

NRC Staff High Level Comments
Selection of Licensing Basis Events
Draft Report Revision 0

- The staff prefers to re-characterize the frequency-consequence figure and describe it as not defining specific acceptance criteria for analyzing Licensing Basis Events (LBEs) but providing a tool to focus the attention of the designer and those reviewing the design and related operational programs to the most significant events and possible means to address those events. The NRC's Advanced Reactor Policy Statement includes expectations that advanced reactors will provide enhanced margins of safety and/or use simplified, inherent, passive, or other innovative means to accomplish their safety and security functions. The safety margin between the design-specific Probabilistic Risk Assessment (PRA) results, and the Frequency-Consequence (F-C) guideline can provide one useful and practical demonstration of how the design fulfills the Commission expectations for enhanced safety. As such, the mention on the figure and within the paper to acceptance criteria used for early generation plants may be misleading. The re-characterization of the F-C figure may require corresponding revisions to the explanations of the event categories (Anticipated Operation Occurrences (AOOs), Design Basis Events (DBEs), and Beyond Design Basis Events (BDBEs)).
- The selection of licensing basis events and associated design features included to address them is key to several major parts of the overall regulatory framework. The paper emphasizes its use for selecting Design Basis Accidents (DBAs) and safety related structures, systems, and components. It would be useful to understand how the Licensing Modernization Project (LMP) views the use of the LBEs in other parts of the regulations. The attached table provides several areas and a possible relationship between the LBEs and the analyses/implementation of different regulatory programs such as establishing necessary operational limits, siting constraints, and appropriate emergency preparedness requirements. The attached table is provided as an example and does not necessarily represent the LMP proposal or a staff consensus in all areas.
- The staff prefers that the consolidated guidance expected to follow the LMP white papers be as generic as possible in terms of defining a relationship between event categories and regulatory requirements, but that it also recognize some different approaches within a common framework. One example is to explicitly recognize acceptance criteria for events that are based on protecting fission product barriers versus the frequency-consequence relationship. This discussion may also be used to explain, and if necessary reconcile, the relationships between the LBE acceptance criteria resulting from this effort and those described in the Advanced Reactor Design Criteria (ARDC).

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- The staff questions the value of the following acceptance criteria included in the paper:
 - The total frequency of exceeding a site boundary dose of 100 mrem shall not exceed 1/plant-year (the integrated frequency-weighted dose for all LBEs) to correlate to the annual exposure limits in 10 CFR 20.
 - The total frequency of a hypothetical site boundary dose for the duration of an event exceeding 750 rem shall not exceed 10^{-6} /plant-year. Meeting this criterion is related to the NRC Safety Goal Policy Statement on limiting the frequency of a large release.

The integration of frequency-weighted doses and comparison to the Part 20 limit might be confusing since the Part 20 limit is not directly related to potential reactor accidents (unless like some research and test reactors, a maximum accident dose can be shown to remain below Part 20 limits). The proposed criterion related to 750 rem might also be problematic and may require discussion of what constitutes prompt mortality, with a general staff view that the value, if used, should be lower (e.g., in the area of 200 rem). Given the F-C lines are no longer considered criteria, defining this “anchor point” may be unnecessary.

- Discussions of external events within the paper should be expanded and include discussion of how the events and related protection features are addressed within the broader LBE categories and safety classification of structures, systems, and components. For example, is it expected that in addition to being included in the PRA events, there will remain a set of traditional design-basis external events to define equipment seismic qualification specifications, minimum flood protections, and capacities for withstanding wind and missile loads?
- Although mechanistic methods for modeling of source terms and release pathways is mentioned within the paper, the topic does not appear to be among the planned LMP white papers. Does the LMP plan to address the topic of mechanistic source term for subsequent inclusion in the consolidated guidance document?
- Additional discussion is needed regarding the frequency cutoff for the BDBE Region.