

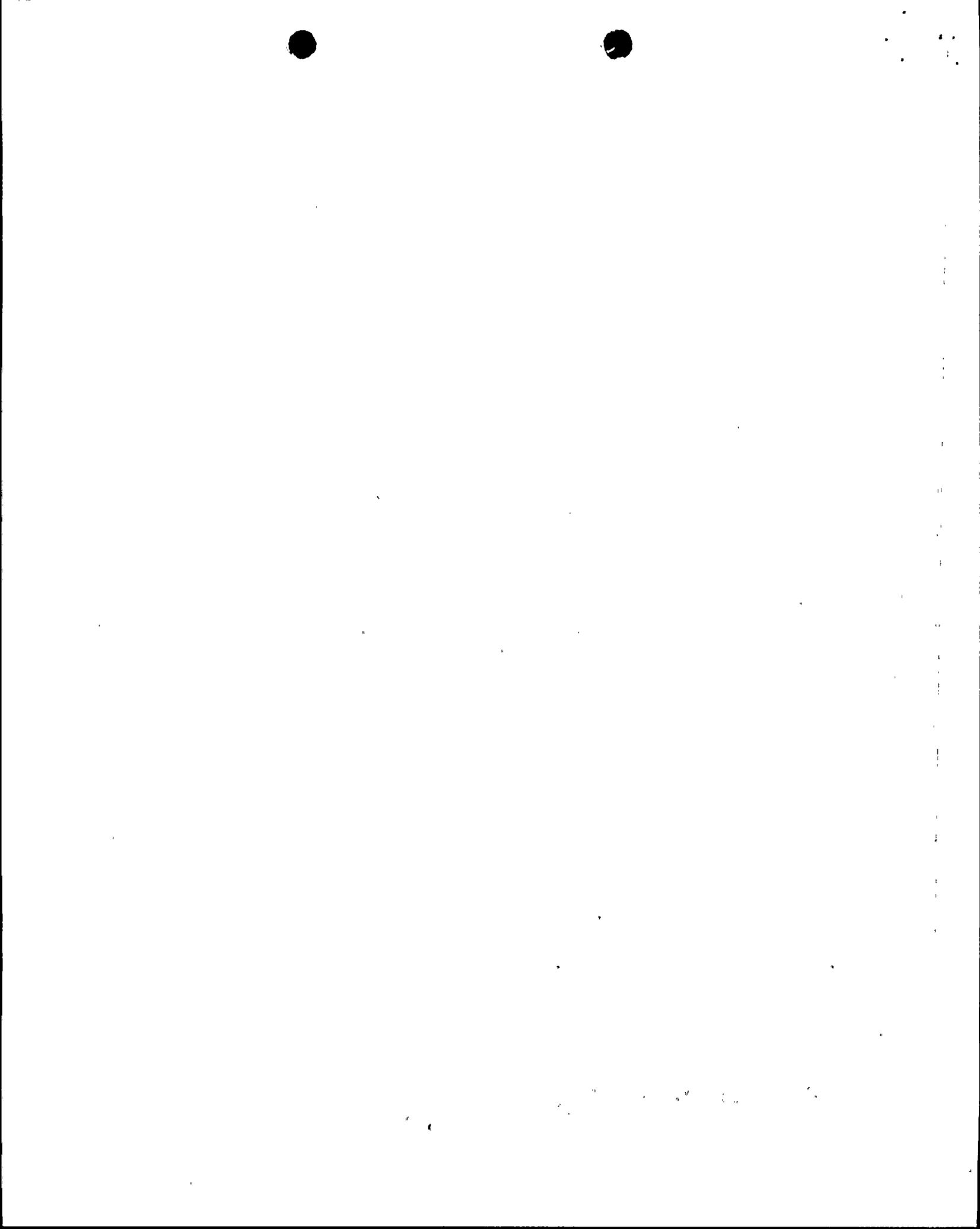
ADDENDUM A
FIRST INTERVAL INSERVICE INSPECTION PROGRAM
TECHNICAL EVALUATION REPORT
TURKEY POINT UNITS 3 AND 4

Submitted to
U. S. Nuclear Regulatory Commission
Contract No. NRC-03-83-096

Submitted by
Science Applications International Corporation
Idaho Falls, Idaho 83402

September 1985

8601090556 851226
PDR ADDCK 05000250
G PDR



CONTENTS

INTRODUCTION 1

Relief Request 10, Reactor Vessel Lower Head Ring
to Disc Weld and Lower Shell Course to Lower Head
Ring, Category B-B, Item B1.2 2

Relief Requests 10, 14, and 15, Reactor Vessel-to-
Flange and Head-to-Flange Circumferential Welds,
Category B-C, Item B1.3 5

Relief Requests 10 and 15, Reactor Vessel Primary
Nozzle-to-Vessel Welds and Nozzle Inside Radiused
Sections, Category B-D, Item B1.4 7

Relief Request 13, Reactor Coolant and Auxiliary
Cooling System Welds, Category B-J, Items B4.5 and B4.6 9

Relief Request 5A, Integrally Welded Supports for
Reactor Coolant Pumps, Category B-K-1, Item B5.4 11

REFERENCES 13

ADDENDUM A TO FIRST INTERVAL INSERVICE INSPECTION PROGRAM
TECHNICAL EVALUATION REPORT

Turkey Point, Units 3 and 4

INTRODUCTION

Science Applications International Corporation (SAIC) submitted a Technical Evaluation Report (TER) on the Inservice Inspection (ISI) program for Units 3 and 4 of Turkey Point to the U.S. Nuclear Regulatory Commission (NRC) on September 10, 1982.¹ On November 18, 1982, Florida Power and Light submitted two new requests for relief,² which the NRC granted on February 14, 1983.³ On April 26, 1983, the NRC issued its formal Safety Evaluation Report,⁴ which included as an attachment SAIC's TER.¹ For Turkey Point Unit 3, the ISI program and relief requests evaluated in these reports covered the last 40 months of the first inspection interval, from August 14, 1979, to December 14, 1982. For Unit 4, they covered the last 80 months of the interval, from January 7, 1977, to September 7, 1983.

On March 26, 1984, the licensee, Florida Power and Light Co. (FPL) submitted its ISI program and relief requests for the second inspection interval.⁵ In response to an informal request for additional information from the NRC, dated May 4, 1984,⁶ the licensee submitted revised relief requests. A second request (this time formal) for additional information from the NRC dated August 17, 1984,⁷ resulted in Florida Power and Light submitting a second revised package of relief requests on November 20, 1984.⁸ This time, pursuant to the terms of 10 CFR 50.55a (g)(5)(iv), Florida Power and Light submitted five requests not previously submitted for relief from the 1974 Edition of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the Code) with Addenda through the Summer of 1975, which was applicable to the first inspection interval. These new relief requests are evaluated in this addendum to the originally issued Technical Evaluation Report.

Relief Request 10, Reactor Vessel Lower Head Ring to Disc Weld and Lower Shell Course to Lower Head Ring, Category B-B, Item B1.2 (Unit 3 only)

Code Requirement

The longitudinal and circumferential welds in the vessel shell and meridional and circumferential welds in vessel heads shall be volumetrically examined. This examination includes weld metal and base metal one plate thickness beyond the edge of weld. The 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. For welds on the reactor vessel, examinations may be performed at or near the end of the inspection interval.

Code Relief Request

Relief is requested from the Code volume not achieved during mechanized ultrasonic examination of welds 3-WR-9 and 3-WR-31.

Proposed Alternative Examination

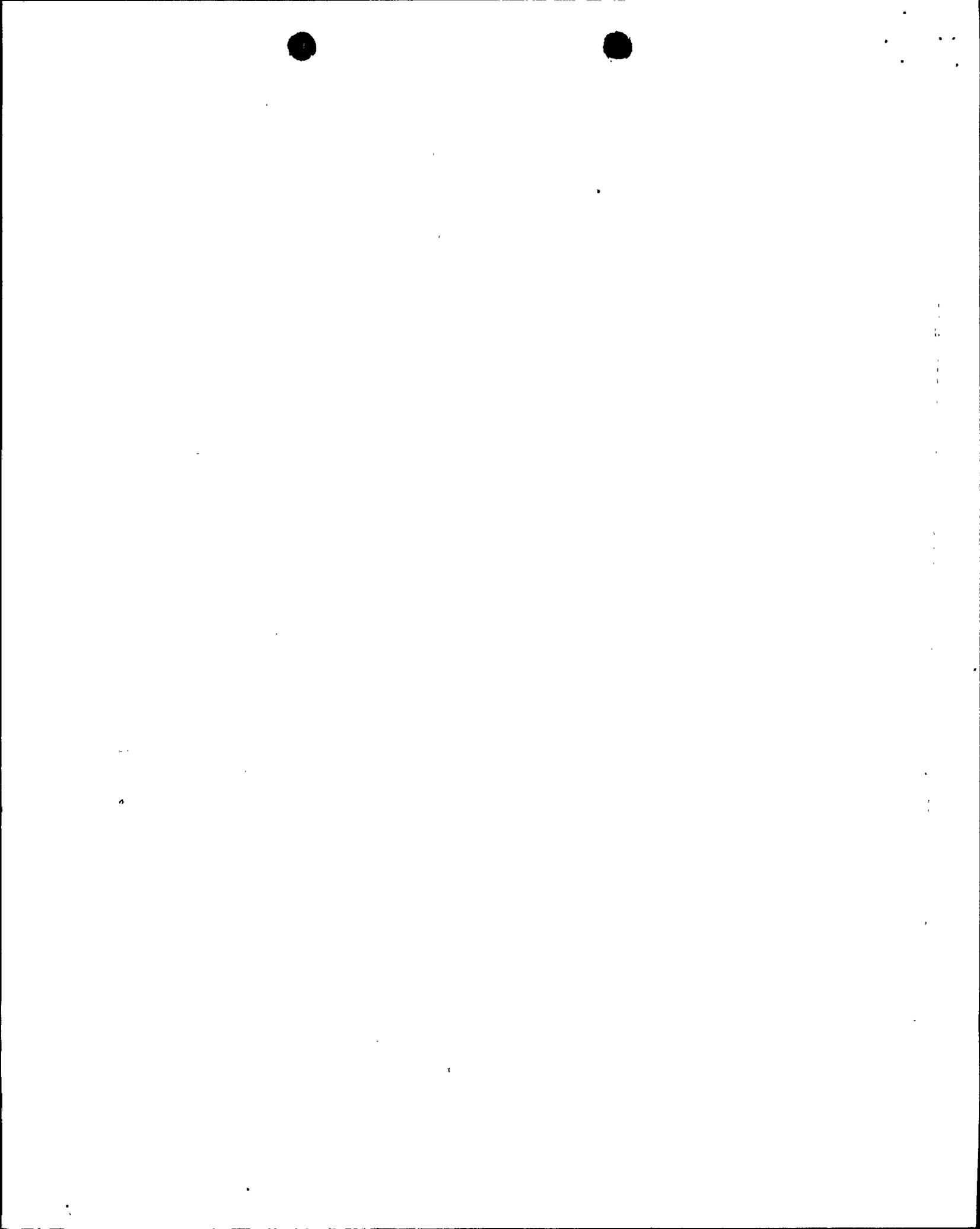
None other than the required periodic system leakage tests per category B-P, Table IWB-2500 and inservice hydrostatic test per category B-P, Table IWB-2500.

Licensee's Basis for Requesting Relief

3-WR-9. Limitations encountered during the examination of the weld were attributable to physical limitations imposed by the incore instrumentation tubes. This condition was most prominent when performing examinations to detect reflectors oriented parallel to the weld with the search unit positioned on the disc side. Due to the height restrictions and number of tubes in this area, attempts to perform examinations from the disc side were abandoned.

Examinations performed for the purpose of detecting reflectors oriented parallel to the examination surface were accomplished utilizing a 0 degree search unit applied to the weld and base material for a distance of 1/2 t. A portion of the weld and 1/2 t of the base material on the disc side was not examined for the reasons just detailed.

Examinations performed for the purpose of detecting reflectors oriented transverse to the weld were restricted in a portion of the base material on the disc side of the weld due to the incore instrumentation tube. Tube interference was encountered in four locations around the weld. These limitations were only encountered during scans 8 and 9 of examination no. 2 and scans 7, 8, and 9 of examination no. 3, and were limited only to a small portion of the base material on the disc side.



3-WR-31. Examination of the welds was limited in the areas containing the core barrel antirotation lugs at azimuth locations of 0, 90, 180, and 270 degrees. These limitations posed physical device limitations when performing examinations from the shell side for the purpose of detecting reflectors oriented parallel to the weld. Limitations were encountered on the lower shell course side when performing 45 and 60 degree examinations. Since these limitations were affected by the search unit module offsets, examination coverage varies. The percentages of weld volume not examined are

TOTAL WELD COVERAGE LIMITATIONS
EXAMINATION NO. 5

<u>Search Unit Angle</u>	<u>Percentage of Weld Length</u>	<u>Inches of Weld Length</u>
45	29.4	143.84
60	29.4	143.84

Total Weld Length: 488.51 in.

From the lower shell ring side, the examination area receives coverage with at least one search unit angle and in some cases, two search angles.

Evaluation

The 1974 Edition with Addenda through Summer 1975 (I-2310) requires that the nominal beam angles for evaluating reflectors and obtaining characterization data shall be 0°, 45°, and 60° with respect to perpendicular to the examination surface. Thus, even though the licensee was able to examine most of the welds with at least one angle, they have not been able to comply with the version of the Code in effect for the first interval. The 1980 Edition with Addenda through Winter 1981 Code, which is in effect for the second inspection interval, requires examination of the accessible length of the welds using only one beam angle. A beam angle of 45 degrees in the material shall be generally used. Other angles may be used for evaluating an indication or where wall thickness or geometric configuration impedes effective use of the 45 degree angle beam. The licensee has complied with the later edition of the Code and has also performed periodical system leakage tests and the inservice hydrostatic test per Code, which would provide initial evidence of seepage from a through-wall perforation. Thus, relief is appropriate.

Conclusions and Recommendations

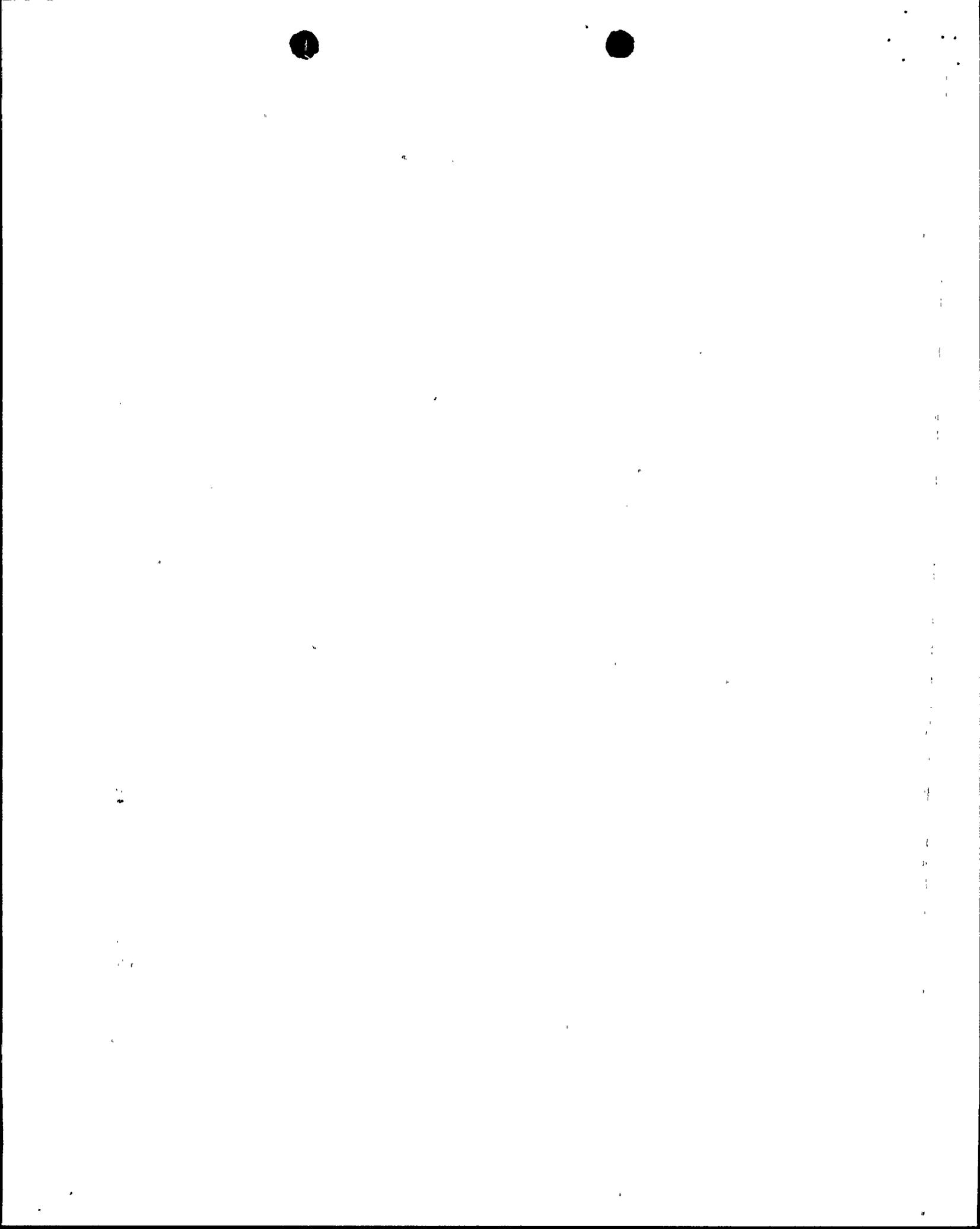
Based on the above evaluation, it is concluded that for the welds discussed above, the Code requirements are impractical. It is further concluded that the alternative examinations discussed above provide the necessary added assurance of structural reliability. Therefore, the following are recommended:

(a) Relief should be granted from the Code volume not achieved during mechanized ultrasonic examination of welds 3-WR-9 and 3-WR-31 for this interval.

(b) The licensee should continue to perform the best-effort examination of the accessible portions of the welds, which would result in the examination of most of the welds with at least one beam, during the second interval.

References

Reference 8.



Relief Requests 10, 14, and 15, Reactor Vessel-to-Flange and Head-to-Flange Circumferential Welds, Category B-C, Item B1.3

Code Requirement

Volumetric examination shall cumulatively cover 100% of each vessel-to-flange and head-to-flange circumferential weld during each inspection interval.

Code Relief Request

Relief is requested from the Code volume not achieved during ultrasonic examination of Welds 3-WR-18, 4-WR-18, 3-WH-12, and 4-WH-12.

Proposed Alternative Examination

None other than required periodic system leakage tests per category B-P, Table IWB-2500 and inservice hydrostatic test per category B-P, Table IWB-2500.

Licensee's Basis for Requesting Relief

3-WR-18 and 4-WR-18. Some areas received no coverage during the examination performed from the upper shell side. Some areas did not receive 0 degree, 45 degree transverse, or 60 degree transverse weld coverage due to the geometric configuration of the flange radius located just above the weld. The percentages of coverage limitation are

<u>Search Unit Angle</u>	<u>Limits % of weld</u>
0	60
45	25
60	20
45t	60
60t	60

Total weld length = 488.51 inches

Examinations performed from the shell side of the weld essentially provided 100% coverage of the weld and 1/2 t of base material on the shell side.

The extent of examination volume achieved ultrasonically and the alternative system pressure tests provide assurance of an acceptable level of quality and safety.

3-WH-12 and 4-WH-12. Configuration and permanent attachments prohibit 100% ultrasonic examination coverage of the required Code examination volume. A welded arrow located above stud hole No. 1 limits 7 inches of circumferential scanning of the closure head weld. No examination was achieved from the flange surface due to the configuration. Each of three welded lugs located 120 degrees apart, between stud holes 10/11, 29/30, and 48/49 limits 3 inches of circumferential scanning of the closure head. Therefore, a combined length of 16 inches of weld cannot be examined. The extent of examination volume achieved ultrasonically and the alternative system pressure tests provide assurance of an acceptable level of quality and safety.

Evaluation

The licensee has examined most of the weld and heat affected area. This appears to be the best examination possible using current ultrasonic methods. The licensee has not been able to examine the entire 1/2 t area of the base material on the shell side for welds 3-WR-18 and 4-WR-18. For welds 3-WH-12 and 4-WH-12, accessibility is physically limited by a welded arrow, welded lugs, and weld configuration. The total area that could not be examined is small, however. The extent of the ultrasonic examination plus the required system pressure tests (which would provide initial evidence of seepage from a through-wall perforation) should adequately indicate the welds' integrity.

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 examinations discussed above provide the necessary added assurance of structural reliability. Therefore, the following are recommended:

- (a) Relief should be granted from the Code volume not achieved during ultrasonic examination of welds 3-WR-18, 4-WR-18, 3-WH-12, and 4-WH-12 for this interval.
- (b) The licensee should continue to perform the best-effort examination of the welds.

References

Reference 8.

Relief Requests 10 and 15, Reactor Vessel Primary Nozzle-to-Vessel Welds
and Nozzle Inside Radiused Sections, Category B-D, Item B1.4

Code Requirement

Each nozzle-to-vessel weld and adjacent areas shall be volumetrically examined over 100% of the volume shown in Figure IWB-2500D. All nozzles shall be examined during each inspection interval.

Code Relief Request

Relief is requested from the Code volume not achieved during mechanized ultrasonic examination of welds 3-D0-A, -B, and -C and 4-D0-A, -B, and -C.

Proposed Alternative Examination

None other than required periodic system leakage tests per category B-P, Table IWB-2500 and inservice hydrostatic test per category B-P, Table IWB-2500.

Licensee's Basis for Requesting Relief

When performing computerized ultrasonic examinations of the nozzle to shell welds from the vessel wall, several areas were described as having limited examination scans. These limitations were restricted to the last several scans of the nozzle to shell examination and were due to the physical limitations imposed by the adjacent nozzles. The limitations all occurred in the vicinity of the 90 or 180 degree nozzle azimuth relative to nozzle orientation. The percentages of weld volume not examined are

<u>Examination Area</u>	<u>Examination Type</u>	<u>Limits % of Weld</u>
Outlet nozzle welds	Parallel scans	12
Outlet nozzle welds	Transverse scans	42

The extent of examination volume achieved ultrasonically and the alternative system pressure tests provide assurance of an acceptable level of quality and safety.

Evaluation

The physical limitations imposed by the adjacent nozzles precluded completing the full volume of the Code-required examination. The licensee has, however, completed a best-effort ultrasonic examination on these nozzles. The ultrasonic examination plus the required system pressure

tests (which would provide initial evidence of seepage from a through-wall perforation) should provide adequate information on the structural integrity of the nozzles.

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 examinations discussed above will provide the necessary added assurance of structural reliability. Therefore, the following are recommended:

- (a) Relief should be granted from the Code volume not achieved during ultrasonic examination of welds 3-DO-A, -B, and -C and 4-DO-A, -B, and -C for this interval.
- (b) The licensee should continue to perform the best-effort examination of the welds.

References

Reference 8.

Relief Request 13, Reactor Coolant and Auxiliary Cooling System Welds,
Category B-J, Items B4.5 and B4.6

Code Requirement

During each inspection interval, 25% of the circumferential and longitudinal pipe welds and 25% of the pipe branch connection welds exceeding 6 inches in diameter shall be volumetrically examined. The areas shall include longitudinal and circumferential welds and the base metal for one wall thickness beyond the edge of the weld. Longitudinal welds shall be examined for at least 1 foot from the intersection with the edge of the circumferential weld selected for examination. For pipe branch connections, the areas shall include the weld metal, the base metal for one pipe wall thickness beyond the edge of the weld on the main pipe run, and at least 2 inches of the base metal along the branch run.

Code Relief Request

Relief is requested from Code volume not achieved during manual ultrasonic examinations. The affected areas are 6 inches of circumferential weld 12"-RC-3, 5 inches of circumferential weld 14"-AC-4, and a 4 x 3 inch area of branch connection weld 12"/10"-RC.

Proposed Alternative Examination

None other than required periodic system leakage tests per category B-P, Table IWB-2500 and inservice hydrostatic test per category B-P, Table IWB-2500.

Licensee's Basis for Requesting Relief

Configuration, permanent attachments, and/or structural interferences prohibit 100% ultrasonic examination coverage of the Code-required examination volume. For weld 12"-RC-3, examination is limited by a welded plate at 180 degrees. For weld 14"-AC-4, examination is limited by the proximity of adjacent pipe run at 270 degrees. For weld 12"/10"-RC, examination is limited by the location of a thermocouple at 100 degrees.

The extent of examination volume achieved ultrasonically and the alternative system pressure tests provide assurance of an acceptable level of quality and safety.



11

Evaluation

Physical impediments preclude the 100% examination of portions of these three welds but the areas are limited. The extent of examination volume achieved plus the required system pressure tests (which would provide initial evidence of seepage from a through-wall perforation) should adequately ensure integrity.

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 examinations discussed above provide the necessary added assurance of structural reliability. Therefore, the following are recommended:

- (a) Relief should be granted from the Code volume not achieved during ultrasonic examination of welds 12"-RC-3 (6"), 14"-AC-4 (5"), and 12"/10"-RC (a 4 x 3" area) for this interval.
- (b) The licensee should continue to perform the best-effort examination of the welds.

References

Reference 8.

Relief Request 5A, Integrally Welded Supports for Reactor Coolant Pumps,
Category B-K-1, Item B5.4

Code Requirement

The volumetric examinations performed during each inspection interval shall cover 25% of the integrally welded external support attachments. The area 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 alternate surface examination of inaccessible weld and adjacent areas of the pump support members not achieved during the inspection interval. (Relief from volumetric examination was granted on April 26, 1983.) The affected welds are

3-RCP-A-L1, 2 & 3

4-RCP-A-L1, 2 & 3

3-RCP-B-L1, 2 & 3

4-RCP-B-L1, 2 & 3

3-RCP-C-L1, 2 & 3

4-RCP-C-L1, 2 & 3

Proposed Alternative Examination

Perform surface examinations per the ISI schedule. Upon disassembly of a pump from the pad, conduct a surface examination on the inaccessible area.

Licensee's Basis for Requesting Relief

Configuration of the integrally welded supports as welded to the pump body and structural interfaces prohibit 100% surface examination coverage due to inaccessibility of portions of the weld. The alternate examinations and tests provide assurance of an acceptable level of quality and safety.

Evaluation

A surface examination was granted by the NRC in its Safety Evaluation Report as a substitute for the required volumetric examination. After attempting the examination, however, the licensee is unable to perform the required 100% surface examination without removing the pump from the pad. The proposed alternative of performing the surface examination on the inaccessible area when the pump is disassembled from the pad should adequately indicate weld integrity, as long as the examination performed shows no weld deterioration. But if indications of weld flaw are found when the accessible areas are examined, then the pump should be removed from the pad and a full surface examination performed.

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 examinations discussed above provide the necessary added assurance of structural reliability. Therefore, the following are recommended:

- (a) Relief should be granted from the Code volume not achieved during surface examination of welds 3 RCP-A-L1, 2 & 3; 4 RCP-A-L1, 2 & 3; 3-RCP-B-L1, 2 & 3; 4-RCP-B-L1, 2 & 3; 3 RCP-C-L1, 2 & 3; and 4-RCP-C-L1, 2 & 3.
- (b) If flaw indications were found during examination of the accessible surface area, the pump should be removed from its pad and an 100% surface examination performed.
- (c) If no indications were found, the licensee should conduct a surface examination on the inaccessible areas when the pump is disassembled from the pad, as proposed.

References

Reference 8.

REFERENCES

1. Science Applications, Inc. Turkey Point Nuclear Generating Stations, Units 3 and 4, Inservice Inspection, Technical Evaluation Report, SAI Report No. 186-028-18, September 10, 1982.
2. R. E. Uhrig (FPL) to D. G. Eisenhut (NRC), L-82-514, Inservice Inspection Relief Request, RR 6/7 on Reactor Coolant Pumps, November 18, 1982.
3. S. A. Varga (NRC) to R. E. Uhrig (FPL), February 14, 1983. (Grants relief to RR 6/7).
4. S. A. Varga (NRC) to R. E. Uhrig (FPL), April 26, 1983. (Transmits SER).
5. Florida Power and Light, Inservice Inspection Second Ten-Year Summary Program for Turkey Point Plants Unit 3/4, Document No. CIS-84-001 (Rev. 0), March 26, 1984.
6. Informal request for additional information from NRC to FPL, May 4, 1984.
7. Request for additional information of August 17, 1984.
8. J. W. Williams, Jr. (FPL) to S. A. Varga (NRC), L-84-341, Inservice Inspection Second Ten Year Summary Program, November 20, 1984. (Response to RAI).

