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Richard L. Anderson
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10 CFR 50.90

1CAN101801

October 17, 2018

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

SUBJECT: Response to Request for Additional Information Related to the Application for Technical Specification Change Regarding Risk-Informed Justification for the Relocation of Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TSTF-425)
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

By letter dated March 12, 2018 (Reference 1), as supplemented by letter dated April 26, 2018, Entergy Operations, Inc. (Entergy), requested NRC approval of a proposed change to the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TSs). The proposed amendment would modify ANO-1 TSs by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04-10, "Risk-Informed Technical Specification Initiative 5B, Risk-Informed Method for Control of Surveillance Frequencies," by adopting Technical Specification Task Force (TSTF)-425, Revision 3, "Relocate Surveillance Frequencies to Licensee Control - Risk Informed Technical Specification Task Force (RITSTF) Initiative 5."

By email dated September 19, 2018 (Reference 3), the NRC informed Entergy that additional information is needed to support the Staff's continued review of the application. Enclosure 1 includes a summary of the (RAI) and Entergy's response.

No new regulatory commitments are included in this amendment request.

In accordance with 10 CFR 50.91, Entergy is notifying the State of Arkansas of this amendment request by transmitting a copy of this letter and enclosure to the designated State Official.

If there are any questions or if additional information is needed, please contact Stephenie Pyle, Manager, Regulatory Assurance, at (479) 858-4704.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on October 17, 2018.

Sincerely,

ORIGINAL SIGNED BY RICHARD L. ANDERSON

RLA/dbb

Enclosure: Response to Request for Additional Information – Adoption of TSTF-425

REFERENCES:

1. Entergy Letter dated March 12, 2018, *Application for Technical Specification Change Regarding Risk-Informed Justification for the Relocation of Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TSTF-425)*, Arkansas Nuclear One, Unit 1 (1CAN031801) (ML18071A319)

2. Entergy letter dated April 26, 2018, *Supplemental Information Supporting the Application for Technical Specification Change Regarding Risk-Informed Justification for the Relocation of Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TSTF-425)*, Arkansas Nuclear One, Unit 1, (1CAN041805) (ML18117A493)

3. NRC email dated September 19, 2018, *Final RAI RE: License Amendment Request to Adopt TSTF-425, Revision 3* (EPID L-2018-LLA-0063) (1CNA091801) (ML18263A302)

cc: Mr. Kriss Kennedy
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Enclosure to

1CAN101801

Response to Request for Additional Information
Adoption of TSTF-425

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

ADOPTION OF TSTF-425

By letter dated March 12, 2018 (Reference 1), as supplemented by letter dated April 26, 2018, Entergy Operations, Inc. (Entergy), requested NRC approval of a proposed change to the Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TSs). The proposed amendment would modify ANO-1 TSs by relocating specific surveillance frequencies to a licensee-controlled program with the implementation of Nuclear Energy Institute (NEI) 04-10, "Risk-Informed Technical Specification Initiative 5B, Risk-Informed Method for Control of Surveillance Frequencies," by adopting Technical Specification Task Force (TSTF)-425, Revision 3, "Relocate Surveillance Frequencies to Licensee Control - Risk Informed Technical Specification Task Force (RITSTF) Initiative 5."

By email dated September 19, 2018 (Reference 3), the NRC informed Entergy that additional information is needed to support the Staff's continued review of the application. The specific questions presented in the Reference 3 request for addition information (RAI) are summarized below for ease of review. Entergy's response is provided thereafter.

PRA-RAI-01 – Facts and Observations (F&Os)

a) <u>F&Os MCR A1-5890 and MCR A1-5891(Supporting Requirement IFQU-A8) – regarding the internal flooding PRA model updates</u>

For F&O MCR A1-5890, the peer review team noted that the internal events PRA model "properly considers both flooding impacts and random equipment failures and human errors." However, the peer review team also observed "at least one instance was identified in which a modified internal events HEP [Human Error Probability] was not properly included in the integrated model." The peer review team illustrated this observation with an example and proposed a resolution to review the process used to incorporate modified HEPs into the internal flooding model and re-quantify with "corrected HEP values." Similarly, for F&O MCR A1-5891, the peer review team also observed one instance where an HEP was identified in flooding scenarios, but not in the flooding PRA model. The peer review team illustrated with an example and proposed a resolution to review the process used to incorporate new flooding HEPs into the internal flooding model and verify that all intended events were included. In its disposition, the licensee indicated that it would update impacted HEPs, as needed, in the Internal flooding analysis model and documentation in response to both F&Os. The licensee also concluded that the incorrect HEPs are expected to result in a "very small" changes to the flooding results.

Describe the process that incorporates the modified HEPs and new HEPs into the internal flooding model and how the licensee concluded that the impact of such changes would result in a very small change to the flooding results. Alternatively, propose a mechanism to incorporate the updates prior to implementation

Entergy Response:

The update to the model of record (MOR) for internal flooding is pending completion of the update to the internal events probabilistic risk assessment (PRA) model update which is expected fourth quarter 2018. As with the internal flooding model that was reviewed for the peer review, a comprehensive review of post-initiator human failure events (HFEs) for impact of flooding events will be performed for the model update. Any HFEs potentially affected by internal flooding events will be appropriately addressed in the PRA logic. A tracking item (WT-WTHQN-2018-0229 CA-18) has been entered into the corrective action tracking system to ensure that the internal flooding PRA updates are completed before the models are used for surveillance test interval (STI) extensions.

b) F&O MCR A1-3893 (SR IE-D1) regarding basic event analysis documentation

For F&O MCR A1-3893, the peer review team observed that the licensee's approach taken for calculation of the basic event values applied the CAFTA calculation method that produced probabilities (calculation method 3) rather than frequencies (calculation method 1) within support system initiating event fault trees. The disposition to F&O MCR A1-3893 states that resolution of the F&O is only a documentation issue and implies that licensee's PRA model logic had the correct calculation type, but the fault tree result was a frequency. The licensee also states that the initiating event underwent extensive revisions and that a very small change to the results is expected.

It is not clear to NRC staff how the disposition addresses the F&O, given that the licensee did not provide clarification of the approach used.

i. Summarize the revisions that were made to initiating event fault tree (IEFT) models in the Revision 5 model update.

ii. Explain how the model produced a frequency result or propose a mechanism to incorporate the appropriate method prior to implementation.

Entergy Response:

i. The revisions to the IEFT models for the Revision 5 update consisted of the following:

   a. Revised affected IEFTs to be consistent with EPRI 1016741.

   b. Corrected several Service Water modeling errors, primarily associated with flow diversion.

   c. Updated to reflect data and plant changes such as removal of air compressors 3A/3B and use of the breathing air compressor as a backup to instrument air.

   d. Transfer of the IEFT documentation from the IE notebook to the respective system analysis notebooks.

ii. Revising the IEFT models as described for the above response to use calculation Method 1 (frequency for normally running components) was intended to ensure that the IEFT results are produced in terms of frequency (per year). The Revision 5 model, however, still contained some IEFT events using calculation Method 3; therefore, all

initiators were subsequently verified for the Revision 6 update currently underway to use calculation Method 1 with an annual failure rate, or calculation Method 9 for initiators. The IEFT models were directly incorporated in the PRA top logic model to allow dynamic calculation of IE frequencies when used with a risk monitor.

c) F&O MCR A1-5894 (IFQU-A7) regarding dependency analysis seed value

The finding implies that the HFE values in the dependency analysis were not seeded with high enough values to ensure inclusion of all relative combinations. The disposition states, "[t]he impacted HFEs will be updated as needed in the Internal Flooding Assessment (IFA) model and documentation." Regarding "Importance to Application," the licensee states that the HEP seed values are expected to have minimal or no impact on the flooding results, but are expected to be assessed in case-by-case Surveillance Testing Interval (STI) evaluations.

i. Summarize how the new seed values were selected and clarify how the process is conservative with the guidance.

ii. Explain how higher seed values have only a minimal or no impact on the results.

iii. If the licensee concludes that this change has an impact on the flooding results and the application, then propose a mechanism to ensure the appropriate HEP values are implemented in the PRA model used for STI calculations prior to program implementation.

Entergy Response:

i. The HEP seed values used in the internal flooding PRA quantification are the same values used for the internal events PRA quantification. Those values are set to 0.1 or higher for the vast majority of events considered in the internal flooding PRA. The values are much higher than the nominal values calculated for the individual HFEs. Use of such values is typical of seeded values used in the industry. Additionally, the convergence study for the internal flooding model shows convergence. As a result, it is concluded that the quantification results examined in the internal flooding PRA peer review meet the requirements of supporting requirement (SR) QU-C1 which says, "IDENTIFY cutsets with multiple HFEs that potentially impact significant accident sequences/cutsets by requantifying the PRA model with HEP values set to values that are sufficiently high that the cutsets are not truncated. The final quantification of these post-initiator HFEs may be done at the cutset level or saved sequence level."

ii. As discussed above, the internal flooding PRA quantification used seed values that are much higher than the nominal HEPs for the events and the model results showed convergence. Therefore, it is concluded that use of higher seed values will have minimal or no impact on the overall results.

iii. Although it is concluded that the use of higher seed values would have minimal or no impact on the overall internal flooding results, a tracking item (WT-WTHQN-2018-0229 CA-18) has been entered into the corrective action tracking system to ensure that the internal flooding PRA updates are completed before the models are used for STI extensions.

d) F&O MCR A1-5886 (SRs IFPP-B3, IFEV-B3, IFQU-B3, IFSN-B3, IFSO-B3, and IFQU-A7) - regarding key assumptions and uncertainties

This finding states, in part, that the flood area uncertainties have the potential for leakage through penetrations that are not sealed as designed. In several places in Attachment 2 of the LAR, it states,

> As part of the PRA evaluation for each STI change request, sensitivity cases are expected to be explored for areas of uncertainty associated with unresolved items (peer review findings for ASME/ANS PRA Standard CC II or plant changes) that would impact the results of the STI change evaluation, prior to presenting the results of the risk analysis to the IDP [Integrated Decision-making Panel].

i. Describe the approach used to identify and characterize the "key" assumptions and "key" sources of uncertainty in the ANO-1 Surveillance Frequency Control Program (SFCP) that will "be explored for areas of uncertainty." The description should contain sufficient detail to identify: (1) whether all assumptions and sources of uncertainty in the failure probabilities of the affected SSCs were evaluated to determine whether they were "key"; and (2) define the criteria used to determine whether the modeling assumptions and sources of uncertainty were considered "key."

ii. Explain how the approach adequately resolves the deficiencies identified in F&Os IFPP-B3, IFEV-B3, IFQU-B3, IFSN-B3, IFSO-B3, and IFQU-A7.

iii. Clarify which sensitivity studies referenced in Section 3.4 of Attachment 2 of the ANO-1 TSTF-425 LAR address key assumptions and key sources of uncertainty. Describe each key assumption and key source of uncertainty identified in the ANO-1 SFCP that was not provided in the ANO-1 Supplement. The description should contain sufficient detail to identify whether key assumptions used in the ANO-1 SFCP which involve any changes to consensus approaches.

iv. Describe how each key assumption and key source of uncertainty, either identified above or presented in the ANO-1 LAR, was dispositioned for this application. If available, provide sensitivity studies that will be used to support the disposition for this application or, alternatively, provide a qualitative discussion to justify why different reasonable alternative assumptions would not affect this application.

Entergy Response:

i. As discussed in Section 7.3 of NUREG-1855, only relevant sources of uncertainties and related assumptions with the potential to challenge the acceptance guidelines for an application are considered key. Therefore, in the context of the ANO-1 PRA MOR, *key* assumptions and sources of uncertainty cannot be determined. However, the ANO-1 PRA MOR sensitivity and uncertainty analysis does review the model assumptions made for the PRA in order to identify candidate sensitivity analyses to assess those uncertainties that may impact the MOR results. The ANO-1 PRA MOR assumptions are reviewed for applicability against the generic sources of model

uncertainty identified in EPRI 1013491, "Guideline for Treatment of Uncertainty in Risk-Informed Applications," and EPRI 1016737, "Treatment of Model and Parameter Uncertainty for Probabilistic Risk Assessments," consistent with the guidance in NUREG-1855. This review was performed for all elements of the internal events PRA (IE, AS, SY, etc.) during the Revision 5 MOR update. The sources of uncertainty determined to be relevant to the ANO-1 PRA MOR based on this review of the assumptions were characterized and further evaluated with a total of 11 sensitivity cases. A similar review has been conducted for the Revision 6 internal flooding update (currently in development to update the MOR). A tracking item, (WT-WTHQN-2018-00229 CA-18) has been entered into the corrective action tracking system to ensure that the internal flooding PRA updates are completed before the models are used for STI extensions.

During the TSTF-425 implementation process, candidate STI changes will be reviewed against the relevant sources of uncertainty identified for the ANO-1 PRA MOR. Those sources of uncertainty determined to have the potential to challenge the acceptance criteria for the STI change will be identified as key, and sensitivity studies performed in accordance with NEI 04-10.

ii. Facts and Observations (F&O) 19-4 related to SRs IFPP-B3, IFEV-B3, IFQU-B3, IFSN-B3, IFSO-B3, and IFQU-A7 found that there was no documentation of modeling uncertainties provided in any of the Revision 5 internal flooding notebooks. Subsequently, Revision 6 of the internal flooding analysis (currently in development to update the MOR) has developed a sources of uncertainty report that follows the approach described in NUREG-1855 to identify and characterize relevant sources of uncertainty and related assumptions, using the candidates in EPRI reports 1013491 and 1016737 referenced by the NUREG. This satisfies SR IFPP-B3 (and similar) to document the characterization of the sources of model uncertainty and related assumptions.

iii. Section 3.4 of Attachment 2 of the Reference 1 ANO-1 TSTF-425 license amendment request (LAR) states that "…the results of any additional sensitivity studies identified during the performance of the reviews of gaps and open items as summarized in Sections 3.2 and 3.3 herein, will be documented and included in the results of the risk analysis submitted to the IDP." This will take place during the TSTF-425 implementation process when candidate STI changes are evaluated. As described in Response i above, assumptions and sources of uncertainty are considered key in the context of an application. Those sources of uncertainty determined to have the potential to challenge the acceptance criteria for specific STI changes will be identified as key, and sensitivity studies performed in accordance with NEI 04-10.

iv. As described in Responses i and iii above, assumptions and sources of uncertainty are considered key in the context of an application. Those sources of uncertainty determined to have the potential to challenge the acceptance criteria for specific STI changes will be identified as key, and sensitivity studies performed in accordance with NEI 04-10. This will take place during the TSTF-425 implementation process when candidate STI changes are evaluated.

PRA-RAI-02 – Fire Human Reliability Analysis (HRA) Methodology Revision

a) F&Os related to Supporting Requirements (SRs) HRA-B3, HRA-A4, HRA-D6, etc. - use of new methodology

The licensee states for these F&Os that the human reliability analysis (HRA) methodology, "was revised to follow the guidance of NUREG-1921, "EPRI/NRC-RES Fire Human Reliability Analysis Guidelines."

i. Justify that the HRA revision to NUREG-1921 does not constitute an ASME/ANS PRA Upgrade. Include a description of the HRA methodology originally used in the ANO-1 PRA models and how it was changed to be in alignment with guidance in NUREG-1921.

ii. If the HRA methodology update is determined to meet the definition of a PRA upgrade per the ASME/ANS 2009 PRA standard, then clarify that a focused-scope peer review has been conducted on HRA updates determined to be PRA upgrades and that all resulting findings along with their dispositions have been provided with this LAR.

Entergy Response:

i. Earlier versions of the HRA methodology used in support of the Fire PRA model development used a simplified flow chart for the incorporation of factors to adjust HEPs. The selected factor considered whether the action was in-control room vs. ex-control room, time available, cue available, and complexity of the action.

In order to comply with the guidance in NUREG/CR-1921, the HRAs for the Fire PRA model were developed in consideration of the cues, timing, manpower, stress, etc. The ANO-1 HRA update utilizing this methodology was considered a methodology upgrade and a focused scope peer review was performed. The discussion in the 4th bullet of Section 3.3.2 of the Reference 1 LAR discusses a peer review that was performed in June of 2014 to evaluate this upgrade in accordance with the ASME/ANS standard. The conclusion of the peer review was that the ANO-1 Fire HRA was performed consistent with the guidance set forth in NUREG/CR-1921.

ii. As stated in previous response, the update of the HRA methodology to conform with NUREG/CR-1921 is considered an upgrade and a focused scope peer review was performed in June of 2014. As a result of this peer review, it was found that the ANO-1 Fire HRA was performed consistent with the guidance set forth in NUREG/CR-1921. The three findings from this peer review, along with the associated dispositions, have been provided in Table 4 of Attachment 2 of the Reference 1 LAR.

PRA-RAI-03 - External Events/Hazards

Attachment 2, Section 3.5 of the LAR does not explain how the risk from external hazards evaluated in the ANO-1 Individual Plant Examination of External Events was updated to reflect new information, when used in performing a qualitative or bounding analysis in support of STI

extension evaluations in accordance with Nuclear Energy Institute (NEI) 04-10, Revision 1, "Risk-Informed Technical Specifications Initiative 5b Risk-Informed Method for Control of Surveillance Frequencies," Section 4, Step 10 (ADAMS Accession No. ML071360456).

Describe the process for monitoring for and incorporating new information into the qualitative or bounding analyses performed for external hazards. Include justification that this process is sufficient to support the Surveillance Frequency Control Program (SFCP) and reflect the as-built as-operated plant configuration. Specifically, describe monitoring for and incorporating new information for the high winds and tornado, hurricane, external flooding, and seismic hazards analyses such as the need to update the site-specific ground motion response spectra.

Entergy Response:

Entergy procedure EN-DC-151, "PSA Maintenance and Update," details the process for maintaining and updating all Entergy PRA models, including those for ANO-1. As described in Section 5.2 of that procedure, any new information identified by a PSA engineer should be evaluated for model impact and a model change (MCR) request created and entered into the MCR database. Each MCR is assigned a grade on creation. An MCR graded as "A" is defined as "Extremely important and necessary to assure the technical adequacy of the PRA or quality of the PRA" and requires that a condition report be generated to document the issue. Per the procedure, an interim PRA model update should be scheduled as soon as possible after the identification of an "A" level MCR or more than 25 open "B" level MCRs. Any new information that would result in a significant change in the external events risk is expected to be identified as an "A" level MCR and would result in a PRA model update as soon as possible. Also, per EN-DC-151, updates to separate PRA models for seismic, fire, external flooding, high winds, toxic chemicals, etc., are considered for updating during each periodic internal events PRA update to meet any plant-specific commitments or applications. The subsequently-updated external events analyses could then be used for the SFCP evaluations.

PRA-RAI-04 – Assumptions for Time Related Failure Contributions

NEI 04-10, Revision 1, Section 4.0, Step 8, states:

> The risk impact of a proposed STI adjustment shall be calculated as a change of the test-limited risk (see Regulatory Guide 1.177, Section 2.3.3). Since the test-limited risk is associated with failures occurring between tests, the failure rate that shall be used in calculating the risk impact of a proposed STI adjustment is the time-related failure rate associated with failures occurring while the component is in standby between tests (i.e. risk associated with the longer time to detect standby stress failures).

Describe how the ANO-1 SFCP will address the standby time-related contribution for extended surveillances.

Entergy Response:

Entergy Procedure EN-DC-354, "Risk Assessment of Surveillance Test Frequency Changes", details the process for quantitative assessment of the risk of an STI change. As described in Sections 5.3 and 5.4 of that procedure, equipment tested by the surveillance

requirement being evaluated is identified, and it is determined if the equipment is modeled in the PRA. If it is not modeled, but can be, the model is changed to incorporate the equipment. If it cannot be modeled, a surrogate component may be used, or a qualitative assessment performed. To explicitly model the component, a standby failure basic event and appropriate common cause failure events are created in the model. When there is an existing demand failure event, and a standby failure event is added, the total number of failures on demand must be partitioned into demand failures and standby failures. As referenced in RG 1.177 by EN-DC-354, when the breakdown between time-related and cyclic demand-related contribution is unknown, all failures can be assumed to be time related to obtain the maximum test-limited risk contribution.

REFERENCES:

1. Entergy Letter dated March 12, 2018, *Application for Technical Specification Change Regarding Risk-Informed Justification for the Relocation of Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TSTF-425)*, Arkansas Nuclear One, Unit 1 (1CAN031801) (ML18071A319)

2. Entergy letter dated April 26, 2018, *Supplemental Information Supporting the Application for Technical Specification Change Regarding Risk-Informed Justification for the Relocation of Specific Surveillance Frequency Requirements to a Licensee Controlled Program (TSTF-425)*, Arkansas Nuclear One, Unit 1, (1CAN041805) (ML18117A493)

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