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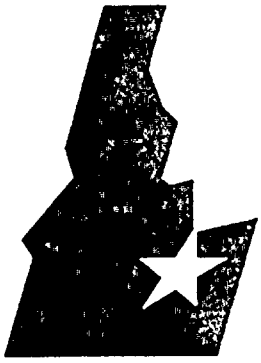

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TECHNICAL EVALUATION REPORT

TECHNICAL EVALUATION REPORT ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN: FLORIDA POWER AND LIGHT COMPANY, ST. LUCIE PLANT, UNIT 1, DOCKET NUMBER 50-335

B. W. Brown
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EG&G Idaho

Work performed under
DOE Contract
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Prepared for the
U.S. NUCLEAR REGULATORY COMMISSION

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ABSTRACT

This report presents the results of the evaluation of the St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection (ISI) Program, Revision 0, submitted September 2, 1987, and Plan, Revision 0, submitted August 29, 1988. Included in these documents are the requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements which the Licensee has determined to be impractical for the second 10-year interval. The St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program and Plan are evaluated in Section 2 of this report. The ISI Program and Plan are evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during the Nuclear Regulatory Commission's (NRC) previous reviews. The requests for relief from the ASME Code requirements which the Licensee has determined to be impractical for the second 10-year inspection interval are evaluated in Section 3 of this report.

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FIN No. D6022, Project 5
Operating Reactor Licensing Issues Program,
Review of ISI for ASME Code Class 1, 2, and 3 Components

SUMMARY

The Licensee, Florida Power and Light Company, prepared the St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection (ISI) Program, Revision 0, to meet the requirements of the 1983 Edition, Summer 1983 Addenda (83S83) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI except that the extent of examination for Code Class 2 piping welds has been determined by ASME Code Case N-408. The second 10-year interval began February 11, 1988, and ends February 11, 1998.

The information in the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, submitted September 2, 1987, was reviewed. Included in the review were requests for relief from the ASME Code Section XI requirements which the Licensee had determined to be impractical. As a result of this review, a Request for Additional Information (RAI) was prepared describing the information and/or clarification required from the Licensee in order to complete the review. The Licensee responded, in a letter dated August 29, 1988, by providing a copy (2 volume set) of the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Plan, Revision 0, dated August 24, 1988, and by addressing the specific information and/or clarifications requested in the RAI.

Based on the review of the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, and Plan, Revision 0, the Licensee's response to the NRC's RAI, and the recommendations for granting relief from the ISI examination requirements that have been determined to be impractical, it is concluded that the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, and Plan, Revision 0, are considered acceptable and in compliance with 10 CFR 50.55a(g)(4).

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TECHNICAL EVALUATION REPORT ON THE
SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN
FLORIDA POWER AND LIGHT COMPANY,
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1. INTRODUCTION

Throughout the service life of a water-cooled nuclear power facility, 10 CFR 50.55a(g)(4) (Reference 1) requires that components (including supports) which are classified as American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, Class 2, and Class 3 meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," (Reference 2) to the extent practical within the limitations of design, geometry, and materials of construction of the components. This section of the regulations also requires that inservice examinations of components and system pressure tests conducted during successive 120-month inspection intervals shall comply with the requirements in the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein. The components (including supports) may meet requirements set forth in subsequent editions and addenda of this Code which are incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein. The Licensee, Florida Power and Light Company, has prepared the St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection (ISI) Program, Revision 0, and Plan, Revision 0, to meet the requirements of the 1983 Edition, Summer 1983 Addenda (83S83) of the ASME Code Section XI except that the extent of examination for Class 2 piping welds has been determined by ASME Code Case N-408 (Reference 3). The second 10-year interval began February 11, 1988 and ends February 11, 1998.

As required by 10 CFR 50.55a(g)(5), if the licensee determines that certain Code examination requirements are impractical and requests relief from them,

the licensee shall submit information and justifications to the Nuclear Regulatory Commission (NRC) to support that determination.

Pursuant to 10 CFR 50.55a(g)(6), the NRC will evaluate the licensee's determinations under 10 CFR 50.55a(g)(5) that Code requirements are impractical. The NRC may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life or property or the common defense and security, and are 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.

The information in the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0 (Reference 4), submitted September 2, 1987, was reviewed, including the requests for relief from the ASME Code Section XI requirements which the Licensee has determined to be impractical. The review of the ISI Program was performed using the Standard Review Plans of NUREG-0800 (Reference 5), Section 5.2.4, "Reactor Coolant Boundary Inservice Inspections and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components."

In a letter dated May 20, 1988 (Reference 6), the NRC requested additional information that was required in order to complete the review of the ISI Program. In a letter dated August 29, 1988 (Reference 7), the Licensee responded by addressing the specific information and/or clarifications requested by the NRC and by providing a copy of the St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection Plan (2 volume set), Revision 0, dated August 24, 1988 (Reference 8).

The St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program and Plan are evaluated in Section 2 of this report. The ISI Program and Plan are evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous reviews by the NRC.

The requests for relief are evaluated in Section 3 of this report. Unless otherwise stated, references to the Code refer to the ASME Code, Section XI, 1983 Edition including Addenda through Summer 1983. Specific inservice test (IST) programs for pumps and valves are being evaluated in other reports.

2. EVALUATION OF INSERVICE INSPECTION PROGRAM PLAN

This evaluation consisted of a review of the applicable program documents to determine whether or not they are in compliance with the Code requirements and any license conditions pertinent to ISI activities. This section describes the submittals reviewed and the results of the review.

2.1 Documents Evaluated

Review has been completed on the following information from the Licensee:

(a) St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, submitted September 2, 1987;

(b) Letter, dated June 20, 1988, providing a schedule for the Licensee's response to the NRC's RAI dated May 20, 1988;

(c) Letter, dated August 29, 1988, containing the Licensee's response to the NRC's May 20, 1988, RAI; and

(d) St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Plan, Revision 0 (2 volume set), dated August 24, 1988.

2.2 Compliance with Code Requirements

2.2.1 Compliance with Applicable Code Editions

The Inservice Inspection Program Plan shall be based on the Code editions defined in 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(b). Based on the starting date of February 11, 1988, for the second 10-year interval, the Code applicable to the second 10-year interval ISI program is the 1983 Edition with Addenda through Summer 1983 (83S83). As stated in Section 1 of this report, the Licensee has written the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, and Plan, Revision 0, to meet the requirements of 83S83 of the Code except that the

extent of examination for Code Class 2 piping welds has been determined by ASME Code Case N-408, "Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1." Code Case N-408 is referenced in NRC Regulatory Guide 1.147, Revision 5 (Reference 9), as an NRC approved Code case and, therefore, may be used.

2.2.2 Acceptability of the Examination Sample

Inservice volumetric, surface, and visual examinations shall be performed on ASME Code Class 1, 2, and 3 components and their supports using sampling schedules described in Section XI of the ASME Code and 10 CFR 50.55a(b). Although it is noted that several Class 2 systems (CHR, CS, SD-CLG, LPSI) have been completely exempted from ISI examinations based on the pipe wall thickness exemptions contained in Code Case N-408, the sample size and weld selection have been implemented in accordance with the Code and appear to be correct.

2.2.3 Exclusion Criteria

The criteria used to exclude components from examination shall be consistent with Paragraphs IWB-1220, IWC-1220, IWC-1230, IWD-1220, and 10 CFR 50.55a(b). The exclusion criteria have been applied by the Licensee in accordance with the Code as discussed in the ISI Program and appear to be correct.

2.2.4 Augmented Examination Commitments

In addition to the requirements as specified in Section XI of the ASME Code, the Licensee has committed to meet the inspection requirements contained in the following documents:

(a) Code Case N-408, "Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1" (Reference 3);

(b) Branch Technical Position, ASB 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment" (Reference 10);

(c) Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity" (Reference 11);

(d) Regulatory Guide 1.65, "Materials and Inspection for Reactor Vessel Closure Studs" (Reference 12);

(e) Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes" (Reference 13); and

(f) Regulatory Guide 1.150, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations" (Reference 14).

2.3 Conclusions

Based on the review of the documents listed above, it is concluded that the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, and Plan, Revision 0, are acceptable and in compliance with 10 CFR 50.55a(g)(4).

3. EVALUATION OF RELIEF REQUESTS

The requests for relief from the ASME Code requirements which the Licensee has determined to be impractical for the second 10-year inspection interval are evaluated in the following sections.

3.1 Class 1 Components

3.1.1 Reactor Pressure Vessel

3.1.1.1 Request for Relief 1, Revision 0, Examination Category B-A, Items B1.11, B1.12, B1.21, B1.22, and B1.30, Reactor Pressure Vessel Welds

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-A, Items B1.11 and B1.12 require a 100% volumetric examination of one circumferential and one longitudinal beltline region weld as defined by Figures IWB-2500-1 and IWB-2500-2. These examinations may be performed at or near the end of the inspection interval.

Items B1.21 and B1.22 require a volumetric examination of the accessible length (essentially 100% of weld length) of one circumferential and one meridional head weld as defined by Figure IWB-2500-3. These examinations may be performed at or near the end of the inspection interval for bottom head welds only.

Item B1.30 requires a 100% volumetric examination of the shell-to-flange weld as defined by Figure IWB-2500-4. This examination may be deferred until the end of the interval provided that at least 50% of the shell-to-flange weld is examined by the end of the first inspection period and the remainder examined by the end of the third period.

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume on the following reactor pressure vessel welds:

Upper Shell-to-Flange Weld	7-203
Lower Head Dollar Plate Weld	204-02
Lower Head Meridional Weld	204-03A
Middle Shell-to-Lower Shell Weld	9-203
Lower Shell Vertical Weld	3-203C

Licensee's Proposed Alternative Examination: None. The Code-required ultrasonic examination will be performed to the maximum extent practical. Supplemental beam angles will be used to maximize the percentage of Code-required volume examined.

Licensee's Basis for Requesting Relief:

RPV Lower Head Weld No. 204-02: Examination coverage of the lower head dollar plate weld is limited due to near surface interface noise. Those volumes that are shadowed by the interface noise will be completely examined with the 45° full vee path scans.

RPV Lower Head Meridional Weld No. 204-03A: Access for examination is limited due to interference from the core support lugs and flow skirt.

Middle Shell-to-Lower Shell Weld No. 9-203: Examination is limited due to interference from surveillance specimens.

Upper Shell-to-Flange Weld No. 7-203: Examination of this weld is performed from the shell side. The 0° and 60° examinations are limited due to near surface interface noise. However, this volume will be effectively examined using the 45° full vee path beam. Manual examinations utilizing beams directed nearly perpendicular to the weld plane from the flange seal surface will compensate for the straight beam and angle beam

examination limitations on the flange side of the weld. Due to the flange configuration, no transverse examination scans will be performed from the flange side of the weld.

RPV Longitudinal Shell Weld No. 3-203C: Examination is limited slightly due to anti-rotation lug and flow skirt interference.

Evaluation: The ASME Code-required examination volume coverage is limited due to component configuration and interference by vessel attachments. The limitations are identified in figures and tables provided by the Licensee with the request for relief. The limitations are being minimized to the maximum extent practical. In all cases where limitations are experienced, the examinations will be supplemented by additional scans using alternate sound beam paths to enhance the overall coverage.

Conclusions: Based on the above evaluation, it is concluded that the volumetric examination is impractical to perform to the extent required by the Code and that the limited Section XI volumetric examination, along with the system pressure tests, provides reasonable assurance of the continued inservice structural integrity. Therefore, it is recommended that relief be granted as requested.

3.1.1.2 Request for Relief 2, Revision 0, Examination Category B-A, Reactor Pressure Vessel Closure Head Welds

NOTE: This request for relief was withdrawn by the Licensee in the August 29, 1988, submittal.

3.1.1.3 Request for Relief 4, Revision 0, Examination Category B-D, Items B3.90 and B3.100, Reactor Pressure Vessel Nozzle-to-Vessel Welds and Nozzle Inside Radius Sections

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-D, Items B3.90 and B3.100 require a 100% volumetric examination of RPV nozzle-to-vessel welds and nozzle inside radius sections as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume of the following RPV nozzle-to-vessel welds and nozzle inside radius sections:

Outlet Nozzles
205-05
205-10

Inlet Nozzles
205-01A
205-01B
205-09A
205-09B

Licensee's Proposed Alternative Examination: None. The Code-required volumetric examinations will be completed to the maximum extent practical.

Licensee's Basis for Requesting Relief: The Licensee reports that the configuration of the nozzle integral extension prohibits 100% ultrasonic examination coverage of the required examination volume. The inlet and outlet nozzle-to-shell welds will be examined from the vessel shell and from the nozzle bore. The nozzle bore examinations are limited due to near surface interface noise. However, surface wave examinations will be performed on the nozzle inner radius sections and shear wave beams directed from the shell will supplement the nozzle bore inside surface coverage. The shell side transverse examinations of the outlet nozzles are limited due to

interference from the nozzle integral extensions. Transverse scans from the nozzle bore on the integral extensions will supplement coverage of this volume.

Evaluation: The ASME Code-required examination volume coverage is limited due to component configuration and near surface interface noise. The Licensee identified the limitations in figures and tables attached to the request for relief. The limitations are minimized to the maximum extent practical. In all cases where limitations are experienced, the examinations are supplemented by additional scans using alternate sound beam paths to enhance overall coverage.

Conclusions: Based on the above evaluation, it is concluded that the volumetric examination is impractical to perform to the extent required by the Code and that the limited Section XI volumetric examination, along with the system pressure tests, provides reasonable assurance of the continued inservice structural integrity. Therefore, it is recommended that relief be granted as requested.

3.1.2 Pressurizer

3.1.2.1 Request for Relief 5, Revision 0, Examination Category B-D, Items B3.110 and B3.120, Pressurizer Nozzle-to-Vessel Welds

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-D, Items B3.110 and B3.120 require a 100% volumetric examination of Pressurizer nozzle-to-vessel welds and nozzle inside radius sections as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume of the following Pressurizer nozzle-to-vessel welds and nozzle inside radius sections:

Nozzle Description	Identification
Safety Nozzle Located at 108 degrees	SV-A
Relief Nozzle Located at 225 degrees	RV
Safety Nozzle Located at 270 degrees	SV-B
Safety Nozzle Located at 305 degrees	SV-C
Spray Nozzle Center of Head	SP
Surge Nozzle Center Bottom Head	SURGE

Licensee's Proposed Alternative Examination: None. The Code-required volumetric examination will be completed to the maximum extent practical.

Licensee's Basis for Requesting Relief: Configuration and permanent attachments prohibit 100% ultrasonic examination coverage of the required examination volume.

Pressurizer Top Head Nozzle Welds: The required scan path for each of the nozzles is approximately 12 inches for the 0° and 60° angle beams. Because of the close proximity of the nozzle arrangements to each other, the 12-inch scan path cannot be achieved.

Pressurizer Bottom Head Nozzle Welds: Ten Pressurizer heater penetrations on the bottom head limit the scan distance for the 60° angle only.

Evaluation: Limitations to coverage of the ASME Code-required examination volumes are due to component configuration and interference by vessel attachments. The Licensee identified these limitations in figures and tables provided with the request for relief. The limitations are minimized to the maximum extent possible. In all cases where limitations are experienced, the examinations are supplemented by additional scans using alternate sound beam paths to enhance overall coverage. It is noted that a minimum of 70% of the Code-required volume is being examined.

Conclusions: Based on the above evaluation, it is concluded that the volumetric examination is impractical to perform to the extent required by the Code and that the limited Section XI volumetric examination, along with the system pressure tests, provides reasonable assurance of the continued inservice structural integrity. Therefore, it is recommended that relief be granted as requested.

3.1.3 Heat Exchangers and Steam Generators

3.1.3.1 Request for Relief 3 (Part 1 of 2), Examination Category B-B, Items B2.32 and B2.40, Steam Generator Tubesheet-to-Head Weld and Head Meridional Welds

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-B, Item B2.32 requires a 100% volumetric examination of one Steam Generator meridional head weld as defined by Figure IWB-2500-3. Item B2.40 requires a 100% volumetric examination of the Steam Generator tubesheet-to-head weld as defined by Figure IWB-2500-6.

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume of Steam Generator S/G-A tubesheet-to-primary extension ring weld, primary extension ring-to-head weld, and meridional head weld No. 1A-1-104-A.

Licensee's Proposed Alternative Examination: None. The Code-required volumetric examination will be completed to the maximum extent practical.

Licensee's Basis for Requesting Relief:

Tubesheet-to-Primary Extension Ring and Primary Extension Ring-to-Head Weld: The tubesheet-to-head weld volumetric examination is obstructed by primary manways, four 1-inch lines, and the hot leg nozzle.

Meridional Head Weld: The Licensee reports that the meridional head weld volumetric examination is obstructed by the primary manways and the adjacent nozzles.

Evaluation: The ASME Code-required examination volume coverage is limited due to component configuration and interference by vessel attachments. The Licensee identified these limitations in figures and tables attached to the request for relief. It is also reported that in all cases where limitations are experienced, the examinations will be supplemented by additional scans using alternate sound beam paths to enhance overall coverage. It is noted that a significant percentage of the Code-required volume is being examined.

Conclusions: Based on the above evaluation, it is concluded that the volumetric examination is impractical to perform to the extent required by the Code and that the limited Section XI volumetric examination, along with the system pressure tests, provides reasonable assurance of the continued inservice structural integrity. Therefore, it is recommended that relief be granted as requested.

3.1.3.2 Request for Relief 3 (Part 2 of 2), Examination Category B-D, Items B3.130 and B3.140, Steam Generator Nozzle-to-Vessel Welds and Nozzle Inside Radius Sections

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-D, Items B3.130 and B3.140 require a 100% volumetric examination of the Steam Generator nozzle-to-vessel welds and nozzle inside radius sections as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: Relief is requested from examining 100% of the Code-required volume of the following Steam Generator nozzle-to-vessel welds and associated nozzle inside radius sections:

Steam Generator 1A
Inlet Nozzle-to-Shell Weld 1A-111C
Outlet Nozzle-to-Shell Welds 1A-5-111A & 1A-5-111B

Steam Generator 1B
Inlet Nozzle-to-Shell Weld 1A-111C
Outlet Nozzle-to-Shell Welds 1B-5-111A & 1B-5-111B

Licensee's Proposed Alternative Examination: None. The Code-required volumetric examination will be completed to the maximum extent practical.

Licensee's Basis for Requesting Relief: Configuration and permanent attachments prohibit 100% ultrasonic examination coverage of the Code-required volume. The Licensee reports that limitations are due to primary manways and the steam generator stay base.

Evaluation: The ASME Code-required examination volume coverage is limited due to component configuration and interference by vessel attachments. The Licensee identified these limitations in figures provided with the request for relief. The limitations are minimized to the maximum extent possible. In

all cases where limitations are experienced, the examinations are supplemented by additional scans using alternate sound beam paths to enhance overall coverage.

Conclusions: Based on the above evaluation, it is concluded that the volumetric examination is impractical to perform to the extent required by the Code and that the limited Section XI volumetric examination, along with the system pressure tests, provides reasonable assurance of the continued inservice structural integrity. Therefore, it is recommended that relief be granted as requested.

3.1.4 Piping Pressure Boundary

3.1.4.1 Request for Relief 6, Examination Category B-J, Item B9.11, Pressure Retaining Welds in Class 1 Piping

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-J, Item B9.11 requires both 100% surface and volumetric examinations of pressure retaining welds in Class 1 piping systems 4 inch nominal pipe size and greater. These examinations shall be as defined by Figure IWB-2500-8.

Licensee's Code Relief Request: Relief is requested from performing the Code-required surface examination of the reactor pressure vessel nozzle-to-pipe transition welds.

Licensee's Proposed Alternative Examination: In lieu of the Code-required surface examination of the weld O.D. surface, the Licensee proposes to conduct a remote volumetric examination from the I.D. surface which includes the entire weld volume and heat affected zone instead of only the inner one-third of the weld volume. This examination will be performed during the mechanized ultrasonic examinations of the nozzle-to-vessel welds.

The outlet nozzle-to-pipe transition welds will be examined by the end of the first period, in conjunction with the Examination Category B-D examinations, and the inlet nozzle-to-pipe transition welds will be examined with the mechanized examinations at or near the end of the inspection interval.

Licensee's Basis for Requesting Relief: The Licensee reports that performance of the surface examination of the reactor pressure vessel nozzle-to-pipe transition welds involves excessive costs, manhours, and man/rem with little or no compensating increase in the level of quality and safety.

The Licensee feels that the extent of examination achieved by the proposed examination method, in lieu of the surface examination, will provide an acceptable level of quality and safety as the proposed alternative examination will detect unacceptable outside surface flaws that would have been detected using surface examination techniques of the outside surface.

Evaluation: Section XI, Paragraph IWA-2240, states that: "Alternative examination methods, a combination of methods, or newly developed techniques may be substituted for the methods specified in this Division, provided the Inspector is satisfied that the results are demonstrated to be equivalent or superior to those of the specified method."

In the August 29, 1988 submittal, in response to the NRC request for additional information, the Licensee reported that the proposed technique was used successfully at Turkey Point, Unit 4, to examine the safe end-to-reactor pressure vessel welds. Examination sensitivity was established using 0.10 inch deep notches (3.6%T).

In order to qualify this technique, a mockup was designed and

fabricated which duplicated, to the extent possible, the configuration of the nozzle-to-pipe welds. Cracks were initiated in the block at specific locations on the inside and outside surfaces. The sizes of these cracks were controlled for qualification purposes. Crack depths ranged from approximately 0.100 to 0.200 inch with a length of 0.5 inch. Prior to the performance of the actual examinations on the vessel safe ends, the technique and procedure were demonstrated to the satisfaction of the Authorized Nuclear Inservice Inspector using this mockup.

Although material differences exist between the Main Reactor Coolant System piping (cast stainless steel) at Turkey Point and the Main Reactor Coolant System piping (carbon steel clad) at St. Lucie, Unit 1, the procedure and equipment have demonstrated the ability to detect O.D. surface indications.

Conclusions: Based on the above evaluation, it is concluded that the Code-required surface examination is impractical to perform and that the proposed ID volumetric examination of the RPV nozzle-to-pipe transition welds, along with the visual examination for leakage during the performance of system hydrostatic tests, provides reasonable assurance of the continued inservice structural integrity. Therefore, it is recommended that relief be granted.

3.1.4.2 Request for Relief 12 (Part 1 of 2), Examination Category B-J, Pressure Retaining Welds in Class 1 Piping

NOTE: This relief request was withdrawn by the Licensee in the August 29, 1988 submittal.

3.1.5 Pump Pressure Boundary

3.1.5.1 Request for Relief 7, Examination Category B-L-1 and B-L-2, Items B12.10 and B12.20, Reactor Coolant Pump Casing Welds and Pump Casings

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-L-1, Item B12.10 requires a 100% volumetric examination of Class 1 pump casing welds as defined by Figure IWB-2500-16. Examination Category B-L-2, Item B12.20 requires a visual (VT-3) examination of the internal surfaces of Class 1 pump casings. These examinations are required on at least one pump in each group of pumps performing similar functions in the system. The examination may be performed at the end of the 10-year interval.

Licensee's Code Relief Request: Relief is requested from performing the Code-required volumetric examination of the reactor coolant pump casing welds and the visual (VT-3) examination of the interior pressure boundary surface of the pump casing.

Licensee's Proposed Alternative Examination: As an alternative to the Code-required examinations, the Licensee proposes the following:

1. A 100% visual examination of the pump interior to the extent practical (recognizing the interference by the vanes) should the pump be disassembled for maintenance.

2. A 100% radiographic examination of the pump casing welds to the extent practical (recognizing the interference by the vanes) should the pump be disassembled for maintenance.

3. The reactor coolant pump shall be hydrostatically tested per the Code requirements.

4. A 100% visual examination of the external surfaces only of one pump and one weld at or near the end of the inspection interval.

Licensee's Basis for Requesting Relief: The Licensee reports that the reactor coolant pumps were manufactured prior to the initial issuance of the ASME Code Section XI and the design did not provide for disassembly and removal of fixed internals. The examination requirements for pumps were originally developed for Type F, radially split, axisymmetric casing designs. St. Lucie Plant has Type E pump designs which have geometric configurations that make examination of the casing welds not practical. The disassembly and reassembly of the pumps is extremely difficult given the interference and/or tight fits which need to be addressed. Without painstaking care, the disassembly/reassembly process could degrade the pump internals from an operational standpoint.

The Licensee also reports that there is a very low probability, based upon experience, that the pumps will be disassembled for the sole purpose of maintenance. There is no requirement by the pump manufacturer (Byron Jackson) to disassemble the pump(s) as part of normal maintenance or inspection. There are no reported failures within the pump casings with these model pump(s). The industrial performance of these pumps has proven their excellent ability to resist inservice degradation.

Evaluation: In the request for relief, the Licensee also addressed the fact that radiographic techniques are limited due to the high radiation levels and fixed internals, ultrasonic examinations are limited by the coarse grain structure inherent in thick stainless steel castings (ASTM A351, Grade CF8M), and liquid penetrant examinations are limited because of the porous condition of the casting surface of the weld zones.

The pump casing examinations are performed to determine whether unanticipated severe degradation of the casing is occurring due to phenomena such as erosion, corrosion, or cracking. However, previous experience during examination of similar pumps at

other plants has not shown any significant degradation of pump casings. The concept of examination when the pump is disassembled for maintenance is acceptable. The disassembly of the pumps for the sole purpose of inspection is a major effort and, in addition to the possibility of damage to the pumps, could result in personnel receiving excessive radiation exposure. However, if the pumps are disassembled for maintenance, the internal surfaces and accessible portions of the welds would be examined, in which case relief would not be required.

Conclusions: Based on the above evaluation, it is concluded that the Code requirement is impractical. Therefore, it is recommended that relief be granted provided that: (a) the visual examination (VT-3) of the internal surfaces of the pumps is performed whenever the internal surfaces are made accessible due to disassembly for maintenance, (b) the Code-required volumetric examination of the pump casing welds is performed whenever the welds are exposed due to disassembly of the pump, and (c) if the pumps have not been disassembled, this fact should be reported by the Licensee in the ISI Summary Report at the end of the interval.

3.1.6 Valve Pressure Boundary

3.1.6.1 Request for Relief 8, Examination Category B-M-2, Item B12.50, Class 1 Valve Bodies

Code Requirement: Section XI, Table IWB-2500-1, Examination Category B-M-2, Item B12.50 requires a visual (VT-3) examination of the internal surfaces of at least one valve in each group of valves that is of the same construction design, such as globe, gate, or check valve, and manufacturing method and that performs similar functions in the system, such as containment isolation and system overpressure protection. The

examination may be performed at the end of the 10-year interval.

Licensee's Code Relief Request: Relief is requested from performing the Code-required visual (VT-3) examination on internal pressure boundary surfaces of the following valves:

Size	System	Valve ID	Type
6"	RC	V-1200	SAFETY
6"	RC	V-1201	SAFETY
6"	RC	V-1202	SAFETY
6"	SI	HVC-3615	GLOBE
6"	SI	HVC-3625	GLOBE
6"	SI	HVC-3635	GLOBE
6"	SI	HVC-3645	GLOBE
6"	SI	V-3114	CHECK
6"	SI	V-3124	CHECK
6"	SI	V-3134	CHECK
6"	SI	V-3144	CHECK
12"	SI	V-3217	CHECK
12"	SI	V-3227	CHECK
12"	SI	V-3237	CHECK
12"	SI	V-3247	CHECK
10"	SI	V-3480	GATE
10"	SI	V-3481	GATE
10"	SI	V-3451	GATE
10"	SI	V-3452	GATE
12"	SI	V-3614	GATE
12"	SI	V-3624	GATE
12"	SI	V-3634	GATE
12"	SI	V-3644	GATE

Licensee's Proposed Alternative Examination: None. The VT-3 examination will be performed on one valve from each design group performing a similar function when disassembly is required for maintenance purposes.

Licensee's Basis for Requesting Relief: The Licensee states that disassembly of these valves for the sole purpose of performing a visual (VT-3) examination is not practical. The process of disassembling these components will result in considerable exposure of personnel to radiation and significantly increase the risk of component damage or failure without providing a compensating increase in the level of quality and safety.

Evaluation: The visual examination is performed to determine if unanticipated severe degradation of the valve body is occurring due to phenomena such as erosion, corrosion, or cracking. However, previous experience during examination of similar valves at other plants has not shown any significant degradation of the valve bodies. The concept of visual examination if the valve is disassembled for maintenance is acceptable. Disassembly of the valves for the sole purpose of inspection is a major effort and, in addition to the possibility of damage to the valves, could result in personnel receiving excessive radiation exposure. However, if the valves are disassembled for maintenance, the internal surfaces would be examined, in which case relief would not be required for those valves.

Conclusions: Based on the above evaluation, it is concluded that the Code requirements is impractical. Therefore, it is recommended that relief be granted provided that: (a) the visual examination (VT-3) of the internal surfaces of the valves is performed whenever the internal surfaces are made accessible due to disassembly for maintenance, and (b) if the valves have mot been disassembled, this fact should be reported by the Licensee in the ISI Summary Report at the end of the interval.

3.1.7 General (No relief requests)

3.2 Class 2 Components

3.2.1 Pressure Vessels (No relief requests)

3.2.2 Piping

3.2.2.1 Request for Relief 9, Examination Category C-F, Class 2 Pressure Retaining Piping Welds in the Containment Spray System

NOTE: This request for relief was withdrawn by the Licensee in the August 29, 1988, submittal.

3.2.2.2 Request for Relief 12 (Part 2 of 2), Examination Category C-F, Pressure Retaining Welds in Class 2 Piping

NOTE: This request for relief was withdrawn by the Licensee in the August 29, 1988, submittal.

3.2.3 Pumps (No relief requests)

3.2.4 Valves (No relief requests)

3.2.5 General (No relief requests)

3.3 Class 3 Components (No relief requests)

3.4 Pressure Tests (No relief requests)

3.5 General

3.5.1 Ultrasonic Examination Techniques

3.5.1.1 Request for Relief 11, ASME Section XI, Appendix III, Ultrasonic Calibration Blocks

Code Requirement: Section XI, Appendix III, Article III-3410 requires that basic calibration blocks be made from the same nominal diameter and nominal wall thickness or pipe schedule as the pipe to be examined. Article III-3411 requires the calibration block be fabricated from one of the materials specified for the piping being joined by the weld.

Licensee's Code Relief Request: Relief is requested from the requirement that the calibration block be the same nominal diameter and wall thickness or pipe schedule and from the requirement that the calibration block be fabricated from one of the same materials as the piping being joined. Relief is being requested for the following:

Cal. Block I.D. Number	Component Description
UT-4A	Primary Coolant Piping Hot Leg
UT-6	Primary Coolant Piping Cold Legs
UT-45	Main Steam Piping Welds
UT-4	Reactor Pressure Vessel
UT-5	Reactor Pressure Vessel

Licensee's Proposed Alternative Examination: The Licensee proposes continued use of the above calibration blocks.

Licensee's Basis for Requesting Relief: UT-4A: Although the calibration block is not curved and is fabricated from material different from that of the primary coolant piping hot leg, the Licensee has determined that SA-533 Grade A is comparable to SA-516 Grade 70 (piping material), as provided by Section XI, Appendix III, Article III-3411(c) and that Articles 4 and 5 of

Section V allow use of flat blocks for items greater than 20 inches in diameter.

UT-6: The calibration block is not curved. However, the block material is identical to the coolant piping material and, therefore, it is preferred over a curved block of different material. The Licensee again points out that Articles 4 and 5 of Section V allow use of flat blocks for items greater than 20 inches in diameter and that, with a 1/2-vee examination technique, curvature is not a major source of error. Sound path calibration is used with full scale plots of indications.

UT-45: The calibration block is of different diameter and thickness than the examined piping. The calibration block is 34 inches in diameter and 1.250 inches in wall thickness and the subject welds are 36.625 inches in diameter and 1.234 inches in wall thickness. The Licensee reports that the small difference in diameter is not ultrasonically noticeable.

UT-4 and UT-5: The 3/4T hole is too close to the end of the calibration block for the straight beam (0 deg.) examination when using calibration block UT-4. The holes are also drilled too close (within 3/4 inch) to the end of calibration block UT-5. The Licensee reports that the closeness of the 3/4T hole to the end of the block satisfies the requirements of the code to which they were fabricated. The condition noted does not interfere with the calibration performed on these blocks.

Evaluation: It is noted that ASME Code Case N-355 permits the use of flat calibration blocks for ultrasonic examination of elbows or other fittings with compound curvatures if the elbow or fitting has an outside diameter greater than 20 inches. Based on this Code Case and the large diameters of the Primary Coolant System hot and cold leg piping involved, it has been determined that the use of flat calibration blocks will not

significantly reduce the examination sensitivity. Likewise, the use of a 34-inch diameter, 1.250-inch wall thickness calibration block (UT-45) to examine 36.625-inch diameter, 1.234-inch wall thickness, Main Steam piping welds also will not reduce the examination sensitivity.

The Licensee states that for Calibration Blocks UT-4 and UT-5, the side-drilled holes satisfy the requirements of the code to which they were fabricated and that the condition noted does not interfere with the calibrations performed using these blocks. All of the proposed calibration blocks have been in use since the plant was built; therefore, their continued use would tend to provide consistent results.

Conclusions: Based on the above evaluation, it is concluded that the Code requirement is impractical and relief should be granted as requested.

3.5.2 Exempted Components (No relief requests)

3.5.3 Other

3.5.3.1 Request for Relief 10, IWF-5000, Snubber Inservice Test Requirements

NOTE: The functional testing of snubbers is not included in this evaluation. Functional tests are not within the scope of this document and will be evaluated elsewhere.

4. CONCLUSION

Pursuant to 10 CFR 50.55a(g)(6), it has been determined that certain Section XI required inservice examinations are impractical to perform. Relief Requests 2, 9, and 12 were withdrawn by the Licensee in the Licensee's August 29, 1988 response to the NRC's request for additional information. In all other cases, the Licensee has demonstrated that specific Section XI requirements are impractical.

This technical evaluation report has not identified any practical method by which the Licensee can meet all the specific inservice inspection requirements of Section XI of the ASME Code for the existing St. Lucie Plant, Unit 1, facility. Requiring compliance with all the exact Section XI required inspections would require redesign of a significant number of plant systems, sufficient replacement components to be obtained, installation of the new components, and a baseline examination of these components. Even after the redesign efforts, complete compliance with the Section XI examination requirements probably could not be achieved. Therefore, it is concluded that the public interest is not served by imposing certain provisions of Section XI of the ASME Code that have been determined to be impractical. Pursuant to 10 CFR 50.55a(g)(6), relief is allowed from these requirements which are impractical to implement if granting the relief 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.

The development of new or improved examination techniques should continue to be monitored. As improvements in these areas are achieved, the Licensee should incorporate these techniques in the ISI program plan examination requirements.

Based on the review of the St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program, Revision 0, dated September 1, 1987, the Licensee's response to the NRC's Request for Additional Information which included the St. Lucie

Plant, Unit 1, Second 10-Year Interval ISI Plan, Revision 0 (2 volume set), dated August 24, 1988, and the recommendations for granting relief from the ISI examination requirements that have been determined to be impractical, it is concluded that the St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection Program, Revision 0, and Plan, Revision 0, are acceptable and in compliance with 10 CFR 50.55a(g)(4). However, the Licensee should consider performing examinations of a sample of the Class 2 piping welds in the CHR, CS, SD-CLG, and LPSI systems as they have been completely exempted from surface and volumetric examinations based on the wall thickness criteria contained in Code Case N-408.

5. REFERENCES

1. Code of Federal Regulations, Volume 10, Part 50.

2. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Division 1, 1983 Edition through Summer 1983 Addenda.

3. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Code Cases - Nuclear Components, 1986 Edition.

4. St. Lucié Plant, Unit 1, Second 10-Year Interval Inservice Inspection Program, Revision 0, Document No. MCI-PSL-100, dated September 1, 1987.

5. NUREG-0800, Standard Review Plans, Section 5.2.4, "Reactor Coolant Boundary Inservice Inspection and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components," July 1981.

6. Letter, dated May 20, 1988, E. G. Tourigny (NRC) to W. F. Conway [Florida Power and Light Company (FP&L)], request for additional information.

7. Letter, dated August 29, 1988, W. F. Conway (FP&L) to Document Control Desk (NRC), response to the NRC's May 20, 1988, request for additional information.

8. St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection Plan, Revision 0, Document No. JNS-PSL-100 (2 volume set), dated August 24, 1988.

9. Regulatory Guide 1.147, Revision 5, "Inservice Inspection Code Case Acceptability, ASME Section XI Division 1," August 1986.

10. Branch Technical Position ASB 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," Revision 1, dated July 1981.

11. Regulatory Guide 1.14, "Reactor Coolant Pump Flywheel Integrity," Revision 1, dated August 1975.

12. Regulatory Guide 1.65, "Materials and Inspection for Reactor Vessel Closure Studs," dated October 1973.

13. Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes," dated July 1975.

14. Regulatory Guide 1.150, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations," Revision 1, dated February 1983.

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13. ABSTRACT (200 words or less)

This report presents the results of the evaluation of the St. Lucie Plant, Unit 1, Second 10-Year Interval Inservice Inspection (ISI) Program, Revision 0, submitted September 2, 1987, and Plan, Revision 0, submitted August 29, 1988. Included in these documents are the requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements which the Licensee has determined to be impractical for the second 10-year interval. The St. Lucie Plant, Unit 1, Second 10-Year Interval ISI Program and Plan are evaluated in Section 2 of this report. The ISI Program and Plan are evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during the Nuclear Regulatory Commission's (NRC) previous preservice inspection (PSI) and ISI reviews. The requests for relief from the ASME Code requirements which the Licensee has determined to be impractical for the second 10-year inspection interval are evaluated in Section 3 of this report.

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