FPL

JUN 2 9 2018

L-2018-121
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington D C 20555-0001

RE: St. Lucie Unit 2
Docket No. 50-389
Renewed Facility Operating Licenses NPF-16
License Amendment Request to Reduce the Number of Control Element Assemblies

Pursuant to 10 CFR 50.90, Florida Power & Light Company (FPL) hereby requests to amend Renewed Facility Operating License NPF-16 for St. Lucie Unit 2. The proposed license amendment modifies the St. Lucie Unit 2 Technical Specifications (TS) by reducing the total number of control element assemblies (CEAs) specified in the TS, from 91 to 87, to support the permanent removal of four 4-element (mini-dual) CEAs from the reactor core. The proposed license amendment relatedly deletes a reference to the 4-element CEAs in an existing TS definition.

The enclosure to this letter provides FPL's evaluation of the proposed changes. Attachment 1 to the enclosure provides the existing St. Lucie Unit 2 TS pages marked up to show the proposed changes. Attachment 2 provides the St. Lucie Unit 2 retyped (clean copy) TS pages with revision bars identifying the proposed changes. No changes are proposed to the St. Lucie Unit 2 TS Bases.

FPL has determined that the proposed changes do not involve a significant hazards consideration pursuant to 10 CFR 50.92(c), and there are no significant environmental impacts associated with the change. The St. Lucie Plant Onsite Review Group (ORG) has reviewed the proposed license amendments. In accordance with 10 CFR 50.91(b)(1), copies of the proposed license amendments are being forwarded to the state designee for the State of Florida.

FPL requests that the proposed license amendments be processed as normal amendment requests with approval by April 1, 2019, in order to allow sufficient time for planning and implementing the mini-dual CEA removal activities during the spring 2020 St. Lucie Unit 2 refueling outage.

This letter contains no new regulatory commitments.

If you have any questions or require additional information, please contact Mr. Michael Snyder, St. Lucie Licensing Manager, at (772) 467-7036.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on JUN 2 9 2018

Sincerely,

Daniel DeBoer
Site Director - St. Lucie Nuclear Plant, Units 1 and 2
Florida Power & Light Company

Enclosure

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, St. Lucie Nuclear Plant, Units 1 and 2
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant, Units 1 and 2
Ms. Cindy Becker, Florida Department of Health

ENCLOSURE

Evaluation of the Proposed Changes

St. Lucie Nuclear Plant, Unit 2
License Amendment Request to Reduce the Number of Control Element Assemblies

1.0 SUMMARY DESCRIPTION

Florida Power & Light Company (FPL) hereby requests to amend Renewed Facility Operating License NPF-16 for St. Lucie Unit 2. The proposed license amendment modifies the St. Lucie Unit 2 Technical Specifications (TS) by reducing the total number of control element assemblies (CEAs) specified in the TS, from 91 to 87, to support the permanent removal of four 4-element (mini-dual) CEAs from the reactor core. The proposed license amendment relatedly deletes a reference to the 4-element CEAs in an existing TS definition.

2.0 DETAILED DESCRIPTION

2.1 System Design and Operation

The St. Lucie Unit 2 reactor contains a total of 91 CEAs: eighty-seven 5-element CEAs, twelve of which are reduced strength CEAs, and four 4-element CEAs. All 5-element CEAs have four control elements arranged in a 4.050 inch square array plus one element at the center of the array. The 4-element CEAs have their four control elements arranged in a 4.050 inch x 4.130 inch array. Each CEA interfaces with the guide tubes of one fuel assembly, with the exception of the 4-element CEAs, which straddle two adjacent fuel assemblies. The 4-element CEAs are located at the periphery of the core, at locations on the 0, 90, 180, and 270 degree axes, in the regions designated as "the flats". These CEAs are part of 22 CEAs comprising the Shutdown Bank A. These 4-element CEAs were originally intended by the fuel designer to provide additional shutdown margin during a steam line break accident in the early core designs.

The 4-element CEAs are unique in two aspects. First, they insert into two adjacent fuel bundles (versus one fuel bundle for the 5-element CEAs). Second, in order to refuel one bundle at a time, the 4-element CEAs are not stored in the fuel bundle during refueling operations. The 4-element CEAs are typically raised into the UGS, and their extension shafts are pinned to the UGS lift rig floor plate. This design feature for the mini-duals is problematic during refueling operations, and during their replacement as it is time consuming and also increases the radiological exposure taken by the crews during the evolution.

2.2 Current Technical Specifications Requirements

St. Lucie Unit 2 TS 5.3.2, "Control Element Assemblies", states that the number of CEAs in the reactor is 91. Definition TS 1.9 mentions the 4-element CEAs.

2.3 Reason for the Proposed Change

The proposed amendment reduces the number of CEAs specified in TS 5.3.2, from 91 to 87, in order to support permanent removal of four mini-dual CEAs, which are not required for Shutdown Margin (SDM) considerations and constitute a burden during refueling operations.

2.4 Description of the Proposed Changes

The following sections provide detailed description of the proposed changes to the TS in this amendment request.

TS Section 5.3.2, DESIGN FEATURES - Core Element Assemblies

In TS 5.3.2 of the Design Features, the number of CEAs is reduced from 91 CEAs to 87, since the four 4-element mini-duals will be permanently eliminated from the reactor core. The new statement in this section will read as follows:

5.3.2 The reactor core shall contain ~~***91***~~ ***87*** full-length control element assemblies and no part-length control element assemblies.

Section 1.9, CORE ALTERATION

In TS 1.9, "Core Alteration", of the Definitions, there is a conforming change related to the permanent elimination of four 4-element mini-duals. The proposed change is as follows:

1.9 CORE ALTERATION shall be the movement or manipulation of any fuel, sources, reactivity control components, or other components affecting reactivity within the reactor vessel with the vessel head removed and fuel in the vessel. Exceptions to the above include ~~***shared (4 fingered) control element assemblies (CEAs) withdrawn into the upper guide structure (UGS) or***~~ evolutions performed with the UGS in place such as CEA latching/unlatching or verification of latching/unlatching which do not constitute a CORE ALTERATION. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.

3.0 TECHNICAL EVALUATION

The proposed license amendment modifies the St. Lucie Unit 2 TS by reducing the total number of CEAs specified in TS 5.3.2, from 91 to 87, to support permanent removal of four 4-element (mini-dual) CEAs from the reactor core. The proposed license amendment relatedly deletes a reference to the 4-element CEAs in an existing TS definition.

3.1 Impact on Core Design and Safety Analysis

For early core designs characterized by out-in type fuel loadings, the 4-element CEAs provided an increase in the minimum net CEA worth contributing to the shutdown margin used in the safety analysis. However, this benefit is relatively small for modern low leakage core designs utilized at St. Lucie Unit 2. The removal of 4-element CEAs will have a small effect on the total rod worth (expected to be <3%), and on the core bypass flow. There will be no effect on plant operation as the plant normally operates with all CEAs out of the core.

3.2 Total Rod Worth

To evaluate the impact on the total rod worth and the subsequent available shutdown margin, several calculations were performed specific to St. Lucie Unit 2. These calculations confirmed a small reduction in the available shutdown margin. This effect, however, can be easily managed during the core design phase to ensure the Core Operating Limits Report (COLR) shutdown margin requirements are met.

Steam line break (SLB) is the predominant event defining the shutdown margin requirements in the St. Lucie Unit 2 Updated Final Safety Analysis Report (UFSAR). The SLB and other UFSAR Chapter 15 events which depend on the shutdown margin, however, use the minimum shutdown margin required by the COLR. Since this requirement will continue to be met with the removal of 4-element CEAs, the UFSAR analyses will remain unaffected. In addition, the reactivity check for the SLB event is performed every cycle to verify that the analysis criteria are met. St. Lucie Unit 2 specific calculations showed minimal impact on the fuel requirements with respect to the cycle specific core designs to meet all the neutronic parameters limits, including the shutdown margin.

3.3 Core Bypass Flow

The reactor internals are designed to direct the reactor coolant flow through the core and minimize the core bypass flow. The bypass flow is the flow that short circuits the core through the gaps, guide tubes, etc. which does not directly participate in the core cooling. The removal of the 4-element CEAs could potentially increase the bypass flow in the respective fuel assembly corner guide tubes. However, the resistance through these corner guide tubes is mainly due to the guide tube cooling hole and the resistance will not change significantly due to the CEAs removal. Additionally, guide tube bypass flow is only a fraction of the total bypass flow for St. Lucie Unit 2 and the removal of the four element CEAs constitutes less than 5% of the total guide tube flow (4 CEAs removed out of 91). Thus, the bypass flow impact is expected to be not significant. Nonetheless, the current bypass flow, as used in the thermal hydraulic analysis, has approximately 5% margin. This is because the bypass flow used in the St. Lucie Unit 2 analyses was increased by more than 10% during the implementation of the AREVA fuel while the actual bypass flow increase was calculated to be approximately 5%. This available margin will cover any small increase of bypass flow due to the removal of the 4-element CEAs.

3.4 Other Impacts

Combustion Engineering Report CE-NPSD-1202 (Reference 6.1) evaluated the impact of the 4-element CEA removal on other items, such as fuel rod vibration potential and core flow distribution. The report determined that there will be no significant impact on these items due to the 4-element CEA removal. Additionally, the Upper Guide Structure (UGS) shroud operating temperature is determined to depend overwhelmingly on the core power distribution and the localized coolant temperature, which will not be affected by the removal of the 4-element CEAs. Thus, the removal of these CEAs is considered acceptable from these considerations.

There are no impacts resulting from removing the 4-element CEA discussion from the definition TS 1.9, "Core Alterations". The elimination of the 4-element CEAs from the current reactor core, and hence, the reduction in the number of CEAs specified in TS 5.3.2, is therefore acceptable.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/ Criteria

The proposed license amendment modifies the St. Lucie Unit 2 TS by reducing the total number of CEAs specified in TS 5.3.2, from 91 to 87, to support permanent removal of four 4-element (mini-dual) CEAs from the reactor core. The proposed license amendment relatedly deletes a reference to the 4-element CEAs in an existing TS definition.

- 10 CFR 50.36 states that the TS are required to include items in the following five specific categories related to station operation:

  (1) Safety limits, limiting safety system settings, and limiting control settings;
  (2) Limiting conditions for operation (LCOs);
  (3) Surveillance requirements (SRs);
  (4) Design features; and
  (5) Administrative controls.

- 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 12, "Suppression of Reactor Power Oscillations" states that the reactor core and associated coolant, control, and protection systems shall be designed to assure that power oscillations which can result in conditions exceeding specified acceptable fuel design limits (SAFDLs) are not possible or can be reliably and readily detected and suppressed.

- GDC 13, "Instrumentation and Control" requires that instrumentation shall be provided to monitor variables and systems for anticipated operational occurrences (AOOs), and for accident conditions as appropriate to assure adequate safety.

- GDC 20, "Protection System Functions" requires that the protection system shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, and (2) to sense accident conditions and initiate the operation of systems and components important to safety.

- GDC 23, "Protection Systems Failure Modes" requires that the protection system shall be designed to fail into a safe state or into a state demonstrated to be acceptable on some other defined basis.

- GDC 25, "Protection System Requirements for Reactivity Control Malfunctions" requires that the protection system shall be designed to assure that the SAFDLs are not exceeded for any single malfunction of the reactivity control systems.

- GDC 26, "Reactivity Control System Redundancy and Capability" requires that two independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods. The second reactivity control system shall be capable of reliably controlling the rate of reactivity changes resulting from planned, normal power changes to assure acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions.

- GDC 27, "Combined Reactivity Control Systems Capability" requires that the reactivity control systems shall be designed to have a combined capability, in conjunction with poison addition by the emergency core cooling system, of reliably controlling reactivity changes to assure that the capability to cool the core is maintained.

- GDC 28, "Reactivity Limits" requires that the reactivity control systems shall be designed with appropriate limits on the potential amount and rate of reactivity increase to assure that the effects of postulated reactivity accidents can neither (1) result in damage to the reactor coolant pressure boundary greater than limited local yielding nor (2) sufficiently disturb the core, its support structures, or other reactor pressure vessel internals to impair significantly the capability to cool the core.

The proposed license amendment complies with the requirements of 10 CFR 50.36, and does not alter the manner in which the St. Lucie Unit 2 is operated and maintained consistent with GDC(s) 12, 13, 20, 23, 25, 26, 27 and 28. Therefore, all applicable regulatory requirements will continue to be satisfied as a result of the proposed license amendment.

4.2 Precedent

The 4-element CEAs were included in several Combustion Engineering designed cores in order to increase the shutdown margin for a steam-line break accident. These CEAs were included in the design at the peripheral locations on the core axes of Waterford Steam Electric Station, Unit 3 (WSES-3), San Onofre Generating Station (SONGS 2 and 3) and St. Lucie Unit 2. In 2002, the USNRC approved an amendment request for the permanent removal of the 4-element CEAs at WSES-3 (Reference 6.2). The amendment request additionally replaced the part length CEAs (PLCEAs), which were part of the original design, with full length CEAs and modified the CEA configuration. The NRC concluded that the proposed changes did not result in a safety margin reduction and that the regulatory requirements would continue to be met. The cited precedent is similar to this amendment request only in proposing the permanent removal of the 4-element CEAs. No changes are proposed to the remaining CEA configuration at St. Lucie Unit 2.

4.3 No Significant Hazards Consideration

As required by 10 CFR 50.91(a), FPL has evaluated the proposed changes using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration. An analysis of the issue of no significant hazards consideration is presented below:

(1) Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

A change is proposed in this License Amendment Request to eliminate all four 4-element Control Element Assemblies (CEAs) currently used in the reactor core. These CEAs are part of 22 CEAs comprising the Shutdown Bank A. CEAs are required to provide sufficient shutdown margin during accident conditions. Removing these four CEAs does not have any adverse impact on the probability of these accidents, even for events were CEAs may be the accident initiator (e.g., CEA withdrawal, CEA drop, CEA ejection). On the contrary, for single CEA events the probability may even decrease since the number of chances for an event to occur will decrease with a lesser number of CEAs available. Also, since the Core Operating Limits Report (COLR) shutdown margin requirements will continue to be met, the accident analysis limits will not be challenged, so the consequences of previously evaluated accidents will remain unaffected.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

(2) Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

A change is proposed in this LAR to eliminate all four 4-element CEAs currently used in the St. Lucie Unit 2 core, reducing the number of CEAs in the core from 91 down to 87. With the proposed changes, no new or different type of equipment will be installed. The proposed change will not introduce credible new failure mechanisms, malfunctions, or accident initiators not considered in the design and/or licensing bases. As a result, the removal of the 4-element CEAs does not introduce a mechanism for creating a new or different kind of accident.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

(3) Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

A change is proposed in this LAR to eliminate all four 4-element CEAs currently used in the St. Lucie Unit 2 core. This constitutes a very small reduction of CEA worth available for shutdown margin, but will not affect the minimum shutdown margin requirement as used in the accident analysis. Thus, this will not translate into a significant reduction in a margin of safety.

The margin of safety is established through the core design limits defined in the COLR, in addition to the equipment design, operating parameters, and the setpoints at which automatic actions are initiated for accident conditions. The proposed changes will not adversely affect operation of plant equipment. These changes will not result in a change to the setpoints at which protective actions are initiated. The response of the plant systems to accidents and transients design limits reported in the Updated Final Safety Analysis Report (UFSAR) is unaffected by this change as nuclear design and fuel management will ensure that the COLR specified shutdown margin requirements are met. The change does not exceed or alter a design basis or safety limit in the UFSAR or the license. Therefore, accident analysis acceptance criteria are not affected.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based upon the above analysis, FPL concludes that the proposed license amendment does not involve a significant hazards consideration, under the standards set forth in 10 CFR 50.92, "Issuance of Amendment," and accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusion

In conclusion, based on the considerations discussed above, (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.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed change would 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, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

6.0 REFERENCES

6.1 Combustion Engineering Owners Group Report, CE-NPSD-1202, Elimination of 4-Rod CEAs from CE NSSS 217 Fuel Assembly Cores, November 2000.

6.2 USNRC Letter to Entergy Operations Inc., Waterford Steam Electric Station, Unit 3 - Issuance of Amendment RE: Replacement of Part-Length Control Element Assemblies (TAC No. MB2379), March 21, 2002 (ADAMS Accession No. ML020810499)

Attachment 1

ST. LUCIE UNIT 1
PROPOSED TECHNICAL SPECIFICATIONS PAGE (MARKUP)

(2 pages follow)

DEFINITIONS

CHANNEL FUNCTIONAL TEST

1.6 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.

CONTAINMENT VESSEL INTEGRITY

1.7 CONTAINMENT VESSEL INTEGRITY shall exist when:

a. All containment vessel penetrations required to be closed during accident conditions are either:

1. Capable of being closed by an OPERABLE containment automatic isolation valve system, or

2. Closed by manual valves, blind flanges, or deactivated automatic valves secured in their closed positions, except for valves that are open on an intermittent basis under administrative control.

b. All containment vessel equipment hatches are closed and sealed,

c. Each containment vessel air lock is in compliance with the requirements of Specification 3.6.1.3,

d. The containment leakage rates are within the limits of Specification 3.6.1.2, and

e. The sealing mechanism associated with each penetration (e.g., welds, bellows or O-rings) is OPERABLE.

CONTROLLED LEAKAGE

1.8 CONTROLLED LEAKAGE shall be the seal water flow supplied from the reactor coolant pump seals.

CORE ALTERATION

1.9 CORE ALTERATION shall be the movement or manipulation of any fuel, sources, reactivity control components, or other components affecting reactivity within the reactor vessel with the vessel head removed and fuel in the vessel. Exceptions to the above include ~~shared (4 fingered) control element assemblies (CEAs) withdrawn into the upper guide structure (UGS) or~~ evolutions performed with the UGS in place such as CEA latching/unlatching or verification of latching/unlatching which do not constitute a CORE ALTERATION. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.

CORE OPERATING LIMITS REPORT (COLR)

1.9a THE COLR is the unit-specific document that provides cycle specific parameter limits for the current operating reload cycle. These cycle-specific parameter limits shall be determined for each reload cycle in accordance with Specification 6.9.1.11. Plant operation within these limits is addressed in individual Specifications.

DESIGN FEATURES

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor shall contain 217 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy, ZIRLO™ or M5® clad fuel rods and/or poison rods, with fuel rods having an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

CONTROL ELEMENT ASSEMBLIES 87

5.3.2 The reactor core shall contain ~~91~~ full-length control element assemblies and no part-length control element assemblies.

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.

Attachment 2

ST. LUCIE UNIT 2
PROPOSED TECHNICAL SPECIFICATIONS PAGE (Clean Copy)

(2 pages follow)

DEFINITIONS

CHANNEL FUNCTIONAL TEST

1.6 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.

CONTAINMENT VESSEL INTEGRITY

1.7 CONTAINMENT VESSEL INTEGRITY shall exist when:

a. All containment vessel penetrations required to be closed during accident conditions are either:

1. Capable of being closed by an OPERABLE containment automatic isolation valve system, or

2. Closed by manual valves, blind flanges, or deactivated automatic valves secured in their closed positions, except for valves that are open on an intermittent basis under administrative control.

b. All containment vessel equipment hatches are closed and sealed,

c. Each containment vessel air lock is in compliance with the requirements of Specification 3.6.1.3,

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CORE ALTERATION

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1.9a THE COLR is the unit-specific document that provides cycle specific parameter limits for the current operating reload cycle. These cycle-specific parameter limits shall be determined for each reload cycle in accordance with Specification 6.9.1.11. Plant operation within these limits is addressed in individual Specifications.

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5.3.1 The reactor shall contain 217 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy, ZIRLO™ or M5® clad fuel rods and/or poison rods, with fuel rods having an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

CONTROL ELEMENT ASSEMBLIES

5.3.2 The reactor core shall contain 87 full-length control element assemblies and no part-length control element assemblies.

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.