April 16, 2008

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT RE: USE OF OPTIMIZED ZIRLO™ FUEL ROD CLADDING (TAC NO. MD5370)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 215 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated April 24, 2007, as supplemented by electronic mail dated February 12, 2008.

The amendment changes TS 5.3.1, "Fuel Assemblies," to add Optimized ZIRLO™ as an acceptable fuel rod cladding material. In addition, you requested an exemption to the cladding material specified in pursuant to Part 50, Section 46 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models" to allow the use of Optimized ZIRLO™ fuel rod cladding material in future core reload applications.

The NRC staff authorized the exemption by letter dated March 11, 2008, and it was published in the *Federal Register* on March 18, 2008 (73 FR 14502).

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

N. Kalyanam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 215 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

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ADAMS Accession Nos.: Pkg ML080380004, Amendment ML080380005, License/TS Pg ML080380006

(*) SE input memo (**) See previous concurrence

OFFICE	DORL/LPL4/PM	DORL/LPL4/LA	DSS/SNPB/BC	DIRS/ITSB/BC	OGC – no legal objection	DORL/LPL4/BC
NAME	NKalyanam (**)	JBurkhardt (**)	AMendiola: EThrom for AM	GWaig (**)	RHolmes (**)	THiltz
DATE	2/21/08	2/19/08	2/21/08	2/25/08	2/27/08	4/15/08

OFFICIAL RECORD COPY

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ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 215
License No. NPF-38

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

   A. The application for amendment by Entergy Operations, Inc. (EOI), dated April 24, 2007, as supplemented by electronic mail dated February 12, 2008, 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, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.2 of Facility Operating License No. NPF-38 is hereby amended to read as follows:

> 2. Technical Specifications and Environmental Protection Plan
>
> The Technical Specifications contained in Appendix A, as revised through Amendment No. 215, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility Operating
License No. NPF-38 and
Technical Specifications

Date of Issuance: April 16, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 215

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace the following pages of the Facility Operating License and Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Facility Operating License

REMOVE	INSERT
- 4 -	- 4 -

Technical Specifications

REMOVE	INSERT
5-5	5-5

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 215 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By letter dated April 24, 2007 (Reference 1), as supplemented by electronic mail dated February 12, 2008 (Reference 6), Entergy Operations, Inc. (Entergy), the licensee, submitted a request for an amendment for Waterford Steam Electric Station, Unit 3 (Waterford 3). The proposed change to Technical Specification (TS) 5.3.1, "Fuel Assemblies," would add Optimized ZIRLO™ as an acceptable fuel rod cladding material. Within the license amendment request (LAR), the licensee also requested an exemption to the cladding material specified in Part 50, Section 46 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Acceptance criteria for emergency core cooling [ECCS] systems for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," to allow the use of Optimized ZIRLO™ fuel rod cladding material in future core reload applications.

The U.S. Nuclear Regulatory Commission (NRC) staff authorized the exemption by letter dated March 11, 2008, and it was published in the *Federal Register* on March 18, 2008 (73 FR 14502).

The supplemental electronic mail dated February 12, 2008, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on May 22, 2007 (72 FR 28720).

2.0 REGULATORY EVALUATION

Part 50 of 10 CFR includes the NRC's requirement that TS shall be included by applicants for a license authorizing operation of a production or utilization facility. Paragraph 10 CFR 50.36(d) requires that TS include items in five specific categories related to station operation. These categories are (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operations; (3) surveillance requirements; (4) design features; and (5) administrative controls. The proposed change to TS 5.3.1 is within the safety limits category.

Regulatory guidance for the review of fuel rod cladding materials and fuel system designs and adherence to applicable General Design Criteria is provided in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP), Section 4.2, "Fuel System Design." In accordance with SRP Section 4.2, the objectives of the fuel system safety review are to provide assurance that:

- The fuel system is not damaged as a result of normal operation and anticipated operational occurrences,
- Fuel system damage is never so severe as to prevent control rod insertion when it is required,
- The number of fuel rod failures is not underestimated for postulated accidents, and
- Coolability is always maintained.

In addition to licensed reload methodologies, an approved mechanical design methodology is utilized to demonstrate compliance with SRP 4.2 fuel design criteria. The NRC staff has previously reviewed and approved Optimized ZILRO™ cladding material for application in Westinghouse and Combustion Engineering fuel assembly designs (Reference 2).

The LAR involves adding Optimized ZIRLO™ as an acceptable fuel rod cladding material. The NRC staff's review of TS 5.3.1 will verify that Optimized ZIRLO™ fuel cladding material is applicable to the licensee and its implementation is done in accordance with established conditions and limitations.

Pursuant to 10 CFR 50.12, "Specific Exemptions," Entergy has requested an exemption to 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models." The regulation in 10 CFR 50.46 contains acceptance criteria for ECCS for reactors fueled with zircaloy or ZIRLO™ cladding. In addition, Appendix K to 10 CFR Part 50 requires that the Baker-Just equation be used to predict the rates of energy release, hydrogen concentration, and cladding oxidation from the metal-water reaction.

The exemption request relates solely to the specific types of cladding material specified in these regulations. As written, the regulations presume the use of zircaloy or ZIRLO™ fuel rod cladding. Thus, an exemption from the requirements of 10 CFR 50.46 and Appendix K to 10 CFR Part 50 is needed to allow a cladding alloy other than zircaloy or ZIRLO™.

Note that a recent revision to 10 CFR 50.44 removed any specification of cladding material (e.g., zircaloy or ZIRLO™). This regulation specifies requirements for the control of hydrogen gas generated after a postulated loss-of-coolant accident for reactors fueled with zirconium cladding. As a result of this revision, an exemption to 10 CFR 50.44 is no longer required for different zirconium cladding alloys.

3.0 TECHNICAL EVALUATION

The proposed change to TS 5.3.1, "Fuel Assemblies," was provided in Attachment 2 of Reference 1. The proposed change consists of adding the text "or Optimized ZIRLO™" within the sentence describing fuel rods. In Reference 2, the NRC staff had approved Optimized ZIRLO™ fuel cladding based on (1) similarities with standard ZIRLO™, (2) demonstrated material performance, and (3) a commitment to provide irradiated data and validate fuel performance models ahead of burnups achieved in batch application.

The NRC staff's safety evaluation (SE) for Optimized ZIRLO™ (contained within Reference 2) includes ten conditions and limitations. The licensee has documented compliance with these ten conditions and limitations in Attachment 1 of Reference 1 and has committed to ensuring compliance for future reloads in Attachment 4 of Reference 1. With the exception of Condition #6 and #7, the NRC staff has reviewed the licensee's compliance with each of the ten SE conditions and limitations and finds each acceptable.

SE Condition #6 and #7 relate to validating in-reactor performance and fuel performance models based on Lead Test Assembly (LTA) data ahead of batch application. In Attachment 1 of Reference 1, the licensee refers to a Westinghouse letter (Reference 3) to demonstrate compliance with these two SE conditions up through the projected burnup of the first cycle. Citing the availability of more recent data, the NRC staff requested that the Westinghouse compliance letter be updated. The revised SE compliance letter (Reference 4) contains LTA pool-side measurements from more recent fuel outages.

In response to a NRC staff request, the Westinghouse provided a revised LTA compliance letter (Reference 5) which added model predictions along with measured parameters. This information was necessary to confirm the adequacy of current fuel performance models. After reviewing the LTA data, the NRC staff finds that the licensee has demonstrated acceptable in-reactor performance and the adequacy of model predictions up through the first cycle burnup.

One of the main objectives of the ongoing Westinghouse creep program was to confirm the adequacy of the PAD creep models (same as FATES) for Optimized ZIRLO™ and verify that the steady state irradiation creep rate is the same in tension and compression. After review of the creep program measurements, the NRC staff is not convinced that these objectives were fulfilled. Based upon the profilometry data in Figures 3 through 6 of Reference 5, the NRC staff finds that the creep models are adequate for the first operating cycle where the fuel rod cladding is predominately in compressive creep. However, based upon the material in Section 3.3.2 of Reference 5, the NRC staff has concerns with respect to tensile creep predictions and potential impacts on cladding liftoff pressure. Cladding liftoff is a concern toward end-of-life, and therefore, is of little concern during the first operating cycle. The licensee has committed to provide further demonstration of model accuracy prior to subsequent cycles. For the next reload, the licensee should scrutinize the tensile creep model predictions with respect to the latest creep program data in order to ensure that the underlying objectives of the Westinghouse creep program are fulfilled.

Based upon information contained in the revised compliance letter (Reference 5), the NRC staff finds the licensee's compliance with SE Condition #6 and #7 acceptable. The licensee has committed to confirm that Westinghouse has provided confirmatory LTA data and validated fuel

performance to the NRC prior to subsequent cycles. The licensee has proposed to add WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006, which contain SE conditions #6 and #7 to TS 6.6.5, Core Operating Limits Report (COLR)." The addition of the WCAP to TS 6.6.5 will require that the SE conditions will be met by the licensee for subsequent refueling cycles.

Based upon the NRC staff's prior approval of Optimized ZIRLO™ and the licensee's current and future compliance with the SE conditions and limitations, the NRC staff finds the proposed change to TS 5.3.1 acceptable along with the future use of Optimized ZIRLO™ fuel cladding material at Waterford 3.

The NRC staff recognizes that implementing a new cladding material (and/or assembly design) along with its supporting analytical methods may impact calculated results for many design-basis accidents. Based on the NRC staff's prior review and approval (Reference 2), the licensee will continue to comply with regulatory criteria.

4.0 REGULATORY COMMITMENTS

1. The reload process for Waterford 3 will ensure the conditions and limitations of the NRC SER for Optimized ZIRLO™ as addressed in Attachment 1 of Reference 1 are met when a batch of Optimized ZIRLO™ is implemented.

2. Entergy will confirm that Westinghouse will provide additional confirmatory data associated with LTA programs at other facilities prior to subsequent cycles of operation with Optimized ZIRLO™ fuel rod cladding. Confirmation will continue until average burnup for the LTA programs at the other facilities reach the licensed average fuel rod burnup for Waterford 3 (60 gigawatt days per metric ton).

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the regulatory commitments are best provided by the licensee's administrative processes, including its commitment management program. The regulatory commitments do not warrant the creation of regulatory requirements (items requiring prior NRC approval of subsequent changes).

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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

published in the *Federal Register* on May 22, 2007 (72 FR 28720). Accordingly, the 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 need be prepared in connection with the issuance of the 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) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

8.0 REFERENCES

1. Letter from Entergy to U.S. Nuclear Regulatory Commission, "License Amendment Request to Allow the Use of Optimized ZIRLO™ Fuel Rod Cladding," April 24, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML071160348).

2. Westinghouse, WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006 (ADAMS Accession No. ML062080576, Proprietary, Non-Publicly Available).

3. Letter from Westinghouse to U.S. Nuclear Regulatory Commission, "SER [Safety Evaluation Report] Compliance with WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A 'Optimized ZIRLO™'," January 4, 2007 (ADAMS Accession No. ML070100389, Proprietary, Non-Publicly Available).

4. Letter from Westinghouse to U.S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™'," November 6, 2007 (ADAMS Accession No. ML073130562, Proprietary, Non-Publicly Available).

5. Letter from Westinghouse to U.S. Nuclear Regulatory Commission, "SER Compliance with WCAP-12610-P-A & CENPD-404-P-A Addendum 1-A 'Optimized ZIRLO™'," LTRNRC-07-58, Rev. 1, February 5, 2008 (ADAMS Accession No. ML080390452).

6. Electronic Mail from R.L. Williams, Entergy Nuclear Operations, Inc., to N. Kalyanam, NRC/NRR/DORL/LPLIV, "2/12/2008 E-mail from Licensee Enclosing Markup of Technical Specification Page 5-5, Supplement to 4/24/2007 License Amendment Request Re: Use of Optimized ZIRLO-TM Fuel Rod Cladding," dated February 12, 2008 (ADAMS Accession No. ML080440127).

Principal Contributor: P. Clifford

Date: April 16, 2008