May 10, 2013

L-2013-139
10 CFR 50.90

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

Re: St. Lucie Unit 1
Docket No. 50-335
Application for Technical Specification Change and Exception Request Regarding the Use of M5 Alloy Fuel Cladding in Core Reload Applications

Pursuant to 10 CFR 50.90 and 50.12, Florida Power and Light Company (FPL) requests to amend Facility Operating License DPR-67 and ask for exception from the regulation for St. Lucie Unit 1.

The proposed license amendment request will revise the Technical Specifications (TS) to allow the use of M5® fuel rod cladding material at St. Lucie Unit 1. Additionally, pursuant to 10 CFR 50.12, FPL requests an exemption from the provisions of 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors," and Appendix K to 10 CFR 50, "ECCS Evaluation Models" to allow the use of M5® fuel rod cladding in future core reload applications for St. Lucie Unit 1.

The Enclosure provides a description of the proposed changes, the not significant hazards consideration determination, the request for exemption from 10CFR50.46 and Appendix K to 10 CFR 50 requirements, the existing marked up TS pages showing the proposed changes, and the revised (clean) TS pages.

FPL requests approval of the proposed amendment by April 2014, to support the implementation schedule of M5® for Cycle 26 in the spring of 2015.

This license amendment proposed by FPL has been reviewed by the St. Lucie Plant Onsite Review Group. In accordance with 10 CFR 50.91(b)(1), a copy of the proposed license amendment is being forwarded to the State Designee for the State of Florida.

Please contact Mr. Eric Katzman, Licensing Manager at 772-467-7734 if there are any questions about this submittal.

A002
NRR

I declare under penalty of perjury that the foregoing is true and correct.
Executed on May 9, 2013.
Sincerely,

Joseph Jensen
Site Vice President
St. Lucie Plant

Enclosure: License Amendment Request and 10 CFR 50.46 and 10 CFR 50 Appendix K Exemption Request – M5 Fuel Rod Cladding

cc: Ms. Cynthia Becker, Florida Department of Health

Enclosure

Evaluation of the Proposed Change
Subject: License Amendment Request and 10 CFR 50.46 and 10 CFR 50 Appendix K Exemption Request – M5 Fuel Rod Cladding

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ATTACHMENTS:
1. Request for Exemption from the Provisions of 10 CFR 50.46 & 10 CFR 50 Appendix K to Allow Use of M5 Fuel Cladding
2. Technical Specification Markups
3. Word Processed TS Pages

1.0 SUMMARY DESCRIPTION

Florida Power and Light Company (FPL) Company proposes to revise the St. Lucie Unit 1 licensing basis by amending Appendix A of Renewed Facility Operating Licenses DPR-67 for St. Lucie Unit 1 to incorporate the enclosed Technical Specification (TS) revisions (see Attachment 2). The proposed change will revise the TS to allow the use of M5® fuel rod cladding material.

Additionally, pursuant to 10 CFR 50.12, Florida Power and Light requests exemptions from the provisions of 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors," and Appendix K to 10 CFR 50, "ECCS Evaluation Models," to allow the use of M5® fuel rod cladding in future core reload applications for St. Lucie Unit 1. This exemption request is included as Attachment 1.

Currently, the fuel cladding used in St. Lucie Unit 1 is Zircaloy, which is allowed by TS 5.3.1. AREVA has developed the M5® advanced fuel rod cladding, which is an AREVA proprietary material comprised primarily of zirconium (approximately 99%) and niobium (approximately 1%). The use of M5® as fuel rod cladding material and its use in AREVA approved methods have been approved by the NRC in References 1 and 2.

Technical Specification (TS) changes for St. Lucie Unit 1 are required to allow the use of M5® fuel rod cladding for core reload applications.

As part of the industry focus to minimize the potential for fuel failure, several licensees have received U.S. Nuclear Regulatory Commission (NRC) staff approval to use M5®. Included in the list of nuclear power plants that have adopted the use of M5® are: Shearon Harris (March 2012), H.B. Robinson (October 2011) and Calvert Cliffs (January 2011). Prior to that, Palisades NP, Arkansas Nuclear One and Crystal River Unit 3 were granted license amendments by the NRC to operate with M5® cladding.

2.0 DETAILED DESCRIPTION

The proposed St. Lucie Unit 1 License Amendment Request (LAR) change will revise the Technical Specifications (TS) to allow the use of M5® fuel rod cladding material at St. Lucie Unit 1. The current acceptable fuel rod cladding material is identified in TS 5.3.1, Reactor Core, Fuel Assemblies. The proposed change would revise TS 5.3.1 to add M5® to the approved fuel rod cladding materials and TS 6.9.1.11 to add Framatome (AREVA) topical report BAW-10240(P)(A), Revision 0, "Incorporation of M5® Properties in Framatome ANP Approved Methods," to the analytical methods used to determine the core operating limits previously reviewed and approved by the U. S. NRC.

A specific description of each change is provided below. In addition, TS mark-ups are provided in Attachment 2 of this document. The word processed changes are shown in Attachment 3.

Technical Specification 5.3.1, Reactor Core, Fuel Assemblies

Current TS

Currently, St. Lucie Unit 1 TS 5.3.1 states:

"The reactor core shall contain 217 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy clad fuel rods and/or poison rods, with fuel rods having an initial composition of natural or slightly enriched uranium dioxide (UO2) 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."

Proposed TS

The TS will be revised as follows:

"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 (UO2) 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."

Technical Specification 6.9.1.11, Core Operating Limits Report

In Section 6.9.1.11.b, the following NRC approved methodology will be added as Item No. 24:

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

3.0 TECHNICAL EVALUATION

The use of nuclear fuel cladding material M5® in PWR reactor fuel is approved by the NRC in Reference 1 topical report BAW-10227P-A, Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5®) in PWR Reactor Fuel," and its use in AREVA approved methods is approved in Reference 2, topical report BAW-10240(P)(A) Revision 0, "Incorporation of M5 Properties in Framatome ANP Approved Methods." The M5® cladding is an AREVA Proprietary material composed primarily of zirconium (approximately 99%) and niobium (approximately 1%). This composition has demonstrated superior corrosion resistance and reduced irradiation induced growth relative to both standard and low-tin Zircaloy. The resulting alloy microstructure is highly stable under irradiation and provides improved in-reactor thermal and mechanical performance of any zirconium alloy.

The NRC Safety Evaluation (SE) of Reference 2 found the topical report acceptable for referencing in licensing applications for Westinghouse and Combustion Engineering designed PWRs to the extent specified and under the limitations provided in the TR and SE.

The conditions in the SE for the use of M5® in AREVA's approved methods are the following:

1. The corrosion limit, as predicted by the best-estimate model will remain below100 microns for all locations of the fuel.

   Response: The restriction that corrosion limit, as predicted by the best-estimate model, will remain below 100 microns for all locations of the fuel is implemented in the AREVA fuel design processes. This limit is verified for each reload as part of cycle specific reload analysis.

2. 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.

   Response: Conditions from approved Safety Evaluations are incorporated as restrictions in AREVA design procedures and guidelines that control the core reload designs for St. Lucie Unit 1. This is verified for each reload as part of cycle specific reload analysis.

3. 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 (Reference 1) were performed.

   Response: 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 Reference 2 were performed, are incorporated as restrictions in AREVA design procedures and guidelines that control the core reload designs for St. Lucie Unit 1. This is verified for each reload as part of cycle specific reload analysis.

4. The burnup limit for implementation of M5® is 62 GWd/MTU.

Response: The burnup limit is not a change for St. Lucie Unit 1. This limit identified in approved methodologies is contained in St. Lucie core functional requirements and AREVA design processes, and is currently limited to 62 GWd/MTU. This limit is verified for each reload as part of cycle specific reload analysis.

Therefore, based on the above discussion, the implementation of the proposed change for St. Lucie Unit 1 will remain in compliance with the SE requirements and there will be no adverse impact on plant safety.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

Large break loss of coolant accident (LBLOCA) and small break loss of coolant accident (SBLOCA) have been re-analyzed for St. Lucie Unit 1 with M5® fuel cladding, using previously approved methodologies (References 3 and 4) as listed in the list of COLR methodologies in TS 6.9.1.11. These re-analyses are done consistent with the analyses recently submitted and approved for Zircaloy cladding as part of Extended Power Uprate license amendment (Reference 5). The re-analyses support a value of 15 kw/ft for peak linear heat rate (LHR) and a value of 1.65 for total integrated radial peaking factor (Fr) at the current operating rated thermal power level of 3020 MWth. The results of the analyses are presented below:

LBLOCA

The results of LBLOCA re-analysis for the limiting PCT case with M5® fuel cladding are:

	Acceptance Criteria	M5® Analysis	Current Zircaloy Analysis
Peak Cladding Temperature (°F)	2200	1788	1667
Maximum Local Oxidation (%)	17	1.854	2.527
Total Core Wide Oxidation (%)	1	0.0392	0.021

SBLOCA

The results of SBLOCA re-analysis with M5® fuel cladding are:

	Acceptance Criteria	M5® Analysis	Current Zircaloy Analysis
Peak Cladding Temperature (°F)	2200	1828	1780
Maximum Local Oxidation (%)	17	3.31	3.47
Total Core Wide Oxidation (%)	1	0.041	0.04

The results of the re-analyses show that the applicable 10 CFR 50.46 acceptance criteria are met.

4.2 No Significant Hazards Consideration Determination

The Commission has provided standards in 10 CFR 50.92(c) for determining whether a significant hazards consideration exists. A proposed amendment to an operating license for a facility involves no significant hazard if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

The proposed amendment does not involve a significant hazards consideration for the following reasons:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change would allow the use of M5® fuel rod cladding in the St. Lucie Unit 1 reactor. The topical report BAW-10240(P)-A prepared by Framatome, currently known as AREVA, has been approved by the NRC for use with M5® fuel cladding. The fuel cladding itself is not an accident initiator and does not affect accident probability. Use of M5® fuel cladding, which has essentially the same properties as currently licensed Zircaloy, has been shown to meet all 10 CFR 50.46 acceptance criteria and, therefore, will not increase the consequences of an accident.

   The proposed change to Technical Specification 6.9.1.11 (Core Operating Limits Report (COLR)) enables the use of the appropriate methodology to analyze accidents for cores containing fuel with M5® cladding to ensure that the plant continues to meet applicable design criteria and safety analysis acceptance criteria. The proposed change to the list of

NRC-approved methodologies listed in Technical Specification 6.9.1.11 has no impact on plant operation and configuration. The list of methodologies in Technical Specification 6.9.1.11 does not impact either the initiation of an accident or the mitigation of its consequences.

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

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

Use of M5® clad fuel will not result in changes in the operation or configuration of the facility. The material properties of M5® are similar to those of Zircaloy. Therefore, M5® fuel rod cladding will perform similarly to those fabricated from Zircaloy, thus precluding the possibility of the fuel becoming an accident initiator and causing a new or different type of accident.

The proposed change to Technical Specification 5.3.1, to add M5® as a fuel clad material, does not create any new accident initiators. The proposed change to the list of NRC-approved methodologies listed in Technical Specification 6.9.1.11, to add BAW-10240(P)-A, has no impact on any plant configuration or system performance. There is no change to the parameters within which the plant is normally operated, and thus the possibility of a new or different type of accident is not created.

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 change involve a significant reduction in a margin of safety?

Response: No.

The proposed change will not involve a significant reduction in the margin of safety because it has been demonstrated that the material properties of the M5® are not significantly different from those of Zircaloy. M5® is expected to perform similarly to Zircaloy for all normal operating and accident scenarios, including both loss of coolant accident (LOCA) and non-LOCA scenarios. For LOCA scenarios, plant-specific LOCA analyses using M5® properties demonstrate that the acceptance criteria of 10 CFR 50.46 have been satisfied.

The proposed change to Technical Specification 5.3.1 has been evaluated in this submittal and all acceptance criteria are met.

The proposed change to the list of NRC-approved methodologies listed in Technical Specification 6.9.1.11 has no impact on any plant configuration or system performance. The added Topical Report has been reviewed and approved by the NRC for use with M5® fuel cladding. Approved methodologies will be used to ensure that the plant continues to meet applicable design criteria and safety analysis acceptance criteria.

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

4.3 Conclusions

Based on the above, FPL concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified.

5.0 ENVIRONMENTAL CONSIDERATION

10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment of an operating license for a facility requires no environmental assessment, if the operation of the facility in accordance with the proposed amendment does not: (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and (3) result in a significant increase in individual or cumulative occupational radiation exposure. FPL has reviewed this LAR and determined that the proposed amendment meets 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 needs to be prepared in connection with the issuance of this amendment. The basis for this determination follows.

Basis

This change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) for the following reasons:

1. As demonstrated in the 10 CFR 50.92 evaluation, the proposed amendment does not involve a significant hazards consideration.

2. The proposed amendment does not result in a significant change in the types or increase in the amounts of any effluents that may be released offsite. The proposed change provides a reduced corrosion rate while maintaining the benefits of mechanical strength and resistance to accelerated corrosion from abnormal chemistry conditions. Thus, the proposed amendment will not result in a significant change in the types or increase in the amounts of any effluents that may be released offsite.

3. The proposed amendment does not result in a significant increase in individual or cumulative occupational radiation exposure. There are no changes to the source term or radiological release assumptions used in evaluating the radiological consequences in the St. Lucie Unit 1 UFSAR. The proposed changes have no adverse impact on component or system interactions. The proposed changes will not degrade the ability of systems, structures or components important to safety to perform their safety function nor change the response of any system, structure or component important to safety as described in the St. Lucie Unit 1 UFSAR. The proposed changes do not alter the design assumptions, conditions, or configurations of the facilities or the manner in which the units are operated. Hence, the proposed amendment does not result in a significant increase in individual or cumulative occupational radiation exposure.

6.0 REFERENCES

1. BAW-10227P-A Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5®) in PWR Reactor Fuel," June 2003.

2. Framatome (AREVA) topical report BAW-10240(P)(A) Revision 0, "Incorporation of M5 Properties in Framatome ANP Approved Methods", May 2004.

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

4. 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.

5. Letter from T. J. Orf (USNRC) to M. Nazar (FPL), St. Lucie Unit 1 – Issuance of Amendment Regarding Extended Power Uprate (TAC No. ME5091), July 9, 2012 (Supplemented with a Correction Letter on July 12, 2012).

St. Lucie Unit 1

LICENSE AMENDMENT REQUEST AND 10 CFR 50.46 AND 10 CFR 50 APPENDIX K EXEMPTION REQUEST – M5 FUEL ROD CLADDING

ATTACHMENT 1

REQUEST FOR EXEMPTION FROM THE PROVISIONS OF 10 CFR 50.46 AND 10 CFR 50 APPENDIX K TO ALLOW USE OF M5 FUEL CLADDING

10 CFR 50.46 and 10 CFR 50 Appendix K Exemption Request

In accordance with 10 CFR 50.12, *Specific Exemptions,* FPL requests exemption from the requirements specified in 10 CFR 50.46, *Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors,* and 10 CFR 50 Appendix K, *ECCS Evaluation Models,* paragraph I.A.5, regarding the use of Zircaloy or ZIRLO as a fuel rod cladding material at St. Lucie Unit 1.

10 CFR 50.46, (a)(1)(i) states in part:

> *"Each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding must be provided with an emergency core cooling system... "*

10 CFR 50 Appendix K, Paragraph I.A.5, states in part:

> *"The rate of energy release, hydrogen generation, and cladding oxidation from the metal/water reaction shall be calculated using the Baker-Just equation (Baker, L., Just, L.C., "Studies of Metal Water Reactions at High Temperatures, III. Experimental and Theoretical Studies of the Zirconium-Water Reaction," ANL-6548, page 7, May 1962)..."*

Both of these regulatory requirements, either explicitly or implicitly, state or assume that either Zircaloy or ZIRLO is to be used as the fuel rod cladding material. This exemption request pertains to the proposed use of the M5® zirconium alloy for fuel rod cladding.

10 CFR 50.12 states that the Commission may grant an exemption from requirements contained in 10 CFR 50 provided that: 1) the exemption is authorized by law, 2) the exemption will not result in an undue risk to public health and safety, 3) the exemption is consistent with the common defense and security, and 4) special circumstances, as defined in 10 CFR 50.12(a)(2) are present. The requested exemption to allow the use of a zirconium alloy other than Zircaloy or ZIRLO for fuel cladding material at St. Lucie Unit 1 satisfies these requirements as described below.

1. The requested exemption is authorized by law.

   The fuel that will be irradiated at St. Lucie Unit 1 contains cladding material that does not conform to the cladding material designations explicitly defined in 10 CFR 50.46 and 10 CFR 50, Appendix K. However, the criteria of these sections will continue to be satisfied for the operation of the St. Lucie Unit 1 core containing M5® fuel rod cladding material. Transition to an alternate, but equivalent fuel product is not precluded by law. As stated above, 10 CFR 50.12 allows the NRC to grant exemptions from the requirements of 10

CFR 50, and granting the proposed exemption would not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, the exemption is authorized by law.

2. The requested exemption does not present an undue risk to the public health and safety.

   The use of the M5® material as fuel rod cladding follows the same evaluation process for its implementation by the fuel vendor, as done for the current fuel rod cladding, to confirm that operation of this fuel product does not increase the probability of occurrence or the consequences of an accident, and does not create any new or different type of accident that could pose a risk to public health and safety. FPL, in conjunction with AREVA NP Inc. (AREVA), will utilize NRC approved methods for the reload design process, for St. Lucie Unit 1 reload cores containing M5® fuel rod cladding, to ensure safety analysis limits are met for operation within the operating limits specified in the Technical Specifications. Thus, granting of this exemption request will not present an undue risk to the public health and safety.

3. The requested exemption is consistent with the common defense and security.

   The M5® fuel rod cladding is similar in design to the current cladding material used at St. Lucie Unit 1. The special nuclear material in this fuel product will continue to be handled and controlled in accordance with approved plant procedures. Therefore, the requested exemption for the proposed use of M5® as fuel rod cladding is consistent with the common defense and security.

4. Special circumstances are present which necessitate the request of an exemption to the regulations of 10 CFR 50.46 and 10 CFR 50 Appendix K.

   The 10 CFR 50.46 and 10 CFR 50 Appendix K regulations do not allow the use of M5® fuel rod cladding material. The chemical composition of the M5® advanced alloy differs from the specifications for either Zircaloy or ZIRLO. Therefore, in the absence of the requested exemption, use of the M5® advanced alloy falls outside the language and intent of 10 CFR 50.46, and 10 CFR 50 Appendix K, Paragraph I.A.5.

The M5® advanced fuel rod cladding is designed to accommodate the high fuel rod burnups that are required for today's modern fuel management schemes and core designs. M5® is an alloy composed primarily of zirconium (approximately 99 percent) and niobium (approximately 1 percent) that has demonstrated superior corrosion resistance and reduced irradiation induced growth relative to both standard and low-tin Zircaloy. The resulting alloy microstructure is highly stable under irradiation and provides superior in-reactor performance of any zirconium alloy. These improvements permit higher burnup of the fuel in conjunction with improved thermal and mechanical performance. The M5® alloy has been tested in both reactor and non-reactor environments to determine its mechanical and structural properties as described in Reference 1. The M5® alloy is planned to be used at St. Lucie Unit 1 for fuel rod cladding.

When used as fuel rod cladding, the M5® alloy will provide increased performance margins with regard to fuel rod corrosion and fuel rod growth.

10 CFR 50.12 states that the Commission will not grant an exemption from requirements contained in 10 CFR 50 unless special circumstances, as defined in 10 CFR 50.12(a)(2) are present. The requested exemption meets the special requirements of 10 CFR 50.12(a)(2)(ii) that *"application of the subject regulation is not necessary to achieve the underlying purpose of the rule."*

For the reasons described below, the use of the M5® advanced alloy as a fuel rod cladding material achieves the underlying purposes of 10 CFR 50.46, and 10 CFR 50 Appendix K, Paragraph I.A.5.

- The underlying purpose of 10 CFR 50.46 is to ensure that facilities have adequate acceptance criteria for the ECCS. Reference 1 demonstrates that the effectiveness of the ECCS will not be affected by a change from Zircaloy fuel rod cladding to M5® fuel rod cladding. Analysis described in the reference also demonstrates that the ECCS acceptance criteria applied to reactors fueled with Zircaloy clad fuel are also applicable to reactors fueled with M5® fuel rod cladding.

  Because the underlying purpose of 10 CFR 50.46 is achieved through the use of the M5® advanced alloy as a fuel rod cladding material, special circumstances are present under 10 CFR 50.12(a) (2) (ii) for granting an exemption to 10 CFR 50.46.

- The underlying purpose of 10 CFR Appendix K, Paragraph I.A.5, is to ensure that cladding oxidation and hydrogen generation are appropriately limited during a LOCA and conservatively accounted for in the ECCS evaluation model. Specifically, Appendix K requires that the Baker-Just equation be used in the ECCS evaluation model to determine the rate of energy release, cladding oxidation, and hydrogen generation. Appendix D of Reference 1 demonstrates that the Baker-Just model is conservative in all post-LOCA scenarios with respect to the use of the M5® advanced alloy as a fuel rod cladding material.

  Because the underlying purpose of 10 CFR 50 Appendix K, Paragraph I.A.5 is achieved through the use of the M5® advanced alloy as a fuel rod cladding material, special circumstances are present under 10 CFR 50.12(a) (2) (ii) for granting exemptions to 10 CFR 50 Appendix K, Paragraph I.A.5.

In summary, the intent of 10 CFR 50.46 and 10 CFR 50, Appendix K will continue to be satisfied for the planned operation with M5® fuel rod cladding. Issuance of an exemption from the criteria of these regulations for the use of M5® fuel rod cladding in the St. Lucie Unit 1 reload cores will not compromise the safe operation of the reactors. Approval of this exemption

request will allow the use of M5® advanced alloy and will improve reactor performance at the St. Lucie Unit 1 Nuclear Plant.

References

1. BAW-10227P-A, Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5®) in PWR Reactor Fuel," June 2003.

St. Lucie Unit 1

LICENSE AMENDMENT REQUEST AND 10 CFR 50.46 AND 10 CFR 50 APPENDIX K EXEMPTION REQUEST – M5 FUEL ROD CLADDING

ATTACHMENT 2

Technical Specification Markups

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DESIGN FEATURES

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

or M5

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

ADMINISTRATIVE CONTROLS

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."

St. Lucie Unit 1

LICENSE AMENDMENT REQUEST AND 10 CFR 50.46 AND 10 CFR 50 APPENDIX K EXEMPTION REQUEST – M5 FUEL ROD CLADDING

ATTACHMENT 3

Word Processed TS Changes

Page 5-4
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DESIGN FEATURES

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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.

ADMINISTRATIVE CONTROLS

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."

Attachment 3