

February 27, 2001

Mr. T. F. Plunkett
President, Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT 1 - EVALUATION OF RELIEF REQUEST NO. 7A
REGARDING THE VISUAL INSPECTION FREQUENCY OF THE REFUELING
WATER TANK LINER FOR THE THIRD 10-YEAR INSERVICE INSPECTION
INTERVAL (TAC NO. MB0324)

Dear Mr. Plunkett:

By letter dated October 18, 2000, Florida Power and Light Company submitted Relief Request (RR) No. 7A, for the St. Lucie Plant, Unit 1. Currently, the third 10-year inservice inspection interval, which began on February 11, 1998, calls for the licensee to drain the refueling water tank every third refueling outage to perform a visual inspection of the tank liner. The staff's approval of RR-7A will now allow the frequency for this inspection to be reduced to once every sixth refueling outage.

On the basis of the enclosed safety evaluation, the U.S. Nuclear Regulatory Commission staff has determined that the licensee's proposed alternative would provide an acceptable level of quality and safety, and the relief request is hereby authorized pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(i).

This completes the staff review of TAC No. MB0324. If you have any comments, please contact Kahtan Jabbour at (301) 415-1496.

Sincerely,

/RA/

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure: As stated

cc w/enclosures: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REVISED INSERVICE INSPECTION RELIEF REQUEST NO. 7A
ST. LUCIE UNIT NO. 1
FLORIDA POWER AND LIGHT COMPANY
DOCKET NO. 50-335

1.0 INTRODUCTION

By letter dated February 2, 1998, the Florida Power and Light Company (FPL, the licensee) submitted its third 10-year inservice inspection (ISI) program for the St. Lucie Unit 1. The third 10-year ISI program for St. Lucie Unit 1 began on February 11, 1998, and is scheduled to end on February 10, 2008. The changes to the St. Lucie ISI program for the third 10-year interval included, in part, Relief Request (RR) No. 7, for approval to extend the alternative repair program for pinhole leaks in the St. Lucie Unit 1 refueling water tank (RWT) to the end of the third 10-year ISI interval. On June 19, 1999, the staff approved FPL's request to extend the alternate repair and ISI program for the pinhole leaks in the bottom of the St. Lucie Unit 1 RWT. The alternate repair and ISI program for the RWT calls for FPL to leave the polymer (a reinforced fiberglass vinyl ester) coating on the bottom liner of the RWT in service, perform remote visual examinations of the RWT during refueling outage (RFO) Nos. SL1-16, SL1-18, SL1-19, and SL1-21, and to drain the tank and perform full hands-on inspections of the RWT during RFO Nos. SL1-17 and SL1-20 in the third 10-year ISI interval.

By letter dated October 18, 2000, FPL submitted RR-7A to amend the alternate ISI plan for the St. Lucie Unit 1 RWT and to instead change the frequency for draining the RWT and performing a comprehensive inspection of the RWT to once every six RFOs.

2.0 BACKGROUND

FPL originally submitted an RR for the alternative repair method by letter dated July 30, 1993 (Letter No. I-93-190). In this submittal, FPL requested approval for a temporary non-Code repair for pinhole leaks that had been detected in the bottom of the RWT; approval was sought until the following refueling outage for the unit. The non-Code repair was to consist of adding a reinforced vinyl ester liner to the bottom of the RWT; this was proposed in lieu of performing an American Society of Mechanical Engineers (ASME) Code-required weld repair of the leaking bottom plates. On October 21, 1993, the U.S. Nuclear Regulatory Commission (NRC) approved this RR on the condition that FPL would perform a Code-required weld repair of the leaking tank liner during the following refueling outage for the unit. On November 16, 1994, FPL submitted a letter informing the staff that it did not consider a Code repair of the RWT bottom to be practical for the fall 1994 refueling outage. Instead, pursuant to Title 10, *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), FPL requested approval to extend the use of the alternative non-Code-repair to the steam generator replacement outage. This request was approved by the staff on November 25, 1994. However, in the safety evaluation (SE) of November 25, 1994, the NRC requested, as a condition of approval, that FPL complete

ENCLOSURE

ongoing laboratory testing and in situ inspections to confirm the ultimate capabilities of the vinyl ester coating as an alternative repair method. On January 6, 1997, FPL indicated that they had completed the laboratory testing and in situ inspections of the vinyl ester coating and had confirmed that the lining meets the manufacturer's specifications for physical and chemical properties and that the coating installed in the RWT was performing as expected. Therefore, by letter dated January 6, 1997, FPL also requested approval of the use of the reinforced vinyl ester liner for both the remainder of the second 10-year ISI interval and for the third 10-year ISI interval. In its SE of May 27, 1997, the staff informed FPL that they were approving the request to extend use of the alternative vinyl ester coating repair for the remainder of the second 10-year ISI interval; however, the staff also stated that, if FPL desired to extend the use for the coating into the third 10-year ISI interval, FPL would have to resubmit the request for approval.

3.0 EVALUATION

3.1 NRC Requirements

Title 10 CFR, Section 50.55a(g)(4), requires, in part, that "throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) which are classified as ASME Code Class 1, Class 2 and Class 3 must meet the requirements . . . set forth in Section XI of editions of the ASME Boiler and Pressure Vessel Code . . . to the extent practical within the limitations of design, geometry, and materials of construction of the components."

However, 10 CFR 50.55a(a)(3)(i) allows the Director of the Office of Nuclear Reactor Regulation to authorize alternatives to the requirements of Section XI of the ASME Code, when an applicant can demonstrate that the alternative program will provide an acceptable level of quality and safety in lieu of complying the requirement in Section XI.

3.2 Current Edition of the ASME Code Used for ISI of ASME Code Class Components

1989 Edition of the Section XI to the ASME Boiler and Pressure Vessel Code, no Addenda (henceforth the 1989 Edition of Section XI).

3.3 Code Requirements

Subparagraph IWC-3132 of the 1989 Edition of Section XI states that relevant flaws that are detected in ASME Code Class 2 structures or components as a result of an inservice visual examination shall be unacceptable for continued service unless it is demonstrated that the flaws are acceptable by either "Supplemental Examination," by "Corrective Measures or Repairs," or by "Evaluation."

Articles IWA-4000 and IWC-4000 of the 1989 Edition of Section XI provide the general and specific requirements for performing welded repairs of ASME Code Class 2 components that do not meet the acceptance standards for continued service contained in Subparagraph IWC-3132 to the 1989 Edition of Section XI.

3.4 Proposed Alternative Program

Pursuant to 10 CFR 50.55a(a)(3)(i), FPL seeks approval to continue to use a reinforced fiberglass vinyl ester coating as an alternative repair for pinhole leaks in the St. Lucie Unit 1 RWT for the third 10-year ISI interval for the plant in lieu of complying with the requirements for performing a Code-required weld repair of the leaking RWT bottom liner pursuant to Article IWA-4000. However, FPL seeks approval to amend the alternate inspection program for the RWT that was previously approved by the NRC on June 19, 1999, and instead defer the frequency for draining borated water inventory of the tank and performing a full hands-on inspection of the tank to once every six RFOs.

3.5 Technical Evaluation of the Alternative Program

The RWT is an above ground aluminum tank sitting on a sand bed and supported by a concrete ring foundation. The RWT is a Quality Group B, ASME Class 2 structure constructed in accordance with American National Standards Institute, ANSI B96.1-1967. A copper ground grid is below the tank and the licensee has reported that the tank bottom has come in contact with the ground grid. During the spring 1996 refueling outage, FPL completely drained RWT in order to conduct a comprehensive inspection of the coating liner, to evaluate the performance of the installed coating liner, and to obtain sufficient data to support the request for approval of the liner as a permanent repair to the tank bottom. FPL performed nondestructive tests of the coating liner to test the liner for acceptability of the following conditions and properties: hardness, delamination, adhesion, peeling, flaking, undercutting, blistering, cracking, discoloration, holidays, and pinholes. A small hole 1/32-inch diameter and 1/16-inch deep was detected that did not penetrate through the liner. The affected area was cleaned and repaired, using Duromar SAR-SU. A small amount of duct tape was found on the RWT wall. The liner was cut open, the tape was removed, and the liner was repaired with Duromar SAR-UW epoxy coating. All of the remaining properties were satisfactory and verified the manufacturer's published information on the physical properties of the Dudick Protecto-Line 800 system. Furthermore, an independent testing laboratory confirmed that the chemical properties of the coating liner conformed to the coating vendor's published information, and that the repairs to the liner were in accordance with the vendor's specifications for the coating system.

The NRC has previously approved the fiberglass reinforced vinyl ester as an acceptable alternate repair method. The current NRC-approved alternate program, approved in the NRC SE of June 19, 1999, for the third 10-year ISI interval consists of the following inspections of the RWT:

- Visual examinations using remote camera equipment during RFO Nos. SL1-16, SL1-18, SL1-19, and SL1-21.
- Draining of the borated water inventory of the tank and performing a full hands-on examination of the RWT during RFO Nos. SL1-17 and SL1-20.

FPL is requesting to defer the frequency for draining of the borated water inventory of the tank and performing a full hands-on examination to once every sixth RFO instead of once every third RFO. This will eliminate the schedule calling for draining of the tank during RFO No. SL1-17. Thus, the revised alternate program will call for FPL to drain the RWT and perform a full

hands-on examination of RWT only during SL1-20. The revised alternate program does not change the program attribute that calls for FPL to perform remote visual examinations of the tank during those RFOs in which FPL is not scheduled to drain the tank and perform the full hands-on examination of the RWT. This will cause FPL to add RFO No. SL1-17 as one of the third-interval ISI RFOs in which FPL is scheduled to perform remote visual examinations of the RWT. This is consistent with the proposed schedule for the remote and full-hands-on examinations summarized in Table 1 of RR-7A. Table 1 of RR-7A also contains the following footnotes:

- A clarification that the proposed schedule for the examinations is only applicable through the end of the third ten-year ISI interval, and that a separate submittal by FPL will be made to the NRC regarding the proposed inspection schedule for the fourth 10-year ISI interval.
- A contingency that should any inspections indicate unacceptable results, or should there be any documented occurrences of leakage through the RWT bottom, the inspection schedule in Table 1 to RR No. 7A will be revised to require a comprehensive inspection during the first RFO following the unacceptable inspection results or documented leakage, and during every third RFO as applicable through the end of the third 10-year ISI interval.

Previous remote visual and full hands-on inspections and hands-on testing of the liner have indicated that the alternative vinyl ester coating repair is performing as expected. Previous independent test laboratory results of the liner material confirm that the correct lining material was used. In addition, the proposed alternate inspection schedule calls for FPL to continue its inspections of the caulking material between the RWT bottom and the concrete foundation ring wall on an annual basis. The inspection of the caulking material between the RWT bottom and the concrete ring wall will improve the chances that the sand bed will remain dry and that galvanic corrosion effects will not be significant.

The staff has confirmed, in part, that the following Technical Specifications (TS) govern operation of the St. Lucie Unit 1 RWT in Operating Modes 1, 2, 3, and 4:

- TS 3.5.4 requires FPL to maintain a minimum borated water inventory of 401,800 gallons in the St. Lucie Unit 1 RWT.
- TS 3.5.4 Action Statement requires FPL to restore the RWT inventory above the minimum inventory requirement within 1 hour whenever FPL determines that the borated water inventory of the tank is not in compliance with the minimum inventory requirement of TS 3.5.4, or else be in hot standby within 6 hours and in cold shutdown within the following 30 hours.
- TS 4.5.4 for St. Lucie Unit 1 requires FPL to verify the water level in the RWT once every 7 days in order to monitor whether the borated water inventory of the tank remains above the minimum required TS inventory of 401,800 gallons.

Since TS 3/4.5.4 requires FPL to monitor for abnormal inventory loss from the RWT, the staff concludes that the alternate proposed repair and ISI program for the RWT, as proposed in RR-7A, and taken in context with the TS requirements for the RWT and the inspection contingencies specified in the footnotes of Table 1 in RR-7A, will be sufficient to identify any degradation of the RWT liner and, therefore, provides an acceptable level of quality and safety for monitoring the integrity of the RWT. The staff, therefore, concludes that FPL's request to defer the schedule for draining the inventory and performing a comprehensive visual examination of the RWT to once every sixth RFO is acceptable. The program for the fourth 10-year ISI interval will be submitted as part of the ISI plan for that interval.

4.0 CONCLUSION

The staff finds that the fiberglass reinforced vinyl ester liner in the RWT is performing as expected and is structurally acceptable for continued service. The lining is a coatings-industry standard with demonstrated capability for the intended application. Furthermore, since TS 3/4.5.4 requires FPL to monitor for abnormal inventory loss from the RWT, the staff concludes that the alternate proposed ISI program for the bottom liner of the RWT, as proposed in the RR-7A, and taken in context with the TS requirements for the RWT and the inspection contingencies specified in the footnotes of Table 1 in RR-7A, will be sufficient to identify any degradation of the RWT liner, and therefore provides an acceptable level of quality and safety for monitoring the integrity of the RWT. The staff, therefore, concludes that FPL's request to defer the schedule for draining the inventory and performing a comprehensive visual examination of the RWT to once every sixth RFO is acceptable. Consequently, the staff concludes the proposed repair and inspection alternatives for the pinhole leaks of the RWT bottom liner will provide an acceptable level of quality and safety in lieu of actually performing a Section XI weld repair of the leaks in the bottom liner of the RWT.

In accordance with the provisions of 10 CFR 50.55a(a)(3)(i), the alternative to continue using the fiberglass reinforced vinyl ester as an alternative repair for the bottom liner of the tank, and the proposal to implement the proposed inspections as described in Table 1 of RR-7A, is approved for the remainder of the third 10-year ISI interval. If FPL desires to request approval for use of the alternative vinyl ester coating during fourth 10-year ISI interval, FPL will be required to resubmit its evaluation of the coating prior to entering the inspection interval.

Principal Contributor: James Medoff, NRR

Date: February 27, 2001

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ST. LUCIE PLANT

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