

FRAMEWORK FOR RISK-INFORMED
PERFORMANCE-BASED ALTERNATIVE
TO 10CFR Part 50

Preliminary Comments

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Topics

- ◆ Progress and Testing
- ◆ Fundamental Quantitative Safety Principles compared to QHO's and F-C Function
- ◆ LBE Definition
- ◆ SSC Significance
- ◆ External Event Treatment
- ◆ Protective Strategies, Design Strategies and Defense-in-Depth
- ◆ Summary

Progress and Testing - Comments

- ◆ April Draft Provides Considerable, Well-Developed Preliminary Technical Bases
- ◆ July Draft Provides a Limited Scope Example for LBE and Safety Classification
- ◆ Example is Reasonable- except NNS SSCs are not Considered
- ◆ Detailed Example, which Considers Stakeholder Input, is Needed
- ◆ Definitions Need to be Unambiguous
- ◆ Preliminary, Technical Comments are Provided for Consideration in Future Development

Fundamental Quantitative Safety Principles Compared to QHOs and F-C Function

- ◆ Structure of RI, PB, TN Framework includes
 - Safety / Security / Preparedness Expectations
 - Defense-in-Depth Expectations
 - Protective Strategies
 - Design Objectives
- ◆ Safety is Addressed in this Presentation
 - F-C and QHOs Compared to CCDF and QHOs is Focus for this Topic in Today's Presentation
 - Deterministic Measures will be Addressed in Future Comments

Safety - Summary of Framework

- ◆ Anchored in Safety Goals
- ◆ Provides for Enhanced Margins of Safety
- ◆ Framework Uses QHOs, F-C Approach and Deterministic Practices
- ◆ Continues the Practice of Ensuring that the Allowable Consequences of Events are Matched to their Frequency
- ◆ Sequences of the PRA Populate the F-C Curve
- ◆ Results Must Lie Below the Curve

QHO and F-C Curve Use Summary of Framework

Comments

- ◆ F-C Function is Applied on a Sequence-specific Basis
- ◆ F-C Function is Not a “Risk Curve”
- ◆ Bases for F-C Function (Form and Values) is not Clear – Primarily Frequency Values
- ◆ Meeting QHO’s Provides Incomplete Assurance of Design Acceptability

F-C Function - Comments

Considerations

- ◆ Aggregation of Sequences could Define Risk Profile, but the Use of Aggregation in the Draft is Unclear
- ◆ Fundamental Quantitative Safety Principles (CCDF) Should be Considered
 - Would provide criteria in the form of a risk profile
 - Would address issues associated with “Rare Events” and definition of an event/event sequence
 - Would address full spectrum of consequences versus QHO focus on total individual risk
- ◆ Consider CCDF as Decision Criteria with F-C Function as a Design Aid or Develop F-C Function and Process on the Basis of a CCDF?

Sample Quantitative Fundamental Safety Principles

Sample, Approximate Fundamental Design Principles (FDPs) (Based on Operating Experience and CDF and LERF goals)	
Consequence Level at EAB (rem)	Frequency of incurring Consequence Level or higher does not exceed this Value (per yr.)
0.001	>1
0.05	0.01
2.5	1E-3 to 1E-4
25	1E-4 to 1E-5
300	1E-5 to 1E-6
750	1E-5 to 1E-6
1000	1E-5 to 1E-6

LBE Definition - Comments

- ◆ Identification and Grouping/Aggregating Should be Clarified
 - Treat Sequences Individually?
 - Group?
 - Definition/Partitioning of IEs? Event Sequence?
- ◆ Consequence Determination Should be Clarified
 - Deterministic?
 - Probabilistic?
- ◆ Lower Frequency values (1E-7 to 1E-8) appear to be too low. CCDF should be final criteria?

SSC Significance – Comments

- ◆ Needs Clarification and Comprehensive Example
- ◆ Appears that any SSC Needed to Meet F-C Function Would be Characterized as Safety Significant
 - This is more restrictive than current practices or RTNSS
 - SSCs which would typically be characterized as NNS should be Considered
 - Treatment for SS SSCs will need to be addressed
- ◆ Treatment of Initiating Events, Other than Managing Frequency, is Not Addressed
 - IEs due to failures in NNS systems could be important
 - As Special Treatment would presumably not be applied to these systems, a similar approach for “NNS” SSCs available to mitigate IEs should be considered

External Events - Comments

- ◆ Calculated Uncertainty is High
- ◆ Should consider Approaches Used in ALWR Certification
 - Screening
 - PRA-based seismic margins
 - Deterministic
- ◆ Relevant Insights can be Obtained

Protection Strategies (PS), Design Strategies and Defense-in-Depth (DID)- Comments

- ◆ Discussion on these Topics is “Interdependent”
 - Physical protection (PS) and consideration of intentional as well as inadvertent events (DID) have overlap
 - Stable Operation (PS) and accident prevention and mitigation (DID) have overlap
- ◆ Consider Tabulating and Grouping
- ◆ Sample on Next Slide

Sample Alternative

Alternative DID Elements & Design Principles
PS1: Physical protection (workers and public)
<i>PS4: Barrier integrity (adequate barriers for workers and public-physical and chemical)</i>
PS2: Stable operation (limit frequency of events that can upset plant stability and challenge safety functions)
DID2/PS5: Accident prevention and mitigation capability (Includes Protective Actions - emergency procedures, accident management and emergency preparedness)
<i>DID3: Ensuring key safety functions (KSFs) are not dependent upon a single element of design, construction, maintenance or operation</i>
<i>DID4: Consideration of uncertainties in equipment and human performance</i>
DID5: Alternative capability to prevent unacceptable releases
DID6: Siting considerations

Summary

- ◆ Impressive Draft Document
- ◆ Test with Detailed Example
- ◆ Consider Fundamental Quantitative Safety Principles (e.g., in the form of an CCDF)
- ◆ LBE and SSC Categorization Clarifications
- ◆ External Event Assessment Alternatives
- ◆ Consider “Grouping” PS’s, DSs and DID
- ◆ THANKS!