

SURRY NUCLEAR POWER STATION  
UNIT NUMBERS 1 & 2  
INSERVICE INSPECTION PROGRAM  
TECHNICAL EVALUATION REPORT

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SURRY NUCLEAR POWER STATION UNITS 1 AND 2  
INSERVICE INSPECTION PROGRAM  
EVALUATION OF RELIEF REQUESTS

INTRODUCTION

The revision to 10 CFR 50.55a, published in February 1976, required that Inservice Inspection (ISI) Programs be updated to meet the requirements (to the extent practical) of the Edition and Addenda of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code\* incorporated in the Regulation by reference in paragraph (b). This updating of the programs was required to be done every 40 months to reflect the new requirements of the later edition of Section XI.

As specified in the February 1976 revision, for plants with Operating Licenses issued prior to March 1, 1976, the regulations became effective after September 1, 1976, at the start of the next regular 40-month inspection period. The initial inservice examinations conducted during the first 40-month period were to comply with the requirements in editions of Section XI and addenda in effect no more than six months prior to the date of start of facility commercial operation.

The Regulation recognized that the requirements of the later editions and addenda of the Section XI might not be practical to implement at facilities because of limitations of design, geometry, and materials of construction of components and systems. It therefore permitted determinations of impractical examination or testing requirements to be evaluated. Relief from these requirements could be granted provided health and safety of the public were not endangered, giving due consideration to the burden placed on the licensee if the requirements were imposed. This report provides evaluations of the various requests for relief by the licensee, Virginia Electric and Power Company (VEPCO), of the Surry Units 1 and 2. It deals only with inservice examinations of components and with system pressure tests. Inservice tests of pumps and valves (IST programs) are being evaluated separately.

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\* Hereinafter referred to as Section XI or Code.



The revision to 10 CFR 50.55a, effective November 1, 1979, modified the time interval for updating ISI programs and incorporated by reference a later edition and addenda of Section XI. The updating intervals were extended from 40 months to 120 months to be consistent with intervals as defined in Section XI.

For plants with Operating Licenses issued prior to March 1, 1976, the provisions of the November 1, 1979, revision are effective after September 1, 1976, at the start of the next one-third of the 120-month interval. During the one-third of an interval and throughout the remainder of the interval, inservice examinations shall comply with the latest edition and addenda of Section XI, incorporated by reference in the Regulation, on the date 12 months prior to the start of that one-third of an interval. For Surry Units 1 and 2, the ISI program and the relief requests evaluated in this report cover the last 40 months of the current 120-month inspection interval, i.e., from August 1979 to December 1982 for Unit 1 and January 1980 to May 1983 for Unit 2. The program was based upon the 1974 Edition of Section XI of the ASME Boiler and Pressure Vessel Code with Addenda through the Summer of 1975.

The two reactor facilities, Surry Unit 1 and 2, are essentially identical. The main differences in their ISI programs are that the regenerative heat exchanger is a Class 1 vessel in Unit 1 and a Class 2 vessel in Unit 2.

The November 1979 revision of the Regulation also provides that ISI programs may meet the requirements of subsequent code editions and addenda, incorporated by reference in paragraph (b) and subject to Nuclear Regulatory Commission (NRC) approval. Portions of such editions or addenda may be used provided that all related requirements of the respective editions or addenda are met. These instances are addressed on a case-by-case basis in the body of this report.

Finally, Section XI of the Code provides for certain components and systems to be exempted from its requirements. In some instances, these exemptions are not acceptable to NRC or are only acceptable with restrictions. As appropriate, these instances are also discussed in this report.

References (1) to (12) listed at the end of this report pertain to previous information transmittals on ISI between the licensee and the NRC. By letter of April 22, 1976,<sup>(1)</sup> the Commission provided initial general guidance to the licensee, and the licensee responded to that guidance on May 27, 1976.<sup>(2)</sup> The Commission issued further generic guidance on November 17, 1976.<sup>(3)</sup>



February 14, 1979, the licensee submitted a proposed Technical Specification change,<sup>(4)</sup> and on May 17, 1979, and September 28, 1979, the licensee submitted ISI Programs for Unit 1 and Unit 2, respectively.<sup>(5,6)</sup> Revisions of the ISI Programs for Units 1 and 2 were made on December 15, 1980.<sup>(7,8)</sup> By letter of February 18, 1982,<sup>(9)</sup> the NRC requested additional information to complete this review. This information was furnished by the licensee on March 25, 1982.<sup>(10)</sup> Further clarification was requested by NRC on April 21, 1982,<sup>(11)</sup> and provided by the licensee on May 25, 1982.<sup>(12)</sup>

From these submittals, a total of 19 requests for relief from Code requirements or for updating to a later code were identified. These requests are evaluated in the following sections of this report. In addition to those evaluated, the licensee has withdrawn two relief requests during the preparation of this report. These requests concerned Regenerative Heat Exchangers, Head-to-Shell and Shell-to-Tube sheet welds (a) for Unit 2 only, Category B-B, Item B3.1 and (b) for Unit 1 only, Category C-A, Item C1.1.



## I. CLASS 1 COMPONENTS

### A. Reactor Vessel

No relief requests.

### B. Pressurizer

#### 1. Circumferential Shell Welds, Category B-B, Item B2.1

##### Code Requirement

The volumetric examinations performed during each inspection interval shall cover at least 10% of the length of each longitudinal shell weld and meridional head weld and 5% of the length of each circumferential shell weld and head weld.

##### Code Relief Request

Relief is requested from the volumetric examination of pressurizer welds C-5 and C-7.

##### Proposed Alternative Examination

The welds will be visually examined for evidence of leakage during system pressure tests.

##### Licensee's Basis for Requesting Relief

Two of the pressurizer circumferential shell welds (C-5 and C-7) are not accessible for examination by volumetric or surface method due to floor penetration and support structure interference.

##### Evaluation

There are a total of seven circumferential welds on the pressurizer. The two welds under consideration are physically inaccessible for examination; however, the licensee will be performing the Code-required examinations on the other five welds. Imposition of full Code requirements would be impractical since it would necessitate the removal of portions of the concrete floor and vessel support.

The examinations performed by the licensee would be adequate for providing an acceptable level of safety and assurance provided at least 7% (instead of 5%) of the length of the five remaining welds is examined to provide an equivalent examination volume.



### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief from volumetric examination of pressurizer welds C-5 and C-7 should be granted, provided that (a) the proposed visual examination for leakage is made according to IWB-5000 and (b) at least 7% (instead of 5%) of the length of the accessible welds is volumetrically examined.

### References

References 7 and 8.



## C. Heat Exchangers and Steam Generator

### 1. Regenerative Heat Exchanger, Nozzle-to-Head Welds (Applies to Unit 2 Only), Category B-D, Item B3.2

#### Code Requirement

The volumetric examination of each nozzle shall cover 100% of the volume to be inspected as shown in Figure 2500-D. All nozzles shall be examined during each inspection interval.

#### Code Relief Request

Relief is requested from making the volumetric examination.

#### Proposed Alternative Examination

Surface examination.

#### Licensee's Basis for Requesting Relief

Due to joint configuration of the nozzle-to-shell welds, volumetric examination is impractical.

#### Evaluation

The sketch (Figure 1 in Reference 10) indicates that a full V-path ultrasonic examination of the weld from the nozzle side can be made. This examination complies with the 1977 Edition, Summer 1978 Addenda, of Section XI, Article III-4420. The required angle beam calibration is given in Article III-3230.

The 1977 Edition has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

If a full volumetric examination cannot be made from one side, it should be supplemented by a surface examination. This surface examination should meet the intent of Figure IWB-2500-10 of the Summer 1978 Addenda of the 1977 Edition. (Although Item B9.31 of this code version calls for volumetric examination, no examination volume is shown on this figure.)



### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted to update to the requirements of the Summer 1978 Addenda to examine the nozzle-to-head welds in the Unit 2 Regenerative Heat Exchanger using the techniques in Appendix III, specifically Articles III-3230 and III-4420, with the following provision:

If a full volumetric examination cannot be made from one side of the weld, a surface examination to Figure IWB-2500-10 of the Summer 1978 Addenda should also be done.

### References

References 8 and 10.



2. Steam Generator, Nozzle to Safe End Welds, Category B-F,  
Item B3.3

Code Requirement

The volumetric and surface examination shall cover 100% of each circumferential weld of dissimilar metals during each inspection interval.

Code Relief Request

Relief is requested from volumetric examination of 100% of each circumferential weld of dissimilar metals.

Proposed Alternative Examination

A volumetric examination will be performed to the extent practical; surface examination will be 100% of weld and base metal on the pipe side.

Licensee's Basis for Requesting Relief

Examination of the steam generator primary nozzle-to-safe end and safe end-to-pipe weld is limited both by the nozzle geometry (see Figure of References 6 and 7) and surface condition, and by the limited surface preparation on the pipe side of the weld. The surface on the pipe side of the weld, which is a cast elbow, is machined for a distance of approximately 3 in. from the edge of the weld. Ultrasonic examination is limited to this from the edge of the weld. Examinations can be performed on the surface of the weld but are severely limited from the nozzle side by the rough, as-cast surface.

Evaluation

The existing nozzle design and pipe geometry limits the extent of the volumetric examinations that can be performed on these welds to the surface of the weld and the 3 in. of machined area on the pipe side. Thus, it is possible to perform a more limited volumetric examination from just one side of the weld. Such an examination would comply with the 1977 Edition of Section XI, Summer 1978 Addenda, Article III-4420, which permits the use of a full V-weld examination from just one side and requires a volumetric examination of the inner third of the weld thickness (Figure IWB-2500-8).



The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

#### Recommendations

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted for the steam generator safe ends to update to the requirements of the 1977 Edition, Summer 1978 Addenda, for Category B-F items. This approval would permit a full V-weld examination from one side and a more limited volumetric examination. If this compliance proves impractical, the licensee should submit a request for relief from the updated Code requirements.

#### References

References 7, 8 and 11 (Section 4.2.2-3 and Table 4.1.3-6).



D. Piping Pressure Boundary

1. Safe End-to-Piping Welds (Steam Generator), Category B-F,  
Item B4.1

The request for relief from volumetric and surface examination of nozzle to safe end welds (see I.C.2 of this report) applies here. Therefore, the following is recommended:

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted to update to the requirements of the 1977 Edition, Summer 1978 Addenda for Category B-F items. This approval would permit a full V-weld examination from one side and a more limited volumetric examination. If this compliance proves impractical, the licensee should submit a request for relief from the updated Code requirements.



2. Circumferential and Longitudinal Pipe Welds, Category B-J,  
Item B4.5

Code Requirement

The volumetric examinations performed during each inspection interval shall cover all of the area of 25% of the circumferential joints, including the adjoining 1-foot sections of longitudinal joints. Examinations in each interval shall cover a different 25% until all welds have been examined.

Code Relief Request

Relief is requested from volumetric examination of welds where limitations occur due to piping system or weld geometry.

Welds in the Surry Unit 1, Class 1 systems that, due to limitations, require code relief are as follows:

- (i) Loop 1 Cold Leg Injection line: Welds 6 and 7.
- (ii) Loop 2 Charging line: Weld 11.
- (iii) Loop 2 Cold Leg Injection line: Welds 4 and 5.
- (iv) Loop 1 RTD Return line: Weld 7.
- (v) Loop 2 RTD Return line: Weld 7.
- (vi) Loop 3 RTD Return line: Weld 7.
- (vii) Loop 3 Cold Leg Injection line: Welds 3 and 4.
- (viii) Pressurizer Safety Valve lines: Welds 7 and 8.
- (ix) Pressurizer Relief line: Welds 4 and 8.
- (x) Ninety Degree Elbow on Crossover Leg.

Welds in Surry Unit 2, Class 1 systems that, due to limitation, require code relief are as follows:

- (i) Loop 1 Cold Leg Injection line: Weld 7.
- (ii) Loop 2 Cold Leg Injection line: Welds 5 and 7.
- (iii) Loop 3 RTD Return line: Weld 9.
- (iv) Loop 3 Cold Leg Injection line: Welds 3 and 4.
- (v) Pressurizer Safety Valve lines: Welds 7 and 8.
- (vi) Pressurizer Relief line: Welds 4 and 19.
- (vii) Ninety Degree Elbows on Crossover Leg.

Proposed Alternative Examination

In instances where ultrasonic examinations cannot be performed on 100% of the volume of the weld, ultrasonic examination will be performed to the extent practical and surface examinations will be performed to supplement the volumetric examination. In the case of the 90-degree elbows in the crossover leg, an ultrasonic examination cannot be performed and the surface examination will substitute for volumetric.



### Licensee's Basis for Requesting Relief

Limitations may occur from the examination of piping system circumferential butt welds (Category B-J) when the welds occur at geometric discontinuities such as pipe-to-vessel welds, pipe-to-fitting welds or fitting-to-fitting welds. For pipe-to-fitting or pipe-to-vessel nozzle welds, examinations can be performed to the extent required by T-532 of Section V from the weld and pipe surfaces. Examinations from the fitting side would be dependent upon the geometric configuration. Where elbows or tees are concerned, examination can be performed from the fitting side except where the intrados of the fitting prevent adequate ultrasonic coupling. No examinations can be performed from the fitting side when it is a valve or a flange. In all cases 100% of the weld material can be examined. In instances where welds occur at fitting to fitting, access restrictions as outlined above occur on both sides of the weld.

The 90° elbows on the crossover leg of the reactor coolant system are fabricated in two halves from austenitic stainless steel castings welded together by the electroslag process. The structure and nature of the electroslag weld in the cast austenitic 90° elbows is such that the material is opaque to ultrasonic transmissions utilizing currently available techniques. Radiography is the only other available technique for volumetric examination. It is not possible to obtain Code acceptable radiographs with double wall "shots" on these components which are approximately thirty-eight inches diameter, 3.5 inches wall thickness, containing a two-inch thick splitter plate and having radiation levels of up to three hundred mr/hr on contact.

### Evaluation

#### (a) Piping Systems Other 90-Degree Elbows

Code relief is not necessary for the piping systems other than the 90-degree elbows. Except for the 90-degree elbows, 100% of the weld and heat-affected zone can be volumetrically examined for all but 14 welds (3.5%) in Unit 1, and all but 10 welds (2.5%) in Unit 2. These inaccessible welds are a statistically small, essentially random sample of Item B4.5 welds. Therefore, none of these welds needs to be included in the 25% sample to be examined during this inspection interval.

For subsequent inspection intervals, the licensee has the option of updating to subsequent Code versions or of staying with the 1974 Edition through the Summer 1975 Addenda, pursuant to 10 CFR 50.55a(b)(2)(ii). Updating would allow the licensee to examine the same 25% sample, if the provisions of the Summer 1978 Addenda of the 1977 Edition continue to prevail (see Footnote (2) of Category B-J in Table IWB-2500-1). By adopting 10 CFR 50.55a(b)(2)(ii) the Commission was offering an option



whereby "operating facilities with ongoing inservice inspection programs would have continuity in the extent and frequency of examinations for pipe welds" (see 44 FR 57913).

Based on these considerations, relief from these requirements is not required at this time for these welds. It is preferable to defer a decision until the next inspection interval, after the licensee has determined which of the above options he wishes to exercise.

In addition, visual examination of the welds for which Code relief is requested could be performed in the interim.

(b) 90-Degree Elbows

For the 90-degree elbows on the crossover leg, the fabrication is austenitic stainless steel casting, welded together by the electroslag process. The material is opaque to ultrasonic transmissions. Radiography is not practical since Code-acceptable examinations cannot be made through components of this diameter and thickness and radiation level. The proposed surface examination is adequate.

Conclusions and Recommendations

(a) Piping Systems Other than 90-Degree Elbows

Based on the above evaluation, it is concluded that for these welds relief from volumetric examination is not necessary at this time and relief should not be granted.

(b) 90-Degree Elbows

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Code relief from the volumetric examination should be granted for the welds in the 90-degree crossover legs, provided the proposed surface examination is performed.

References

References 7 and 8.



3. Branch Pipe Connection Welds Exceeding 6" Diameter,  
Category B-J, Item B4.6

Code Requirement

The volumetric examinations performed during each inspection interval shall cover all of the area of 25% of the branch-pipe connection joints.

Code Relief Request

Relief is requested from full volumetric examination of welds where limitations occur due to piping design or weld geometry.

Proposed Alternative Examination

Volumetric examinations will be performed to the extent practical from the pipe and nozzle adjacent to the weld. Surface examinations will be performed to supplement this limited volumetric examination.

Licensee's Basis for Requesting Relief

The configuration of the reactor coolant branch nozzle connection welds is as shown in Figure 2 of Reference Documents 6 and 7. Ultrasonic examinations cannot be performed on the surface of the weld.

Evaluation

The sketch (Figure 2 of References 7 and 8) indicates that a full V-path ultrasonic examination of the weld from the nozzle forging side can be made. This examination complies with the more recent 1977 Code, Summer 1978 Addenda, Article III-4420. The required angle beam calibration is given in Article III-3230.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.



If a full volumetric examination cannot be made from one side, it should be supplemented by a surface examination. This surface examination should meet the intent of Figure IWB-2500-10 of the Summer 1978 Addenda of the 1977 Edition. (Although Item B9.31 of this code version calls for volumetric examination, no examination volume is shown on this figure.)

#### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted to update to the requirements of the Summer 1978 Addenda to examine Item B4.6 welds using the techniques in Appendix III, specifically Articles III-3230 and III-4420, with the following provision:

If a full volumetric examination cannot be made from one side of the weld, a surface examination to Figure IWB-2500-10 of the Summer 1978 Addenda should also be done.

#### References

References 7 and 8.



4. Integrally Welded Supports, Category B-K-1, Item B4.9

Code Requirements

The volumetric examination of weld areas shall include essentially 100% of the integrally welded external support attachments. This includes the welds to the pressure retaining boundary and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses.

Code Relief Request

Relief is requested from performing 100% of the volumetric examination.

Proposed Alternative Examination

A volumetric examination will be performed to the extent practical supplemented with surface examination.

Licensee's Basis for Requesting Relief

The piping system integrally welded supports are attached to the pipe by fillet welds. The configuration of such welds is such that examinations cannot be performed to the extent required by IWB-2600 and only the base material of the pipe wall can be examined by ultrasonic techniques.

Evaluation

The geometry of fillet welds for piping supports generally cannot be examined to the extent required by Section XI by ultrasonic examination. Ultrasonic examination of the base metal would detect piping flaws in the heat-affected zone, but would provide little or no information on weld penetration. Any penetration flaws would most likely generate at the surface and be detectable by surface examination.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief from 100% volumetric examination should be granted, provided the alternative surface examination is performed to



supplement the volumetric examination of the base material of the pipe wall.

References

References 7 and 8.



E. Pump Pressure Boundary

1. Reactor Coolant Pump, Seal House Bolting, Category B-G-1,  
Item B5.1

Code Requirement

Volumetric examination of bolting 2 in. and larger in diameter shall cover 100% of the bolts, studs, nuts, and threads in base material and flange ligaments between threaded stud holes. The examination schedule shall be according to Paragraph IWB-2400.

Bolting may be examined either in place under tension, when the connection is disassembled, or when bolting is removed.

Code Relief Request

Relief is requested from examination according to the schedule in Paragraph IWB-2400.

Proposed Alternative Examination

Examination will be performed to the extent required by IWB-2600 only when the seal housing is disassembled for maintenance.

Licensee's Basis for Requesting Relief

The reactor coolant pump seal housing bolts are of the socket head type and the configuration is such that ultrasonic examinations as required by IWB-2600 cannot be performed when the bolting is in place.

Evaluation

The design of the seal housing bolts prevents ultrasonic examination, and radiography is an impractical technique to use with the bolting in place. To disassemble a reactor coolant pump at the frequency required to perform the examination would place an undue burden on the licensee without providing a comparable increase in the level of safety of the facility.

The ISI program requires that at least one pump in the group be disassembled and the casing weld be examined once every 10 years. The bolting should be examined at the same time; so as a minimum, the bolting of at least one pump will be examined every 10 years. This limited inspection and the routine monitoring for leakage will provide adequate information about the condition of seal housing bolts.



### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the bolts discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief from volumetric examination according to the schedule in Paragraph IWB-2400 should be granted, provided that the pump bolting is Code-examined when pumps are disassembled for maintenance.

### References

References 7 and 8.



2. Integrally Welded Supports, Category B-K-1, Item B5.4

Code Requirement

The volumetric examination of weld areas shall include essentially 100% of the integrally welded external support attachments. This includes the welds to the pressure retaining boundary and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses. The examination performed during each inspection interval shall cover 25% of the integrally welded supports.

Code Relief Request

Relief is requested from the ultrasonic examination of reactor coolant pump integrally welded supports.

Proposed Alternative Examination

Surface and visual examination will be performed as a substitute for volumetric.

Licensee's Basis for Requesting Relief

The structure and nature of the material of integrally welded pump supports are such that it is opaque to ultrasonic transmission.

Evaluation

The reactor coolant pump supports are fabricated from castings of austenitic steel. The material properties of cast austenitic steel attenuate ultrasound to the extent that ultrasonic examination is not possible. The materials of construction make the examination requirements of Section XI impractical. Any penetration flaws would most likely generate at the surface and be detectable by surface examination. The surface and visual examinations proposed by the licensee will be adequate.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:



Code relief from volumetric examination should be granted, provided the proposed alternative surface and visual examinations are performed.

References

References 7 and 8.

F. Valve Pressure Boundary

No relief requests.



## II. CLASS 2 COMPONENTS

### A. Pressure Vessels

#### 1. Seal Water Return Filter, Cover Weldment-to -Shell Weld and Head-to-Shell Weld, Category C-A, Item C1.1

##### Code Requirement

The volumetric examinations shall cover at least 20% of each circumferential weld uniformly distributed among three areas around the vessel circumference. This examination shall be scheduled over the lifetime of the plant (four intervals with three periods within each interval).

##### Code Relief Request

Relief is requested from performing the volumetric examination required by Code.

##### Proposed Alternative Examination

Surface and visual examinations will be made in lieu of volumetric examination.

##### Licensee's Basis for Requesting Relief

The thickness of the materials (0.188" thick) used for the construction of these filters is such that meaningful results could not be expected with ultrasonic examination as required by IWC-2600.

##### Evaluation

The material used for construction of this component is too thin for a meaningful ultrasonic examination. This is recognized in the 1977 Code (Summer 1978 Addenda) where in certain categories (i.e., C-B and C-F), only surface examination is required for anything less than 1/2-inch. The proposed surface and visual examination is an acceptable alternative.

##### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, it is recommended that code relief from the volumetric examination be granted, provided the proposed surface and visual examinations are done.

##### References

References 7 and 8.



2. Reactor Coolant Filters, Cover Weldment-to-Shell Weld and Head-to-Shell Weld, Category C-A, Item C1.1

Except for the component involved, this relief request is the same as for the Item C1.1 welds of the Seal Water Return Filters (see II.A.1 of this report). Therefore, the following is recommended:

Code relief from the volumetric examination should be granted, provided the proposed surface and visual examinations are done.



3. Residual Heat Exchanger (Tube Side), Nozzle-to-Vessel  
Welds, Category C-B, Item C1.2

Code Requirements

The volumetric examinations shall cover 100% of the nozzle-to-vessel attachment weld. The examination shall be scheduled over the lifetime of the plant (four intervals and three periods within each interval).

Code Relief Request

Relief is requested from performing the volumetric examination required by Code.

Proposed Alternative Examination

The area will be subject to visual examination for evidence of leakage during system pressure tests.

Licensee's Basis for Requesting Relief

The nozzle-to-vessel welds of the residual heat exchangers are covered by 1-inch thick by 3-inch wide reinforcement pads, as shown in Figure 3 of the reference documents 7 and 8. These welds are not accessible for examination by volumetric or surface methods.

Evaluation

The existing component geometry makes the Code required volumetric examinations impractical because the subject weld is entirely covered by a reinforcement pad which is fillet welded to the nozzle. The visual examinations proposed by the licensee will be acceptable.

Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief from the volumetric examination should be granted provided the proposed visual examinations during system pressure tests per IWC-5000 are performed.

References

References 7 and 8.



B. Piping

1. Circumferential Butt Welds, Categories C-F and C-G, Item C2.1

Code Requirement

Categories C-F and C-G require the 100% volumetric examination (including weld metal and base metal for one-wall thickness) of those welds selected for inspection as outlined in IWC-2520. This examination shall be scheduled over the lifetime of the plant (four intervals with three periods within each interval).

Code Relief Request

Relief is requested from performing 100% volumetric examination of the following welds in the Surry Unit 1, Class 2 piping systems:

- (i) Loop 1 Mainsteam By-Pass: Welds 1, 7, 13, 20
- (ii) Loop 2 Mainsteam Relief line:  
Welds 12, 13, 16, 18, 20, 22, 29, 31
- (iii) Loop 2 Mainsteam By-Pass: Welds 1, 7, 13, 20
- (iv) Loop 2 SIS Hotleg: Weld 15
- (v) 14" RHR: Welds 1, 10, 15, 22, 27
- (vi) 8", 10", 12" RHR: Welds 2, 3, 4, 11, 13  
14, 15, 36, 38, 45 (Sketch VPA-2-2510)
- (vii) 12", 10" RHR: Welds 1, 7, 15, 20, 27 (Sketch VPA-2-2511)
- (viii) 12", 10", 6" RHR: Weld 10
- (ix) 10" SIS: Weld 9
- (x) 10", 6" SIS: Welds 6 and 14

and for the following in the Surry Unit 2, Class 2 piping systems:

- (i) Loop 1 Mainsteam: Welds 20, 18, 15, 22, 2, 4, 6,  
8
- (ii) Loop 1 Mainsteam By-pass: Welds 12, 7, 19, 1
- (iii) Loop 2 Mainsteam: Welds 2, 4, 6, 8, 11, 12,  
18, 20
- (iv) Loop 2 Mainsteam By-pass: Welds 7, 12, 19, 1
- (v) Loop 3 Mainsteam: Welds 2, 4, 6, 8, 11, 12,  
18, 20
- (vi) Loop 3 Mainsteam By-pass: Welds 7, 12, 19, 1
- (vii) 10" RHR: Weld 14

Proposed Alternative Examination

In instances where ultrasonic examinations cannot be performed on one hundred percent of the volume of the weld and heat-affected zone, surface examinations may be performed to supplement the limited volumetric examination.



### Licensee's Basis for Requesting Relief

Examination of Class 2 piping systems is limited to those occurring at geometric discontinuities such that some limitations may be expected at all locations. For pipe-to-fitting or pipe-to-vessel nozzle welds, examinations can be performed to the extent required by T-532 of Section V from the weld and pipe surfaces. Examination from the fitting side would be dependent upon the geometric configuration. Where elbows or tees are concerned, examination can be performed from the fitting side except where the intrados of the fitting prevents adequate ultrasonic coupling. No examination can be performed from the fitting side when it is a valve or a flange. In all cases one hundred percent of the weld material can be examined. In instances where welds occur at fitting-to-fitting access restrictions, as outlined above, occur on both sides of the weld. Welds in the Surry Unit 1 and 2, Class 2 systems with limitations at geometric discontinuities are listed in the above relief request.

In response to further questions, the licensee submitted the following additional information:

As both Surry unit piping systems were constructed to B31.1 1967, no preservice work was performed on Class 2 systems prior to unit startup. Therefore, the as-built construction of each weld cannot be determined for inspectability until the NDE examination is performed for inservice inspection.

Class 2 circumferential butt welds under Item C2.1 that cannot be volumetrically examined 100%, as required by Section V T-532, would be determined on a case basis. Supplemental surface inspections would then be performed.

The listings that were provided with both Surry 1 and 2 Relief Requests were welds that had been previously inspected for meeting other augmented examination requirements and were known to be inaccessible for performing a 100% volumetric examination of the weld and HAZ due to geometric configuration.

### Evaluation

The licensee is committing to make a full volumetric examination from the pipe side of all accessible Item C2.1 piping welds with geometric discontinuities. The licensee's proposal to supplement the volumetric examination (where it cannot be performed on 100% of weld volume and HAZ) is consistent with the intent of later versions of Section XI; for example, the 1977 Edition through Summer 1978 Addenda. It is therefore, appropriate to grant to the licensee approval to update to the examination requirements and methods for Item C2.1 welds to the Summer 1978 Addenda where they become Item C5.10 or C5.20 depending upon pipe thickness. This position is consistent with that taken on similar relief requests by other licensees.



In Figure IWC-2520-7 of the Summer 1978 Addenda, the required examination volume CDEF covers only the inner third of the weld thickness, but extends beyond the weld width on both sides. The required surface examination area (A-B) extends 1/2-inch to either side of the weld crown width. The licensee should meet the intent of these examination requirements to the extent practical. If the licensee chooses to make a full volumetric examination (and no surface examination) it should cover the cross section bounded by ABDEFC in Figure IWC-2520-7.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

#### Recommendations

Based on the above evaluation, relief from Code requirements should not be granted. Instead, pursuant to 10 CFR 50.55a (g)(4)(iv), approval should be granted to update to the examination requirements and methods of the 1977 Edition, Summer 1978 Addenda, for C5.10 and C5.20 items. This approval would permit surface examination to be substituted for volumetric examination for Class 2 piping welds less than 1/2-in. thick. It would accommodate the licensee's request to supplement the volumetric examination with a surface examination in those instances where a full volumetric examination is impractical. A full volumetric examination should be interpreted to cover the cross section bounded by ABDEFC in Figure IWC-2520-7 of the Summer 1978 Addenda.

#### References

References 7, 8, 9, 10 and 12.



2. Branch Pipe-to-Pipe Welds, Categories C-F and C-G, Item C2.3

Code Requirement

Categories C-F and C-G require the 100% volumetric examination (including weld metal and base metal for one-wall thickness) for those branch-to-branch welds selected for inspection in IWC-2520. This inspection shall be scheduled over the lifetime of the plant (four intervals with three periods within each interval).

Code Relief Request

Relief is requested from performing the 100% volumetric examination of the branch-pipe-to-pipe welds selected for inspection in IWC-2520.

Proposed Alternative Examination

Examination will be performed to the extent practical from the pipe and nozzle surfaces adjacent to the weld. Surface examination of the weld will be performed to supplement the volumetric examination.

Licensee's Basis for Requesting Relief

The configuration of typical branch pipe welds is shown in Figure 4 in reference documents 7 and 8. Ultrasonic examinations cannot be performed on the surface of the weld.

Evaluation

In this request, the licensee has two approaches. First, the sketch (Figure 4 in References 7 and 8) indicates that a full V-path ultrasonic examination of the weld from the nozzle forging side can be made. This examination complies with the more recent 1977 Code, Summer 1978 Addenda, Article III-4420. The required angle beam calibration is given in Article III-3230.

The licensee has proposed to perform surface examinations to supplement the limited volumetric examination. This surface examination should meet the intent of Figure IWC-2520-9 of the Summer 1978 Addenda.

The proposed examinations are more than adequate as evidenced by the Summer 1978 Addenda, which no longer require a volumetric examination for piping branch connections (Item C5.30). The dropping of the volumetric examination in the newer version of the Code opens the second approach to the licensee. Under the 1977 Edition, Summer 1978 Addenda, the licensee could



perform a surface examination only, and the examination requirements are shown in Figures IWC-2529-9 and -7 for circumferential (C5.31) and longitudinal (C5.32) welds, respectively. Either approach is acceptable.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

#### Conclusions and Recommendations

Based on the above evaluation, relief from Code requirements should not be granted. Instead, pursuant to 10 CFR 50.55a(g)(4)(iv), approval should be granted to update to the examination requirements and methods of the 1977 Edition, Summer 1978 Addenda. This approval would allow a surface examination to either supplement the volumetric examination or to be substituted for the volumetric examination.

#### References

References 7 and 8.

#### C. Pumps

No relief requests.

#### D. Valves

No relief requests.



### III. CLASS 3 COMPONENTS

No relief requests.

### IV. PRESSURE TESTS

#### A. General

No relief requests.

#### B. Class 1 System Pressure Tests

##### 1. Piping Between Two Check Valves or Two Normally Closed Valves

###### Code Requirement

The pressure retaining components shall be subjected to a hydrostatic test at 1.10 times the system operating pressure at least once toward the end of each inspection interval and a leakage test at operating pressure following each outage.

###### Code Relief Request

Relief is requested from the pressure testing requirements for piping between two check valves or two normally closed valves. The portions of systems affected by this limitation in units 1 and 2 are:

- (i) Cold-leg injection from accumulators between check valves 2-SI-109, 130 and 147 and 2-SI-107, 128 and 145, test lines to valves HCV-2850B, D and F, RHR return to valves MOV-2720B and check valve 2-RH-47.

During normal operation these portions of the systems are filled and pressurized to the normal accumulator operating pressure of 620 to 665 psig.

- (ii) Hot-leg injection between check valves 2-SI-88 91 and 94, and check valves 2-SI-238, 239 and 240 and check valves 2-SI-226 and 227. These portions of systems are filled and vented but not pressurized during normal operation.
- (iii) Cold-leg low-head injection line between check valves 2-SI-79, 82 and 85, and check valves 2-SI-241, 242 and 243; and high head and boron injection to check valves 2-SI-235, 236 and 237.



- (iv) RHR take-off line between normally closed (with pressure interlock) valves MOV-2700 and 2701. This portion of the system will be pressurized whenever the system is put into operation during plant shutdown when the reactor coolant system is cooled to 350<sup>0</sup>F and depressurized to 450 psig.

#### Licensee's Basis for Requesting Relief

Requirements for the visual examination of Class 1 systems and components for evidence of leakage during the performance of a system pressure test following each refueling are identified by IWB-5200. Exception is taken to the implementation of these requirements on those portions of Class 1 systems which are contained between two check valves or two normally closed valves, where pressure applied to the reactor coolant system will be retained at the first valve in the line.

#### Evaluation

The licensee has not provided sufficient justification to establish that these pressure testing requirements are impractical. In the case of two normally closed valves in series, it should be possible to open the first valve by bypassing any interlocks and to pressurize the line to the second valve. In the case of two check valves in series, one or more options exist:

- (a) Pressurize in the direction of normal flow (such as with charging pumps) at the same time as the RCS hydrostatic test;
- (b) Improvise a test connection between the two valves;  
or
- (c) Remove the internals of one check valve.

#### Conclusions and Recommendations

Based on the above evaluation, it is concluded that there is not presently enough justification for declaring the Code requirements impractical. Therefore, the following is recommended:

- (a) Relief should not be granted at this time from the system hydrostatic pressure tests.
- (b) If relief is still desired, the licensee should provide additional specific justification why the options discussed in the above evaluation are not practical.

#### References

References 7 and 8.



## C. Class 2 System Pressure Tests

### 1. Systems That Cannot Be Isolated from Class 1 Systems

#### Code Requirement

The pressure retaining components shall be subjected to a hydrostatic test at 1.25 times the system design pressure at 100°F at least once toward the end of each inspection interval.

#### Code Relief Request

Relief is requested from system pressure testing requirements of Class 2 piping that cannot be isolated from Class 1 piping.

Exception is taken to the performance of the hydrostatic test requirements as required by Article IWC-2412(a) on those portions of the Class 2 systems identified below:

- (i) R. C. Pump-seal bypass lines from the flow orifice to valve HCV-2307.
- (ii) Hot-leg injection between check valves 2-SI-88, 91 and 94 and check valves 2-SI-238, 239 and 240 and check valves 2-SI-226 and 227. These portions of systems are filled and vented but not pressurized during normal operation.
- (iii) R. C. Pump-seal injection line from check valve 2-CH-323, 333 and 349 to manually operated valve 2-CH-294, 297 and 300.
- (iv) Excess letdown system from valve HCV-2201 to HCV-2137.
- (v) Letdown line from valve LCV-2460 to orifice outlet valves HCV-2200A, B and C.

#### Proposed Alternative Examination

Visual examination for evidence of leakage conducted on these portions of the systems at the system nominal operating pressure in accordance with the requirements of IWB-5220 for the adjoining Class 1 system.



### Licensee's Basis for Requesting Relief

Subsections IWB and IWC contain differing requirements for the hydrostatic testing of Class 1 and Class 2 systems and components. The implementation of these requirements is impractical when the only means of pressurizing the Class 2 system is through the Class 1 system or when the boundary between the two systems is a check valve arranged for flow from Class 2 to the Class 1 system.

### Evaluation

Each of the listed portions of Class 2 systems has a design pressure of 2485 psig. The operating pressure of the reactor coolant system is 2235 psig. To meet the requirements of IWC-5220 (a), each line would have to be tested at a pressure of  $1.05 \times 2485$  at  $500^{\circ}\text{F}$ , i.e., 2609 psig. To meet the requirements if IWB-5222, the lines would require testing at  $1.02 \times 2235$  at  $500^{\circ}\text{F}$ , i.e., 2280 psig. The six portions involved either cannot be isolated from the Class 1 systems or can only be pressurized through the Class 1 systems. The licensee has agreed to conduct visual examinations for evidence of leakage on these portions of the above systems at the system's nominal operating pressure in accordance with the requirements of IWB-5222 for the adjoining Class 1 system.

The alternative testing program proposed by the licensee is acceptable.

### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the portions of Class 2 systems discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief should be granted from the requirements of Article IWC-2412(a) for Class 2 piping (listed above) that cannot be isolated from Class 1 piping, provided the requirements of IWB-5220 are substituted.

### References

References 7 and 8.



## D. Class 3 System Pressure Tests

### 1. Systems in Continuous Use

#### Code Requirement

- (a) The system test pressure shall be at least 1.10 times the system design pressure.
- (b) In the case of storage tanks, the nominal hydrostatic pressure developed with the tank filled to its design capacity shall be acceptable as the system test pressure.
- (c) Open-ended portions of a system (e.g., suction line from a storage tank) extending to the first shutoff valve may be exempted from the test requirements of IWD-5200.

#### Code Relief Request

Relief is requested from system pressure test requirements for Class 3 systems that are in continuous use.

#### Proposed Alternative Examination

Visual examination of these systems will be performed at normal operating pressures to verify leak-tightness.

#### Licensee's Basis for Requesting Relief

The examination requirements for Class 3 systems and components as given in the enclosed tabulation are in accordance with IWD-2410 (c) which specifies that 100 percent of the components be examined as required by IWA-5240 and IWD-2600 either during normal operation or during system inservice testing. An additional requirement of IWD-2410 (b) is the examination of Class 3 systems and components for evidence of leakage during the performance of a system pressure test in accordance with IWD-5000. It should be noted, that these system pressure tests when required are impractical in those portions of systems, such as component cooling, service water, and boric acid transfer and recirculation, which are in continuous operation during plant operation. The continuous functional operation serves to demonstrate the structural and leak-tight integrity of these systems.

#### Evaluation

Subarticle IWD-5200 which provided the above code requirement in the 1974 Edition, Summer 1975 Addenda, was significantly expanded in subsequent versions of Section XI. In the Summer 1978 Addenda of the 1977 Edition, Paragraph IWD-5210 in that



subarticle required that pressure-retaining components within the boundaries of each Class 3 system undergo various pressure tests, including a system hydrostatic test. For purposes of pressure testing, Class 3 systems are divided into three examination categories, specified in Table IWD-2500-1. These categories involve supporting one of the following functions: reactor shutdown, emergency core cooling, containing heat removal, atmosphere cleanup, reactor residual heat removal, and residual heat removal from spent fuel storage pool. All of the systems cited in the licensee's basis for relief fall into one of the three categories.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

In view of these detailed requirements, it is not appropriate to grant the blanket code relief requested by the licensee. Instead, the requirements of subarticle IWD-5200 in the Summer 1978 Addenda of the 1977 Edition should be invoked. These requirements, while more specific than those the Summer 1975 Addenda, do provide some relief; for example, the hydrostatic test pressure is lower. If the licensee finds specific technical justification for not being able to comply with any part of these requirements, relief requests for individual systems should be submitted.

#### Conclusions and Recommendations

Based on the above evaluation, it is concluded that there is not enough justification for granting blanket relief from Code requirements. Therefore, the following is recommended:

- (a) Relief should not be granted from the system pressure test requirements for Class 3 systems in continuous use.
- (b) The licensee should update to the total requirements of Subarticle IWD-5200 in the 1977 Edition, Summer 1978 Addenda, pursuant to 10 CFR 50.55a(g)(4)(iv).
- (c) If any of the updated Code requirements are determined to be impractical, the licensee should submit specific relief requests for individual systems.

#### References

References 7 and 8.



## V. GENERAL

### A. Ultrasonic Examination Techniques

#### 1. Ultrasonic Examination Recording Levels for Piping Welds

##### Code Requirements

ASME Code Section XI (1974 Edition), Paragraph IWA-2232, Ultrasonic Examination: "Ultrasonic examination shall be conducted in accordance with the provisions of Appendix I. Where Appendix I (I-200) is not applicable, the provisions of Article 5 of Section V shall apply."

ASME Code Section V (1974 Edition), Paragraph T-537, Evaluation of Indications: "All indications which produce a response greater than 20% of the reference level shall be investigated to the extent that the operator can evaluate the shape, identity, and location of all such reflectors in terms of the acceptance-rejection standards of the referencing Code section."

##### Code Relief Request

For piping welds, relief is requested from the requirement that ultrasonic examinations be conducted in accordance with the provisions of Appendix I and Article 5 of Section V as required by Paragraph IWA-2232.

##### Alternative Examination

As an alternative to using Article 5 of Section V, Appendix III of Section XI of the 1974 Edition, Winter 1975 Addenda of the ASME Boiler and Pressure Vessel Code, will be used for ultrasonic examination of piping systems with the following changes:

- (1) Non-geometric indications 50% of DAC or greater shall be recorded.
- (2) An indication 100% of DAC or greater shall be investigated by a Level II or Level III examiner to the extent necessary to determine the size, shape, identity and location of the reflector and evaluated in accordance with the acceptance requirements of Section XI.
- (3) Any non-geometric indication 20% of DAC or greater, discovered during the ultrasonic (UT) examination shall be evaluated by a Level II or Level III examiner to the extent necessary to determine the shape, identity and location of the reflector.



### Licensee's Basis for Requesting Relief

It is recognized that Appendix III of Section XI was issued in the Winter 1975 Addenda and, as such, has not been officially recognized by the NRC by reference in 10 CFR 50. However, Appendix III is the first guideline that has been published in the ASME Code for the UT examination of pipe welds and, as such, its use is essential.

### Evaluation

Recording and evaluating indications at 20% of the reference level is impractical for the following reasons:

- (1) The welded joints in nuclear piping frequently contain Code-allowable wall thickness differences (12% of nominal thickness) as well as some weld drop-through, counterbore taper, crown height, etc. These conditions generate an extremely large number of geometric reflectors which produce UT indications greater than 20% of the reference level.
- (2) Weld metal in stainless steel piping contains reflectors due to the metallurgical structure which produce a large number of UT indications.
- (3) All examination personnel experience radiation exposure during inservice examinations. The Section V requirement to record and evaluate UT indications at the 20% level places an unnecessary burden on the limited number of experienced and qualified examiners available to the Licensee.

The 1977 Edition of Section XI has been referenced in 10 CFR 50.55a and inservice examinations may meet the requirements of this edition in lieu of those from previous editions with the following provisions:

- (a) Commission approval is required to update to the more recent edition (pursuant to 10 CFR 50.55a(g)(4)(iv));
- (b) When applying the 1977 Edition, all of the addenda through Summer 1978 Addenda must be used;
- (c) Any requirement of the more recent edition which is related to the one(s) under consideration must also be met.

Updating to the 1977 Edition (Summer 1978 Addenda), Paragraph IWA-2232 is acceptable with one additional requirement. This paragraph includes the following:



- (1) For examination of welds, reflectors that produce a response greater than 50% of the reference level shall be recorded. (IWA-2232(c)(1))
- (2) For examination of welds, all reflectors which produce a response greater than 100% of the reference level shall be investigated to the extent that the operator can determine the shape, identity, and location of all such reflectors in terms of the acceptance-rejection standards of IWA-3100(b). (IWA-2232(c)(2))
- (3) The size of reflectors shall be measured between points which give amplitudes equal to 100% of the reference level. (IWA-2232(c)(3))

In addition, indications of 20% of reference level or greater which are interpreted to be a crack must be identified and evaluated to the rules of Section XI.

The above is consistent with the recommended position on relief requests by other licensees and is essentially the same as the licensee's proposal.

#### Recommendations

Approval should be granted to update from the requirements of Paragraph IWA-2232 of the 1974 Edition (Summer 1975 Addenda) to the requirements of the same paragraph in the 1977 Edition (Summer 1978 Addenda) with the additional requirement that indications 20% of reference level or greater that are interpreted to be a crack must be identified and evaluated to the rules of Section XI.

#### References

References 7 and 8.



## 2. Ultrasonic Calibration Standard

### Code Requirement

I-3121 Block Selection: Material from which the block is fabricated shall be from one of the following: (1) the component nozzle dropout; (2) the component prolongation; or (3) when it is not possible to fabricate the block from material taken from component, it may be fabricated from a material of a specification included in applicable examination volumes of the component. The acoustic velocity and attenuation of such a block shall be demonstrated to fall within the range of straight beam longitudinal wave velocity and attenuation found in the unclad component.

### Code Relief Request

Request relief from the requirements of I-3121.

### Proposed Alternative Examination

As an alternative for I-3121 of Section XI: "Calibration blocks required for the examination of welds in ferritic vessels 2-1/2 inches thick and over will be fabricated from material of the same specification, product form, and heat treatment as one of the materials being joined as allowed by Article T-434.1 in the Winter, 1976 Addenda of Section V of the ASME Boiler and Pressure Vessel Code."

### Licensee's Basis for Requesting Relief

The reason this alternative is requested is that the Code requires that calibration blocks for the examination of welds in ferritic vessels 2-1/2 inches thick and greater be fabricated from material taken from the component nozzle dropout or material from the component prolongation. As a third alternative, when it is not possible to fabricate the block from material taken from the component, the block may be fabricated from a material of a specification included in the applicable examination volumes of the component. It is required that the acoustic velocity and attenuation of such a block be demonstrated to fall within the range of straight beam longitudinal wave velocity and attenuation found in the unclad components.

For the components in Surry Unit 1, particularly the pressurizer and steam generators, it will be impossible to meet the requirements of alternatives 1 or 2. Materials of the specification are readily available, but because all the components involved are clad on the inner surfaces, it would be impossible to obtain a comparison of sound beam velocities and attenuations in the unclad component.



### Evaluation

Since there is no material available from a drop out or component prolongation, the licensee has committed to fabricate the calibration block from a material of the same specification, product form and heat treatment as the materials being joined. This is in accordance with T-434.1.1 of the Winter 1976 Addenda of Section V. The requirement of I-3121 that requires the acoustic velocity and attenuation of the block to be demonstrated to fall within the ranges found in the unclad components is impractical since these components are clad. The alternate method of calibration block fabrication proposed by the licensee is acceptable.

### Conclusions and Recommendations

Based on the above evaluation, it is concluded that for the calibration blocks discussed above, the code requirements are impractical. It is further concluded that the alternative examination discussed above will provide necessary added assurance of structural reliability. Therefore, the following is recommended:

Relief should be granted from the code-required method of calibration block fabrication provided the method proposed by the licensee is adopted.

### References

References 7 and 8.

#### B. Exempted Components

None

#### C. Other

None



## REFERENCES

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3. R. W. Reid (NRC) to W. L. Proffitt (VEPCO), Surry Nuclear Power Station, Units 1 and 2, November 17, 1976.
4. C. M. Stallings (VEPCO) to H. R. Denton (NRC), February 14, 1979.
5. C. M. Stallings (VEPCO) to H. R. Denton (NRC), Requested Relief from Inservice Inspection and Testing Requirements, Surry Power Station, Unit No. 1, May 17, 1979.
6. C. M. Stallings (VEPCO) to H. R. Denton (NRC), Requested Relief from Inservice Inspection and Testing Requirements, Surry Power Station, Unit No. 2, September 28, 1979.
7. R. B. Sylvia (VEPCO) to H. R. Denton (NRC), Requested Relief from Inservice Inspection and Testing Requirements, Surry Power Station, Unit No. 1, December 15, 1980.
8. R. B. Sylvia (VEPCO) to H. R. Denton (NRC), Requested Relief from Inservice Inspection and Testing Requirements, Surry Power Station, Unit No. 2, December 15, 1980.
9. S. A. Varga (NRC) to R. H. Leasburg (VEPCO), February 18, 1982.
10. R. H. Leasburg (VEPCO) to H. R. Denton (NRC), Serial No. 111, March 25, 1982.
11. S. A. Varga (NRC) to R. H. Leasburg (VEPCO), April 21, 1982.
12. R. H. Leasburg (VEPCO) to H. R. Denton (NRC), Serial No. 263, May 25, 1982.
13. Final Safety Analysis Report, Surry Power Station Units 1 and 2, December 12, 1969.