UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 82

TO FACILITY OPERATING LICENSE NO. DPR-67

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT, UNIT NO. 1

DOCKET NO. 50-335

1.0 INTRODUCTION

By application dated February 28, 1986, as supplemented by letters dated November 14, 1986, and April 15, 1987, Florida Power and Light Company (FP&L) requested an amendment to the facility operating license for the St. Lucie Plant, Unit No. 1. The proposed amendment would change the expiration date of the Unit No. 1 Facility Operating License, DPR-67, from July 1, 2010, to March 1, 2016. The November 14, 1986 and April 15, 1987 submittals provided additional information and did not alter the action noticed in the Federal Register on March 26, 1986, or affect the staff's initial no significant hazards determination.

2.0 DISCUSSION

Section 103.C of the Atomic Energy Act of 1954 states that a license is to be issued for a specified period not to exceed 40 years. The Commission's regulations in 10 CFR Part 50.51 specify that each license will be issued for a fixed period of time not to exceed 40 years from the date of issuance. The currently licensed term for the St. Lucie Plant, Unit No. 1, is 40 years commencing with the issuance of the construction permit which was issued on July 1, 1970. Accounting for the time that was required for plant construction, this represents an effective operating license term of approximately 34 years. Consistent with Section 103.C of the Atomic Energy Act and Section 50.51 of the Commission's regulations, the licensee, by the February 28, 1986 application, seeks extension of the operating license term so that the fixed period of the license would be from the date of issuance of the operating license.

3.0 EVALUATION

The following evaluation was conducted to assure that the licensee's "as low as is reasonably achievable" (ALARA) measures and dose projections are applicable for the additional years of plant operation and are in accordance with 10 CFR Part 20 and Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures At Nuclear Power Stations Will Be As Low As is Reasonably Achievable" (Revision 3).

3.1 ALARA MEASURES

FP&L stated that operating and maintenance personnel will follow specific plans and procedures to ensure that ALARA goals are achieved in the extended years of operation. High radiation exposure operations will be preplanned and carried out by personnel trained in radiation protection using proper equipment. During such activities, personnel will be monitored for exposure to radiation and contamination. When major maintenance, repair, surveillance, and refueling tasks are completed, results will be factored into the radiation protection procedures to make changes in future job procedures and techniques that will reduce personnel exposures. FP&L anticipates improvements such as robotics, remote surveillance, remote tooling, decontamination, improved computer resources, etc., to be factors in the future toward achieving ALARA doses. If the projected total person-rem increases during the extended years, higher levels of supervision and management oversight will be employed to audit and approve the ALARA reviews. In addition, the station and general office health physics staff will be available for advice, consultation, and review of any tasks with a relatively high potential radiological hazard.

The licensee has established an ALARA Executive Organization consisting of the Group Vice President of Nuclear Energy Operations, the Plant Manager, the Plant Health Physics Supervisor, an ALARA Coordinator, a Corporate Health Physicist and plant staff. The purpose of this organization is to 1) conduct and appraise the effectiveness of the ALARA program at the nuclear facility, 2) ensure that it is properly implemented at St. Lucie, and 3) confirm that it appropriately integrates FP&L management philosophy and NRC regulatory requirements and guidance. A plant ALARA Review Board also periodically evaluates the effectiveness of the plant's ALARA program. The licensee's radiation protection/ALARA program has been recognized by the NRC staff as adequate overall in the Systematic Assessment of Licensee Performance (SALP) from 1981 to 1986 (Category 2 rating). Further, Region II has recently reduced the frequency of inspection of St. Lucie due to high performance in the SALP evaluation in the areas of management, productivity, surveillance and testing programs. The staff, therefore, concurs that St. Lucie Unit 1 has an adequate health physics organization and radiation protection program, and that personnel will be adequately trained for the additional years of operation. The staff further concludes that the updated FSAR for St. Lucie Unit 1 (Radiation Protection) is in accordance with 10 CFR Part 20 and is consistent with the criteria of Regulatory Guide 8.8. Thus, the staff finds the ALARA program and practices to be acceptable.

3.2 DOSE ASSESSMENT

FP&L provided tables specifying person-rem exposures at St. Lucie Unit 1 by plant system independent of when these exposures were obtained (e.g., during normal operations, maintenance, repair, or refueling activities) and by whom (e.g., plant operations personnel, plant maintenance personnel, or contractor/ vendor personnel). The staff audited the licensee's dose assessment for the extended years (2010-2016) against the criteria of Standard Review Plan (SRP) Section 12.3. The licensee based their estimate on 8 years of operating experience and engineering judgment, and on personnel exposure at St. Lucie Unit 1 for the years 1978-1985. FP&L expects the additional years of operation of St. Lucie Unit 1 to result in a total dose of 3360 person-rem or an average of 560

person-rem per year. Currently, operating PWR's average more than 569 person-rem per unit annually (1980-1985) with some plants experiencing an average lifetime annual dose as high as 1300 person-rem. These average doses are based on widely varying yearly doses at PWR's.

The licensee estimated 4 additional refueling cycle years and 2 non-refueling cycle years during the years 2011-2016. Barring major plant modifications, the total dose is predicted to be 3600 person-rems. The predicted value is based on an assumed 160 person-rem for a non-outage year and 760 man-rem for a refueling outage year. Dose allowance for crud build-up will be offset by dose savings from a continually improving ALARA program. It is expected that state-of-the-art technologies will be in use including some robotics, enhanced chemistry control and modern decontamination processes.

3.3 CONCLUSION ON RADIATION PROTECTION

Based on the above, the staff concludes that the licensee's dose assessment is acceptable, and the radiation protection program is adequate for ensuring that occupational radiation exposures will be maintained in accordance with ALARA guidelines and in compliance with 10 CFR Part 20 requirements.

3.4 PRESSURE VESSEL TOUGHNESS

The licensee for the St. Lucie Plant, Unit No. 1, in response to the requirements of 10 CFR 50.61, "Fracture Toughness Requirements for Protection against Pressurized Thermal Shock Events," submitted information on the projected values of the RT_{PTS} to expiration of their current operating license, July 1, 2010. RT_{PTS} means the reference temperature which is a calculated value and is used as a screening criterion. The staff evaluation, which was forwarded to the licensee by letter dated February 10, 1987, calculated an RT_{PTS} value of 231°F (the licensee calculated 230°F) which is less than 270°F which is the screening criterion for the limiting material at the current expiration date of the license (July 1, 2010). The following evaluation addresses the proposed license extension date of March 1, 2016.

In the February 10, 1987 evaluation of the PTS issue, it was established that the methodology, the cross sections and the approximations used by the licensee in the estimation of the RT_{PTS} to end of the current license are acceptable.

The same methodology, cross sections and approximations have been used in the estimation of the fluence for 32 effective full power years of operation. The value of the fluence for welds 3-203 A, B, C was estimated to be 1.93×10^{19} n/cm^2. The equation specified in 10 CFR 50.61, as applicable for the St. Lucie Unit 1 plant for the calculation of the RT_{PTS}, is:

$$RT_{PTS} = I + M + (-10 + 470 \times Cu + 350 \times Cu \times Ni) \times f^{0.27}$$

where:

I =	Initial RT_{NDT}	=-56°F
M =	Uncertainty Margin	=-59°F
Cu =	w/o Copper in welds 3-203, A, B, C	=-0.30
Ni =	w/o Nickel in welds 3-203, A, B, C	=-0.64
F =	azimuthal fluence on welds 3-203, A, B, C (E>1.0 MeV) for 32 effective full power years of operation in units of 10^{19} n/m^2	= 1.93

Therefore:

$$RT_{PTS} = -56 + 59 + (-10 + 470 \times 0.30 \times 350 \times 0.30 \times 0.64) \times 1.93^{0.27}$$
$$= 3 + 198.2 \times 1.194 = 239.7°F$$

which is lower than 270°F, the applicable 10 CFR 50.61 screening criterion.

3.5 CONCLUSION ON PRESSURE VESSEL TOUGHNESS

Based on the above, the staff concludes that the requested license amendment to extend the license to 40 calendar years of operation will comply with the pressure vessel toughness requirements for protection against pressurized thermal shock events as required by 10 CFR 50.61.

3.6 EFFECTS ON SYSTEMS AND EQUIPMENT

The licensee's request for extension of the operating license is based on the fact that a 40-year service life was considered during the design and construction of the plant. This does not mean that some components will not wear out during the plant lifetime. Rather, design features were incorporated which provide for inspectability of structures, systems, and equipment. Surveillance and maintenance practices which were implemented in accordance with the ASME Code and the facility Technical Specifications provide assurance that any unexpected degradation in plant equipment will be identified and corrected. The design of the reactor vessel and its internals considered the effects of 40 years of operation, and a comprehensive vessel material surveillance program is maintained in accordance with 10 CFR Part 50, Appendix H. Surveillance capsules placed inside the reactor vessel provide a means of monitoring the cumulative effects of power operation.

Aging analyses have been performed for all safety-related electrical equipment in accordance with 10 CFR 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants," identifying qualified lifetimes for this equipment. These lifetimes will be incorporated into plant equipment maintenance and replacement practices to ensure that all safety-related electrical equipment remains qualified and available to perform its safety function regardless of the overall age of the plant.

3.7 SUMMARY OF FINDINGS

Based upon the above, the staff finds that the extension of the operating license for the St. Lucie Plant, Unit No. 1, to allow a 40-year service life, is consistent with the safety analysis for St. Lucie Plant, Unit No. 1, and that the Commission's previous safety findings are not changed. All issues associated with plant systems and equipment, including aging and changes in fracture toughness properties of materials, have been addressed and are acceptable for 40-years of operation. The plant continues to meet the guidelines of 10 CFR Part 100. Accordingly, the staff finds the proposed change to the expiration date of the St. Lucie Plant, Unit No. 1 Facility Operating License DPR-67 to be acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

An Environmental Assessment and Finding of No Significant Impact relating to the proposed extension in the expiration date of Facility Operating License No. DPR-67 for the St. Lucie Plant, Unit No. 1, was published in the Federal Register on June 8, 1987 (52 FR 21634).

5.0 CONCLUSION

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: July 8, 1987

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