February 23, 2005

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: ST. LUCIE NUCLEAR PLANT, UNIT 2 - RELIEF REQUEST NO. 2 REGARDING RISK-INFORMED INSERVICE INSPECTION PROGRAM (TAC NO. MC0938)

Dear Mr. Stall:

By letter dated August 6, 2003, as supplemented by letters dated September 17 and December 28, 2004, Florida Power & Light Company (FPL) submitted Relief Request No. 2 (RR-2) for the third Inservice Inspection (ISI) interval at St. Lucie Unit 2. Pursuant to Title 10, *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), FPL requested a revision to the St. Lucie Unit 2 ISI program, for Class 1 piping only, to use a risk-informed ISI program as an alternative to the requirements for Class 1 examination Categories B-F and B-J in Table IWB-2500-1 of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 1998 Edition with 2000 Addenda.

The NRC staff's evaluation and conclusions are contained in the enclosed safety evaluation. The NRC staff determined that FPL's proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the alternative proposed in RR-2 is authorized for use at St. Lucie Unit 2 for the third 10-year ISI interval, which began August 8, 2003, and ends August 7, 2013.

If there are any questions, please contact Brendan Moroney at (301) 415-3974.

Sincerely,

/RA/
Michael L. Marshall, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-389

Enclosure: Safety Evaluation

cc w/enclosure: See next page

Mr. J. A. Stall
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cc w/enclosure: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION PROGRAM

RELIEF REQUEST NO. 2

FLORIDA POWER AND LIGHT COMPANY

SAINT LUCIE, UNIT 2

DOCKET NO. 50-389

1.0 INTRODUCTION

By letter dated August 6, 2003 (Reference 1), as supplemented by letters dated September 17 (Reference 2) and December 28, 2004 (Reference 3), Florida Power & Light Company (FPL) submitted Relief Request No. 2 (RR-2) for the third Inservice Inspection (ISI) interval at St. Lucie Unit 2. Pursuant to Title 10, *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), FPL requested a revision to the St. Lucie Unit 2 ISI program, for Class 1 piping only, to use a risk-informed (RI) ISI program as an alternative to the requirements for Class 1 examination Categories B-F and B-J in Table IWB-2500-1 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1998 Edition with 2000 Addenda.

The original RI-ISI program for St. Lucie Unit 2, submitted under Reference 4, was developed in accordance with the methodology contained in the Westinghouse Owners Group (WOG) Topical Report WCAP-14572 Revision 1-NP-A (Reference 7), which was previously reviewed and approved by the U.S. Nuclear Regulatory Commission (NRC, the Commission). FPL proposed the RI-ISI program as an alternative to the requirements in the ASME Code, Section XI, pursuant to 10 CFR 50.55a(a)(3)(i). FPL originally requested implementation of this alternative during the third period of the second ISI interval at St. Lucie Unit 2, and it was approved by the NRC on April 25, 2003.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). As stated in 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements 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) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The objective of the ISI program as described in the ASME Code, Section XI and applicable addenda, is to identify conditions (i.e., flaw indications) that may be precursors to leaks and ruptures in the pressure boundary of these components, and may impact plant safety.

The regulations require that inservice examination 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 St. Lucie Unit 2 third 10-year ISI interval is the 1998 Edition through the 2000 Addenda of the ASME Code. The applicable edition of the ASME Code for the previous 10-year ISI interval was the 1989 Edition with no Addenda (Reference 4).

In requesting continuation of a previously approved program, the NRC staff concludes that the regulatory approach taken by FPL is acceptable.

3.0 TECHNICAL EVALUATION

According to References 9 and 10, the following safety principles should be met in an acceptable RI-ISI program:

1. The proposed change meets current regulations unless it is explicitly related to a requested exemption.

2. The proposed change is consistent with the defense-in-depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When proposed changes result in an increase in core damage frequency or risk, the increase should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed change should be monitored using performance measurement strategies.

Reference 10 describes methods acceptable to the NRC staff for integrating insights from the Probabilistic Safety Assessment (PSA) techniques with traditional engineering analyses into ISI programs for piping, and addresses risk-informed approaches that are consistent with the basic elements identified in Reference 9.

FPL originally proposed to use an RI-ISI program for ASME Code Class 1 piping, examination categories B-F and B-J welds, as an alternative to the ASME Code, Section XI requirements for the second 10-year ISI interval at St. Lucie Unit 2 (Reference 4). FPL stated that this proposed program was developed using the RI-ISI methodology described in WCAP-14572

Revision 1-NP-A (Reference 7). The NRC approved (Reference 8) the methodology described in an earlier draft of WCAP-14572, and concluded that this methodology conforms to the guidance provided in References 9 and 10, in that applying the methodology results in risk-neutrality or risk-reduction for the piping addressed in the RI-ISI program. It also concluded that the proposed RI-ISI program as described in Reference 7, conditioned upon the changes to be incorporated as discussed in Reference 12, will provide an acceptable level of quality and safety. Subsequent to this, the WOG published and distributed Revision 1-NP-A (accepted revision) to WCAP-14572, which contains the methodology employed by FPL.

FPL's description, in Reference 1, of pipe segment evaluation and ranking procedures for the RI-ISI program of the third ISI interval remained unchanged from those described in Reference 4 for FPL's RI-ISI program of the second ISI interval. FPL stated, in Reference 2, that there are no changes in high safety significant segments between the second ISI interval program and the proposed third ISI interval program.

The transition from the 1989 Edition, second ISI interval Code of record, to the 1998 Edition with 2000 Addenda of ASME Code, Section XI for St. Lucie Unit 2 third ISI interval, does not impact the currently approved RI-ISI program development processes to be used in the third ISI interval, and the requirements of the new Code edition/addenda will be implemented as detailed in FPL's ISI Program Plan (Reference 1). This fact and the NRC staff's review of References 1, 2, and 3, cause the staff to conclude that the development processes of the currently approved RI-ISI Program (References 4, 5, and 6), including the previously approved deviations from Reference 7, remain unchanged for the third ISI interval.

An acceptable RI-ISI program plan is expected to meet the five key principles discussed above. The first principle is met in this relief request because an alternative ISI program may be authorized pursuant to 10 CFR 50.55a(a)(3)(i) and, therefore, an exemption request is not required.

The second and third principles require assurance that the alternative program is consistent with the defense-in-depth philosophy and that sufficient safety margins are maintained, respectively. Assurance that the second and third principles are met is based on the application of the approved methodology and not on the particular inspection locations selected. The methodology used to develop the third ISI interval RI-ISI program complies with the NRC-approved methodology described in WCAP-14572. Therefore, the second and third principles are met.

The fourth principle, that any increase in core damage frequency (CDF) and risk are small and consistent with the Commission's Safety Goal Policy statement, requires an estimate of the change in risk, and the change in risk estimate is dependent on the location of inspections in the proposed ISI program compared to the location of inspections that would be inspected using the requirements of ASME Code, Section XI.

In Reference 2, FPL indicated that an update of the St. Lucie Unit 2 PSA was completed in July 2004. Consequently, FPL re-performed the risk evaluation, to determine the contribution of pipe segments to CDF, and the change in risk evaluations, to consider the overall impact of the RI-ISI program vis-a-vis the traditional ASME Code, Section XI ISI program. In addition, the Expert Panel reviewed the results for impact on pipe segment risk categorization.

Results of the risk evaluation indicated a fractionally noticeable, but insignificant increase in contribution to CDF, both with and without credit for operator action, for Class 1 pipe segments of the Safety Injection (SI) System, a fractionally noticeable, but insignificant decrease in contribution to CDF for Class 1 pipe segments of the Charging (CH) System, and a significant decrease in contribution to CDF for Class 1 pipe segments of the Reactor Coolant System (RCS), relative to contributions to CDF calculated for the pipe segments for the second ISI interval. This same increase/decrease pattern holds for contributions to large early release frequency (LERF), both with and without operator action, with the exception that there is a slight fractional, but insignificant increase in contribution to LERF for Class 1 pipe segments of the CH system.

FPL indicated, in Reference 2, that the same pipe segments identified in Reference 4 with a risk reduction worth (RRW) equal to or more than 1.005 were, again, identified with an RRW above this threshold. FPL also stated that the five pipe segments which were previously in the RRW range between 1.001 and 1.005, referred to as "Medium Safety Significant" segments in Reference 2, remain in this range.[1] Re-performance of the same sensitivity analysis (segment dominance) that was performed during the preparation of the second ISI interval RI-ISI program indicated that the RRW of the same two "Medium Safety Significant" segments from the second ISI interval continued to elevate to 1.005, whereas the RRW of the other three segments remained well below the 1.005 threshold. As a result, the Expert Panel retained the former two segments as high safety significant. Hence, for the third ISI interval, the population of high safety significant pipe segments is identical to that of the second ISI interval.

With regard to the change of risk evaluation, FPL stated, in Reference 2, that it re-calculated the overall change of risk for the proposed third ISI interval program, using the July 2004 PSA model, and provided the results with an updated Table 3.10-1. The NRC staff observed that the overall change of risk results were reasonable, and remained within the acceptance guidelines in Reference 7. Thus, the NRC staff concludes that the change in risk estimate results for the third ISI interval provide assurance that the fourth key principle is met.

FPL summarized, in Reference 3, the changes in overall weld count and in inspection locations between the second and the third ISI intervals. FPL stated that per the 1998 Edition of the ASME Code with Addenda through 2000, many Category B-F welds were re-designated as Category B-J dissimilar metal welds. This accounts for the reduction in the total number of B-F welds given in the updated Table 5-1. In addition, FPL explained that several welds located in RCS to CH system transition segments were reassigned to the RCS from the CH system. This re-designation also took place within some of the RCS to SI system transition segments. This re-designation explains the net increase in RCS welds, and decrease in CH and SI system welds. The updated Table 5-1 also reported an increase of three overall in-scope butt welds.

This is explained as follows:

1. One butt weld was erroneously identified as a socket weld during the second ISI interval.

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1. References 4, 5, and 6, which document the second ISI interval submittal and associated responses to NRC Requests for Additional Information, all contain versions of Table 3.7-1, indicating only two pipe segments in this Medium Safety Significance range. Reference 2 indicated that these tables were not accurate, and should have indicated that five such pipe segments in the RCS were in the Medium Safety Significance range.

2. One butt weld was overlooked and not counted during the second ISI interval.

3. A new butt weld was installed at St. Lucie Unit 2 during the second ISI interval.

The NRC staff finds the explanations of the changes in weld counts to be reasonable.

FPL also noted, in Reference 2, that there has been no change in volumetric non-destructive examination (NDE) locations between the second and third ISI intervals. The second ISI interval program provided for three NDEs of Category B-F welds, while the third ISI interval program showed no NDEs of these welds. FPL also explained, that of the six remaining in-scope Category B-F welds, all are low safety significant. The B-F welds previously selected for NDE during the second ISI interval are now Category B-J welds. The NRC staff finds FPL's selection of weld locations for NDE acceptable as it is identical with the selection made for the second ISI interval, and that all remaining Category B-F welds are in low safety significant segments.

The methodology employed by FPL for its RI-ISI program requires FPL to review industry experience. Known failures at other plants should be considered and evaluated for applicability. Industry experience based on cracking of dissimilar metal welds at V.C. Summer, Three Mile Island, and Ringals 3 and 4, attributes the degradation mechanism to be primary water stress corrosion cracking involving Alloys 82 and 182. This degradation mechanism has not been addressed in Reference 7. The NRC staff requested that FPL indicate if the aforementioned recent industry experience was taken into account when selecting dissimilar welds in B-F and B-J categories for volumetric inspection. FPL responded, in Reference 2, that it had taken this information into account and that it is actively involved in industry initiatives to address the issue. FPL indicated that the Electric Power Research Institute Materials Reliability Program Alloy 600 Butt Welding Group is preparing its safety assessment for these bimetallic welds, and inspection recommendations (type and frequency) are expected to follow when the work is complete. FPL also stated that when those recommendations are issued, FPL will incorporate them as applicable, including them into either the RI-ISI program or into an augmented ISI program. The NRC staff finds FPL's approach in responding to the aforementioned recent industry experience to be acceptable.

FPL stated that the third ISI interval RI-ISI program plan will continue to be a living program. Maintenance of a living program is also unaffected by the relocation of inspections and, therefore, the fifth key principle, which provides that risk-informed applications should include performance monitoring and feedback provisions, is met.

Based on the above discussion, the NRC staff finds that the five key principles of risk-informed decision making are satisfied by FPL's proposed third ISI interval RI-ISI program plan, and, therefore, the proposed program for the third ISI interval is acceptable.

4.0 CONCLUSION

For RR-2, the NRC staff determined that FPL's proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the alternative proposed in RR-2 is authorized for use at St. Lucie Unit 2 for the third 10-year ISI interval, which began August 8, 2003, and ends August 7, 2013.

5.0 REFERENCES

1. Letter from William Jefferson, Jr. (Vice President, St. Lucie Plant), to NRC, containing St. Lucie Unit 2 Third 10-Year Inservice Inspection Interval, Inservice Inspection Program, dated August 6, 2003.

2. Letter from William Jefferson, Jr. (Vice President, St. Lucie Plant), to NRC, containing St. Lucie Unit 2 Third 10-Year Inservice Inspection Interval, Relief Request No. 2 Request for Additional Information Response, dated September 17, 2004.

3. Letter from William Jefferson, Jr. (Vice President, St. Lucie Plant), to NRC, containing St. Lucie Unit 2 Docket No. 50-389 Third 10-Year Inservice Inspection Interval Relief Request No. 2 Supplemental Information, dated December 28, 2004.

4. Letter from Donald E. Jernigan (Vice President, St. Lucie Plant), to NRC, containing St. Lucie Unit 2 Relief Request No. 29 Risk-Informed Inservice Inspection Program, dated July 23, 2002.

5. Letter from Donald E. Jernigan (Vice President, St. Lucie Plant), to NRC, containing St. Lucie Unit 2 - Relief Request No. 29 Request for Additional Information Response, dated January 16, 2003.

6. Letter from Donald E. Jernigan (Vice President, St. Lucie Plant), to NRC, containing St. Lucie Unit 2 - Relief Request No. 29 Request for Additional Information Response, dated March 26, 2003.

7. WCAP-14572 Revision 1-NP-A, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, Final Report, December 1998.

8. NRC Staff Safety Evaluation on WCAP-14572 Revision 1-NP-A, Revision B-A, dated October 28, 1999.

9. NRC Regulatory Guide 1.174, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, Revision 1, November 2002.

10. NRC Regulatory Guide 1.178, *An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping*, Revision 1, September 2003.

11. NRC NUREG-0800, Chapter 3.9.8, *Standard Review Plan For the Review of Risk-Informed Inservice Inspection of Piping*, Revision 1, September 2003.

12. Letter from Louis F. Liberatori, Jr. (Chairman, WOG), to Peter C. Wen (NRC), Transmittal of Responses to NRC Open Items on WOG RI-ISI Program and Reports WCAP-14572, Revision 1, and WCAP-14572, Revision 1, Supplement 1, September 30,1998.

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Date: February 23, 2005