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SUBJECT:
FORWARDING LIC NO DPR-67 APPL FOR AMEND: APPENDIX A TECH SPEC PROPOSE CHANGE CONCERNING DELETING REQUIREMENTS FOR PART LENGTH CONTROL ELEMENT ASSEMBLIES FROM UNIT 1 TECH SPECS...NOTARIZED 04/13/78...W/ATT LIC FEES.

PLANT NAME: ST LUCIE #1

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FLORIDA POWER & LIGHT COMPANY

April 12, 1978
L-78-125

Office of Nuclear Reactor Regulation
Attention: Mr. Victor Stello, Director
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Stello:

Re: St. Lucie Unit No. 1, Docket No. 50-335
Proposed Amendment to Facility Operating
License No. DPR-67

In accordance with 10 CFR 50.30, Florida Power and Light Company (FPL) submits herewith three (3) signed originals and forty (40) copies of a request to amend Appendix A of Facility Operating License DPR-67.

The purpose of this proposed amendment is to delete the requirements for Part Length Control Element Assemblies (PLCEA's) from the Technical Specifications for St. Lucie Unit No. 1 because of the CEA guide tube wear problem and the requirement to maintain the PLCEA's fully withdrawn and non-scrammable. Plant operation at power is not allowed with the PLCEA's in the core. FPL plans to remove the PLCEA's during the present refueling outage. CEA guide tube plugs will be installed into the locations previously occupied by the PLCEA's to preserve the current dynamic operating characteristics of the reactor. This request must be approved to support startup following refueling.

The proposed amendment is described below and shown on the accompanying Technical Specification pages bearing the date of this letter in the lower right hand corner.

Page 1-3

Reference to PLCEA's in Definition 1.13 is deleted.

Page 3/4 1-23

Specification 3/4.1.3.2 requiring PLCEA withdrawal and surveillance is deleted.

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Page 3/4 1-24

Reference to "part length" in Specification 3.1.3.3 and ACTION statement a are deleted. ACTION statement b is renumbered to reflect the above deletion.

Page 3/4 1-25

ACTION statement c and d are renumbered to reflect the deletion of ACTION statement a.

Page 3/4 2-7

Reference to PLCEA's in Specification 4.2.2.3 is deleted.

Page 3/4 10-1

Specification 3.10.1.b is deleted. References to the PLCEA's in ACTION statement a and Specification 4.10.1.1 are deleted. Specification 4.10.1.3 is deleted.

Page B 3/4 1-5

Reference to the PLCEA's in BASES 3/4.1.3 is deleted.

Page 5-5

Reference to the PLCEA's in Specification 5.3.2 is deleted.

In accordance with the criteria stated in 10 CFR 170.22, FPL has determined that this is a CLASS III amendment. A check in the amount of $4,000 to cover the requisite amendment fee is enclosed.

Deletion of the PLCEA's has been requested by a number of plants, including Millstone 2, Calvert Cliffs, and Indian Point 2. The St. Lucie Plant Facility Review Group and the Florida Power and Light Company Nuclear Review Board have reviewed the proposed amendment and concluded that it does not involve an unreviewed safety question. A safety evaluation is attached.

Very truly yours,

for Robert E. Uhrig
Vice President

REU:MAS:sl
Attachment

cc: Mr. Peter B. Erickson
Mr. James P. O'Reilly, Region II
Harold F. Reis, Esquire

STATE OF FLORIDA)
) ss.
COUNTY OF DADE)

A. D. Schmidt, being first duly sworn, deposes and says:

That he is Vice President of Florida Power & Light Company, the licensee herein;

That he has executed the foregoing document; that the statements made in this said document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said Licensee.

A. D. Schmidt

Subscribed and sworn to before me this

13th day of April, 1978

NOTARY PUBLIC, in and for the County of Dade, State of Florida

My commission expires: NOTARY PUBLIC STATE OF FLORIDA at LARGE MY COMMISSION EXPIRES AUGUST 24, 1981 BONDED THRU MAYNARD BONDING AGENCY

CHANNEL FUNCTIONAL TEST

1.11 A CHANNEL FUNCTIONAL TEST shall be the injection of a simulated signal into the channel as close to the primary sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

CORE ALTERATION

1.12 CORE ALTERATION shall be the movement or manipulation of any component within the reactor pressure vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATION shall not preclude completion of movement of a component to a safe conservative position.

SHUTDOWN MARGIN

1.13 SHUTDOWN MARGIN shall be the instantaneous amount of reactivity by which the reactor is or would be subcritical from its present condition assuming

all full length control element assemblies (shutdown and regulating) are fully inserted except for the single assembly of highest reactivity worth which is assumed to be fully withdrawn.

IDENTIFIED LEAKAGE

1.14 IDENTIFIED LEAKAGE shall be:

a. Leakage (except CONTROLLED LEAKAGE) into closed systems, such as pump seal or valve packing leaks that are captured, and conducted to a sump or collecting tank, or

b. Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be PRESSURE BOUNDARY LEAKAGE, or

c. Reactor coolant system leakage through a steam generator to the secondary system.

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POSITION INDICATOR CHANNELS

LIMITING CONDITION FOR OPERATION

3.1.3.3 All shutdown and regulating CEA reed switch position indicator channels and CEA pulse counting position indicator channels shall be OPERABLE and capable of determining the absolute CEA positions within ± 2.25 inches.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With a maximum of one reed switch position indicator channel per group or one (except as permitted by ACTION item d. below) pulse counting position indicator channel per group inoperable and the CEA(s) with the inoperable position indicator channel partially inserted, within 6 hours either:

1. Restore the inoperable position indicator channel to OPERABLE status, or

2. Be in HOT STANDBY, or

3. Reduce THERMAL POWER to ≤ 70% of the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination; if negative reactivity insertion is required to reduce THERMAL POWER, boration shall be used. Operation at or below this reduced THERMAL POWER level may continue provided that within the next 4 hours either:

a) The CEA group(s) with the inoperable position indicator is fully withdrawn while maintaining the withdrawal sequence required by Specification 3.1.3.6 and when this CEA group reaches its fully withdrawn position, the "Full Out" limit of the CEA with the inoperable position indicator is actuated and verifies this CEA to be fully withdrawn. Subsequent to fully withdrawing this CEA group(s), the THERMAL POWER level may be returned to a level consistent with all other applicable specifications; or

POSITION INDICATOR CHANNELS (Continued)

LIMITING CONDITION FOR OPERATION

b) The CEA group(s) with the inoperable position indicator is fully inserted, and subsequently maintained fully inserted, while maintaining the withdrawal sequence and THERMAL POWER level required by Specification 3.1.3.6 and when this CEA group reaches its fully inserted position, the "Full In" limit of the CEA with the inoperable position indicator is actuated and verifies this CEA to be fully inserted. Subsequent operation shall be within the limits of Specification 3.1.3.6.

b. With a maximum of one reed switch position indicator channel per group or one pulse counting position indicator channel per group inoperable and the CEA(s) with the inoperable position indicator channel at either its fully inserted position or fully withdrawn position, operation may continue provided:

1. The position of this CEA is verified immediately and at least once per 12 hours thereafter by its "Full In" or "Full Out" limit (as applicable),

2. The fully inserted CEA group(s) containing the inoperable position indicator channel is subsequently maintained fully inserted, and

3. Subsequent operation is within the limits of Specification 3.1.3.6.

c. With one or more pulse counting position indicator channels inoperable, operation in MODES 1 and 2 may continue for up to 24 hours provided all of the reed switch position indicator channels are OPERABLE.

SURVEILLANCE REQUIREMENTS

4.1.3.3 Each position indicator channel shall be determined to be OPERABLE by verifying the pulse counting position indicator channels and the reed switch position indicator channels agree within 4.5 inches at least once per 12 hours except during time intervals when the Deviation circuit is inoperable, then compare the pulse counting position indicator and reed switch position indicator channels at least once per 4 hours.

SURVEILLANCE REQUIREMENTS (Continued)

c. Within four hours if the AZIMUTHAL POWER TILT (T_q) is > 0.02.

4.2.2.3 F_r^P shall be determined each time a calculation of F_r^T is required by using the incore detectors to obtain a power distribution map with all full length CEAs at or above the Long Term Steady State Insertion Limit for the existing Reactor Coolant Pump combination. This determination shall be limited to core planes between 15% and 85% of full core height and shall exclude regions influenced by grid effects.

4.2.2.4 T_q shall be determined each time a calculation of F_r^T is required and the value of T_q used to determine F_r^T shall be the measured value of T_q.

3/4.10 SPECIAL TEST EXCEPTIONS

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 may be suspended for measurement of CEA worth and shutdown margin provided

reactivity equivalent to at least the highest estimated CEA worth is available for trip insertion from OPERABLE CEA(s).

APPLICABILITY: MODE 2.

ACTION:

a. With the reactor critical ($K_{eff} \geq 1.0$) and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at $\geq$ 40 gpm of 1720 ppm boron or equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With the reactor subcritical ($K_{eff} < 1.0$) by less than the above reactivity equivalent, immediately initiate and continue boration at $\geq$ 40 gpm of 1720 ppm boron or equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length CEA either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each CEA not fully inserted shall be demonstrated OPERABLE by verifying its CEA drop time to be $\leq$ 3.3 seconds within 24 hours prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

The LSSS setpoints and the power distribution LCOs were generated based upon a core burnup which would be achieved with the core operating in an essentially unrodded configuration. Therefore, the CEA insertion limit specifications require that during MODES 1 and 2, the full length CEAs be nearly fully withdrawn. The amount of CEA insertion permitted by the Long Term Steady State Insertion Limits of Specification 3.1.3.6 will not have a significant effect upon the unrodded burnup assumption but will still provide sufficient reactivity control. The Power Dependent Insertion Limits of Specification 3.1.3.6 are provided to ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of a CEA ejection accident are limited to acceptable levels; however, long term operation at these insertion limits could have adverse effects on core power distribution during subsequent operation in an unrodded configuration.

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 73 full length control element assemblies. The control element assemblies shall be designed and maintained in accordance with the original design provisions contained in Section 4.2.3.2 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 700°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 11,100 $\pm$ 180 cubic feet at a nominal T_{avg} of 567°F.

5.5 EMERGENCY CORE COOLING SYSTEMS

5.5.1 The emergency core cooling systems are designed and shall be maintained in accordance with the original design provisions contained in Section 6.3 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

5.6 FUEL STORAGE

CRITICALITY

5.6.1 The new fuel storage racks are designed and shall be maintained with a center-to-center distance of not less than 21 inches between assemblies placed in the storage racks. The spent fuel storage racks are designed and shall be maintained with a center-to-center spacing of not

SAFETY EVALUATION

REMOVAL OF PART LENGTH CONTROL ELEMENT ASSEMBLIES FROM ST. LUCIE UNIT 1

I. INTRODUCTION

This report provides information to justify plant operation following the removal of the part-length control element assemblies (PLCEAs). Plant operation at power is currently not allowed with PLCEAs in the core.

CEA guide tube plugs will be installed into the locations previously occupied by the PLCEAs. These plugs are being installed to preserve the current dynamic operating characteristic of the reactor, i.e. pressure drops, coolant flow rates, etc., which could be affected if just removal of the PLCEAs was performed.

II. CEA PLUG MECHNICAL DESIGN

The CEA guide tube plugs, which will be inserted into locations previously occupied by PLCEA, have essentially the same configuration as the casting of standard four arm CEA spiders with elements extending down from the end of each spider arm and from the center. Also in the manner of a standard CEA, there are springs and retainers around the center element.

The only significant differences between the plugs and standard CEAs are the following items:

1. The fingers of the plug are very short and extend only approximately five (5) inches into the top of the fuel assembly, and are made from solid 304 stainless steel. Each finger has a leaf spring type attachment which positively positions the finger such that it will not vibrate against the wall of the upper end fitting post. The fingers of Standard CEAs, by comparision, are made of Inconel 625 tubing and extend approximately 150 inches into the fuel assembly.

   In view of the vast differences between the dynamic characteristics of the plug elements and CEA elements, it is concluded that the plugs will not be susceptible to the same mechanism which has produced guide tube wear. Moreover, since the plug does not extend into the Zircaloy portion of the assembly whatever vibration may occur will not result in guide tube wear.

2. The plug incorporates design features which engage the lower ends of the flow scupper in the upper guide structure and compress a spring which holds the plug against the under side of the scupper. This preload spring is loacted in approximately the same location as the CEA spider spring on standard CEAs, but is somewhat longer in order to accommodate the effects on differential expansion, irradiation induced Zircaloy growth, and component tolerances.

3. Minor hardware modifications will be made to make the plug compatible with existing fuel and CEA handling equipment. In order to preclude inadvertent pickup of a plug, the PLCEA extension shafts will be removed during plant operation.

It should be noted that the basic design of the CEA guide tube plugs are similar to that of plugs which have been used successfully in the Fort Calhoun reactor during all operating cycles and has been revised for use in 2560 MW class plants only to reflect minor dimensional variations between the two classes of plant.

III. THERMAL HYDRAULIC EFFECTS

A. Thermal Effects

Physics analysis indicates that there will be no adverse effect of the plug assemblies on the core power distribution. Since the plugged fuel assemblies have no adverse effect on the design core flow distribution, calculated core thermal margin will be unaffected.

B. Hydraulic Effects

The following hydraulic aspects were considered with respect to the installation of the plug assemblies in the part length CEA locations.

1. Hydraulic uplift force on the plug assembly.

   The hydraulic uplift force on the plug assembly is calculated to be 90 lbs. This uplift force is offset by a hold-down spring design force of at least 150 lbs plus the wet weight of the plug assembly. Because of the large margin, no uplift problem is anticipated with the plug assembly.

2. Hydraulic uplift force on the fuel assembly.

   The uplift force on the fuel assembly increases by less than 5 lbs. due to the installation of the plug assembly. This represents an insignificant change in fuel assembly uplift margin.

3. Core Bypass Flow Rate.

   The core bypass flow rate increases very slightly, 0.02% of vessel flow rate, due to the reduced hydraulic resistance of the plug assembly relative to that for the part-length CEAs. The resulting total core bypass flow, 3.4% at the end of the second cycle, remains below the thermal design bypass flow rate of 3.7%.

4. Guide Tube Flow Rates and Crossflow Velocities on Fuel Rods.

The flow rate into a guide tube increases by 22% when replacing the part length CEA with the plug assembly. The lateral velocities across the fuel rods in the immediate vicinity of the guide tube cooling holes are calculated to increase from 2.5 fps to 3.1 fps. Results from hydraulic tests on 14x14 fuel assemblies, in which the lateral velocities were more adverse, showed no fuel rod fretting. Therefore, no problems with fuel rod fretting are expected with the installation of the plug assembly.

5. Flow-Induced Vibration Characteristics

The CEA fingers are known to vibrate within the guide tubes due to a flow-induced mechanism. That mechanism will most likely be present when a plug assembly is installed in a fuel assembly. The expected response of the plug assembly has been covered above in Section II.

IV. NEUTRONICS EFFECTS

The removal of part length rods has no impact on any physics information generated in the past for St. Lucie Unit 1. The use of part length CEAs has been prohibited by Technical Specifications and they have been locked in the full out position during operation. The installation of CEA plug assemblies as described in Sections II and III will have no influence on the physics characteristics of the reactor. Section II states that the lowest portion of the plug assemblies will not be within several inches of the top of the fuel. Therefore, operation with installed plugs will not invalidate any of the physics parameters contained in the Cycle 2 reload submittal.

V. ACCIDENT AND TRANSIENT ANALYSES

A. Impact on Analyses of Design Basis Events

A list of design basis events (DBEs) which the current plants are required to accommodate is presented in Table 1. An assessment has been made to determine the impact of replacing the PLCEAs with "plug" CEAs on safety related input data used in analyses of these DBE. It has been determined that none of the safety related input data is worse than corresponding input data used in the Cycle 2 analyses when the PLCEAs are removed. Hence, operational thermal margins are not reduced below the design values, nor are consequences introduced which are more adverse than those previously reported in the St. Lucie Unit 1, Cycle 2, license submittal.

B. Impact on Probability of Occurence

A potential safety concern is that the probability of some event previously analyzed can be increased due to the replacement of PLCEAs with "plug" CEAs. No information exists which suggests that

the replacement of PLCEAs with "plug" CEAs increases the probability of any event previously analyzed.

C. Other Malfunctions Not Previously Analyzed

No information exists which suggests that the replacement of PLCEAs with "plug" CEAs introduces a possibility for an accident or any malfunction of a different type than those previously analyzed. Hence, it is concluded that the replacement of PLCEAs with plugs does not introduce the possibility of events not previously analyzed.

D. Margin of Safety

It is evaluated that the consequences of replacing the PLCEAs with "plug" CEAs does not reduce the margin of safety, as defined in the bases for applicable technical specifications.

E. Summary

The probability of occurrence of events has not increased and the consequences of these events remain within those reported in previous analyses. The possibility of other types of accidents or malfunctions has not increased. Hence, the information presented in this report leads to the conclusion that Cycle 2 operation of St. Lucie Unit 1, with the "plug" CEAs instead of PLCEAs, does not present any danger to the health and safety of the public. If any new technical information is obtained which would change the conclusions, such information will be reported in a timely manner.

TABLE I

DESIGN BASIS EVENTS

Control Element Assembly Withdrawal

Boron Dilution

Startup of an Inactive Reactor Coolant Pump

Excess Load

Loss of Load

Loss of Feedwater Flow

Excess Heat Removal due to Feedwater Malfunction

Reactor Coolant System Depressurization

Loss of Coolant Flow

Loss of AC Power

Full Length CEA Drop

Transients Resulting form Malfunction of One Steam Generator

Part Length CEA Drop

Part Length CEA Malpositioning

VI. TECHNICAL SPECIFICATION CHANGES

As a result of removal of PLCEAs, the following Unit 1 technical specifications must be revised as indicated on the attached sheets.

1. Section 3.1.2.3
2. Section 3.1.3.3
3. Section 3.10.1
4. Section 5.3.2
5. Bases 3/4.1.3
6. Definition 1.13
7. Section 4.2.2.3

VII. CONCLUSIONS

Based on the considerations discussed above, we have concluded that removal of the PLCEAs does not invalidate any of the safety analyses provided in the reload submittal. In addition, removal of the PLCEAs assures no CEA to guide tube interaction can take place in these fuel assemblies.

The public health and safety will not be endanagered by removal of the PLCEAs.