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Docket No. 50-389

Mr. J. W. Williams, Jr.
Vice President
Nuclear Energy Department
Florida Power & Light Company
P. O. Box 14000
Juno Beach, Florida 33408

Dear Mr. Williams:

SUBJECT: EMERGENCY SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION - SURVEILLANCE REQUIREMENTS

The staff completed its review of your application to amend Operating License NPF-16 for St. Lucie Plant, Unit No. 2 in late 1984. The application, dated May 22, 1984 (L-84-133) requested an increase in the surveillance interval from 6 to 8 months for the Emergency Safety Features Actuation System. This review was performed under TAC# 55063.

As a result of the staff's review, it was determined that there was insufficient information/justification to approve this change to the surveillance requirement currently reflected in the Technical Specifications. There have been several oral discussions with members of your staff and the NRC project manager during the last few months.

In the most recent discussions with your staff, it was agreed to provide you with a draft of the Safety Evaluation, prepared by the staff, that provides the basis for denying your application for amendment. The draft Safety Evaluation is enclosed.

You are requested to provide additional information and/or justification in support of your application within 30 days of receipt of this letter or a date that you can meet within 15 days. If we do not receive a response within the times indicated above, it is the intent of the staff to issue the draft Safety Evaluation as a final document denying your May 22, 1984 application.

If you have any questions concerning this matter, please contact the project manager, D. E. Sells, at (301) 492-9735.

This request affects fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Original signed by:

Edward J. Butcher, Acting Chief
Operating Reactors Branch #3
Division of Licensing

Enclosure:
As stated

cc w/enclosure
See next page

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DRAFT

ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF
NUCLEAR REACTOR REGULATION RELATED TO
AMENDMENT TO APPENDIX A OF FACILITY
OPERATING LICENSE NPF-16
FLORIDA POWER AND LIGHT COMPANY
ST. LUCIE UNIT 2
DOCKET NO. 50-389

Introduction

Florida Power and Light Company (FP&L), the licensee of the St. Lucie Unit 2 Nuclear Plant, in a letter written to the Commission, dated May 22, 1984, proposed changes to the Operating License of Unit No. 2 (NPF-16). The changes are not accepted as submitted by FP&L.

EMERGENCY SAFETY FEATURES ACTUATION SYSTEM
INSTRUMENTATION - SURVEILLANCE REQUIREMENTS

Discussion and Evaluation

In their letter of May 22, 1984, FP&L proposed changes to the Technical Specifications which would alter the frequency of performance of the Emergency Safety Features Actuation System (ESFAS) subgroup relay surveillance test from six to eighteen months (refueling cycle).

The licensee's submittal utilizes reliability/availability modeling and estimation techniques to quantitatively demonstrate that the effect of ESFAS subgroup relay surveillance testing on the ESFAS actuation channel is insensitive to a change in the surveillance test interval. During our evaluation of the licensee's equation for determining the effect of surveillance testing on ESFAS subgroup relays, making the same assumptions as the licensee made except for the failure rate for relays, we determined that the ESFAS actuation channel is sensitive to change.

Additionally, when reviewing the Standard Technical Specifications for similar CE plants, the surveillance requirements for the Automatic Actuation Logic were identified to be monthly vis-a-vis the St. Lucie requirement of monthly for each initiation relay and six months for subgroup relays.

In a letter dated June 7, 1983, the NRR Staff clarified its position regarding Engineered Safety Feature Actuation System surveillance testing. The staff considered the St. Lucie Unit 2 Technical Specifications and the commitments made in Sections 7.2.1.1.9., 7.3.1.1.1.d., and 7.4.2.3. of the FSAR to require testing of the ESFAS at power including complete operation of the actuation devices (subgroup relays, initiation relays, etc.) and associated actuated equipment

except for the components specifically identified in FSAR Table 7.3-9 (various pumps and valves). Additionally, the staff requested the utility provide a list of specific devices along with the justification why these devices could not be tested at power, if the list of devices identified in FSAR Table 7.3-9 was insufficient. If the surveillance frequency is changed to every eighteen months (refueling cycle), the utility would not meet their commitment for testing at power.

Detailed Analysis

The licensee conducted reliability/availability modeling and estimation techniques on two ESFAS systems. A typical subsystem, the Safety Injection Actuation Signal (SIAS) was chosen and the Auxiliary Feedwater Actuation System (AFAS) was chosen for this analysis.

a. The licensee constructed a reliability block diagram model for the SIAS. Included in this model were the measurement channels, bistable, isolation and actuation modules, associated power supplies, subgroup relay, control circuit, and circuit breaker for the Low Pressure Safety Injection Pump 2A. The reliability block diagram was translated directly into a Boolean expression which simplified into a system unavailability (Qsys) expression. The licensee then determined system unavailability by adding up all individual component unavailabilities (failure rates). Included in the expression was the variable T, which is the fault exposure time for the subgroup relay (KS01 B).

$$T = \frac{\text{Test Interval}}{2}$$

When evaluating the SIAS, the same assumptions made in the licensee's analysis were used, with the exception of the failure rate of the subgroup actuation relays (K501B). The licensee used the value 6E-8/hr (Value obtained from MIL-Handbook 217B, June 1977). Instead, the value 3E-6/hr was used (Value obtained from NUREG/CR-2728, Interim Reliability Evaluation Program (IREP) Procedures Guide, January 1983) for determining system availability. The value 3E-6/hr is more conservative and is the mean value failure rate for the types of relays commonly found in nuclear power plant safety systems.

The SIAS system unavailability is calculated:

$$Qsys = 1.2 \times 10^{-3} + 3 \times 10^{-6} \times T$$

The SIAS system availability is calculated:

$$Asys = (1-Qsys)$$

To determine a change in system availability, the SIAS availability was calculated for each surveillance interval and the difference was computed to determine percent change in availability.

Surveillance Interval	Qk501B (Relay)	Qsys	Asys (1-Qsys)
4380 hr	6.6×10^{-3}	7.8×10^{-3}	.9922
13140 hr	1.97×10^{-2}	2.09×10^{-2}	.9790

This represents a decrease in SIAS actuation channel availability of 1.3%.

b. For the AFAS, the licensee chose a fault tree approach to determine system unavailabilities. Since AFAS actuates a number of components, the licensee considered an actuation path to one typical component. The actuation device chosen was a circuit breaker for AFW motor driven pump 2A. When evaluating the AFAS, the same assumptions made in the licensee's analysis were used, except for relay failure rates. The values used were obtained from NUREG/CR-2728, IREP Procedures Guide, January 1983. The mean value failure rates for typical relays found in a nuclear plant safety system are:

Relay Contact failure rate = 8.3E-7/hr
Relay Coil failure rate = 3.0E-6/hr

When the AFAS fault tree was solved for minimal cutsets and the component unavailabilities substituted for the basic events, the following expression for fault tree top event probability resulted.

$$QAFAS = 1.4E\text{-}3 + 8.3E\text{-}6T + 2.8E\text{-}11T^2$$

Where T = ½ (Time between Automation Actuation Logic Tests)

The availability of AFAS was determined for each surveillance interval and the difference was computed to determine percent change in system availability. The licensee also considered the number of anticipated plant transients in a year, and this element was factored into the AFAS availability expression.

$$\text{Where } T = \frac{8760 \text{ Hrs/YR}}{\frac{\#\text{ Tests}}{\text{Year}} + \frac{\#\text{ Transient Demands}}{\text{Year}}}$$

AFAS AVAILABILITY - NO ANTICIPATED TRANSIENT DEMANDS

Test Interval (Hrs)	Fault Exp. Time (Hrs)	Q (Unavail)	A (Avail) (1-Q)
4380 (6 mo.)	2190	1.97E-2	.9802
13140 (18 mo.)	6570	5.7E-2	.9428

With NO ANTICIPATED transient demands, this represents a decrease in AFSA availability of 3.7%.

With anticipated transient demands of 2.67/year, the availability decrease is 0.6%.

Conclusion

The licensee considered the ESFAS to be insensitive to change in the test interval (0.03% change in availability for SIAS and 0.02% change for the AFAS). When using more conservative published relay failure rates, the systems appear to be sensitive (1.3% change for SIAS and 0.6% change for the AFAS) and a change in test intervals would have more of an effect.

Considering the above analysis and that the Standard Technical Specifications for similar CE plants are more restrictive than the licensee's present requirements, we feel that the requested change in surveillance test frequency from 6 months to 18 months for a system as important as ESFAS is significantly less conservative.

The proposed change is denied as submitted.

Mr. J. W. Williams, Jr.
Florida Power & Light Company

St. Lucie Plant

Mr. Jack Shreve
Office of the Public Counsel
Room 4, Holland Building
Tallahassee, Florida 32304

Mr. Allan Schubert, Manager
Public Health Physicist
Department of Health and
Rehabilitative Services
1323 Winewood Blvd.
Tallahassee, Florida 32301

Resident Inspector
c/o U.S. NRC
Senior Resident Inspector
7585 S. Hwy A1A
Jensen Beach, Florida 33457

State Planning & Development Clearinghouse
Office of Planning & Budget
Executive Office of the Governor
The Capitol Building
Tallahassee, Florida 32301

Harold F. Reis, Esq.
Newman & Holtzinger
1615 L Street, N.W.
Washington, DC 20036

Norman A. Coll, Esq.
McCarthy, Steel, Hector and Davis
14th Floor, First National Bank Building
Miami, Florida 33131

Administrator,
Department of Environmental Regulation
Power Plant Siting Section
State of Florida
2600 Blair Stone Road
Tallahassee, Florida 32301

Mr. Weldon B. Lewis, County
Administrator
St. Lucie County
2300 Virginia Avenue, Room 104
Fort Pierce, Florida 33450

Mr. Charles B. Brinkman, Manager
Washington - Nuclear Operations
Combustion Engineering, Inc.
7910 Woodmont Avenue
Bethesda, Maryland 20814

Regional Administrator
USNRC, Region II
Executive Director for Operations
101 Marietta Street N.W., Suite 2900
Atlanta, Georgia 30323