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1CAN041601

April 7, 2016

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

SUBJECT: Response to PRA RAI 19
Adoption of National Fire Protection Association Standard NFPA-805
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

By email dated March 10, 2016 (Reference 15), the NRC requested additional information with respect to the quality and controls associated with the Probabilistic Risk Assessment (PRA) model supporting the Entergy Operations, Inc. (Entergy) request to amend the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TS) and licensing bases to comply with the requirements in 10 CFR 50.48(a), 10 CFR 50.48(c), and the guidance in Regulatory Guide (RG) 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants." The amendment request followed Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c)." This submittal described the methodology used to demonstrate compliance with, and transition to, National Fire Protection Association (NFPA)-805, and included regulatory evaluations, PRAs, change evaluations, proposed modifications for non-compliances, and supporting attachments. The Entergy response to PRA Request for Additional Information (RAI) 19 is discussed in Attachment 1 to this letter.

The information, as detailed in this letter, with respect to the original Entergy request (Reference 1) has been reviewed and Entergy has determined that the information does not invalidate the no significant hazards consideration included in the Reference 1 letter.

In accordance with 10 CFR 50.91(b)(1), a copy of this application is being provided to the designated Arkansas state official.

This letter contains no new commitments.

If you have any questions or require additional information, please contact Stephenie Pyle at 479-858-4704.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 7, 2016.

Sincerely,

ORIGINAL SIGNED BY JEREMY G. BROWNING

JGB/dbb

Attachment: Response to PRA RAI 19 – ANO-1 Transition to NFPA-805

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REFERENCES:

1. Entergy letter dated January 29, 2014, *License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)* (1CAN011401) (ML14029A438)
2. NRC letter dated May 5, 2015, *Arkansas Nuclear One, Unit 1 – Request for Additional Information Regarding License Amendment Request to Adopt National Fire Protection Association Standard 805* (TAC No. MF3419) (1CNA051501) (ML15091A431)
3. Entergy letter dated May 19, 2015, *Response to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN051501) (ML15139A196)
4. Entergy letter dated June 16, 2015, *60-Day Response to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN061501) (ML15167A503)
5. Entergy letter dated July 21, 2015, *90-Day Response to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN071501) (ML15203A205)
6. Entergy letter dated August 12, 2015, *120-Day Response to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN081501) (ML15224A729)
7. NRC email dated September 8, 2015, *Arkansas Nuclear One, Unit 1 – 2nd Round Request for Additional Information - ANO-1 NFPA-805 LAR* (TAC No. MF3419) (1CNA091501) (ML15251A220)
8. Entergy letter dated September 22, 2015, *Round 2 Response to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN091501) (ML15265A113)
9. NRC email dated October 6, 2015, *Arkansas Nuclear One, Unit 1 – 2nd Round Part 2 Request for Additional Information - ANO-1 NFPA-805 LAR* (TAC No. MF3419) (1CNA101501) (ML15280A114)
10. Entergy letter dated November 4, 2015, *Second Set of Round 2 Responses to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN111501) (ML15308A452)
11. Entergy letter dated November 17, 2015, *Clarification of Response to Round 2 Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN111502) (ML15321A076)
12. NRC email dated January 12, 2016, *Arkansas Nuclear One, Unit 1 – 3rd Round Request for Additional Information - ANO-1 NFPA-805 LAR* (TAC No. MF3419) (1CNA011601) (ML16012A049)

REFERENCES (continued):

13. Entergy letter dated January 15, 2016, *Response to Round 3 Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN011601) (ML16015A421)
14. NRC email dated February 3, 2016, *Arkansas Nuclear One, Unit 1 – 3rd Round Request for Additional Information - ANO-1 NFPA-805 LAR (TAC No. MF3419)* (1CNA021601)
15. NRC email dated March 10, 2016, *Arkansas Nuclear One, Unit 1 – 4th Round Request for Additional Information - ANO-1 NFPA-805 LAR - TAC No. MF3419* (1CNA031601) (ML16070A131)
16. Entergy letter dated March 25, 2016, *Response to PRA RAI 03 – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN031602) (ML16088A299)

Attachment to

1CAN041601

**Response to PRA RAI 19
ANO-1 Transition to NFPA-805**

Response to PRA RAI 19 – ANO-1 Transition to NFPA-805

By email dated March 10, 2016, the NRC requested additional information with respect to the quality and controls associated with the Probabilistic Risk Assessment (PRA) model supporting the Entergy Operations, Inc. (Entergy) request to amend the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TS) and licensing bases to comply with the requirements in 10 CFR 50.48(a), 10 CFR 50.48(c), and the guidance in Regulatory Guide (RG) 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants." The Entergy response to PRA Request for Additional Information (RAI) 19 is discussed below. The RAI itself is repeated prior to the response for completeness.

PRA RAI 19

In Section 4.5.1.1 of the license amendment request (LAR) dated January 29, 2014 (ADAMS Accession No. ML14029A438), the licensee states that the "ANO-1 base internal events PRA (ANO-1 PSA Model 4p00) was the starting point for the Fire PRA." It is unclear to the U.S. Nuclear Regulatory Commission (NRC) staff when this internal events PRA model was last updated to incorporate changes to the plant and procedures unrelated to NFPA-805. In Section 4.8.2 of the LAR dated January 29, 2014, the licensee also states that following installation of the modifications in Table S-1 of Attachment S to the LAR, additional updates to the Fire PRA model may be necessary. In Table S-2 of Attachment S to the LAR, Implementation Item S2-9, the licensee states that the PRA model update "will be performed in accordance with Entergy fleet PSA Maintenance procedure EN-DC-151, Section 5.2."

Please describe how the procedures in Entergy fleet PSA procedure EN-DC-151 will ensure that the risk contribution from plant modifications and changes unrelated to NFPA-805, included together with the modifications and changes listed in Attachment S to the LAR, will "ensure the as-built change-in-risk" will not "exceed the PRA model change-in-risk estimates reported in the LAR," as stated in Implementation Item S2-9.

Entergy Response

As described in Section 4.5.1.1 of the ANO-1 LAR submitted January 29, 2014 (Reference 1), the internal events PRA (ANO-1 PSA Model 4p0) was the starting point for the Fire PRA (FPRA). The ANO-1 PSA Model 4p0 was updated in 2009. Although the internal events model was the foundation of the ANO-1 FPRA model, the intent of the NFPA-805 FPRA model project was to develop and use a FPRA model that reflected, as closely as possible, the as-built/as-operated plant with consideration of the planned NFPA-805 modifications.

Entergy procedure EN-DC-151, *PSA Maintenance and Update*, states that a periodic PRA update should be performed at least once every four years. The procedure notes that separate models such as seismic, fire, internal flooding, winds and tornadoes, etc., should also be considered for update.

The requirement to perform a periodic internal events PRA update as described in the procedure was not followed with respect to the last scheduled update, which should have been completed in the 2013 time frame. This deficiency was first identified in 2011 and is currently documented in Condition Report (CR) CR-ANO-C-2016-0552. ANO initiated an update of the internal events PRA model for ANO-1 in 2013. However, the update is not scheduled to be completed until April of 2016.

Similar to the process that was used for the ANO-2 FPRA, since the timing of the final LAR submittals and subsequent RAI responses were beyond the 4-year expected update frequency, additional actions were initiated to verify that the FPRA model used to support the LAR/RAI responses remained valid, specifically with respect to reflecting the as-built/as operated plants. A review was performed to determine which Engineering Changes (ECs) implemented between January 1, 2008, and April 28, 2014, had the potential to impact the ANO-1 FPRA (reference EC-50788, *Evaluate Engineering Changes for Fire PRA Impacts – ANO-1*). The results of this review identified only a small number of ECs that required further assessment with respect to potential fire risk impact. The final FPRA quantifications included in the response to PRA RAI 03 (Reference 16), with one exception, considered, but were not affected by, the ECs identified as having a potential impact on the FPRA. The risk impact of the noted single exception, which is related to the installation of additional permanent shielding, has been analyzed for its potential impact to the FPRA and determined to result in no risk increase for the scenarios created from the inclusion of this shielding for ANO-1.

EC-63177 was also initiated to review the model change requests (MCRs) identified between June 6, 2009, and January 29, 2014. Additionally, MCRs that were closed after the internal events model integration and quantification work package was completed, but prior to the model completion date (July 6, 2009), were reviewed. These reviews concluded that none of the MCRs, open or closed, would result in a risk increase that would change the conclusions presented in the LAR.

Although not specifically performed as part of the FPRA model development, a procedure review was also performed for the ANO-1 internal events model update. The review, performed for the period between January 2008 and July 2013, is documented in Jenson Hughes Report Number: 0021-037-RPT-002. No procedure changes were identified that would affect the internal events PRA model. Typically, procedure changes would only have an effect on human error probabilities (HEPs) associated with precursors or operator actions that are credited for mitigation. While the impact on the FPRA model was not within the scope of this review, the internal events impact would be applicable to that portion of the FPRA model that relies on the precursors and operator actions associated with non-fire events. The NFPA-805 Fire Risk Evaluation results require consideration of new operator actions; however, this is also required for the transition to NFPA-805 and as such, will be addressed through required procedure changes as part of the transition (Reference 16 – Updated Attachment S, Table S-2, Implementation Item S2-6).

Changes to the Internal Events PRA model and FPRA are directed by the processes outlined in the following procedures:

- EN-DC-115, *Engineering Change Process*
- EN-DC-128, *Fire Protection Impact Reviews*
- EN-DC-151, *PRA Maintenance and Update*

Plant modifications (e.g., both non-NFPA-805 modifications and NFPA-805 modifications) are developed in accordance with EN-DC-115 which includes a review of any change to a structure, system, or component (SSC), including design changes, document-only changes, and equivalent changes. The procedure includes screening criteria related to risk significance and the FPRA. If any of the screening criteria associated with fire modeling are impacted, then a Fire Protection Program Impact Review per EN-DC-128 is required. The reviews performed in

accordance with EN-DC-128, which are performed by Fire Protection and PRA engineers, ensure the acceptance criteria of the current fire protection Operating License conditions and the Operating License conditions proposed under NFPA-805 are maintained.

For the PRA engineering impact review, if any of the screening criteria associated with the PRA model are impacted by an EC, then a PRA review is required that could involve changes to the Emergency Operating Procedures, Abnormal Operating Procedures, Severe Accident Procedures, or Maintenance Rule function.

As stated above, EN-DC-151 requires a periodic update of the PRA models, including the FPRA. As described in Section 5.2 of EN-DC-151, Revision 5, in the interim period between updates, reviews are performed and MCRs are initiated, as appropriate, if any of the following are identified as impacting the PRA model:

- Modeling errors
- Peer review comments
- Model enhancements or improvements
- Plant modifications
- Circuit and/or cable changes
- License basis document changes
- Emergency operation procedure changes

The requirements specified in EN-DC-151 consist of real time identification of plant changes, methodology changes, and procedure changes that could impact the PRA model. These changes, once identified, are tracked in the MCR database for inclusion into the PRA models. The MCR process ensures that any PRA model updates will address all identified issues.

In summary, reviews of plant changes and MCRs were performed to ensure the final FPRA quantification provided in response to PRA RAI 03 reflected the as-built/as-operated plant with consideration of the planned NFPA-805 modifications. The existing procedural processes ensure that the risk contribution from plant modifications and changes unrelated to NFPA-805, together with the modifications and changes listed in Attachment S to the LAR (Reference 1), are considered. These processes have been utilized and continue to be performed in order to ensure that the as-built change in risk will not exceed the PRA model change-in-risk estimates reported in the LAR (Reference 1).

As reflected in Entergy letter dated March 25, 2016 (Reference 16), Attachment 6, Table S-2, Implementation Item S2-9, was modified to state the following:

Validate the change in risk by revising the FPRA model for each modification or implementation item completed that is credited either directly or indirectly by PRA. If the as-built change-in-risk from each modification or implementation item, including the procedure changes in Implementation Item S2-6, exceeds RG 1.205 acceptance criteria, the results shall be entered into the corrective action program to evaluate the cause of risk increase and determine appropriate resolution. The FPRA update will be performed in accordance with Entergy fleet PSA Maintenance procedure EN-DC-151, Revision 5, Section 5.2.

This is consistent with the Duane Arnold Nuclear Facility approach to be more specific with respect to the intended verifications and the expected actions to drive resolution (reference Duane Arnold letter to NRC dated July 2, 2013, ML13191A035).

With respect to the in-transition period between NRC approval of the ANO-1 NFPA-805 amendment request and the time in which full compliance with 10 CFR 50.48(c) is achieved, the proposed Operating License condition (Reference 16, Attachment 9, Page 7), states that risk-informed changes to the FPRA may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact. As stated above, Entergy has verified the risk results, including the change in risk, provided in the updated Attachment W (Reference 16) to be consistent with the as-built/as-operated plant with consideration of the planned NFPA-805 modifications. Should modifications or procedure changes impacting the FPRA be performed during the transition period, or incorporation of the updated internal events model result in changes that do not meet the Operating License conditions so described in Attachment 9 of Reference 16, NRC approval will be required to implement necessary changes.

Conclusion

Based on the procedural, process, and program controls described, and the modification and procedure reviews performed to date, the as-built change in risk estimates reported in Reference 16 are not expected to be exceeded. In accordance with Operating License conditions that will govern (following NRC approval) in-transition and post-transition implementation of NFPA-805 for ANO-1, the NRC will be notified if stated acceptance criteria are not met.

REFERENCES

1. Entergy letter dated January 29, 2014, *License Amendment Request to Adopt NFPA-805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)* (1CAN011401) (ML14029A438)
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REFERENCES (continued)

6. Entergy letter dated August 12, 2015, *120-Day Response to Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN081501) (ML15224A729)
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11. Entergy letter dated November 17, 2015, *Clarification of Response to Round 2 Request for Additional Information – Adoption of National Fire Protection Association Standard NFPA-805* (1CAN111502) (ML15321A076)
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