



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

July 13, 2015

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-0751

**SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – REQUEST FOR
ADDITIONAL INFORMATION REGARDING NATIONAL FIRE PROTECTION
ASSOCIATION STANDARD 805 (TAC NO. ME7602)**

Dear Sir or Madam:

By letter dated November 17, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML113220230), as supplemented by letters dated January 26, September 27, and October 16, 2012 (ADAMS Accession Nos. ML12027A049, ML12272A099, and ML12290A215, respectively); May 16 and December 18, 2013 (ADAMS Accession Nos. ML13137A128 and ML13365A325, respectively); June 11, 2014 (ADAMS Accession No. ML14162A506); and March 12, April 10, and May 14, 2015 (ADAMS Accession Nos. ML15071A296, ML15103A647, and ML15138A057, respectively), Entergy Operations, Inc. (the licensee) submitted a license amendment request for Waterford Steam Electric Station, Unit 3 (Waterford). The proposed amendment would transition Waterford's fire protection licensing basis from Section 50.48(b) of Title 10 of the *Code of Federal Regulations* (10 CFR) to 10 CFR 50.48(c), National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."

The U.S. Nuclear Regulatory Commission staff has reviewed the information provided by the licensee in the March 12, April 10, and May 14, 2015, supplements and determined that additional information is needed to complete the review of the proposed amendment. Please provide the additional information requested in the enclosure by August 31, 2015.

Vice President, Operations

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If you have any questions, please contact me at 301-415-3229 or Michael.Orenak@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael D. Orenak". The signature is fluid and cursive, with the first name "Michael" being more legible than the last name "Orenak".

Michael D. Orenak, Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure:
Request for Additional Information

cc w/enclosure: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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REQUEST FOR ADDITIONAL INFORMATION
REGARDING LICENSE AMENDMENT REQUEST TO ADOPT
NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805
ENTERGY OPERATIONS, INC.
WATERFORD STEAM ELECTRIC STATION, UNIT 3
DOCKET NO. 50-382

By letter dated November 17, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML113220230), as supplemented by letters dated January 26, September 27, and October 16, 2012 (ADAMS Accession Nos. ML12027A049, ML12272A099, and ML12290A215, respectively); May 16 and December 18, 2013 (ADAMS Accession Nos. ML13137A128 and ML13365A325, respectively); June 11, 2014 (ADAMS Accession No. ML14162A506); and March 12, April 10, and May 14, 2015 (ADAMS Accession Nos. ML15071A296, ML15103A647, and ML15138A057, respectively), Entergy Operations, Inc. (the licensee) submitted a license amendment request (LAR) for Waterford Steam Electric Station, Unit 3 (Waterford). The proposed LAR would transition Waterford's fire protection licensing basis from Section 50.48(b) of Title 10 of the *Code of Federal Regulations* (10 CFR) to 10 CFR 50.48(c), National Fire Protection Association Standard (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing the LAR and requests the following additional information.

Fire Modeling (FM) Request for Additional Information (RAI) S01.b.01

NFPA 805, Section 2.4.3.3, states, in part, that the probabilistic risk assessment (PRA) approach, methods, and data shall be acceptable to the NRC. LAR Section 4.5.1.2, "Fire Model Utilization in the Application," states, in part, that fire modeling was performed as part of the fire PRA development.

In the supplement dated April 10, 2015, the licensee responded to FM RAI S01.b and explained that a focused walkdown was conducted to identify areas where ignition of secondary combustibles (cable trays) could occur. In these areas, the zone of influence (ZOI) was first determined for the applicable ignition source(s) to identify fire scenarios that are expected to involve secondary combustibles. The ZOI for these scenarios was then recalculated to account for the heat release rate (HRR) contribution of secondary combustibles. Then, additional targets within the expanded ZOI were failed.

The licensee explained, in general terms, the process that was used to address the effect of the HRR contribution of secondary combustibles on the ZOI, but made no mention in its response of how secondary combustibles were treated in the hot gas layer (HGL) calculations and how ignition, horizontal flame spread, and vertical fire propagation in a stack of cable trays were modeled. Provide the following information:

- (a) Explain how the time to ignition of a single horizontal tray, or the lowest tray in a stack of horizontal trays above an ignition source, was determined, and provide justification for the criteria used to estimate when cables ignite.
- (b) Describe how subsequent fire propagation in the stack was modeled. Explain the assumptions that were made regarding the time to ignition and initial burning section of each tray in the stack, the lateral (horizontal) flame spread rate along the cables in a tray, and describe the method that was used to calculate the total HRR of the stack.
- (c) Explain how fires that involve cable trays as secondary combustibles were treated in the HGL and multi-compartment analysis (MCA) calculations.

FM RAI S01.c.01

NFPA 805, Section 2.4.3.3, states, in part, that the PRA approach, methods, and data shall be acceptable to the authority having jurisdiction (AHJ). LAR Section 4.5.1.2, "Fire Model Utilization in the Application," states, in part, that fire modeling was performed as part of the fire PRA development.

In the supplement dated April 10, 2015, the licensee responded to FM RAI S01.c and stated that the fire PRA team, supported by plant fire protection staff, conducted several days of focused walkdowns to identify (non-cable) intervening combustibles. The licensee further stated that secondary combustibles were removed from fire area Reactor Auxiliary Building 27 as a result of the significant contribution to the core damage frequency of scenarios involving these combustibles, and that three other fire areas were found to have potential scenarios involving secondary combustibles.

In the response to FM RAI S01.c, it is often not clear what type of combustibles the licensee is referring to when the term "secondary combustibles" is used. For example, in the first paragraph, the licensee stated that there are three fire areas with potential scenarios involving secondary combustibles, but in the fourth paragraph it is stated that eight physical analysis units (PAUs) contained the potential for secondary ignition to occur.

Provide the following information:

- (a) Clarify how many fire scenarios that involve non-cable secondary combustibles (e.g., combustible heating, ventilation, and air conditioning duct insulation) were included in the fire PRA and provide a brief description of these scenarios.

- (b) Explain how the time to ignition and HRR of non-cable secondary combustibles were determined in these scenarios.

FM RAI S01.f.01

NFPA 805, Section 2.4.3.3, states, in part, that the PRA approach, methods, and data shall be acceptable to the AHJ. LAR Section 4.5.1.2, "Fire Model Utilization in the Application," states, in part, that fire modeling was performed as part of the Fire PRA development.

In the supplement dated March 12, 2015, the licensee responded to FM RAI S01.f and explained that transient fire sources were generally assumed to be at floor level, as this is typically where transient combustibles brought into a PAU for temporary work, cleaning, or storage would be located.

The top surface of transient combustibles is generally located at some elevation above the floor, and assuming that transient fires are at floor level would, therefore, be non-conservative in the ZOI determination.

Provide technical justification for the assumption that transient fires are at floor level.

FM RAI S01.h(ii).01

NFPA 805, Section 2.4.3.3, states, in part, that the PRA approach, methods, and data shall be acceptable to the AHJ. LAR Section 4.5.1.2, "Fire Model Utilization in the Application," states, in part, that fire modeling was performed as part of the fire PRA development.

In the supplement dated May 14, 2015, the licensee responded to FM RAI S01.h(ii) and explained that the electrical cabinet fires in the equipment area are grouped in one main control room (MCR) abandonment scenario, and that this scenario bounds electrical cabinet fires that propagate to adjacent cabinets. The licensee further stated that there are three electrical cabinets in the operator area of the MCR not included in this grouping; the individual scenarios involving these cabinets all lead to abandonment; and the results would be the same, regardless of fire propagation between cabinets.

The NRC staff determined that the revised Consolidated Model of Fire Growth and Smoke Transport analysis of MCR abandonment due to a loss of habitability does not include scenarios with cabinet fires that propagate to one or two adjacent cabinets.

Provide a summary of an analysis to determine the time to MCR abandonment for propagating panel fires and the corresponding probability for abandonment, or provide technical justification for not considering propagating cabinet fire scenarios.

FM RAI S01.j(iii).01

NFPA 805, Section 2.4.3.3, states, in part, that the PRA approach, methods, and data shall be acceptable to the AHJ. LAR Section 4.5.1.2, "Fire Model Utilization in the Application," states, in part, that fire modeling was performed as part of the fire PRA development.

In the supplement dated March 12, 2015, the licensee responded to FM RAI S01.j(iii) and explained that barrier failure from the second to a third compartment was not considered due to the fact that the inclusion of an additional barrier failure probability "would likely cause" the MCA scenario to be screened out based on the low risk.

The statement, "...would likely cause..." implies that the licensee's response is not based on any quantitative analysis.

Provide a quantitative assessment to substantiate the assumption that the inclusion of an additional barrier failure probability would cause the MCA scenario to be screened out based on low risk.

Vice President, Operations

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If you have any questions, please contact me at 301-415-3229 or Michael.Orenak@nrc.gov.

Sincerely,

/RA/

Michael D. Orenak, Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure:
Request for Additional Information

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ADAMS Accession No.: ML15182A346

*RAI input e-mail

OFFICE	NRR/DORL/LPL4-2/PM	NRR/DORL/LPL4-2/LA	NRR/DRA/AFP/BC*
NAME	MOrenak	PBlechman (LRonewicz)	AKlein
DATE	7/7/15	7/7/15	6/23/15
OFFICE	NRR/DORL/LPL4-2/BC	NRR/DORL/LPL4-2/PM	
NAME	MKhanna	MOrenak	
DATE	7/7/15	7/7/15	

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