From: Sebrosky, Joseph
Sent: Friday, June 18, 2021 10:53 AM
To: Afzali, Amir
Cc: Steven Nesbit; Michael Tschiltz; Chisholm, Brandon Michael; Jung, Ian; Uribe, Juan; Oesterle, Eric; Reckley, William; Segala, John; Sanfilippo, Nathan; Shams, Mohamed; Jim C. Kinsey Jr; 'Tom King'; Thomas Hicks; Christopher P. Chwasz; NICHOL, Marcus; AUSTGEN, Kati; Cyril Draffin; Smith - NRR, Brian
Subject: Priority List of Topics for Industry-Developed TICAP Guidance Document
Attachments: Additional priority list of TICAP topics for consideration.docx

To: Amir Afzali
Southern Company Services
Licensing and Policy Director- Next Generation Reactors

The purpose of this email is to provide U.S. Nuclear Regulatory Commission (NRC) staff priority list of topics related to industry-developed draft technology inclusive content of application project (TICAP) guidance document dated April 15, 2021. The industry-developed TICAP guidance document can be found in the Agencywide Documents Access and Management System (ADAMS) under Accession Number ML21106A013. This email will be captured in ADAMS and made publicly available.

Background
In an April 15, 2021, email (ADAMS Accession No. ML21106A013), industry provided a draft TICAP guidance document. This guidance document was the subject of publicly noticed workshops on May 11 (see: https://www.nrc.gov/pmns/mtg?do=details&Code=20210516), May 19 (see: https://www.nrc.gov/pmns/mtg?do=details&Code=20210574) and May 26 (see: https://www.nrc.gov/pmns/mtg?do=details&Code=20210579). The staff has provided feedback during these workshops as documented in the meeting summary for these workshops. In addition the staff provided industry with a detailed set of comments as documented in an email dated June 10, 2021 (see ADAMS accession No. ML21161A172)

Current Status
The attached word document contains a priority list of topics for industry's consideration. It should be noted that the attached comments have not been subjected to NRC management or legal reviews. In addition, the comments were developed in parallel with the workshops and some of the comments therefore do not reflect the outcome of the issues discussed during the workshops. Nevertheless, the NRC staff believes that it is appropriate to provide the attached document for industry's consideration (along with the feedback provided during the workshops) as industry considers revisions to the April 15, 2021, TICAP guidance document.

Please let me, Eric Oesterle, or Juan Uribe, know if you have any questions regarding the attached document.

Sincerely,
Joe Sebrosky
Senior Project Manager
Advanced Reactor Policy Branch
Office of Nuclear Reactor Regulation

Hearing Identifier: NRR_DRMA
Email Number: 1233

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Options

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Additional (Significant) Comments Regarding TICAP Guidance Document

1. DBEHL Comment for TICAP Guidance Document

Section 6.1.1 of the TICAP guidance document describes the guidance related to design basis external hazard levels (DBEHLs). In the latest draft, the guidance only specifies that "The DBEHLs should be summarized in this section. A tabular form such as Table 6 1 is recommended." Beyond listing a hazard level value in a table, the guidance should specify that the applicant describe how each DBEHL is used as an input parameter to the design analysis of safety-related SSCs. For example:

- Regarding the seismic design input, where would the application describe the design ground motion response spectra, floor response spectra, damping values, and time histories? Refer to SRP Section 3.7 for relevant topics to be addressed.
- For design basis wind hazards, where would an application describe the design-basis wind loadings including design wind velocity and its recurrence interval and the methods used to transform the wind velocity into an effective pressure applied to surfaces of structures? Refer to SRP Section 3.3 for relevant topics to be addressed.

2. Construction Permit (CP) Guidance to Demonstrate Compliance With Part 100

CP guidance related to LBE analysis and meeting Part 100 should be consistent with content required for an early site permit (ESP). RG 1.206, Rev 1 describes ESP content for Chapter 15 as follows:

- "Chapter 15 is analogous to a COL FSAR for the potential reactor designs but is limited to Section 15.0.3 addressing the evaluation of the radiological consequences of design basis."

Furthermore…….from SRP 15.0.3:

- "Early Site Permit Reviews: Subpart A to 10 CFR Part 52 specifies the requirements and procedures applicable to the Commission's review of an ESP application for approval of a proposed site. Information required in an ESP application includes a description of the site characteristics and design parameters of the proposed site. The scope and level of detail of review of data parallel that used for a CP review."

Our current ARCAP CP guidance in the area of LBEs addresses the following areas (from SRP 15.0.3):

- Discussion of selected DBAs. Ensure that the spectrum of DBAs includes those DBAs that present the greatest challenge with respect to calculated fission product releases.
- Discussion of accident source terms.
- The identification of radionuclide release mechanisms from fuel, the associated limits, and the contribution to source term are or will be supported by experimental data that cover the needed range of applicability.
- The performance of fission product barriers credited to prevent and/or inhibit the release of radionuclides are or will be supported by existing or planned experimental data that cover the needed range of applicability.
- The use of bounding assumptions and conservative modeling to account for the uncertainty in final design details.
- Discussion of the major SSCs of the facility that are intended to mitigate the radiological consequences of a DBA with a description of how the three fundamental safety functions are accomplished for each DBA. Major SSCs of the facility include those that may affect the performance of barriers that restrict or limit the transport of radioactive materials from the fuel

to the public (i.e., that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in 10 CFR 50.34(a)(1)).

- Identification of the design basis for the SSCs (e.g., codes and standards to be followed, seismic categories, etc.) as well as the SSC fission product removal mechanisms. This includes natural fission product removal processes or for unique features of the design that may require additional information from the applicant to fully explain the process being credited, the amount of removal being credited (specifically decontamination factors or coefficients and timing), basis for the proposed values and inputs to the dose analysis calculation, and the justification for assuming the removal process is applicable to the design of the plant for the duration of the event.
- Discussion of the characteristics of fission product releases from the proposed site to the environment including the rates of fission product release, the isotopic quantities and the chemical forms of fission products released to the environment.
- Discussion of the meteorological characteristics of the proposed site used in the accident analysis including the site-specific short-term atmospheric dispersion (χ/Q) values determined by the applicant.
- Discussion of the analysis methods, assumptions and results for the total calculated radiological consequence dose at the exclusion area boundary (EAB), the outer boundary of the low population zone (LPZ) and control room (if required, e.g., operator actions are relied upon for safety-significant functions) from the DBAs. The uncertainty analyses in the mechanistic source terms and radiological doses should be reviewed as part of the evaluation of conservative assumptions used in this analysis. The plant design features intended to mitigate the radiological consequences of accidents, site atmospheric dispersion characteristics and the distances to the EAB and to the LPZ outer boundary are acceptable if the total calculated radiological consequences for the postulated fission product release (calculated at the upper 95th percentile of consequences) fall within the following exposure acceptance criteria specified in 10 CFR 50.34(a)(1)(ii)(D):
  - An individual located at any point on the boundary of the exclusion area for any 2-hour period following the onset of the postulated fission product release, would not receive a radiation dose in excess of 25 rem total effective dose equivalent (TEDE), and
  - An individual located at any point on the outer boundary of the LPZ, who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage), would not receive a radiation dose in excess of 25 rem TEDE.

3. Integrated Analysis

Chapter 4 of the TICAP guidance describes the integrated analysis. For each integrated analysis (100 mrem site dose, EAB early fatality risk, and latent cancer risk) the guidance specifies that the applicant "…should provide the predicted total risk from the entire range of LBEs from higher frequency, lower consequences to lower frequency, higher consequences. This result should be based on [mean values]. The margin between the target….and the predicted plant performance should be described." This guidance does not require any discussion regarding the analysis except the final result.

The applicant should describe what analysis was performed. The description should include:

- The site parameters (e.g. meteorology, off-site population distribution, EAB size) used in the analysis,
- Assumptions on location of individual members of the public,
- The analysis method used,
- Key assumptions (e.g., emergency preparedness measures, source terms, timing and duration of release, credit for medical treatment, early and latent fatality risk coefficients) used in the analysis,
- Modes of operation (full power, low power & shutdown, refueling) considered in the analysis.
- How multiple units on the site were considered,
- Uncertainty/sensitivity analysis performed,
- Results, including comparison to the target criteria.

4. Plant Programs

Chapter 8 of the TICAP guidance for plant programs specifies that "The chapter should provide an overview of the special treatment programs, addressing the purpose, scope, and performance objectives as well as applicability to SR SSCs, NSRST SSCs, or operations activities. The intent is not to provide a detailed description of how each program works. Such details will inevitably evolve over time and are fully described in owner-controlled records. " This guidance is insufficient to properly document important aspects of the program. The following describes two examples where additional guidance is appropriate:

<u>First example – Maintenance Program</u>

10 CFR 50.65 requires that a maintenance program be established, equipment performance be monitored and corrective action be taken when degraded equipment performance is detected. NRC RG 1.160 provides additional guidance on one way to meet the requirements of 10 CFR 50.65. Current evolutionary LWR licensees have maintenance program descriptions that incorporate by reference NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52." Topics addressed in the NEI template include:

- Maintenance rule scoping per 10 CFR 50.65(b)
- Monitoring and corrective action per 10 CFR 50.65(a)(1)
- Preventive maintenance per 10 CFR 50.65(a)(2)
- Periodic evaluation of monitoring and preventive maintenance per 10 CFR 50.65(a)(3)
- Risk assessment and risk management per 10 CFR 50.65(a)(4)
- Maintenance Rule Training And Qualification
- Maintenance Rule Program Relationship With Reliability Assurance Activities
- Maintenance Rule Program Relationship With Industry Operating Experience Activities
- Maintenance Rule Program Implementation

The staff, in its SER, determined that incorporation of NEI 07-02 by reference in a COL application will provide an acceptable method for (1) complying with the requirement in 10 CFR 52.79(a)(15) that FSARs contain a description of the program, and its implementation, for monitoring the effectiveness of maintenance to meet the requirements of Section 50.65 and (2) satisfying the acceptance criteria of SRP 17.6.

Second example - Example) Reliability Assurance Program (RAP{)

NUREG-0800, Section 17.4 provides a discussion on the RAP required by 10 CFR 52. In summary, the application should describe:

- Who in the plant organization is responsible for implementation and evaluation of the RAP.
- A description of how the equipment to be monitored was selected and its relation to the plant risk analysis (e.g. selected by importance measures).
- A listing of the equipment included in the RAP, the parameters being monitored and the frequency of monitoring.
- A description of how the RAP is coordinated/integrated with the maintenance, surveillance and ISI/IST programs
- A description of how the data collected is evaluated to determine the equipment reliability and its uncertainty.
- A description of how the reliability and uncertainty information is used (e.g. how is it determined that equipment reliability is consistent with the PRA, what is done if inconsistences are found). This should include assessing the impact of the reliability information on the PRA and its risk insights (e.g. LBE selection, SSC safety classification, DBAs).