UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

ACRSR-2046

September 17, 2003

The Honorable Nils J. Diaz
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE LICENSE RENEWAL APPLICATION FOR THE ST. LUCIE NUCLEAR PLANT UNITS 1 AND 2

Dear Chairman Diaz:

During the 505th meeting of the Advisory Committee on Reactor Safeguards on September 10-13, 2003, we completed our review of the License Renewal Application (LRA) for the St. Lucie Nuclear Plant Units 1 and 2, and the related final Safety Evaluation Report (SER) prepared by the NRC staff. Our Plant License Renewal Subcommittee reviewed this LRA and the staff's initial SER during a meeting on April 9, 2003. During our review, we had the benefit of discussions with representatives of the NRC staff and Florida Power and Light Company (FPL or the applicant). We also had the benefit of the documents referenced.

CONCLUSION AND RECOMMENDATION

1. The programs instituted by FPL to manage age-related degradation are appropriate and provide reasonable assurance that St. Lucie Units 1 and 2 can be operated in accordance with their current licensing bases for the period of extended operation without undue risk to the health and safety of the public.

2. The FPL application for renewal of the operating licenses for St. Lucie Units 1 and 2 should be approved.

BACKGROUND AND DISCUSSION

This report fulfills the requirement of 10 CFR 54.25, which states that the ACRS should review and report on all license renewal applications. St. Lucie Units 1 and 2 are 2700 MWt Combustion Engineering-designed pressurized water reactors in large dry containments. In its application, FPL requested renewal of the operating licenses for St. Lucie Units 1 and 2 for 20 years beyond the current license term, which expires on March 1, 2016 for Unit 1 and April 6, 2023 for Unit 2. St. Lucie Unit 1 was licensed approximately 7 years before St. Lucie Unit 2. During these 7 years, significant events occurred at operating nuclear plants, including the Three Mile Island Unit 2 event and

the Browns Ferry Fire event. The lessons learned from these events resulted in design differences between St. Lucie Unit 1 and Unit 2, which are appropriately reflected in the LRA.

The final SER documents the results of the staff's review of the information submitted by the applicant, including commitments that were necessary to resolve open items identified by the staff in the initial SER. In particular, the staff reviewed the completeness of the applicant's identification of structures, systems, and components (SSCs) that are subject to aging management; the integrated plant assessment process; the applicant's identification of the possible aging mechanisms associated with passive, long-lived components; and the adequacy of the applicant's aging management programs.

The staff also conducted several inspections at St. Lucie, including an audit of the adequacy of the scoping and screening methodology and its implementation to ensure that SSCs within the scope of license renewal have been appropriately identified; an inspection of the aging management programs to confirm that existing programs are functioning well and to examine the applicant's plans for establishing new and enhanced aging management programs; and a walkdown of plant systems to assess how the systems are being maintained.

On the basis of our review of the final SER, LRA, and the inspection report, we conclude that the process implemented by the applicant to identify SSCs that are within the scope of license renewal was effective, the applicant performed a comprehensive aging management review of such SSCs, and the staff and the applicant appropriately identified all SSCs that are within the scope of license renewal. The applicant stated that it plans to implement 70 to 80% of the commitments for license renewal prior to the issuance of the renewed licenses. We agree with the staff's conclusion that all open and confirmatory items have been closed appropriately and there are no issues that preclude renewal of the operating licenses for St. Lucie Units 1 and 2.

The groundwater at the St. Lucie site is characterized by high concentrations of chlorides and sulfates that create an aggressive environment for concrete structures. The applicant has committed to enhance those elements of the St. Lucie's Systems and Structures Monitoring Program that deal with inspections of accessible and inaccessible concrete structures. This Program will be enhanced to include specific provisions consistent with industry standards and inspection guidelines for monitoring concrete structures. The monitoring plan for inaccessible concrete structures includes inferring material conditions of inaccessible structures from inspection of accessible structures exposed to groundwater and opportunistic inspections of below-grade concrete. The applicant stated that during construction, concrete of sufficient quality was used to inhibit degradation of concrete and protect the embedded reinforcing steel. No concrete degradation has been found during opportunistic inspections of inaccessible concrete structures performed in 1997 and 2002. Based on this information, we agree with the staff that the enhancements proposed by the applicant provide reasonable assurance that the integrity of concrete structures at St. Lucie will be adequately monitored during the period of extended operation.

St. Lucie's Alloy 600 Inspection Program includes provisions and commitments for inspecting reactor pressure vessel (RPV) head penetration nozzles. The applicant has performed visual and ultrasonic inspections of the RPV heads of both units, and no evidence of leakage has been identified. An axial flaw was identified and repaired in two control element drive mechanism penetrations of Unit 2. The applicant has ordered replacement heads for both units. The applicant will continue to participate in the industry program for assessing and managing primary water stress corrosion cracking (PWSCC) in Alloy 600 RPV head penetration nozzles, and has committed to perform inspections as recommended by this program. Based on the applicant's responses to related NRC bulletins and its commitment to participate in the industry's program for assessing and managing PWSCC of the RPV head penetration nozzles, there is reasonable assurance that the integrity of St. Lucie Units 1 and 2 RPV heads will be adequately monitored and maintained.

The applicant identified those components at St. Lucie Units 1 and 2 that are supported by time-limited aging analyses (TLAAs) and provided data to demonstrate that the components have sufficient margin to operate properly during the period of extended operation.

Two of the TLAAs are unique to St. Lucie because they qualify repairs of long-lived passive components for the period of extended operation. The first addresses the repairs that took place at St. Lucie Unit 1 to deal with damage identified in 1983 in the core support barrel (CSB) and thermal shield assemblies. The thermal shield was permanently removed. Four lugs were found to have separated from the CSB and through-wall cracks were found adjacent to the lug areas. These cracks were arrested with crack-arrestor holes that were sealed by inserting expandable plugs. The repairs were qualified for the remaining life of the plant and have been repeatedly inspected and found to be effective. In order to qualify these repairs for 60-years life, the fatigue analysis of the CSB middle cylinder and the acceptance criterion for the expandable-plugs preload based on irradiation-induced stress relaxation had to be repeated to cover 60-years of operation. The staff performed a thorough review of this TLAA and found it acceptable. The work presented by the applicant and the staff, and the inservice inspections to which the CSB will continue to be subjected provide reasonable assurance that the integrity of the CSB will be adequately monitored and maintained during the period of extended operation.

The second TLAA involves the 1994 half-nozzle repair of four leaking pressurizer instrument nozzles at Unit 2 and the 2001 half-nozzle repair of one leaking hot leg instrument nozzle at Unit 1. These repairs need to be qualified for the extended period of operation. The staff's review of the supporting analyses, which includes a request for relief from certain requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, is still under way. The applicant has committed that if the acceptability of the half-nozzle design cannot be demonstrated for the period of extended operation, then this TLAA will be dispositioned by other means, possibly including appropriate nozzle replacement to comply with ASME Code replacement criteria. This commitment ensures that these repairs will be adequately qualified for the period of extended operation.

The applicant and the staff have identified plausible aging effects associated with passive, long-lived components. Adequate programs have been established to manage the effects of aging so that St. Lucie Units 1 and 2 can be operated in accordance with their current licensing bases for the period of extended operation without undue risk to the health and safety of the public.

Sincerely,

/RA/

Mario V. Bonaca
Chairman

References:

1. U.S. Nuclear Regulatory Commission, NUREG -xxxx, "Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2," July 2003.
2. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report with Open Items Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2," February 2003.
3. Letter dated November 29, 2001 from J. A. Stall, Florida Power and Light Company, to U.S. Nuclear Regulatory Commission, transmitting Application to Renew the Operating Licenses of St. Lucie Nuclear Plant, Units 1 and 2.
4. U. S. Nuclear Regulatory Commission, Region II Inspection Report No. 50-335/03-03, 50-389/03-03.