

Challenges in Defining a Multi-Unit PRA

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Overview

- Importance of a multi-unit PRA (MUPRA)
- MUPRA Standard
- Challenges to developing the standard
- Insights and comments on application of MUPRA

Importance of developing a Multi-Unit PRA

- Globally, many sites have multiple units
 - Typically, these sites address unit risk as independent
 - Several factors could produce a correlation
 - Neglecting this correlation could underestimate risk
- Current regulatory guidance based on a single unit
 - Concentrates on the size and timing of release
 - Sufficient single unit release leading to the potential for early fatalities
 - Timing sufficient to allow for emergency planning measures
 - Correlated smaller releases could exceed a single unit limit

MUPRA Standard

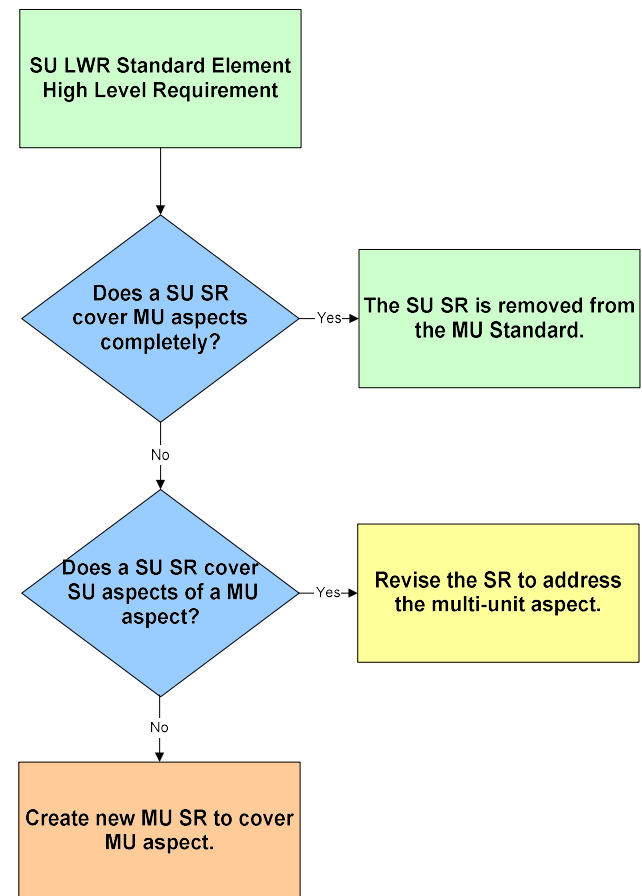
- Lessons learned from single-unit assessments indicate that the presence of standard guidance has improved the realistic implementation of PRA-based risk metrics
- Limited case studies so that the single-unit (SU) model(s) can provide the multi-unit starting point
- The standard serves to bridge a SU baseline model to the MUPRA by addressing the correlation aspects missing in the SU assessment

Multi-Unit LWR Standard

Single Unit LWR
Standard

Guidance for Reviewing Single-Unit PRA Standard SRs for Inclusion in the Multi-Unit Standard

- Consider the guidance of the high-level requirement (HLR).
- The top-level guidance ensures that all SU SRs are met so they do not need to be repeated.
- If a specific aspect of an HLR is not addressed for a multi-unit aspect, such as a multi-unit common cause, but a parallel single-unit SR is present, the existing SR is revised to address the multi-unit aspect.
- If the SU SRs fail to address a multi-unit aspect covered by the HLR, a new SR for MU is completed.



Challenges to Developing the Standard

- Defining a multi-unit site
- Combinations of operating states
- Combinations of initiating events
- Partial site N/M assessment
- Dissimilar designs and construction
- Seismic ground response
- MU operator dependencies
- Consistency with SU model

Insights and Comments on MUPRA

- Considering sites with multiple units, assuming independence is nonconservative.
- Multiple CD events could occur, resulting in a more significant source term than limiting LERF SU cases.
- The external events and operator actions represent the most critical considerations
- Maintaining MUPRA standard aligned with IAEA guidance
- Predicted draft standard available in early summer for JCNRM review
- There are limited regulatory metrics for multi-unit risk acceptance

Questions
and
Comments?
I'm all Ears.

