Public Meeting on Oklo Topical Reports

September 1, 2021

MCA and Performance-based Licensing Topical Reports

Why are they important?

- Articulate the methodologies used by Oklo in developing the licensing basis for its reactor designs
- Offer an alternative licensing approach to the current approaches being considered for Part 53
- Represent a technology-inclusive, risk-informed performance-based licensing methodology, available for use by any advanced reactor developer, to enable broader deployment as directed by NEIMA

MCA and Performance-based Licensing Topical Reports

What do they do?

- Focus on the requirements for assuring adequate protection, rather than regulatory guidance developed for other technologies
- Utilize iterative processes to simplify the design, with preferential use of inherent features and passive systems over complex, active systems
- Clearly demonstrate safety significant functions and features of the design and how to apply the necessary controls to ensure their reliability

MCA and Performance-based Licensing Topical Reports

Current status?

- Oklo submitted both topical reports to the NRC on 7/2/2021
- NRC staff performed completeness review and identified supplemental information to support review of both topical reports
- Oklo/NRC discussion through public meetings on the identified supplemental information and proposed resolution of NRC staff comments

Maximum Credible Accident Topical Report

accident scenarios (see Note 1 and Note 2).

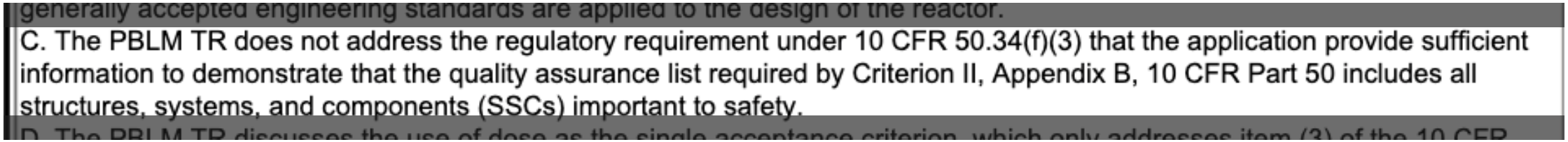
IV. The MCA TR does not identify the necessary conditions and interfaces essential to the implementation of the methodology (e.g., hazard identification team composition, information needs, documentation requirements). Common elements among the approaches used to identify hazards, initiating events, and accident scenarios include the use of a qualified team, making all essential design information available to the team, and documentation of the process (see Note 1).

V. The MCA TR provides a high-level statement that the methodology should include the use of probabilistic risk assessment

Note 1: The NRC staff's comparison of approaches for identifying hazards, initiating events, and accident scenarios included (1) standards and literature surveys of generic (i.e., non-technology specific) hazard identification techniques, (2) recent reports and regulatory guidance for advanced non-light-water reactors such as Nuclear Energy Institute (NEI) 18-04, "Risk-Informed Performance Based Technology-Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development" (ADAMS Accession No. ML19241A472) and several case studies that implemented the approach outlined in NEI 18-04, (3) approaches used to license and certify light-water-reactor designs, (4) approaches used to license research and test reactors, and (5) approaches used to license fuel-cycle facilities. These techniques include, but are not limited to, failure modes and effects analysis, hazard operability analysis, master logic diagram, use of expert panels and standards committees, and combinations thereof.

- Certain design interfaces outlined in comment IV are comparable to the requirements imposed in 10 CFR Appendix B for design and documentation. Therefore, implementation of this topical report by an entity with an NRC approved QA plan should be sufficient to meet the comment provided.
- Proposed revision language: "Application of this methodology is intended to be performed by those with an NRC approved quality assurance program for design."

Performance-based Licensing Topical Report


generally accepted engineering standards are applied to the design of the reactor.

C. The PBLM TR does not address the regulatory requirement under 10 CFR 50.34(f)(3) that the application provide sufficient information to demonstrate that the quality assurance list required by Criterion II, Appendix B, 10 CFR Part 50 includes all structures, systems, and components (SSCs) important to safety.

D. The PBLM TR discusses the use of dose as the single acceptance criterion, which only addresses item (3) of the 10 CFR

- Section 4.4, provides for a systematic approach to classifying functions and features.
- Section 4.6, describes how quality assurance is then specifically applied to SSCs.
- It is unclear what specific information the NRC is requesting be supplemented based on the requirements articulated in 10 CFR 50.34(f)(3) and 10 CFR Part 50, Appendix B, Criterion II.

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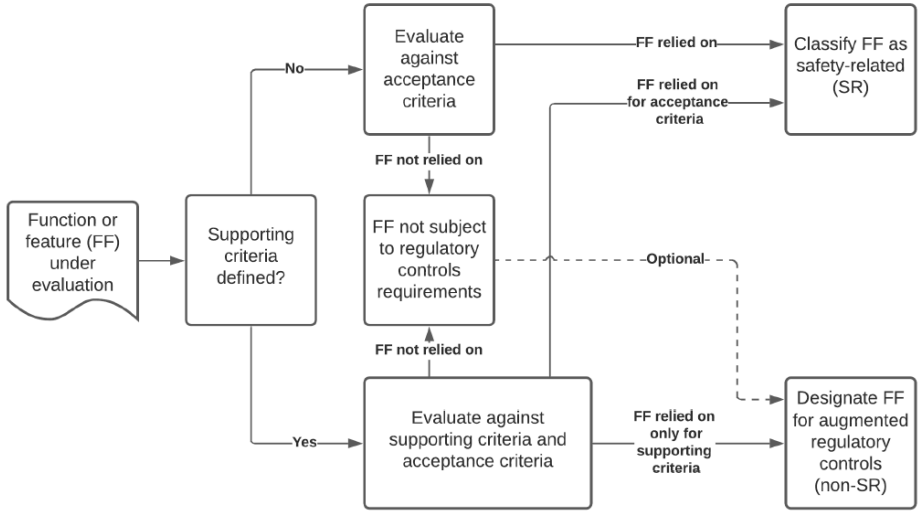
- Section 4.4, provides for a systematic approach to classifying functions and features.

4.4 Classifying functions and features

4.4.1 Evaluation approach

The methodology identifies the safety relevance of each function and feature of the design as it contributes to the licensing basis event analysis. To make this determination, each function and feature is evaluated individually to determine whether the function or feature is relied on to meet the acceptance criteria and supporting criteria (if defined). Figure 4-1 schematically shows the evaluation process for functions and features described in the following sections.



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- Section 4.6, describes how quality assurance is then specifically applied to SSCs.

4.6 The role of quality assurance as a programmatic control: assigning quality assurance requirements

4.6.1 Quality assurance approach

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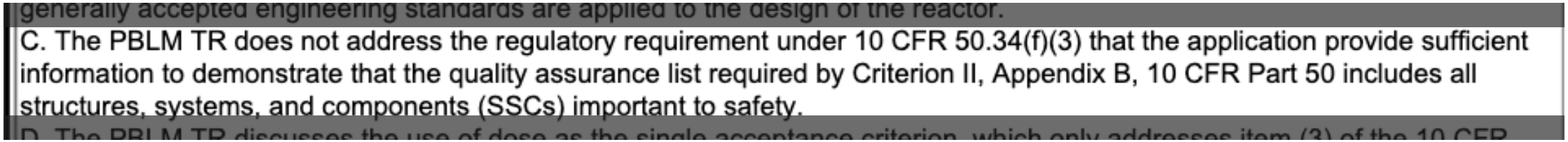
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- 10 CFR 50.34(f), "Additional TMI-related requirements," paragraph (3)(ii) states:
  - *"(ii) Ensure that the quality assurance (QA) list required by Criterion II, app. B, 10 CFR part 50 includes all structures, systems, and components important to safety. (I.F.1)"*
- It is unclear what specific information the NRC is requesting be supplemented based on the requirements articulated in 10 CFR 50.34(f)(3) and 10 CFR Part 50, Appendix B, Criterion II.

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structures, systems, and components (SSCs) important to safety.
D. The PBLM TR discusses the use of dose as the single acceptance criterion, which only addresses item (3) of the 10 CFR 50.2 definition of safety-related SSCs. The report does not discuss other requirements inherent in the current regulatory framework, which include:

1. Safely shutting down the reactor under a broad spectrum of licensing basis events ranging from anticipated operational occurrences to design basis accidents
2. Providing adequate defense-in-depth and mitigation measures to protect against beyond-design-basis events
3. Addressing uncertainty in selecting licensing basis events and design basis accidents
4. Ensuring that the overall risk to the public from the operations of the facility under normal conditions, transients, and during and after accidents is acceptably low, consistent with Commission policy

E. The PBLM TR does not identify how the principal design criteria (PDC) are developed for the facility. The PBLM TR states

- The topical report comprehensively discusses the 10 CFR 50.2 definition of safety-related and the technology-specific nature of items (1) and (2).
- Could the staff elaborate on both the technical and regulatory basis for the inclusion of the material requested in I.D.1?

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- Could the staff elaborate on the regulatory basis to support the supplemental material requested in I.D.2?

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- Can the staff clarify what is meant by “uncertainty in selecting” licensing basis events?

Performance-based Licensing Topical Report

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- Could the staff elaborate on the specific Commission policy referenced in this comment and its associated regulatory basis?

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II. The PBLM TR does not address any exemptions from regulatory requirements, pursuant to 10 CFR 50.12, "Specific exemptions," that may be needed to implement the PBLM.

- In development of the topical report, Oklo did not identify any exemptions that must be requested to support licensing under this methodology. Could the staff clarify the comment on exemptions that might be necessary?

Performance-based Licensing Topical Report

> III. The PBLM TR relies on programmatic controls (preoperational testing, Inspections, Tests and Analyses, Acceptance Criteria, startup testing, etc.) to verify adequate performance of the as-built system. The TR does not address other aspects of the design, analysis, operation, and maintenance of SSCs that impact public safety, including, but not limited to:
> A. Margin in the design and analysis to address aleatory and epistemic uncertainties
> B. Design and analysis provisions to address long-term operations including appropriate consideration of time-dependent phenomena
> C. Provisions to ensure qualification of SSCs to operate in their anticipated environments
> D. Design, analysis, fabrication, and construction provisions to ensure confidence in the safety of SSCs prior to initiating testing
> E. Provisions to ensure reliability and capability of SSCs throughout their lifecycle, including appropriate consideration of material degradation mechanisms.

- Oklo's methodology describes a process for identifying what functions and features require programmatic controls, but does not prescribe the programmatic controls, only that they should be justified based on the safety basis of the function or feature.
- This should be a design-specific selection that allows for flexibility in demonstrating the necessary requirements for safety-related and important to safety equipment are met.

Questions?