May 9, 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 - CORRECTION TO AMENDMENT NO. 214 RE: REQUEST TO SUPPORT NEXT GENERATION FUEL; REVIEW AND APPROVAL OF REVISED EMERGENCY CORE COOLING SYSTEM (ECCS) PERFORMANCE ANALYSIS; AND REVIEW AND APPROVAL OF SUPPLEMENT TO THE ECCS PERFORMANCE ANALYSIS (TAC NOS. MD6299, MD6363, AND MD6954)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC) issued the Amendment No. 214 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. This amendment consists of: (1) changes to the Technical Specifications (TSs) in response to your application dated August 2, 2007, as supplemented by letters dated January 17, and March 10, 2008, and electronic mail dated March 24, 2008; (2) review and approval of your request submitted by letter dated August 9, 2007, as supplemented by letter dated January 21, 2008, the Waterford 3 revised Emergency Core Cooling System (ECCS) Performance Analysis that supports the implementation of Combustion Engineering (CE) 16x16 Next Generation Fuel (NGF) described in Westinghouse Topical Report (TR), WCAP-16500, "CE 16 x 16 Next Generation Fuel Core Reference Report"; and (3) review and approval of your request dated October 4, 2007, as supplemented by letter dated March 4, 2008, which provided a supplement to the ECCS performance analysis in support of NGF.

The amendment changes the Waterford 3 TS 6.9.1.11.1, Core Operating Limits Report (COLR), TS 3.5.1, Safety Injection Tanks, and TS 3.6.1.5, Containment Air Temperature, to add new analytical methods, modify the containment average air temperature, and modify the safety injection tank level to support the implementation of NGF.

The NRC staff inadvertently issued the cover letter, pages 8, 9, and 10 of the Safety Evaluation and TS page 3/4 6-13 with errors. The corrected pages, with the changes listed below, denoted by the vertical bar on the right, are enclosed.

1. Cover letter to the issuance of amendment – TAC No. and Topical Report number corrected.
2. The correct TS page 3/4 6-13, which should have been Insert 2 in the attachment to your supplemental letter dated January 17, 2008, added under ACTION in that TS page.
3. Page 8 of SE, Section 3.2 – Reference number corrected
4. Page 9 of SE, Table 2 – Topical Report number, Limiting Break Size and Peak Clad Temperature corrected.
5. Page 10 of SE – Referenced S2M methodology to Item 5 in TS 6.9.1.11.1 and added the reference of TR CENPD-137-2-P-A to SBLOCA analyses methodology.

If you have any questions, please contact me at (301) 415-1480.

Sincerely,

/RA/

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

Docket Nos. 50-382

cc: See next page

Enclosure: Corrected copies of Cover Letter dated April 15, 2008; TS Page 3/4 6-13, and SE pages 8, 9, and 10.

If you have any questions, please contact me at (301) 415-1480.

Sincerely,

/RA/

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

Docket Nos. 50-382

cc: See next page

Enclosure: Corrected copies of Cover Letter dated April 15, 2008; TS Page 3/4 6-13, and SE pages 8, 9, and 10.

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Corrected TS Pages: ML081270036

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April 15, 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: REQUEST TO SUPPORT NEXT GENERATION FUEL; REVIEW AND APPROVAL OF REVISED EMERGENCY CORE COOLING SYSTEM (ECCS) PERFORMANCE ANALYSIS; AND REVIEW AND APPROVAL OF SUPPLEMENT TO THE ECCS PERFORMANCE ANALYSIS (TAC NOS. MD6299, MD6363, AND MD6954)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 214 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). This amendment consists of: (1) changes to the Technical Specifications (TSs) in response to your application dated August 2, 2007, as supplemented by letters dated January 17, and March 10, 2008, and electronic mail dated March 24, 2008; (2) review and approval of your request submitted by letter dated August 9, 2007, as supplemented by letter dated January 21, 2008, the Waterford 3 revised Emergency Core Cooling System (ECCS) Performance Analysis that supports the implementation of Combustion Engineering (CE) 16x16 Next Generation Fuel (NGF) described in Westinghouse Topical Report (TR), WCAP-16500, "CE 16 x 16 Next Generation Fuel Core Reference Report"; and (3) review and approval of your request dated October 4, 2007, as supplemented by letter dated March 4, 2008, which provided a supplement to the ECCS performance analysis in support of NGF.

The proposed amendment changes the Waterford 3 TS 6.9.1.11.1, Core Operating Limits Report (COLR), TS 3.5.1, Safety Injection Tanks, and TS 3.6.1.5, Containment Air Temperature. The changes add new analytical methods and modify the containment average air temperature and safety injection tank level to support the implementation of NGF. The staff finds that the proposed changes to the Technical Specifications are acceptable.

The NRC staff has reviewed the ECCS performance analyses and concluded that the CE large break loss-of-coolant accident (LBLOCA) and small break loss-of-coolant accident (SBLOCA) analyses methodology, as described in CE TR, CENPD-132, Supplement 4-P-A, "Calculative Methods for the CE Nuclear Power Large Break LOCA Evaluation Model," March 2001, and CENPD-137, Supplement 2-P-A, Calculative Methods for the ABB CE Small break LOCA Evaluation Model, April 1998 (S2M Methodology), are acceptable for use by the licensee in demonstrating Waterford 3 compliance with the requirements of Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," of Title 10 of the *Code of Federal Regulations*. The Updated Final Safety Analysis Report will be changed to reflect the revised LOCA analyses.

injected into the Reactor Coolant System (RCS) as the RCS pressure lowers, thereby increasing the reactor vessel reflood rate. The higher core reflood rate results in less time for the cladding to heat up and better core reflood heat-transfer coefficients and, therefore, lower the PCT for an LBLOCA.

The licensee provides the technical basis to justify that the change in SIT level (from 77.8 percent to 72.8 percent) still meets the conservative maximum allowable SIT level based on the results of the ECCS Performance Analysis (Reference 2) given in Table 5.1 of Reference 1. The staff has reviewed the justification for the licensee's technical basis to support this proposed TS change and found it acceptable because an approved methodology has been used and the analysis produces a conservative result.

Summary

The staff concludes that lowering the maximum SIT level from 77.8 percent to 72.8 percent is acceptable because the proposed change is based on the result of the LBLOCA analysis using an approved methodology.

In addition to the proposed changes above, the licensee identified administrative changes on TS pages 6-20a and 6-20b, such as the text that is currently at the bottom of page 6-20a associated with TS 6.9.1.11.2 and TS 6.9.1.11.3 will be moved to page 6-20b as will some of the above-listed references. The staff finds these administrative changes acceptable.

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).

3.2 Review and Approval of Emergency Core Cooling System Performance Analysis

In Reference 3, the licensee provided the results for the Waterford 3 LBLOCA analyses operating at a power of 3735 MWt (while the rated core power is 3716 MWt, analyses were performed at 3735 MWt to account for a 0.5 percent power measurement uncertainty) performed in accordance with the CE LBLOCA methodology. The licensee's results for the calculated PCTs, the maximum cladding oxidations (local), and the maximum core-wide cladding oxidations for Waterford 3 are provided in the Table 1 along with the acceptance criteria of 10 CFR 50.46(b).

The concern with core-wide oxidation relates to the amount of hydrogen generated during a LOCA. Because hydrogen that may have been generated pre-LOCA (during normal operation) will be removed from the reactor coolant system throughout the operating cycle, the NRC staff noted that pre-existing oxidation does not contribute to the amount of hydrogen generated post-LOCA and, therefore, it does not need to be addressed further when determining whether the calculated total core-wide hydrogen meets the 1.0 percent criterion of 10 CFR 50.46(b)(3).

As discussed above, Entergy had Westinghouse conduct the LBLOCA analyses for Waterford 3 operating at a power level of 3735 MWt using an NRC-approved CE LBLOCA analysis methodology. The NRC staff concluded that the results of these analyses indicated compliance

with 10 CFR 50.46(b)(1) through (b)(3) for power levels of up to 3735 MWt. Meeting these criteria provides reasonable assurance that at the current licensed power level, the Waterford 3 core will be amenable to cooling as required by 10 CFR 50.46(b)(4). The capability of Waterford 3 to satisfy the long-term cooling requirements of 10 CFR 50.46(b)(5) is unaffected by the proposed LAR. The LBLOCA analysis methodology used to perform the analyses discussed above continues to be acceptable and suitable for inclusion in the Waterford 3 Core Operating Limits Report (COLR).

TABLE 1
LARGE BREAK LOCA ANALYSIS RESULTS
CENPD-132, SUPPLEMENT 4-P-A, ADDENDUM 1-P

Parameter	Waterford 3 Results*	10 CFR 50.46 Limits
Cladding Material	Zirlo	(Cylindrical) Zircaloy or Zirlo
Peak Clad Temperature	2166 ^{o}F	2200 ^{o}F (10 CFR 50.46(b)(1))
Maximum Local Oxidation	16.9 percent	17.0 percent (10 CFR 50.46(b)(2))
Maximum Total Core-Wide Oxidation (All Fuel)	<1 percent	1.0 percent (10 CFR 50.46(b)(3))

* for a double ended guillotine break at the reactor coolant pump discharge leg.

The small-break LOCA (SBLOCA) methodology used for the analyses was found to apply to all conventional CE PWR designs in the NRC generic SE of CENPD-137, Supplement 2 P-A (S2M) methodology (Reference 9). Therefore, the SBLOCA methodology described in CENPD-137, Supplement 2-P-A, is acceptable for application to Waterford 3, which is a PWR designed by CE, and for inclusion in the Waterford 3 TSs. The above-listed TS Reference the Supplement 2 version (referred to as the S2M or Supplement 2 Model) was identified in the licensee's submittal as a TS reference.

The licensee's results from the SBLOCA analyses, for the calculated PCTs, the maximum cladding oxidations (local), and the maximum core-wide cladding oxidations for Waterford are provided in Table 2, shown below, along with the acceptance criteria of 10 CFR 50.46(b).

TABLE 2
SMALL-BREAK LOCA ANALYSIS RESULTS CENPD-137, SUPPLEMENT 2-P-A

Parameter	Waterford 3 Results*	10 CFR 50.46 Limits
Limiting Break Size/Location	0.055ft^2/PD	Not Applicable
Cladding Material	Zirlo	(Cylindrical) Zircaloy or Zirlo
Peak Clad Temperature	1973 ^{o}F	2200 ^{o}F (10 CFR 50.46(b)(1))
Maximum Local Oxidation	14.3 percent	17 percent (10 CFR 50.46(b)(2))
Maximum Total Core-Wide Oxidation (All Fuel)	<1 percent	1.0 percent (10 CFR 50.46(b)(3))

* for a break at the pump discharge.

Therefore, the NRC staff concludes that the S2M methodology is applicable to Waterford 3 and that the limitations and conditions of the NRC's SE approving the S2M methodology (Reference 10) were satisfied for the Waterford 3 rated power level and the fuels discussed above. The staff concludes that the S2M applies to Waterford 3 because it is already listed, as Item 5, in TS 6.9.1.11.1.

In Reference 7, the licensee stated, "Waterford 3 and its vendor, Westinghouse Electric Company LLC, continue to have ongoing processes, which assure that LOCA analysis input values bound the as-operated plant values for those parameters." The NRC staff finds that this statement, along with the generic acceptance of the CE LBLOCA analysis methodology, provides assurance that the CE CENPD-132, Supplement 4-P-A, Addendum 1-P LBLOCA analysis methodology and LBLOCA analyses are applicable to Waterford 3, operated at its current licensed power level.

The staff also finds that S2M report used at Waterford 3 and the version listed in the COLR for the Waterford 3 plant, is consistent with guidance provided in NUREG-1432.

Summary

Based on this review, the NRC staff concludes that the CE LBLOCA and SBLOCA analyses methodologies, which are described in (1) TR CENPD-132-P-A. and (2) TRs CENPD-137-P-A and CENPD-137-2-P-A, respectively, are acceptable for use by Entergy in demonstrating that Waterford 3 complies with the requirements of 10 CFR 50.46(b), because the Waterford 3 plant design is among the designs for which application of the CE LBLOCA and SBLOCA methodologies was approved by the NRC (References 8 and 10).

The NRC staff's review of the acceptability of the CE LBLOCA and SBLOCA methodologies for Waterford 3 focused on assuring that the licensee and its vendor have processes to assure that specific input parameters or bounding values are used to conduct the Waterford 3 LBLOCA and SBLOCA analyses, that the analyses will be conducted within the conditions and limitations stated in the NRC-approved CE LBLOCA and SBLOCA methodologies, and that the results will satisfy the requirements of 10 CFR 50.46(b) for Waterford 3 operating at its present licensed power.

This SE also documents the NRC staff review and acceptance of the CE LBLOCA and SBLOCA analysis methodology for application to Waterford 3, for inclusion in the Waterford 3 TS and COLR, and of the specific LBLOCA and SBLOCA analyses discussed above that were performed with NRC-approved CE LBLOCA and SBLOCA methodologies for Waterford 3 operated at powers up to its licensed power level of 3716 MWt.

3.3 Review and Approval of Supplementary Emergency Core Cooling System Performance Analysis

3.3.1 1999 EM Optional Steam Cooling Model

The licensee performed supplementary LBLOCA analysis using the 1999 NRC approved EM: CEFLASH-4A/FII for the blowdown analysis; COMPERC-II/LB for the reflood analysis; STRIKIN-II for the hot rod heatup analysis; and COMZIRC for the corewide oxidation calculation.