From:	Wengert, Thomas
Sent:	Monday, April 18, 2022 9:31 AM
To:	Keele Jr, Riley D
Cc:	Clark, Robert; Dixon-Herrity, Jennifer
Subject:	Final RAI RE: License Amendment Request Concerning TS Changes Due to Revised Dose Calculations (L-2021-LLA-0181)
Attachments:	Final RAI for ANO-1 Revised Dose Calculation LAR.pdf

On April 13, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff sent Entergy Operations, Inc. (the licensee) the draft Request for Additional Information (RAI) identified below. This RAI relates to the proposed revision to the Dose Equivalent Iodine (I)-131 and the reactor coolant system (RCS) primary activity limits required by Technical Specification (TS) 3.4.12, "RCS Specific Activity," and the proposed new primary-to-secondary leak rate limit in TS 3.4.13, "RCS Leakage."

Subsequently, the licensee informed the NRC staff that a clarification call for this draft RAI was not necessary. The licensee agreed to provide a response to this RAI within 30 days of this correspondence. A publicly available version of this final RAI (attached with "draft" removed) will be placed in the NRC's Agencywide Documents Access and Management System (ADAMS).

From: Wengert, Thomas
Sent: Wednesday, April 13, 2022 11:32 AM
To: Keele Jr, Riley D <rkeele@entergy.com>
Cc: Clark, Robert <RCLARK@entergy.com>; Dixon-Herrity, Jennifer <Jennifer.Dixon-Herrity@nrc.gov>
Subject: ANO-1 Draft RAI RE: License Amendment Request Concerning TS Changes Due to Revised Dose Calculations (L-2021-LLA-0181)

By letter dated September 30, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21274A874), as supplemented by letter dated December 2, 2021 (ADAMS Accession No. ML21337A245), Entergy Operations Inc. (Entergy or the licensee) applied for a license amendment to Facility Operating License No. DPR-51 for Arkansas Nuclear One, Unit 1. The requested amendment would revise the Dose Equivalent Iodine (I)-131 and the reactor coolant system (RCS) primary activity limits required by Technical Specification (TS) 3.4.12, "RCS Specific Activity." In addition, a new primary-to-secondary leak rate limit, provided in TS 3.4.13, "RCS Leakage," is being proposed. These proposed changes are due to non-conservative inputs used in the steam generator tube rupture accident, the main steam line break accident, and the control rod ejection accident dose calculations.

The NRC staff has reviewed the submittals and has determined that additional information is required for the staff to complete its review of this application. This request for additional information (RAI) is identified as draft at this time to confirm your understanding of the information that the NRC staff needs to complete the evaluations. If the request for information is understood, please respond to this RAI within 30 days of the date of this request.

Please contact me if you would like to set up a conference call with the NRC staff to clarify this draft RAI.

Tom Wengert

Project Manager – Arkansas Nuclear One
NRR/DORL/LPL4
(301) 415-4037

Hearing Identifier: NRR_DRMA
Email Number: 1602

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"Clark, Robert" <RCLARK@entergy.com>
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"Dixon-Herrity, Jennifer" <Jennifer.Dixon-Herrity@nrc.gov>
Tracking Status: None
"Keele Jr, Riley D" <rkeele@entergy.com>
Tracking Status: None

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REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST FOR TECHNICAL SPECIFICATION

CHANGES DUE TO REVISED DOSE CALCULATIONS

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

By letter dated September 30, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21274A874), as supplemented by letter dated December 2, 2021 (ADAMS Accession No. ML21337A245), Entergy Operations Inc. (the licensee) applied for a license amendment to Facility Operating License No. DPR-51 for Arkansas Nuclear One, Unit 1. The requested amendment would revise the Dose Equivalent Iodine (I)-131 and the reactor coolant system (RCS) primary activity limits required by Technical Specification (TS) 3.4.12, "RCS Specific Activity." In addition, a new primary-to-secondary leak rate limit, provided in TS 3.4.13, "RCS Leakage," is being proposed. These proposed changes are due to non-conservative inputs used in the steam generator tube rupture (SGTR) accident, the main steam line break accident, and the control rod ejection accident dose calculations.

From January 31, 2022, through March 11, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a virtual regulatory audit of the licensee's calculations and analyses supporting the proposed license amendment. The audit plan, dated January 21, 2022, can be found at ADAMS Accession No. ML22019A134.

The NRC staff has reviewed the information provided by the licensee in the license amendment request and has determined that additional information is required to complete its review, as described below.

Regulatory Basis

The following request for information is to support the NRC staff evaluation of whether the licensee's request meets the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(c)(2), "Limiting conditions for operation," 10 CFR 50.36(c)(3), "Surveillance requirements," and the dose limits in 10 CFR 50.67, "Accident source term."

Request for Additional Information (RAI)

Nuclear Systems Performance Branch (SNSB)

SNSB-RAI-1

The SGTR break flow flashing fraction was determined using data from the SGTR case with delayed reactor trip. However, the dose calculations use the SGTR case with an early reactor trip. The NRC staff requests the licensee to:

a. Provide justification as to why the calculated flashing fraction is applicable for both early and delayed reactor trip cases, or

b. Recalculate the flashing fraction based on data from the early reactor trip case.

SNSB-RAI-2

During the regulatory audit, NRC staff reviewed the calculations of the SGTR break flow flashing fraction and discovered that the steam generator (SG) steam flow data used was significantly lower than the nominal steam flow. Since the case was run from full power, the NRC staff requests the licensee to:

a. Confirm that the correct steam flow data was used, and

b. If the correct steam flow data was used, justify why this is significantly lower than the nominal steam flow, or

c. If the steam flow data was incorrect, repeat the calculations and provide updated results for the flashing fraction.

SNSB-RAI-3

During the audit, the NRC staff determined that the computational fluid dynamics (CFD) analysis did not contain sufficient validation, verification, and uncertainty analyses using experimental data obtained from a geometry similar to a steam generator or a scaled model capturing the complexities of the two-phase flow jet in a tube bundle. Therefore, NRC staff is treating the results of the CFD analysis as input assumptions to the other calculations. The NRC staff requests that the licensee provide justification that the number of wetted tubes (650 above tube support plate (TSP) #15 and 180 below TSP #15) and the wetted surface area of the tubesheet are conservative. The discussion should include information related to how much of the break flow is converted into steam from each method of heat transfer (i.e., from the tubes, from the tubesheet, etc.).

SNSB-RAI-4

The calculations of evaporation due to heat transfer from the SG tubes includes convective heat transfer at the tube inner surface and nucleate boiling on the tube outer surface. The NRC staff requests that the licensee provide the heat transfer correlations used in these calculations and justification that they are appropriate for the applicable geometry.

SNSB-RAI-5

The calculations for evaporation due to heat transfer from the SG tubesheet and evaporation due to heat transfer from superheated steam flow are not described in the license amendment request (LAR). The NRC staff requests that the licensee describe these calculations. The response should include details concerning any heat transfer correlations used and why they are appropriate for the applicable geometry.

Operator Licensing and Human Factors Branch (IOLB)

IOLB-RAI-1

The regulation in 10 CFR Part 50.67(b) states, in part, that "[a] licensee who seeks to revise its current accident source term in design basis radiological consequence analyses shall apply for a license amendment under § 50.90. The application shall contain an evaluation of the consequences of applicable design basis accidents previously analyzed in the safety analysis report."

NUREG-0800, Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," Rev. 0, assigns responsibility to the NRC's Operator Licensing and Human Factors Branch for the review issues related to emergency operating procedures and human factors engineering design. This section also states, in part, that an acceptable implementation of an alternative source term should demonstrate compliance with plant-specific licensing commitments made in response to the NUREG-0737, "Clarification of TMI [Three Mile Island] Action Plan Requirements." Specific provisions of interest within the context of this review plan section include III.D.3.4, Control Room Habitability, as it relates to maintaining the control room in a safe, habitable condition under accident conditions by providing adequate protection against radiation and toxic gases.

In the license amendment request (LAR) dated September 30, 2021, the licensee does not appear to directly address the area of emergency operating procedures.

1. To determine whether human factors considerations have been adequately accounted for, the NRC staff require a description of whether modifications to emergency operating procedures will occur as part of the LAR (such as, for example, the incorporation of new or modified operator actions for maintaining control room habitability under accident conditions). In the no significant hazards consideration analysis, the licensee responded in part, as follows:

   > Does the proposed amendment create the possibility of a new or different kind of accident from any previously evaluated?
   >
   > Response: No
   >
   > The proposed amendment changes accident analysis inputs for calculating dose consequences at the EAB [exclusion area boundary], LPZ [low population zone], and CR [control room]. There are no plant modifications or operating procedure changes.

Confirm that the licensee will not be modifying any emergency operating procedures as part of the LAR. If modifications are proposed, describe the procedural changes, any changes in the time constraints associated with the performance of procedurally driven actions, and any operator training associated with those changes. If applicable, include a discussion of how the considerations like those in NUREG-0737 described above are addressed.

2. The credited manual actions are described in the technical evaluation portion of the LAR in the thermal-hydraulic model, which affects only the SGTR. It is the NRC staff's understanding that the actions described are no different than those that are currently credited. Confirm that there are no changes to operator actions and that the current operator actions will not be impacted by the revised thermal-hydraulic model changes. If changes are required, provide the details of the changes.