September 29, 2008

Mr. J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: SAFETY EVALUATION FOR ST. LUCIE NUCLEAR POWER PLANT UNIT 1 RELIEF REQUEST NO. 30 THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM EXAMINATION OF REACTOR COOLANT SYSTEM PIPING WELDS TO ASME CODE, SECTION XI, APPENDIX VIII, SUPPLEMENT 3 (TAC NO. MD8041)

Dear Mr. Stall:

By letter dated February 4, 2008, Florida Power and Light Company (the licensee) submitted Relief Request (RR) No. 30, related to the third 10-Year Interval Inservice Inspection (ISI) Program for the St. Lucie Plant, Unit 1. The licensee requested approval to implement alternatives to the requirements of Appendix VIII, Supplement 2, as referenced by Supplement 3, within the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 1995 Edition with the 1996 Addenda, for ultrasonic testing of ferritic reactor coolant system piping welds from the inside surface.

Based on the information provided in RR No. 30, the staff concludes in the attached safety evaluation that the alternatives proposed for the third 10-year ISI interval will provide an acceptable level of quality and safety. Therefore, pursuant to Title 10 of the Code of Federal Regulations 50.55a(a)(3)(i), the staff authorizes the ISI program alternatives proposed in RR No. 30 for the third 10-year ISI interval of St. Lucie Nuclear Plant, Unit 1.

Sincerely,

/RA/

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure:
Staff Evaluation Report

cc: See next page

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Sincerely,

/RA/

Thomas H. Boyce, Chief
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Division of Operating Reactor Licensing
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

RELIEF REQUEST NO. 30

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE NUCLEAR POWER PLANT UNIT 1

DOCKET NO. 50-335

1.0 INTRODUCTION

By letter dated February 4, 2008, Florida Power and Light Company (FPL, the licensee) submitted Relief Request (RR) No. 30, related to the third 10-Year Interval Inservice Inspection (ISI) Program for the St. Lucie Plant, Unit 1. The licensee requested approval to implement alternatives to the requirements of Appendix VIII, Supplement 2, as referenced by Supplement 3, within the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1995 Edition with the 1996 Addenda, for ultrasonic testing of ferritic reactor coolant system piping welds from the inside diameter (ID).

The automated ultrasonic techniques to be utilized for the examinations of reactor coolant piping from the ID will be qualified by demonstration in accordance with the requirements of Appendix VIII, Supplement 3, of the 1995 Edition with Addenda through 1996 of ASME Section XI and the proposed alternatives by the Performance Demonstration Initiative (PDI). The staff has evaluated the licensee's proposed alternatives pursuant to Title 10 of Code of Federal Regulations (10 CFR) Section 50.55a(a)(3)(i).

2.0 REGULATORY EVALUATION

It states in 10 CFR 50.55a(g), that ISI of ASME Code Class 1, 2, and 3 components are to be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). In addition, according to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the U.S. Nuclear Regulatory Commission, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for ISI of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of

Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI Code of record for the third 10-year inspection interval for St. Lucie Unit 1 is the 1989 Edition of the ASME Code, Section XI. However, 10 CFR 50.55a, requires that licensees implementing the 1989 Edition and earlier editions and addenda of IWA-2232 of Section XI, Division 1, of the ASME Boiler and Pressure Vessel Code must implement the 1995 Edition with the 1996 Addenda of Appendix VIII of Section XI, Division 1 of the ASME Boiler and Pressure Vessel Code.

3.0 TECHNICAL EVALUATION

3.1 Systems/Components for Which Relief Is Requested

Reactor Coolant System Ferritic Piping Welds subject to Ultrasonic (UT) Examination from ID.

3.2 ASME Code Requirements

The qualification requirements applicable to Examination Category B-J, Items B9.11 and B9.12, are as stated in Appendix VIII, Supplement 2, as referenced by Supplement 3, within ASME Section XI, 1995 Edition with the 1996 Addenda.

3.3 Code Requirements for which Relief is Requested

ASME Code, Section XI, Appendix VIII, Supplement 2, as referenced by Supplement 3 requires when scanning from the OD, the specimen's inside surface to and identification shall be concealed from the candidate. When scanning from the ID, the location and specimen identification shall be observed to maintain a "blind test."

3.4 Licensee's Proposed Alternatives to Code

The licensee has proposed the following alternatives relative to specific sections in Supplement 2, as referenced by Supplement 3, Appendix VIII to ASME Section XI, 1995 Edition with Addenda through 1996, in the RR No. 30 that provides allowance for demonstrations performed from the inside surface of the piping.

1.1 General

The proposed alternative will be applicable to ferritic piping welds examined from either the ID or OD [outside diameter] surface. The applicable qualification criteria shall be satisfied separately.

1.1(b) It shall include the minimum, within 1/2 NPS [National Pipe Standard], and maximum pipe diameter for which the examination procedure is applicable.

1.1(c) Taking into consideration the accessible scanning surface, the OD or ID specimen set shall include applicable examples of the following fabrication conditions:

1.1(c)(3) Geometric conditions that normally require discrimination from flaws (e.g., counterbore, weld root conditions such as excessive ID reinforcement for OD scans, or OD reinforcement for ID scans, as applicable).

1.1(c)(4) Typical limited scanning surface conditions (e.g., diametrical shrink, single-side access due to safe ends or fittings, clad surfaces, or counter-bore within the scanning area, as applicable).

1.2 Detection Specimens

1.2(b) Detection sets for personnel qualification shall be selected from Table VIII-S2-1 of Supplement 2, Appendix VIII, 1995 Edition with Addenda through 1996. The number of unflawed grading units shall be at least twice the number of flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.

1.3 Sizing Specimens

1.3(a) The minimum number of flaws shall be ten. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables at least one personnel qualification set is required.

2.0 Conduct of Performance Demonstrations

When scanning from the OD, the specimen inside surface and identification shall be concealed from the candidate. When scanning from the ID, flaw location and specimen identification shall be obscured to maintain a “blind test.” All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.

2.2 Length and Depth Sizing Test

2.2(a) Each reported flaw in the detection test shall be length sized. When only length sizing is being tested, the regions of each specimen containing a flaw to be sized may be identified to the candidate. The candidate shall determine the length of the flaw in each region.

2.2(b) The depth sizing test may be performed in conjunction with or separate from the detection test. When only depth sizing is being tested, the regions of each specimen containing a flaw to be sized may be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.

3.1 Detection Acceptance

3.1(a) Personnel demonstration shall meet the requirements of Table VIII-S2-1 for both detection and false calls.

3.1(b) Procedure qualifications shall demonstrate detectability of each flaw within the scope of the procedure. Successful personnel demonstrations may be combined to satisfy the requirements for procedure qualification.

3.5 Licensee's Bases for Requesting Relief

St. Lucie Unit 1 reactor coolant piping consists of nominal 42-inch ID, 3-3/16 inch minimum thick, hot leg piping and 30-inch ID, 3-inch minimum thick, cold leg elbows attached to the reactor pressure vessel (RPV) nozzle safe-ends that are fabricated from carbon steel mill clad with stainless steel. Examinations are performed from the inside surface of the piping.

The examinations of these welds are performed in conjunction with the 10-year RPV examinations from the inside surface using automated ultrasonic examination techniques qualified in accordance with ASME Section XI, Appendix VIII, Supplement 3. The qualification requirements provided in ASME Section XI, Supplement 2, as referenced by Supplement 3, do not provide allowances for demonstrations performed from the inside surface of the piping.

Prior to the issuance of the 2002 Addenda of ASME Section XI, the PDI administered demonstration activities for ID examinations in accordance with Supplement 3 as modified by the PDI instructions. The PDI worked with the ASME Code to provide clarification of the intent of Section XI when demonstrations and examinations of carbon steel piping welds were to be performed from the ID. However, 10 CFR 50.55a specifically prohibits the use of Appendix VIII and the Supplements to Appendix VIII and Article I-3000 of Section XI of the ASME Code, 2002 Addenda through the latest Edition and Addenda. FPL's contractor has qualified by demonstration from the ID, in accordance with PDI's implementation of Supplement 3, which is consistent with the requirements described in the 2002 Addenda of ASME Section XI, Appendix VIII.

The automated UT techniques to be utilized for the examinations of the reactor coolant piping from the ID will have been qualified by demonstration in accordance with the requirements of Appendix VIII, Supplement 3, of the 1995 Edition with Addenda through 1996 of ASME Section XI and proposed alternatives by the PDI. The use of techniques qualified from the inside surface provides assurance that the reactor coolant piping welds have remained free of service induced flaws thus enhancing quality and ensuring plant safety and reliability.

4.0 STAFF EVALUATION

Section 50.55a of 10 CFR mandates implementation of Appendix VIII of the ASME Code, Section XI, 1995 Edition including the 1996 Addenda "Performance Demonstration for Ultrasonic Examination Systems." The qualification requirements applicable to Examination Category B-J, Items B9.11 and B9.12, are as stated in Appendix VIII, Supplement 2, as referenced by Supplement 3, of ASME Section XI, 1995 Edition with the 1996 Addenda. However, the qualification requirements specified for the piping examination are applicable for examination from the OD of the pipe. The licensee's proposed alternatives specify qualification requirements for examination from the ID of the pipe. The licensee has performed a comparative analyses of their proposed alternative with the corresponding OD requirement of the above Code. The staff has evaluated the deviations identified in licensee's comparative analyses as summarized in the following discussion.

1.1(b): Pipe wall thickness can either be expressed in terms of exact measurement or as a standardized nominal value. The requirements in providing tolerances to pipe thickness may be specified in terms of as-built measurement of wall thickness while the licensee is applying a tolerance on the nominal values of pipe diameters expressed in terms of National Pipe Standard (NPS) in examination of pipes. Qualifications that used test specimens with machined diameters may not include any NPS nominal values within the stated tolerance. The licensee

proposed a 1/2 NPS tolerance for NPS nominal values to achieve an overlap between the two different systems for identifying pipe diameter. The 1/2 NPS is the minimum tolerance expressible for NPS nominal values that overlaps the exact measurement tolerances. The oversight was corrected in later editions of the ASME Code. These editions are referenced in the 10 CFR 50.55a(b) accepting the tolerance on piping expressed in NPS nominal values. The staff concludes that the solution selected by the licensee to achieve overlapping of the two tolerance methods will provide reasonable assurance that personnel and procedures qualified under one tolerance method will perform as well under the other tolerance method. Therefore, the change is acceptable.

1.1(c): The licensee expanded the requirements to include examinations performed from the inside diameter. The expansion added equally challenging surface conditions for ID demonstrations that exists for OD demonstrations. Specifically, the change adds representative surface conditions for ID demonstration. Both OD and ID demonstrations are performed on representative mockups which provide an indication of personnel and procedure effectiveness under field conditions. The staff finds the surface conditions for ID demonstrations are consistent with the objective for OD demonstration and therefore are acceptable.

1.2(b) and 1.3(a): In Detection Specimens and Sizing Specimens, the licensee's proposed alternative goes beyond the Code requirement for initial procedure qualification by including the equivalent of three personnel qualification sets which translate to detection and sizing of more flaws than that required by the Code. This requirement adds more conservatism to procedure qualification since it increases the number of test specimens over that required by the Code for OD. To qualify new values of essential variables, at least one personnel qualification set is required. The staff accepts this alternative since it would be more stringent than that of the Code for initial procedure qualification.

2.0: The proposed alternative for conducting the performance demonstration provides clarification necessary for a blind test. When scanning from the OD, the specimen's inside surface and identification is concealed from the candidate; only the OD surface is available for viewing and placing the transducer. When scanning from the ID, the transducers must be placed on the ID which is the surface that has the flaws. The licensee's proposal requires that the flaw locations and test specimen identification be obscured to maintain a "blind test." The staff considers that the licensee's approach in protecting test specimen confidentiality from the candidates during ID performance demonstrations to be consistent with the objective for OD confidentiality and therefore are acceptable.

2.2: The Code requires that for length sizing of flaws, the flaw location be identified to the candidate. The proposed alternative is to allow the candidate to perform detection and length sizing as part of one performance demonstration. This improves testing efficiency while adding difficulty to the length sizing aspects of the demonstrations. The difficulty is that the length sizing is part of the detection blind performance demonstration. Not knowing the location of the flaw to be length sized, adds difficulty to the test. Therefore, the proposed alternative is acceptable.

2.2(b): The Code requires that for depth sizing of flaws, the flaw location be identified to the candidate. The proposed alternative is to allow the candidate to perform detection and depth sizing as part of one performance demonstration. This improves testing efficiency while adding difficulty to the depth sizing aspects of the demonstrations. The difficulty is that the depth sizing is part of the detection blind performance demonstration. Not knowing the location of the flaw to be depth sized adds difficulty to the test. Therefore, the proposed alternative is acceptable.

3.0: The Code requires that both personnel and procedures satisfy the acceptance criteria in Table VIII-S2-1 which permits not detecting a given number of flaws with a limited number of false calls. The proposal has the same requirements for personnel qualifications. The proposal adds difficulty to the procedure qualification by requiring all flaws within the scope of the procedure to be detected. The proposal does not allow procedure qualifications to miss detecting a given number of flaws. The staff considers the proposal acceptable because it adds difficulty to the performance demonstration process.

The staff finds that the licensee's proposed alternatives provide specific qualification requirements in regard to specimen requirements for detection specimens and sizing specimens including conduct of performance demonstrations and their acceptance criteria for the ID examination in addition to the existing requirements for the OD examination. The deviations from the requirements of Appendix VIII, Supplement 2, as referenced by Supplement 3, of the ASME Section XI Code, 1995 Edition with the 1996 Addenda, as approved under 10 CFR 50.55a are relevant and specific to performance demonstration for the ID examination. There is no relaxation of Code requirements and the proposed alternatives incorporate equivalent conservatism to the ID examination as that of the OD examination by the Code. The staff, therefore, has determined that the licensee's proposed alternatives in RR No. 30 would provide an acceptable level of quality and safety.

5.0 CONCLUSION

Based on the above evaluation, the staff concludes that the proposed alternatives to the qualification requirements of Supplement 2, as referenced by Supplement 3, Appendix VIII to ASME Section XI, 1995 with Addenda through 1996, will provide an acceptable level of quality and safety for piping examinations conducted from the inside surface. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the alternatives proposed in Relief Request No. 30 are authorized for the third 10-year inservice inspection interval for St. Lucie Unit 1. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Prakash Patnaik

Dated: September 29, 2008

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