February 28, 2000

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

SUBJECT: ST. LUCIE UNIT 2 - ISSUANCE OF AMENDMENT REGARDING TURBINE OVERSPEED PROTECTION SYSTEM (TAC NO. MA6372)

Dear Mr. Plunkett:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No.108 to Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit No. 2. This amendment consists of changes to your Final Safety Analysis Report (FSAR) in response to your application dated August 18, 1999. Your application contained a request to withhold information classified by Westinghouse Electric Company as proprietary. In a letter to H.A. Sepp, Manager, Regulatory and Licensing Engineering, dated October 21, 1999, the NRC determined the information contained proprietary commercial information that will be withheld from public disclosure.

We have completed our review of the unreviewed safety question issue regarding decreased surveillance frequency for cycling steam valves in the turbine overspeed protection system from monthly to quarterly.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/RA/

Kahtan N. Jabbour, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-389

Enclosures: 1. Amendment No. 108 to NPF-16
2. Safety Evaluation

cc w/enclosures: See next page

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FLORIDA POWER & LIGHT COMPANY

ORLANDO UTILITIES COMMISSION OF

THE CITY OF ORLANDO, FLORIDA

AND

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. 50-389

ST. LUCIE PLANT UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 108
License No. NPF-16

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power & Light Company, et al. (the licensee), dated August 18, 1999, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, changes to the updated Final Safety Analysis Report (FSAR) to reflect St. Lucie Unit 2 decreased surveillance frequency for cycling steam valves in the turbine overspeed protection system from monthly to quarterly, as set forth in the application for amendment by Florida Power and Light Company dated August 18, 1999, are authorized. The licensee shall submit the revised description authorized by this amendment with the next update of the FSAR.

3. This license amendment is effective as of its date of issuance and shall be implemented as specified in 2 above.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

Date of Issuance: February 28, 2000

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 108 TO FACILITY OPERATING LICENSE NO. NPF-16

FLORIDA POWER AND LIGHT COMPANY, ET AL.

ST. LUCIE PLANT, UNIT NO. 2

DOCKET NO. 50-389

1.0 INTRODUCTION

By letter dated August 18, 1999, Florida Power and Light Company (FPL, the licensee) submitted a request to amend Facility Operating License No. NPF-16 for St. Lucie Plant, Unit 2. The submittal proposed changes to the Final Safety Analysis Report (FSAR) to revise surveillance requirements related to the turbine overspeed protection system. On the basis of past operational experience, Westinghouse Electric Corporation's (Westinghouse) recommendations for inspection intervals, and the results of the Westinghouse proprietary reports and letter, the licensee proposed to increase the surveillance interval for the steam valves in the turbine overspeed protection system from once per month to once per quarter (92 days).

2.0 BACKGROUND

St. Lucie Unit 2 turbine is a Westinghouse BB-296 turbine with steam chests. The turbine operates at 1800 RPM and consists of one double-flow, high pressure (HP) turbine in tandem with two double-flow low pressure (LP) turbines. The turbine has moisture separation and reheat between the high and two low pressure elements.

The HP turbine has two steam chests. Each steam chest has two stop (throttle) valves and two control (governor) valves. Each of the four HP turbine exhausts is routed through a moisture separator reheater (MSR) to the two LP turbines. Each MSR flow path has one reheat-stop and one reheat-intercept valve arranged in series. These valves are of the butterfly type. All 16 of the turbine steam valves are hydraulically operated by the digital-electronic-hydraulic control system. Hydraulic pressure keeps these valves open and a loss of hydraulic pressure will result in valve closure. However, the failure of one valve to close will not prevent the shutdown of the turbine. The function of these valves is to control and limit turbine speed and, in the case of a loss of generator load, stop steam admission to the turbines.

The turbine-generator system is equipped with two automatic overspeed trip systems that have conservative trip settings of approximately 111% of rated turbine speed. These independent systems have redundant and diverse speed sensing devices. These systems are designed to minimize the probability of turbine missiles and meet the requirements of Title 10, *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 4, "Environmental and Dynamic Effects Design Bases."

Turbine overspeed protection is required since excessive overspeed of the turbine could generate potentially damaging missiles which, in turn, could impact and damage safety-related components, equipment or structures. Although the design, manufacturing, and testing practices minimize the potential of a major turbine structural failure, such failures are hypothesized and either barriers or equipment separation is provided where indicated by analysis to protect Class 1 systems from turbine failure missiles. Updated FSAR Section 3.5.1.3 describes the St. Lucie Unit 2 licensing basis analysis that was performed to evaluate turbine generated missile hazards from an unfavorably oriented turbine, and classifies turbine failures into two general types referred to as design overspeed failures (120% of normal running speed) and destructive overspeed failures (194% of normal running speed).

Pursuant to the St. Lucie Unit 2 updated FSAR, each turbine throttle, governor, reheat-stop, and reheat-intercept valve must be cycled from their running position at monthly intervals when the plant is in Mode 1, and in Modes 2 and 3 if all steam paths to the turbine are not isolated. Although this type of testing may be beneficial for detecting sluggish or non-operation of the valves, the test causes some wear to the valves and stress to the steam system, and represents a load threat for Mode 1 operation which could result in a significant reactor transient. NUREG-1366 discusses this test in the framework of "Improvements to Technical Specifications Surveillance Requirements," and recommends that, where the turbine manufacturer agrees, the testing interval for turbine valves as part of the turbine overspeed protection system surveillance be extended from weekly or monthly tests to one test done quarterly, in which a direct visual observation will be made of the movement of each turbine valve.

The licensee proposed to modify the updated FSAR Section 13.7.1.6.2.a, by changing the test frequency from once per month to once per quarter, and from once per 31 days to once per 92 days, respectively. FPL based this request on both probabilistic and deterministic analyses.

3.0 EVALUATION

An evaluation of the impact from extending the test interval for the St. Lucie, Unit 1 and Unit 2, turbine valves from monthly to quarterly was performed by Westinghouse Electric Company LLC. The probability of turbine missile generation (per year) as a function of various test intervals was examined for design (approximately 120% of rated turbine speed), intermediate (approximately 130% of rated turbine speed), and destructive (runaway speed in excess of approximately 180%) overspeed events. The results of the evaluation are contained in three reports, which collectively form the basis for the proposed test interval for St Lucie Unit 2 amendment request:

(1) WCAP-14732, Revision 1, "Probabilistic Analysis of Reduction in Turbine Valve Test Frequency for Nuclear Plants with Westinghouse BB-296 Turbines with Steam Chests," Westinghouse Energy Systems, June 1997.

(2) WCAP-14732, Revision 1, Addendum 1, "Evaluation of the Applicability of WCAP-14732, Revision 1, to St. Lucie Units 1 and 2," Westinghouse Electric Company LLC, April 1999.
(3) Letter Report, "Evaluation of Turbine Missile Ejection Probability Resulting From Extending the Test Interval of Interceptor and Reheat Stop Valves at St. Lucie Units 1 and 2;" prepared by Westinghouse Electric Company LLC, April 1999 (attachment to transmittal letter WOG-

TVTFFPL-99-002 from A.P. Drake (Westinghouse Owners Group (WOG)) to C. Buehrig (FPL), April 30, 1999).

Regarding the maintenance and testing schedules for turbine overspeed protection systems, the NRC staff recommended that the annual probability of turbine missile ejection not exceed 1.0E-04/year for favorably oriented, and 1.0E-05/year for unfavorably oriented turbines. The St. Lucie turbine is unfavorably oriented. For all test intervals analyzed, the missile ejection frequency from destructive overspeed met the acceptance criteria of 1.0E-5/year. However, since the governor and throttle valve failure rates are based on plant operating experience, sufficient failure information for longer test intervals does not currently exist. Westinghouse supports quarterly testing until reasonable failure rate data can be accumulated. The licensee will inform the staff if the accumulated failure rate data does not support the longer test intervals. For quarterly testing, the total probability of turbine missile ejection from destructive overspeed was determined to be less than 5.0E-07/year.

The staff found that plant safety can be improved, equipment degradation decreased, and the burden of unnecessary testing eliminated by reducing the amount of testing required during plant operation. Generic Letter 93-05 provided guidance to implement these recommendations as line-item TS improvements. These line-item TS improvements are reported in NUREG-1366. Although the proposed changes are to surveillance requirements in the FSAR, the effect of the changes remains the same. Therefore, the proposed changes are in accordance with this guidance.

Section 5.13 of NUREG-1366 provides a comprehensive evaluation of turbine overspeed protection system testing and contains NRC recommendations for the frequency of testing turbine valves. The NUREG recommends that, where the manufacturer agrees, the turbine valve test frequency should be changed to one test done quarterly. The surveillance interval could be extended up to 3 months if such a change is supported by the turbine manufacturer's generic data and the licensee follows the manufacturer's methodology using plant-specific data to justify the new test frequency. The Westinghouse reports recommend that all plants with BB-296 turbines with steam chests, such as the turbine at St. Lucie Unit 2, change the surveillance frequency to quarterly.

Section 10.2 of the Standard Review Plan (SRP), NUREG-0800, provides guidance on evaluating the surveillance testing of steam valves. The purpose of this guidance is to ensure that the turbine overspeed protection system will perform in a manner that meets the requirements of GDC 4 of 10 CFR Part 50, Appendix A, with regard to the protection of structures, systems, and components important to safety. With quarterly testing of the turbine throttle and governor valves, the total probability of turbine missile ejection from destructive overspeed was determined to be 5.0E-07/year.

Based on the review described above, the staff finds that the proposed FSAR amendment meets the guidance provided in NUREG-1366, the requirements of GDC 4 of 10 CFR Part 50, Appendix A, and the intent of the guidance of Section 10.2 of the SRP with regard to the protection of structures, systems, and components important to safety, from the effects of turbine missiles. Therefore, the proposed changes to the surveillance requirements for the St. Lucie Unit 2 turbine overspeed protection system are acceptable.

It should be noted that the NRC staff did not complete a generic review of WCAP-14732, Revision 1, in conjunction with this evaluation and, therefore, this review does not constitute NRC approval or endorsement of WCAP-14732, Revision 1.

5.0 STATE CONSULTATION

By letter dated March 8, 1991, Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, informed Deborah A. Miller, Licensing Assistant, U.S. NRC, that the State of Florida does not desire notification of issuance of license amendments. Thus, the State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

These amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding (64 FR 51345). Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

7.0 CONCLUSION

Based on the review described above, the staff concludes that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Tatum, NRR
W. Gleaves, NRR

Date: February 28, 2000

Mr. T. F. Plunkett
Florida Power and Light Company

ST. LUCIE PLANT

cc:
Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
P.O. Box 6090
Jensen Beach, Florida 34957

Joe Myers, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

M. S. Ross, Attorney
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Douglas Anderson
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

Mr. William A. Passetti, Chief
Department of Health
Bureau of Radiation Control
2020 Capital Circle, SE, Bin #C21
Tallahassee, Florida 32399-1741

Mr. Rajiv S. Kundalkar
Vice President
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. R. G. West
Plant General Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

E. J. Weinkam
Licensing Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. John Gianfrancesco
Manager, Administrative Support
and Special Projects
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J. A. Stall
Vice President - Nuclear Engineering
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J. Kammel
Radiological Emergency
Planning Administrator
Department of Public Safety
6000 SE. Tower Drive
Stuart, Florida 34997