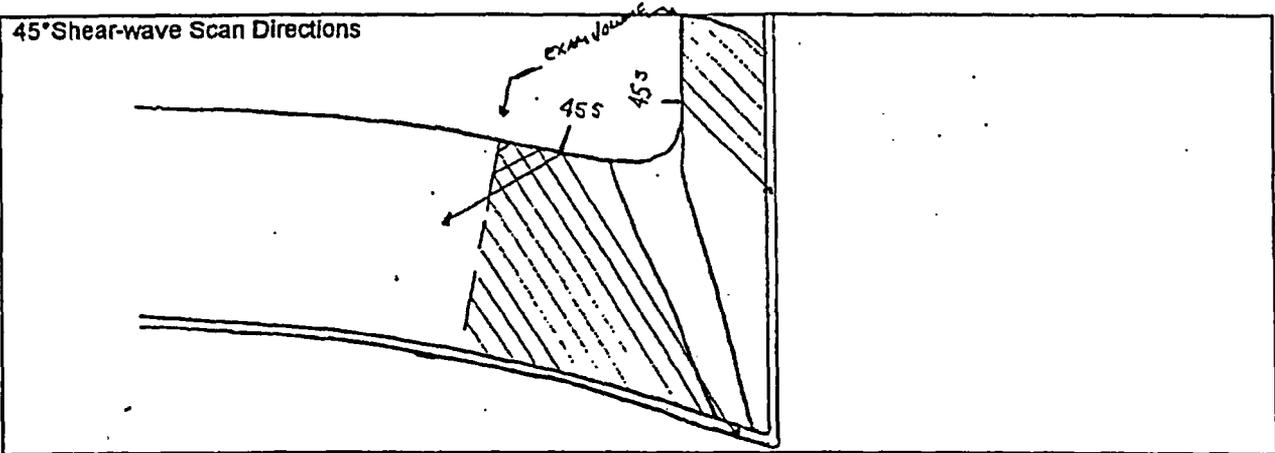
Vessel Weld T: ~5.5"

Angles Used: 45° 60° 70° S - ½ V, 0° L

### NOTES:

- 1 The 1/2T dimension on each side of the weld is for Class 1 vessel volume.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.

45° Shear-wave Scan Directions



No Coverage

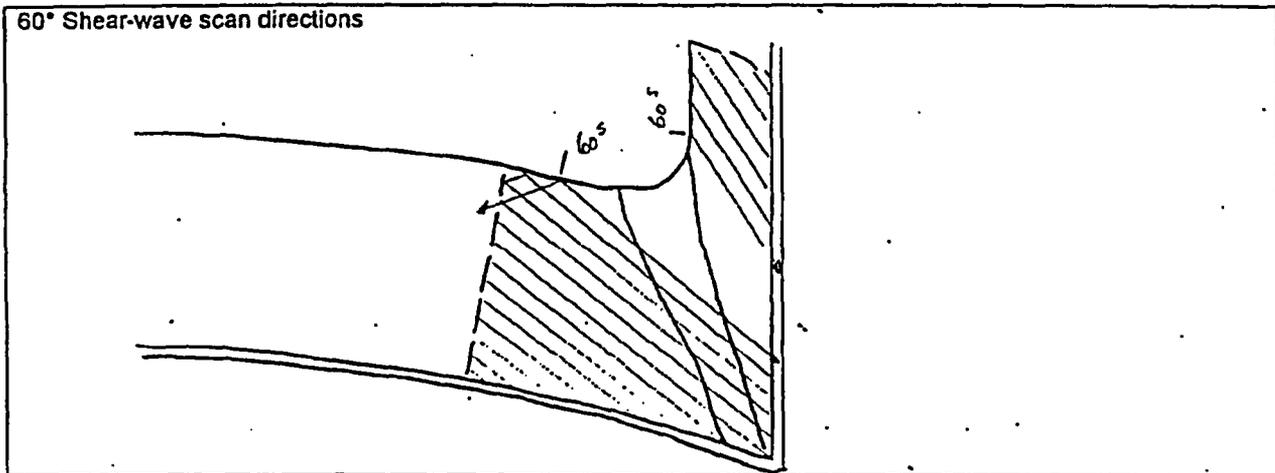


Direction #1



Direction #2

60° Shear-wave scan directions



No Coverage



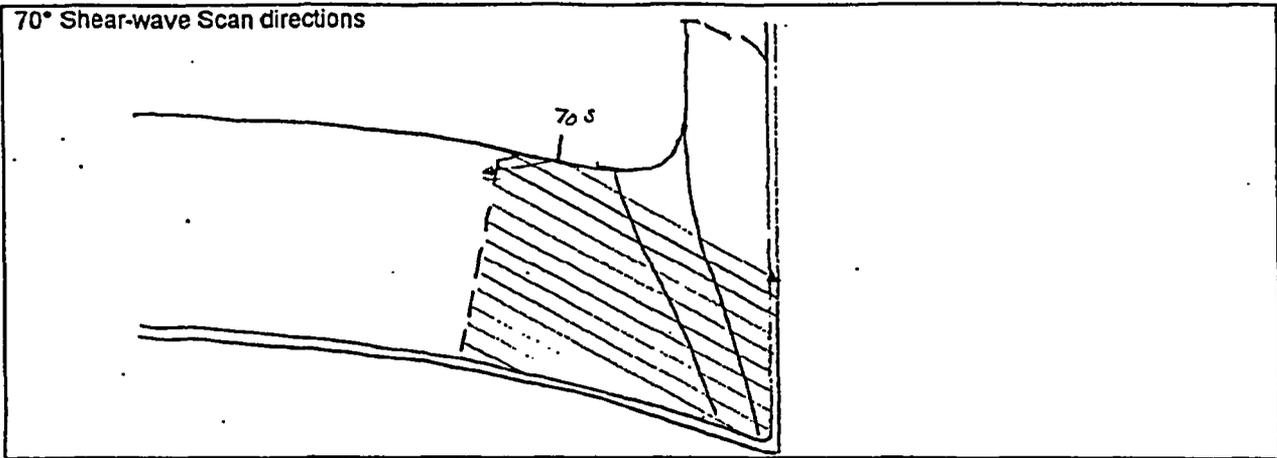
Direction #1



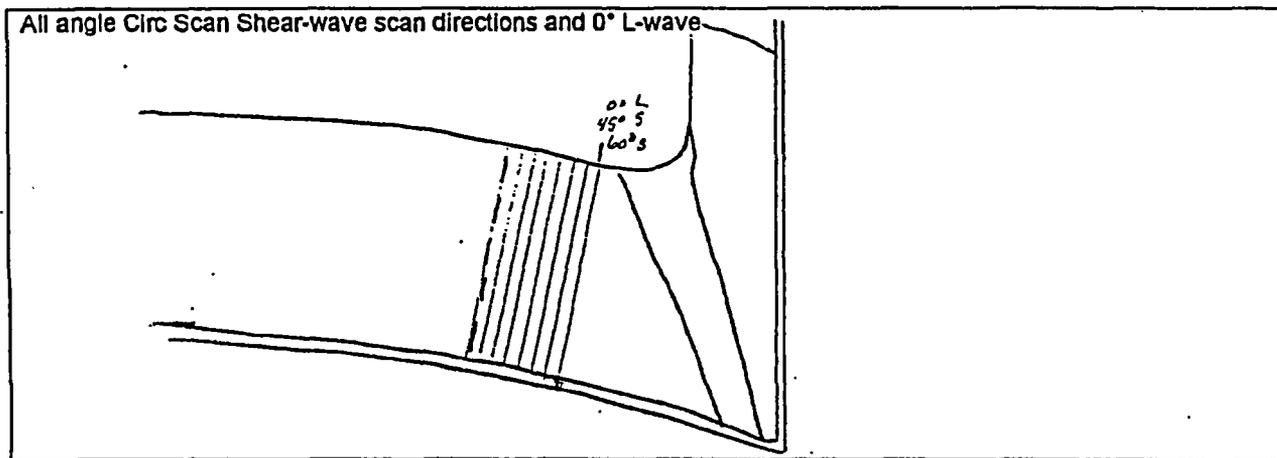
Direction #2



# EXAMINATION COVERAGE CALCULATION SHEET



No Coverage       Direction #1       Direction #2



No Coverage       Direction #3       Direction #4

Required scan coverage obtained:  
Weld ~15.9 %, Base material head side ~ 65.7%, Base material nozzle side ~32.5%  
**TOTAL EXAM VOLUME OBTAINED: 38%**

**COMMENTS:** Pressurizer head to safety nozzle. This is primarily a single sided examination. Scans were performed from the nozzle side to supplement coverage with minimal effect. The cumulative coverage estimation includes the code required base metal coverage adjacent to the weld and the factor of multiple angles from multiple directions. Coverage illustrations depict only one location of a complicated nozzle geometry.

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7/24/02

**ENCLOSURE 2**

**CNRO-2003-00063**

**RELIEF REQUEST  
ANO1-ISI-002**

**ENTERGY OPERATIONS, INC.  
RELIEF REQUEST  
ANO1-ISI-002**

**I. ASME COMPONENTS**

Components/Numbers: Pipe-to-valve welds listed in Table 1

ASME Code Class: 1

- References:
1. ASME Section XI 1992 Edition, Table IWB-2500-1
  2. ASME Section XI 1980 Edition with the Winter 1981 Addenda
  3. Letter from the NRC to Entergy Operations, Inc., *Evaluation of Entergy Operations, Inc. Request for Authorization to Update Inservice Inspection Programs to the 1992 and Portions of the 1993 ASME Boiler and Pressure Vessel Code, Section XI for Arkansas Nuclear One, Units 1 and 2, Grand Gulf Nuclear Station, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. M94472, M94471, M94454, M94473, and M94488)*, dated December 12, 1996
  4. Letter from the NRC to Entergy Operations, Inc., *Risk-Informed Alternative to Certain Requirements of ASME Code Section XI, Table IWB-2500-1, at Arkansas Nuclear One, Unit 1 (TAC No. MA2023)*, dated August 25, 1999
  5. ASME Code Case N-460 – Alternative Examination Coverage for Class 1 and 2 Welds, Section XI, Division 1

Examination Category: B-J

Item Numbers: B9.11

Unit / Inspection Interval Applicability: Arkansas Nuclear One Unit 1 – third (3<sup>rd</sup>) 10-year interval

**II. ASME CODE REQUIREMENT(S)**

ASME Section XI, Table IWB-2500-1, Examination Category B-J, Item B9.11 requires essentially 100% volumetric examination of the Class 1 pipe welds identified through the risk-informed process. ASME Code Case N-460 allows a reduction in coverage for Class 1 and 2 welds due to interference or geometry as long as the overall coverage is greater than 90%.

### III. RELIEF REQUESTED

Pursuant to 10 CFR 50.55a(g)(6)(i), Entergy Operations, Inc. (Entergy) requests relief from achieving the Code-required coverage (> 90%) when performing volumetric examinations of the components identified in Table 1, below.

<b>Table 1 Limited B-J Examinations</b>			
<b>Item ID</b>	<b>Description</b>	<b>Coverage (%)</b>	<b>Reason for Limitation</b>
24-024	2 ½-inch pipe-to-valve weld	71.5	Pipe-to-Valve Configuration
25-031	1 ½-inch pipe-to-valve weld	61.2	Pipe-to-Valve Configuration

### IV. BASIS FOR RELIEF

The subject welds are clad carbon steel and were examined to the maximum extent practical using the ultrasonic testing (UT) examination technique. However, Code-required coverage could not be obtained. A 70° shear wave and 70° RL wave were used to maximize coverage. These welds were examined prior to May 22, 2000 (mandatory implementation of ASME Section XI Appendix VIII) using personnel that met the qualification requirements for performing UT in accordance with the 1992 Edition of ASME Section XI, Appendix VII, "Qualification of Nondestructive Examination Personnel for Ultrasonic Examination." Additionally, the personnel that performed the UT examinations had successfully completed the practical examinations of the Performance Demonstration Initiative (PDI) for the specific application areas. Examination coverage calculation sheets provided in the attachment of this relief request show the piping configurations, limitations, and beam plots.

Welds 24-024 and 25-031 were selected for examination via a risk-informed process based on the NRC's safety evaluation for ASME Code Case N-560 (Reference 4). The degradation mechanism identified for both welds was thermal fatigue; therefore, Entergy conducted an assessment to determine the volume necessary to locate degradation caused by thermal fatigue. A description of the assessment process and its results as applied to these welds are discussed below.

#### Thermal Fatigue Volume Assessment

1. The first step in the assessment process identifies whether or not the area to be examined is located in a horizontal run of piping connected to the secondary side of a steam generator. Since the industry has experienced cracking in such locations (in particular, the counterbore section of the pipe-side weld), the examination must capture the volume of interest. As such, partial coverage of the safe-end or nozzle is acceptable, but full coverage is required for the pipe-side of the weld heat affected zone (HAZ), including the pipe side counterbore.

In this case, the subject welds are not located on a horizontal run of piping connected to a steam generator.

2. The second step identifies whether or not the location is a "pipe-to-pipe" configuration. If so, the assessment investigates the presence of a counterbore - for example, the distance of the counterbore from the weld fusion line. If the counterbore is a fair distance ( $> \frac{1}{2}$  inch) from the welded joint, then the multiplicative effect of stress concentration due to the welding process, counterbore discontinuity, and weld geometry are less than if the counterbore were in close proximity to the welded joint. As such, the acceptable examination volume does not need to capture the counterbore for pipe-to-pipe joints, if the counterbore is at least  $\frac{1}{2}$  inch from the edge of the weld fusion line. In this case, the subject welds are both pipe-to-valve welds rather than pipe-to-pipe welds.
3. For other pipe-to-component welds, the assessment process determines the extent of examination coverage taking into account not capturing the counterbore. In this situation, the process divides the area of concern into two parts: (1) the pipe side of the joint; and (2) the component side of the joint. There is sufficient evidence to assure that the dominate cracking will occur in the pipe side of the joint; therefore, limited coverage on the component side is acceptable.

As stated in #2 above, both welds are pipe-to-valve welds with no counterbore and received 100% coverage on the pipe-side of the weld.

Based on the above assessment, the volume required to locate degradation due to thermal fatigue on a pipe-to-valve weld has been examined for the subject welds.

#### **VI. PROPOSED ALTERNATIVE EXAMINATIONS**

Entergy has examined Welds 24-024 and 25-031 to the extent practical and will continue to perform pressure testing on the subject welds as required by the Code.

#### **VI. CONCLUSION**

10 CFR 50.55a(g)(6)(i) states:

The Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Due to design configuration, it is impractical to obtain greater than 90% coverage on Welds 24-024 and 25-031. To obtain the required coverage would necessitate modifying and/or replacing components. Based on the assessment for thermal fatigue discussed above, the volume examined included that necessary to locate the expected degradation if it existed, thereby demonstrating an acceptable level of integrity. Examinations performed on the subject welds, in addition to examinations of similar welds contained in the program, would detect generic degradation, if it existed. Therefore, Entergy requests the NRC staff authorize the proposed alternative pursuant to 10 CFR 50.55a(g)(6)(i).

**ATTACHMENT**

**RELIEF REQUEST  
ANO1-ISI-002**

**EXAMINATION COVERAGE CALCULATION SHEETS**



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

ANO 1

ANO 2

Grand Gulf

River Bend

Waterford 3

Component ID: 24-024

Report No.: 199ISIUT047

Material Type: SS

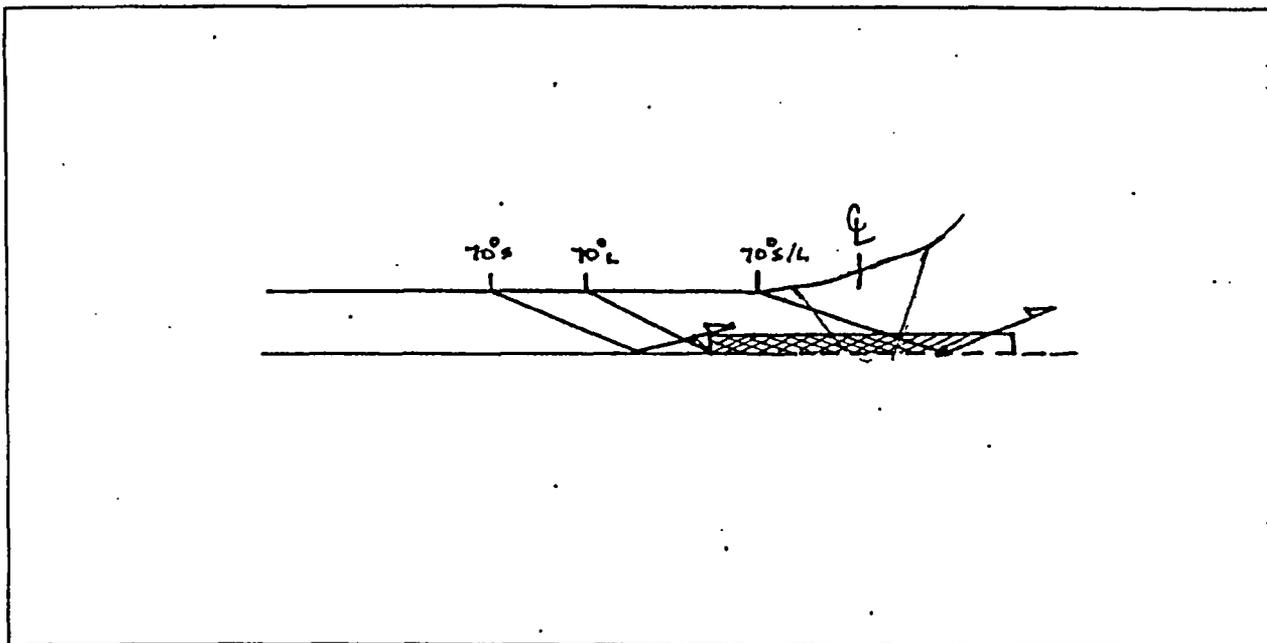
Pipe Diameter.: 2.5"

Sch/ T: .375"

Angle's Used: 70° S - 1 V , 70° RL 1/2 V

### NOTES:

- 1 The .25" dimension on each side of the weld is for non-risk informed ISI, for risk informed ISI the exam volume will be determined by the risk informed program.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.



No Coverage



Direction #1



Direction #2

TOTAL EXAM VOLUME OBTAINED: 71.5 %

**COMMENTS:** Single side exam due to configuration (pipe to valve). This examination was performed prior to the Section XI, Appendix VIII implementation.

*Ranther*  
7/24/02



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

ANO 1

ANO 2

Grand Gulf

River Bend

Waterford 3

Component ID: 25-031

Report No.: 199ISIUT045

Material Type: SS

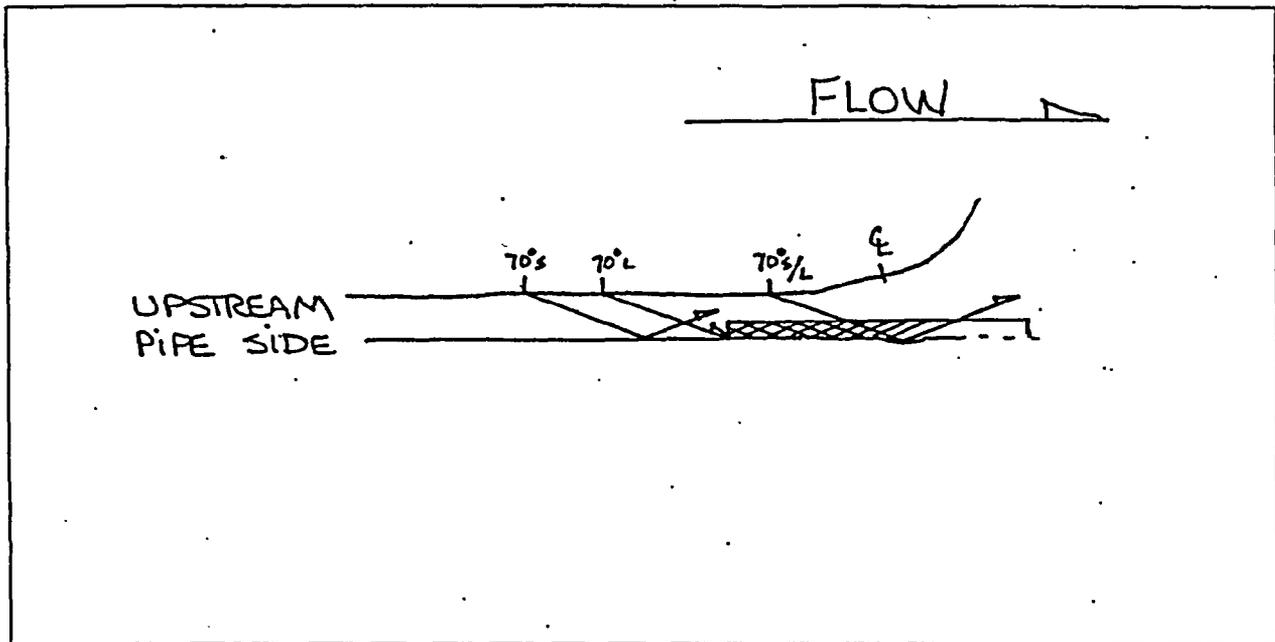
Pipe Diameter.: 1.5"

Sch/T: .281"

Angle's Used: 70° S - 1 V , 70° RL ½ V

## NOTES:

- 1 The .25" dimension on each side of the weld is for non-risk informed ISI, for risk informed ISI the exam volume will be determined by the risk informed program.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.



No Coverage



Direction #1



Direction #2

TOTAL EXAM VOLUME OBTAINED: 61.2 %

**COMMENTS:** Single side exam due to configuration (pipe to valve). This examination was performed prior to the Section XI, Appendix VIII Implementation.

*Rantle*  
7/24/02

**ENCLOSURE 3**

**CNRO-2003-00063**

**RELIEF REQUEST  
ANO1-ISI-003**

**ENTERGY OPERATIONS, INC.  
RELIEF REQUEST  
ANO1-ISI-003**

**I. ASME COMPONENTS**

Component/Number: Steam generator A upper shell-to-upper nozzle belt circumferential weld 03-047

ASME Code Class: 2

References:

1. ASME Section XI 1992 Edition, Table IWC-2500-1
2. ASME Section XI 1980 Edition with the Winter 1981 Addenda
3. Letter from the NRC to Entergy Operations, Inc., *Evaluation of Entergy Operations, Inc. Request for Authorization to Update Inservice Inspection Programs to the 1992 and Portions of the 1993 ASME Boiler and Pressure Vessel Code, Section XI for Arkansas Nuclear One, Units 1 and 2, Grand Gulf Nuclear Station, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. M94472, M94471, M94454, M94473, and M94488)*, dated December 12, 1996
4. ASME Code Case N-460 – Alternative Examination Coverage for Class 1 and 2 Welds, Section XI, Division 1

Examination Category: C-A

Item Numbers: C1.10

Unit / Inspection Interval Applicability: Arkansas Nuclear One Unit 1 – third (3<sup>rd</sup>) 10-year interval

**II. ASME CODE REQUIREMENT(S)**

ASME Section XI, Table IWC-2500-1, Examination Category C-A, Item C1.10 requires essentially 100% volumetric examination of the pressure retaining welds. ASME Code Case N-460 allows a reduction in coverage for Class 1 and 2 welds due to interference or geometry as long as the overall coverage is greater than 90%.

**III. RELIEF REQUESTED**

Pursuant to 10 CFR 50.55a(g)(6)(i), Entergy Operations, Inc. (Entergy) requests relief from achieving the Code-required coverage (> 90%) when performing volumetric examinations of the subject weld. See information in Table 1.

<b>Table 1 Limited C-A Examination</b>			
<b>Item ID</b>	<b>Description</b>	<b>Coverage (%)</b>	<b>Reason for Limitation</b>
03-047	Steam generator upper nozzle belt-to-upper shell weld	75.1	Nozzle-to-vessel configuration

**IV. BASIS FOR RELIEF**

During the ultrasonic examination of Weld 03-047, 100% coverage of the required examination volume could not be obtained due to the configuration of the steam generator. Specifically, effective volumetric examination was limited by the nozzle belt taper. Examination coverage calculation sheets provided in the attachment of this relief request show the shell-to-nozzle belt configuration, limitations, and the beam plots of the different examination angles used. The volume was scanned using 45°, 60°, and 70° beam angles.

Radiography is not practical because of the geometry of the component, which prevents proper placement of the film and exposure source. To perform the Code-required examination would require modifying and/or replacing the component. The examinations performed on Weld 03-047, in addition to the examination of other steam generator welds contained in the program, would detect generic degradation, if it existed, thereby demonstrating an acceptable level of integrity.

**V. PROPOSED ALTERNATIVE EXAMINATIONS**

Entergy has examined Weld 03-047 to the extent practical and will continue to perform pressure testing on the weld as required by the Code.

**VI. CONCLUSION**

10 CFR 50.55a(g)(6)(i) states:

The Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Due to design configuration, it is impractical to obtain greater than 90% coverage on Weld 03-047. To obtain the required coverage would necessitate modifying and/or replacing the component. Examinations performed on the subject weld, in addition to examinations of similar welds contained in the program, would detect generic degradation, if it existed, thereby demonstrating an acceptable level of integrity. Therefore, Entergy requests the NRC staff authorize the proposed alternative pursuant to 10 CFR 50.55a(g)(6)(i).

**ATTACHMENT**

**RELIEF REQUEST  
ANO1-ISI-003**

**EXAMINATION COVERAGE CALCULATION SHEETS**



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

ANO 1

ANO 2

Grand Gulf

River Bend

Waterford 3

Component ID: 03-047

Report No.: 99ISIUT027

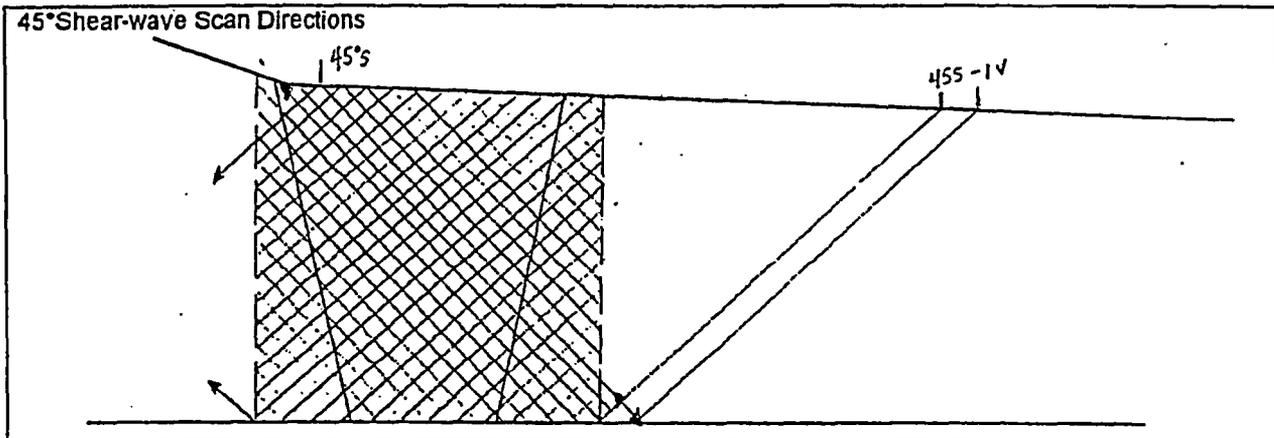
Material Type: CS

Vessel Weld T: ~5.5"

Angles Used: 45° 1V, 60° 70° S - ½ V, 0° L

### NOTES:

- 1 The ½" dimension on each side of the weld is for Class 2 vessel volume.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.



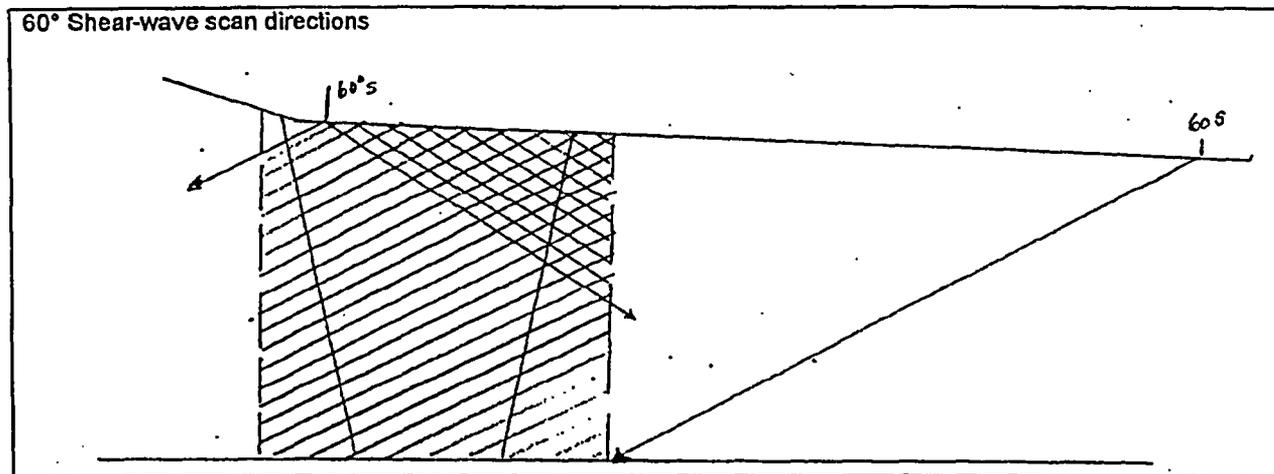
No Coverage



Direction #1



Direction #2



No Coverage

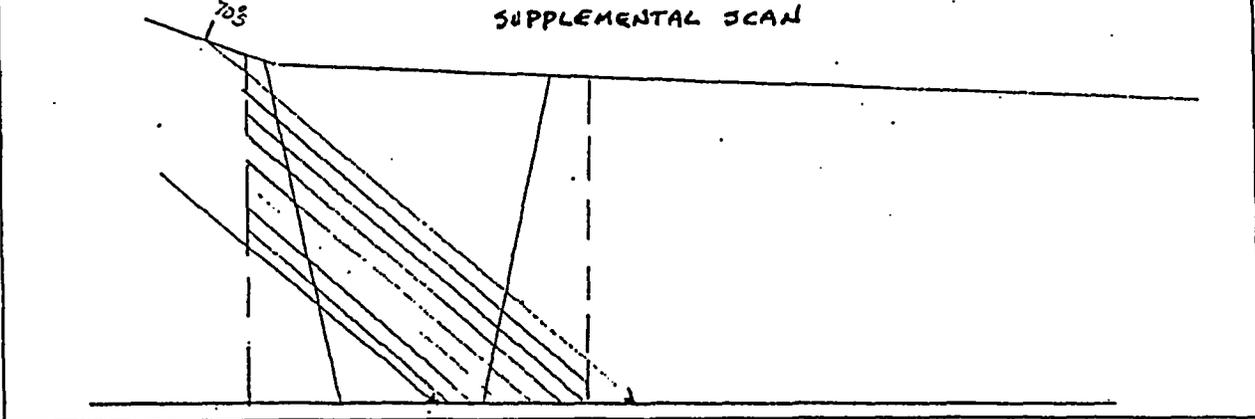


Direction #1



Direction #2

70° Shear-wave Scan directions



No Coverage

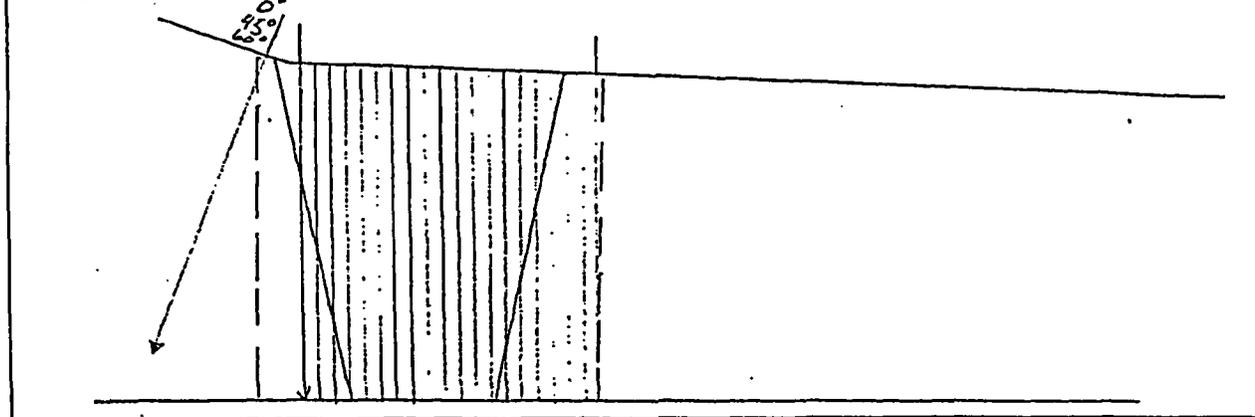


Direction #1



Direction #2

All angle Circ Scan Shear-wave Scan directions and 0° L-wave



No Coverage



Direction #3



Direction #4

Required scan coverage:

Weld ~87.5%, Base material nozzle belt side ~37.8%, Base material shell side 100%

**TOTAL EXAM VOLUME OBTAINED: 75.1%**

**COMMENTS:** Steam generator upper nozzle belt to upper shell weld. The primary limitation was on the required circumferential scans on the upper nozzle belt taper, base material. The cumulative coverage estimation includes the code required base metal coverage adjacent to the weld and the factor of multiple angles from multiple directions.

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2/24/02

**ENCLOSURE 4**

**CNRO-2003-00063**

**RELIEF REQUEST  
ANO1-ISI-004**

**ENTERGY OPERATIONS, INC.  
RELIEF REQUEST  
ANO1-ISI-004**

**I. ASME COMPONENTS**

Component/Number: Steam generator E32A upper head-to-tube sheet circumferential weld 03-001

ASME Code Class: 1

References:

1. ASME Section XI 1992 Edition, Table IWB-2500-1
2. ASME Section XI 1980 Edition with the Winter 1981 Addenda
3. Letter from the NRC to Entergy Operations, Inc., *Evaluation of Entergy Operations, Inc. Request for Authorization to Update Inservice Inspection Programs to the 1992 and Portions of the 1993 ASME Boiler and Pressure Vessel Code, Section XI for Arkansas Nuclear One, Units 1 and 2, Grand Gulf Nuclear Station, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. M94472, M94471, M94454, M94473, and M94488)*, dated December 12, 1996
4. ASME Code Case N-460 – Alternative Examination Coverage for Class 1 and 2 Welds, Section XI, Division 1

Examination Category: B-B

Item Numbers: B2.40

Unit / Inspection Interval Applicability: Arkansas Nuclear One Unit 1 – third (3<sup>rd</sup>) 10-year interval

**II. ASME CODE REQUIREMENT(S)**

ASME Section XI, Table IWB-2500-1, Examination Category B-B, Item B2.40 requires essentially 100% volumetric examination of the pressure retaining welds. ASME Code Case N-460 allows a reduction in coverage for Class 1 and 2 welds due to interference or geometry as long as the overall coverage is greater than 90%.

**III. RELIEF REQUESTED**

Pursuant to 10 CFR 50.55a(g)(6)(i), Entergy Operations, Inc. (Entergy) requests relief from achieving the Code-required coverage (> 90%) when performing volumetric examinations of the subject weld. See information in Table 1.

<b>Table 1 Limited B-B Examination</b>			
<b>Item ID</b>	<b>Description</b>	<b>Coverage (%)</b>	<b>Reason for Limitation</b>
03-001	Steam generator upper head-to-tube sheet weld	71.0	Steam generator tube sheet configuration and integral attachments and man-ways

**IV. BASIS FOR RELIEF**

During the ultrasonic examination of Weld 03-001, 100% coverage of the required examination could not be obtained due to the configuration of the steam generator. Specifically, effective volumetric examination is limited by the taper on the tube sheet side of the weld. Additionally, integral attachments and man-ways limited the coverage on the head side of the weld. Examination coverage calculation sheets provided in the attachment of this relief request show the head-to-tube sheet configuration, limitations, and the beam plots of the different examination angles used. The volume was scanned using 45°, 60°, and 70° beam angles.

Radiography is not practical because of the geometry of the component, which prevents proper placement of the film and exposure source. To perform the Code-required examination would require modifying and/or replacing the component. The examinations performed on Weld 03-001, in addition to the examination of other steam generator welds contained in the program, would detect generic degradation, if it existed, thereby demonstrating an acceptable level of integrity.

**V. PROPOSED ALTERNATIVE EXAMINATIONS**

Entergy has examined Weld 03-001 to the extent practical and will continue to perform pressure testing on the weld as required by the Code.

**VI. CONCLUSION**

10 CFR 50.55a(g)(6)(i) states:

The Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Due to design configuration, it is impractical to obtain greater than 90% coverage on Weld 03-001. To obtain the required coverage would necessitate modifying and/or replacing the component. Examinations performed on the subject weld, in addition to examinations of similar welds contained in the program, would detect generic degradation, if it existed, thereby demonstrating an acceptable level of integrity. Therefore, Entergy requests the NRC staff authorize the proposed alternative pursuant to 10 CFR 50.55a(g)(6)(i).

**ATTACHMENT**

**RELIEF REQUEST  
ANO1-ISI-004**

**EXAMINATION COVERAGE CALCULATION SHEETS**



# EXAMINATION COVERAGE CALCULATION SHEET

Attachment #: A

<input checked="" type="checkbox"/> ANO 1	<input type="checkbox"/> ANO 2	<input type="checkbox"/> Grand Gulf	<input type="checkbox"/> River Bend	<input type="checkbox"/> Waterford 3
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Component ID: 03-001

Report No.: 99ISIUT044

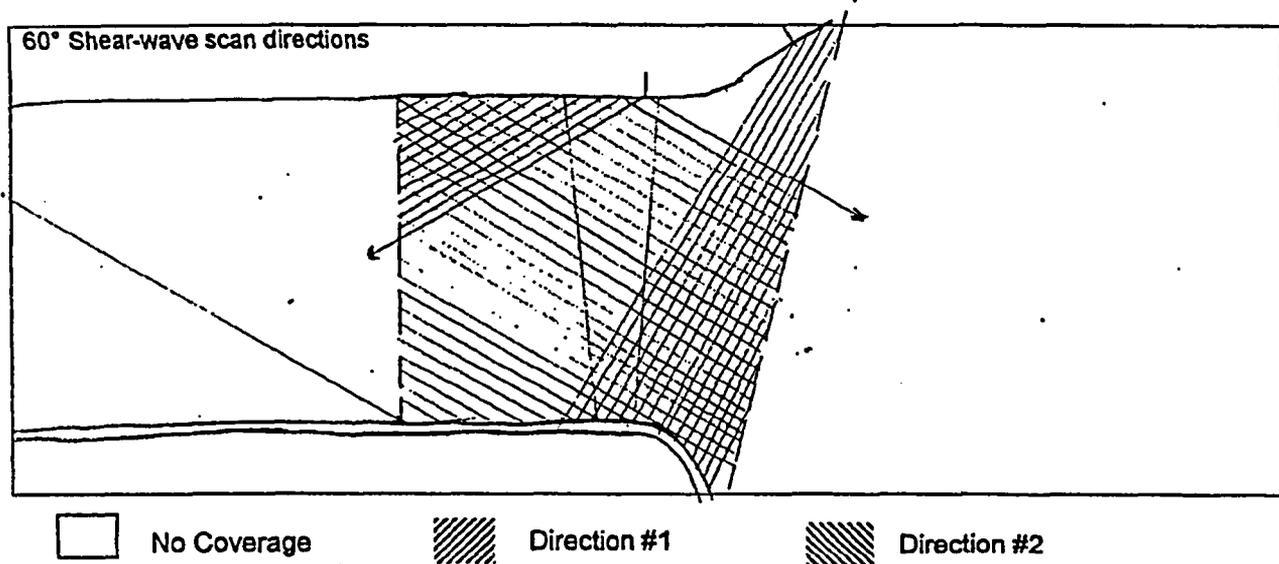
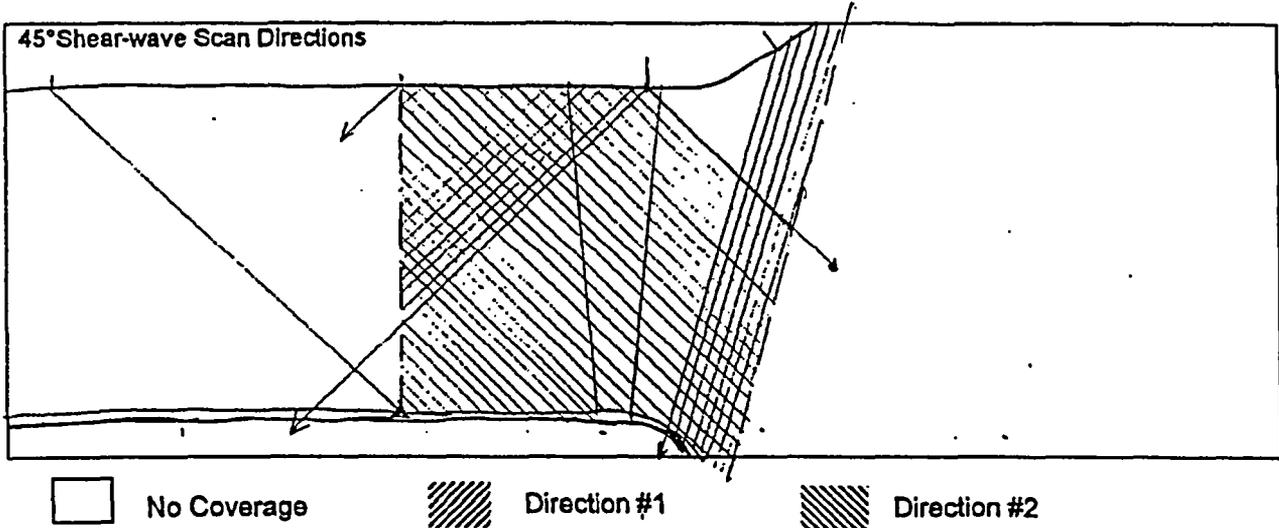
Material Type: CS w/clad

Vessel Weld T: ~9.0"

Angles Used: 45° 60° 70° S - 1/2 V, 0° L

## NOTES:

- 1 The 1/2T dimension on each side of the weld is for Class 1 vessel volume.
- 2 This is an approximate percent of the examination volume for which coverage was obtained.
- 3 The plot shown is a representation of the actual profile and not to scale.

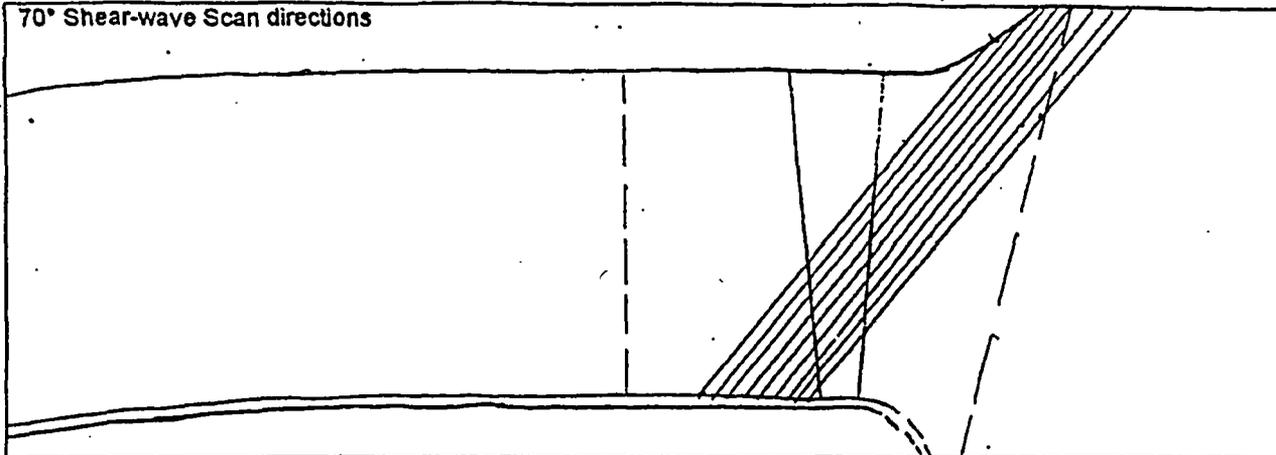


pg 1 of 2  
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7/24/02



# EXAMINATION COVERAGE CALCULATION SHEET

70° Shear-wave Scan directions



No Coverage

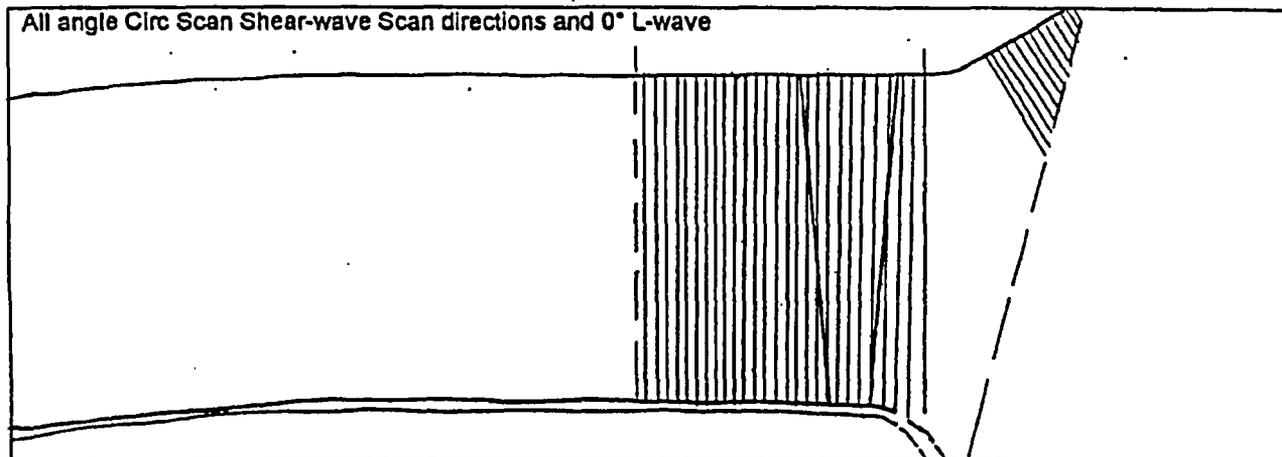


Direction #1



Direction #2

All angle Circ Scan Shear-wave Scan directions and 0° L-wave



No Coverage



Direction #3



Direction #4

Required scan coverage:

Weld ~81%, Base material head side ~97%, Base material tube-sheet side ~35%

**TOTAL EXAM VOLUME OBTAINED: 71.0%**

**COMMENTS:** Upper head to tube-sheet weld approximately 426 inches in circumference. Primarily a single side examination from the upper head, however, some coverage was obtained scanning from the taper on the tube-sheet side. The cumulative coverage estimation includes the code required base metal coverage adjacent to the weld and the factor of multiple angles from multiple directions. The scan from the head was limited for approximately 47 inches due to integral attachments and the manways.