UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 31, 2014

Mr. Mano Nazar
Executive Vice President and
Chief Nuclear Officer
NextEra Energy
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT 1 - ISSUANCE OF AMENDMENT REGARDING THE USE OF M5® ALLOY FUEL CLADDING IN CORE RELOAD APPLICATIONS (TAC NO. MF1817)

Dear Mr. Nazar:

The U.S. Nuclear Regulatory Commission (NRC or the Commission) has issued the enclosed Amendment No. 218 to Renewed Facility Operating License No. DPR-67 for the St. Lucie Plant, Unit No. 1. This amendment consists of changes to the Technical Specifications in response to your application dated May 10, 2013, as supplemented by letter dated September 30, 2013.

This amendment modifies the Technical Specifications to allow the use of M5® Alloy Fuel Cladding as an approved fuel rod cladding. This change is consistent with the NRC's allowed use of M5® cladding in topical report BAW-10227P-A, Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5®) in PWR [Pressurized-Water Reactor] Reactor Fuel," and topical report BAW-10240(P)(A), Revision 0, "Incorporation of M5® Properties in Framatome ANP Approved Methods."

The NRC staff's safety evaluation of the amendment is enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

Lisa M. Regner, Senior Project Manager
Plant Licensing Branch II-2
Division of Operator Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosures:
1. Amendment No. 218 to DPR-67
2. Safety Evaluation

cc w/encls: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-335

ST. LUCIE PLANT UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 218
Renewed License No. DPR-67

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

   A. The application for amendment by Florida Power & Light Company (the licensee), dated May 10, 2013, as supplemented by letter dated September 30, 2013, 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, Renewed Facility Operating License No. DPR-67 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 3.B to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 218 , are hereby incorporated in the renewed license. FPL shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Jessie F. Quichocho, Chief
Plant Licensing Branch II-2
Division of Operator Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Operating License
and Technical Specifications

Date of Issuance: March 31, 2014

ATTACHMENT TO LICENSE AMENDMENT NO. 218

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-67

DOCKET NO. 50-335

Replace Page 3 of Renewed Operating License DPR-67 with the attached Page 3.

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
5-4	5-4
6-19b	6-19b

applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. Maximum Power Level

FPL is authorized to operate the facility at steady state reactor core power levels not in excess of 3020 megawatts (thermal).

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 218 are hereby incorporated in the renewed license. FPL shall operate the facility in accordance with the Technical Specifications.

Appendix B, the Environmental Protection Plan (Non-Radiological), contains environmental conditions of the renewed license. If significant detrimental effects or evidence of irreversible damage are detected by the monitoring programs required by Appendix B of this license, FPL will provide the Commission with an analysis of the problem and plan of action to be taken subject to Commission approval to eliminate or significantly reduce the detrimental effects or damage.

C. Updated Final Safety Analysis Report

The Updated Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on March 28, 2003, describes certain future activities to be completed before the period of extended operation. FPL shall complete these activities no later than March 1, 2016, and shall notify the NRC in writing when implementation of these activities is complete and can be verified by NRC inspection.

The Updated Final Safety Analysis Report supplement as revised on March 28, 2003, described above, shall be included in the next scheduled update to the Updated Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following issuance of this renewed license. Until that update is complete, FPL may make changes to the programs described in such supplement without prior Commission approval, provided that FPL evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

D. Sustained Core Uncovery Actions

Procedural guidance shall be in place to instruct operators to implement actions that are designed to mitigate a small-break loss-of-coolant accident prior to a calculated time of sustained core uncovery.

2.1.2 SHIELD BUILDING

a. Minimum annular space = 4 feet

b. Annulus nominal volume = 543,000 cubic feet

c. Nominal outside height (measured from top of foundation base to the top of the dome) = 230.5 feet

d. Nominal inside diameter = 148 feet

e. Cylinder wall minimum thickness = 3 feet

f. Dome minimum thickness = 2.5 feet

g. Dome inside radius = 112 feet

DESIGN PRESSURE AND TEMPERATURE

5.2.2 The containment vessel is designed and shall be maintained for a maximum internal pressure of 44 psig and a temperature of 264°F.

PENETRATIONS

5.2.3 Penetrations through the containment structure are designed and shall be maintained in accordance with the original design provisions contained in Sections 3.8.2.1.10 and 6.2.4 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 217 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy 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 non-limiting core regions.

5.3.1.1 Except for special test as authorized by the NRC, all fuel assemblies under control element assemblies shall be sleeved with a sleeve design previously approved by the NRC.

CORE OPERATING LIMITS REPORT (continued)

20. EMF-1961(P)(A), "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors"

21. EMF-2310(P)(A), "SRP Chapter 15 Non-LOCA Methodology for Pressurized Water Reactors," Revision 1, as supplemented by ANP-3000(P), "St. Lucie Unit 1 EPU - Information to Support License Amendment Request," Revision 0.

22. EMF-2328(P)(A), "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based," Revision 0, as supplemented by ANP-3000(P), "St. Lucie Unit 1 EPU - Information to Support License Amendment Request," Revision 0.

23. EMF-2103(P)(A), "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," Revision 0, as supplemented by ANP-2903(P), "St. Lucie Nuclear Plant Unit 1 EPU Cycle Realistic Large Break LOCA summary Report with Zr-4 Fuel Cladding," Revision 1.

24. BAW-10240(P)(A) Revision 0, "Incorporation of M5 Properties in Framatome ANP Approved Methods."

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 218

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-67

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT, UNIT NO. 1

DOCKET NO. 50-335

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC or the Commission) dated May 10, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13135A008), as supplemented by letter dated September 30, 2013 (ADAMS Accession No. ML13283A002), Florida Power & Light Company (the licensee) requested to amend Renewed Operating License DPR-67 for St. Lucie Plant Unit 1, by April 2014.

The licensee's supplementary submittal dated September 30, 2013 (Accession No. ML13283A002), provided clarifying information that did not change the scope of the proposed amendment as described in the notice of proposed action published in the *Federal Register* (78 FR 47790) and did not change the initial proposed no significant hazards consideration determination.

The proposed change would modify Technical Specification (TS) 5.3.1, "Fuel Assemblies," by adding M5® as an acceptable fuel rod cladding material. Currently, as stated in TS 5.3.1, the St. Lucie Plant Unit 1 fuel cladding is zircaloy; therefore, an amendment is needed in order to use M5® fuel cladding. The proposed amendment would also revise the St. Lucie Plant Unit 1 TS 6.9.1.11.b, "Core Operating Limits Report (COLR)," to permit the addition of the new reference document of analytical methodologies for the M5® material.

M5® is an alloy comprised primarily of zirconium (about 99 percent) and niobium (about 1 percent). The elimination of tin in M5® has resulted in superior corrosion resistance and reduced irradiation-induced growth relative to both standard zircaloy (1.7 percent tin) and low-tin zircaloy (1.2 percent tin). The addition of niobium increases ductility, which is desirable to avoid brittle failures.

By letter dated February 4, 2000 (ADAMS Accession No. ML003681490), the NRC approved AREVA topical report BAW-10227P, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR [Pressurized-Water Reactor] Reactor Fuel," which describes AREVA M5® fuel designs and provides justification for its use in PWR cores. The AREVA topical report

BAW-10227P-A, was submitted to the NRC by letter dated February 11, 2000 (ADAMS Accession No. ML003685828). The topical report is proprietary and not publicly available.

The licensee also requested an exemption from the requirements of Title 10 of *the Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K, "ECCS [Emergency Core Cooling System] Evaluation Models," to 10 CFR Part 50, to allow the use of fuel rods clad with M5® alloy for future reload applications. The NRC addressed this exemption in separate correspondence (ADAMS Accession No. ML14064A125).

2.0 REGULATORY EVALUATION

The regulatory requirements that the NRC staff applied in the review of the application include:

The regulations in 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," allow a licensee to apply to amend or change the license. Further, 10 CFR 50.92, "Issuance of amendment," specifies that the staff will be guided by the considerations that govern the issuance of initial licenses to the extent applicable and appropriate in determining whether an amendment will be issued to the applicant. The licensee requests a license amendment to add M5® as an acceptable fuel rod cladding material in the TSs.

The NRC staff reviewed the licensee's amendment request to ensure that operation with M5® clad fuel in the core in accordance with the proposed changes will be within the conditions of operation necessary for application of the NRC-approved AREVA topical report BAW-10227P-A, and that the licensee will continue to operate the plant within its design basis and will comply with applicable regulatory requirements following implementation of the proposed changes. These applicable regulatory requirements include:

- 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors."
- 10 CFR 50, Appendix K, "ECCS [Emergency Core Cooling System] Evaluation Models"
- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants:"
    - Criterion 4, "Environmental and dynamic effects design bases"
    - Criterion 10, "Reactor design"
    - Criterion 33, "Reactor coolant makeup"
    - Criterion 34, "Residual heat removal"
    - Criterion 35, "Emergency core cooling"
- NUREG 0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition," Section 4.2, "Fuel System Design."

3.0 TECHNICAL EVALUATION

The licensee proposed to revise the design features section of St. Lucie Plant Unit 1 TSs, specifically TS 5.3.1, to include the use of M5® advanced alloy as a fuel rod cladding and fuel assembly structural material. Specifically, the licensee proposed to add two words, "or M5," to TS 5.3.1 such that the revised TS would read, "Each assembly shall consist of a matrix of

Zircaloy 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."

3.1 Analyses and Evaluations

The NRC-approved topical reports BAW-10227P-A and BAW-10240(P)(A), "Incorporation of M5 Properties in Framatome ANP Approved Methods (approved by NRC letter dated May 5, 2004; ADAMS Accession No. ML041260560)," evaluate the material properties of the M5® alloy and conclude that M5® properties are similar or better than those of zircaloy-4. BAW-10240(P)(A) listed BAW-10227P-A in the reference and was approved to 62 gigawatt-days per megaton uranium metal (GWd/MTU) in the associated NRC staff safety evaluation (SE).

The licensee evaluated the performance of the M5® cladding for a loss-of-coolant accident (LOCA) scenario. The licensee's conclusion was that the results with M5® clad fuel meet the acceptance criteria of 10 CFR 50.46 and 10 CFR 50 Appendix K and are consistent with analyses which the NRC staff approved for the 2012 power uprate for St. Lucie Plant Unit 1.

This conclusion is consistent with the conclusions in AREVA topical reports BAW-10227P-A and BAW-10240(P)(A). Based on the approved topical reports, the NRC staff concludes that the licensee may perform reload analyses to evaluate St. Lucie Plant, Unit 1 operation with cores including M5® fuel with its present NRC-approved models which compensate for the presence of M5® fuel cladding.

The staff SE stated that licensees referencing BAW-10240(P)(A) to implement M5® cladding fuel must ensure compliance with four conditions as specified in the NRC staff SE dated May 5, 2004. The licensee has documented its compliance with these four conditions in the May 2013 submittal.

Condition 1

The first condition states:

> *The corrosion limit, as specified by the best-estimate model will remain below 100 microns for all locations of the fuel.*

The licensee stated in its submittal that the corrosion limit, as predicted by the best-estimate model, will be below 100 microns for all locations of the fuel in the AREVA fuel design processes. In addition, the limit is verified for each reload as part of the cycle-specific reload analysis as required by TS 6.9.1.11, "Core Operating Limits Report." The NRC staff finds this condition is met by the licensee's stated action; since the core reload process is part of the current licensing basis, no additional requirement needs to be imposed.

Condition 2

The second condition states:

> *All of the conditions listed in the NRC SEs for all AREVA methodologies used for M5 fuel analysis will continue to be met, except that the use of M5 cladding in*

addition to zircaloy-4 cladding is now approved.

The licensee stated that conditions from approved SEs are incorporated as restrictions in AREVA design procedures and guidelines that control the core reload designs for St. Lucie Plant, Unit 1. In addition, this is verified for each reload as part of the cycle-specific reload analysis as required by TS 6.9.1.11. The NRC staff finds this condition is met by the licensee's stated action; since the core reload process is part of the current licensing basis, no additional requirement needs to be imposed.

Condition 3

The third condition states:

> *All AREVA methodologies will be used only within the range for which M5 data was acceptable and for which the verifications discussed in BAW-10240(P) or BAW-10227P-A were performed.*

The licensee stated that the limitations to ensure AREVA methodologies will be used only within the range for which M5® data was acceptable, and for which the verifications discussed in BAW-10240(P) or BAW-10227P-A were performed, are incorporated as restrictions in AREVA design procedures and guidelines that control the core reload designs for St. Lucie Plant, Unit 1. In addition, this is verified for each reload as part of the cycle-specific reload analysis as required by TS 6.9.1.11. The NRC staff finds this condition is met by the licensee's stated action; since the core reload process is part of the current licensing basis, no additional requirement needs to be imposed.

Condition 4

The fourth condition states:

> *The burnup limit for implementation of M5 is 62 GWd/MTU.*

The licensee stated that the maximum fuel rod burnup limit for AREVA fuel designs including M5® cladding continues to be 62 GWd/MTU for St. Lucie Plant Unit 1. This limit is currently part of the St. Lucie Plant, Unit 1 core functional requirements and AREVA design processes, and is verified as part of the cycle-specific reload analysis as required by TS 6.9.1.11. The staff considers this acceptable.

3.2 TS Revisions

Section 5.3.1 Fuel Assemblies

The licensee proposes to add M5® as an acceptable fuel rod cladding material. The new sentence states:

> "Each assembly shall consist of a matrix of Zircaloy or M5 clad fuel rods ..."

Based on the NRC-approved M5® clad fuel, the staff concludes that this revision is acceptable for St. Lucie Plant Unit 1.

Section 6.9.1.11.b Core Operating Limits Report

The licensee proposes to add the approved AREVA topical report BAW-10240(P)(A), "Incorporation of M5 Properties in Framatome ANP Approved Methods," to the list of references in the COLR. This approved method is consistent with the guidance stated in Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," to be used for determining cycle-specific emergency core cooling system limits. This proposed change assures that applicable cycle-specific parameter limits will be determined in accordance with NRC-approved methodologies and that safety analysis limits are met. Based on the NRC-approved topical report, the staff concludes that the revision is acceptable for St. Lucie Plant Unit 1.

4.0 CONCLUSION

The staff has reviewed the licensee's license amendment request to permit the use of AREVA's advanced zirconium-based M5® alloy for fuel design. Based on the evaluation, the staff concludes that the M5® fuel design is acceptable to a peak rod average burnup limit of 62 GWd/MTU and the TS revisions are acceptable for St. Lucie Plant Unit 1.

5.0 STATE CONSULTATION

Based upon a letter dated May 2, 2003, from Michael N. Stephens of the Florida Department of Health, Bureau of Radiation Control, to Ms. Brenda L. Mozafari, Senior Project Manager, U.S. Nuclear Regulatory Commission, the State of Florida does not desire notification of issuance of license amendments. In an email dated July 25, 2012 (ADAMS Accession No. ML12208A014), from Cynthia Becker, Florida State Bureau of Radiation Control, to Farideh Saba, Senior Project Manager, U.S. Nuclear Regulatory Commission, the State of Florida confirmed that the May 2003 letter continues to reflect the State's position on notification of issuance of license amendments.

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 amendment involves 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 amendment involves no significant hazards consideration and there has been no public comment on such finding (78 FR 4790, dated August 6, 2013). 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

The Commission has 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, (2) there is reasonable assurance that 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 Contributors: Tai Huang
Shih-Liang Wu

Date: March 31, 2014

March 31, 2014

Mr. Mano Nazar
Executive Vice President and
Chief Nuclear Officer
NextEra Energy
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT 1 - ISSUANCE OF AMENDMENT REGARDING THE USE OF M5® ALLOY FUEL CLADDING IN CORE RELOAD APPLICATIONS (TAC NO. MF1817)

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The NRC staff's safety evaluation of the amendment is enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,
/RA/
Lisa M. Regner, Senior Project Manager
Plant Licensing Branch II-2
Division of Operator Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosures:
1. Amendment No. 218 to DPR-67
2. Safety Evaluation

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ADAMS Accession No.: ML14064A129 * concurrence by email

OFFICE	LPLII-2/PM	LPLII-2/LA	DSS/SRXB	DSS/SRXB/BC*	DSS/SNPB/BC (A)
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DATE	03/27/14	03/27/14	02/27/2014	03/24/14	03/24/2014

OFFICE	DSS/STSB/BC*	OGC (NLO)	LPLII-2/BC	LPLII-2/PM	
NAME	RElliott	MYoung	JQuichocho	LRegner	
DATE	03/24/14	03/26/14	03/27/14	03/31/14	

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