Discussion Items on "KP-FHR Risk-Informed Performance-Based Licensing Basis Development Methodology Topical Report" Docket No. 99902069

1. Purpose (Section 1.1): The TR uses the expression 'license application" in multiple places as in the following:

   > Kairos Power is requesting U.S. Nuclear Regulatory Commission (NRC) review and approval to use the methodology presented in this report to define the LBEs, to classify the SSCs, and to assess the DID adequacy of the KP-FHR as part of safety analysis reports required to be submitted to meet the associated requirements for content of license applications required in 10 Code of Federal Regulations (CFR) 50.34(a), 10 CFR 50.34(b), 10 CFR 52.47, 10 CFR 52.79, 10 CFR 52.137, and 10 CFR 52.157.

   It should be 'licensing application' since the term 'license' is typically associated with either operating license or combined license. Since the TR can be used for other applications such as permits, SDAs, or DCs, this change will help reduce any misunderstanding.

2. Regulatory Information (Section 1.4): The TR states the following:

   > Kairos Power intends to license the KP-FHR under Title 10 of the Code of Federal Regulations (10 CFR) using a licensing pathway provided in Part 50 or Part 52.

   To license a reactor design is an NRC function. It should be modified for correction. The following is a suggestion:

   > Kairos Power intends to pursue a licensing application for the KP-FHR under Title 10 of the Code of Federal Regulations (10 CFR) using a licensing pathway provided in Part 50 or Part 52.

3. Regulatory Information (Section 1.4): The TR states the following:

   > This requirement is echoed for the final safety analysis report (FSAR) in 10 CFR 50.34(b)(4) and for Part 52 licensing paths in 10 CFR 52.47(a)(4), 10 CFR 52.79(a)(5), 10 CFR 52.79(b)(4), and 10 CFR 52.157(f)(1).

   Is this requirement echoed for applications under 10 CFR 52.137? If yes, it should be included in the paragraph.

4. Frequency-Consequence Evaluation Criteria (Section 3.2.1): The TR states the following:

   > While interpreting the 10 CFR 20 annual exposure limits of 100 mrem/year, it is recognized that the use of this criteria in developing the F-C Target is to be applied to individual LBEs. To establish an aggregate risk measure including

> AOOs and other lower consequence events, the LBE process includes an activity to assure that the total frequency of exceeding 100 mrem summed over all the AOOs, DBEs, and BDBEs does not exceed 1/year.

The use of the unit 'per year' (/year) here is inconsistent with the intent of the LMP, which is to be 'per plant year' (/plant-year). It should be either corrected or explained.

5. LBE Selection Process (Section 3.2.2) The TR states the following:

> LBEs are classified as risk-significant if the LBE site boundary dose exceeds 2.5 mrem over 30 days and the frequency of the dose is within 1% of the F-C Target.

This sentence defines risk-significant LBEs but is not exactly the same as the definition in other places. For example, Glossary of Terms in Appendix A of the TR states:

> An AOO, DBE, or BDBE is regarded as risk-significant if the combination of the upper bound estimates of the frequency and consequence of the LBE are within 1% of the F-C Target AND the upper bound 30-day TEDE dose at the EAB exceeds 2.5 mrem.

The 'risk-significant LBE' definition should be consistently used.

6. Role of the PRA in LBE Selection (Section 3.3) The TR states the following:

> The NRC staff has developed technical criteria (e.g., Quantitative Health Outcomes) for evaluating multi-reactor unit risk.

Is Quantitative Health Outcomes the same as the NRC Safety Goal QHOs (Quantitative Health Objectives)?

7. Safety Functions (Section 3.3.4). The TR states the following:

> RSFs are defined starting with generic Fundamental Safety Functions (FSFs) defined by the International Atomic Energy Agency (IAEA) of controlling heat generation, controlling heat removal, and retaining radionuclides in IAEA document, "Proposal for a Technology-Neutral Safety Approach for New Reactor Designs (Reference 5)."

The referenced IAEA document, IAEA-TECDOC-1570, states that:

> To ensure safety (i.e. to satisfy the safety goal of meeting allowable radiological consequences during all foreseeable plant conditions), the following fundamental safety functions shall be achieved for all the plant states:
> - control of the reactor power;
> - removal of heat from the fuel; and
> - confinement of radioactive materials

The exact definition of the IAEA document for the FSFs should be used, or the difference should be explained.

8. Risk Metrics for PRA Model Development (Section 3.3.5). The TR states the following:

This is addressed by using the following approaches…

- Treatment of common-cause failures delineates those that may impact multi-reactor units.

Potential common-cause failures can include those that may involve non-reactor radiological sources. The following is suggested for completeness:

- Treatment of common-cause failures delineates those that may impact multi-reactor units or non-reactor radiological sources.

9. SSC SAFETY CLASSIFICATION APPROACH (Section 4.1 under Task 7) The TR states the following:

   RSFs are those SFs that are fulfilled to keep the DBEs within the F-C Target.

   This definition of RSFs are not consistent with ones used elsewhere. For example, Glossary has the following definition for an RSF:

   An SF that is required to be fulfilled to maintain the consequence of one or more DBEs or the frequency of one or more high-consequence BDBEs inside the F-C Target

   The RSF definition should be consistently used.

10. The TR states the following:

    4.4.2 Regulatory Design Requirements for Safety-Related SSCs

    For each of the RFDCs, a set of SRDCs appropriate to the SR SSCs is assigned to perform the RSFs.

    The design requirements are performance-based and tied to RSFs, derived from the LBEs, and used to systematically select the SR SSCs.

    The expression ‘regulatory design requirements’ is not clear to which specific regulations they are referring. It should be clarified.

11. The TR states the following (Section 5.3 Task 16):

    The SSC performance targets are set by the design IDP that is responsible for establishing the adequacy of DID.

    The term ‘design IDP’ is used only once in this document. Is this IDP different from the IDP discussed in other parts of the TR?

12. The TR states the following (Section 5.9.3):

- Risk margins against the F-C Target are sufficient.
- Risk margins against cumulative risk targets are met.

Should the expression ‘met’ be ‘sufficient’?

13. The TR in Section 7, “References,” repeats IAEA-TECDOC-1570 twice. One should be removed.

14. Appendix A. Glossary of Terms. The TR defines FSFs to be the following:

> SFs common to all reactor technologies and designs; includes control heat generation, control heat removal and confinement of radioactive material

This is identical to Discussion Item #7 above. It is different from both IAEA-TECDOC-1570, which states:

> To ensure safety (i.e. to satisfy the safety goal of meeting allowable radiological consequences during all foreseeable plant conditions), the following fundamental safety functions shall be achieved for all the plant states:
>
> - control of the reactor power;
> - removal of heat from the fuel; and
> - confinement of radioactive materials

The exact definition of the IAEA document for the FSFs should be used, or the difference should be explained.