



**ANS**

# ANS Standards Committee RP3C RIPB Standards Guidance Training (Part 1 – WG Guidance)

May 26, 2020

# Training Objective



- Provide training on ANS Guidance Document, *Incorporating Risk-Informed and Performance-Based Approaches/Attributes in ANS Standards*
- Provide knowledge to writers of ANS Standards that will assist them in incorporating Risk-Informed Performance-Based (RIPB) attributes in their ANS Standards.

# Background



- Risk-Informed, Performance-Based Principles and Policy Committee (RP3C) formed in 2013
- RP3C Bylaws includes a task for developing RIPB Plan/Procedure for standards to utilize RIPB approaches
- For some standards, the incorporation of a RIPB approach/attributes will make them even more effective for the user community to achieve the standard's desired outcome(s)
- Trial Guidance Document issued on June 11, 2019
  - Applies to new standards and revisions to existing standards

# Overview of Guidance



Guidance has the following major sections:

- Purpose of Guidance
- Background
- Roles and Responsibilities
- Process
- RIPB Approaches

Also, very important.... An Appendix of Examples

# Roles and Responsibilities



## **ANS Standards Board**

- Approve the Guidance Document and promote its use within all Consensus Committees

## **RP3C Chair**

- Assign responsibilities to maintain the Guidance Document
- Assign responsibilities of members for review of new and revised standards

## **Consensus Committee Chairs**

- Support awareness of and implementation of this Guidance Document throughout the various stages of development of new and revised standards

## **Working Group (WG) Chairs**

- Use this Guidance Document throughout the development of any new or revised standards for which they are leading

# RIPB Guidance Process



## Working Group Formation and Project Initiation Notification System (PINS) Stage

- Consider recruiting a professional with experience in RIPB to be a part of the WG
- Consider a training session on this Guidance Document for all WG members
- Note: this will support answering the following PINS Form question
  - *Will this standard use risk-informed insights, performance-based requirements, and/or a graded approach?*

## **Early Outlines/Draft**

- Use this Guidance Document (particularly Section 5) to support incorporation of RIPB approaches into the standard.
- Reach out to the RP3C Chair for support

## **Pre Sub-Committee Draft**

- Send the draft standard to the RP3C for review by the RP3C
  - Note: Might be difficult at this stage to implement RP3C recommendations

# Outcome Attributes of Risk-Informed and Performance-Based Safety (from SECY-98-0144 )



# ANS

A risk-informed and performance-based approach to safety decision-making combines the "risk-informed" and "performance-based" elements. Stated succinctly, risk-informed and performance-based safety is an approach which

- (1) focuses attention on the most important activities
- (2) establishes objective criteria for evaluating performance
- (3) develops measurable or calculable parameters for monitoring system and licensee performance
- (4) provides flexibility to determine how to meet the established performance criteria in a way that will encourage and reward improved outcomes
- (5) focuses on the results as the primary basis for decision-making



# Performance-Based Approaches



- Define the Ultimate Outcome of the Standard
- Define the Approach (Major Steps) to Obtaining the Outcome
- Determine Whether there are Alternative Approaches for Achieving the Outcome

# Risk-Informed Approaches



- Use Risk Insights to Define the Outcome the Standard
- Use Risk Insights to Define How to Meet the Standard's Outcome
- Use Risk Insights and Tools to Monitor the Outcome of a Standard

# RIPB Attributes



## Performance-Based Attributes

- P1. The outcome of the standard is clearly defined.
- P2. The criteria that are established to achieve the outcome are high-level (i.e., provide flexibility in the manner in which the criteria is measured and to determine the “successful” level of the metrics).

## Risk-Informed Attributes

- R1. The standard defines how to develop the risk insights (e.g., the importance of inputs or steps used in the standard).
- R2. The standard defines how to use risk insights (e.g., to specify a required actions to achieve the outcome).

(take some time.....outcome may not be entirely evident.....needs to be looked at ..working group has to think about what is the outcome.....context...)

# RIPB Guidance Examples



- Maintenance Rule (10 CFR 50.65)
- ANSI/ANS-2.26-2004 (R2017), *Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design*
- ANSI/ANS-2.3-2011 (R2016), *Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites*
- ANSI/ANS-2.21-2012 (R2016), *Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink*

# Maintenance Rule (10 CFR 50.65.)



## Outcome

- *[licensees] shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions*

## Questions

- What are the elements of the outcome and are they clearly defined (Attribute P1)?
  - Are licensee-established goals clear at the function, system, sub-system, and component levels?

# Maintenance Rule



## Directions for Meeting the Outcome

- *[t]he licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The scope of the assessment may be limited to structures, systems, and components that a risk-informed evaluation process has shown to be significant to public health and safety.*

## Questions

- Are the criteria that are established to achieve the outcome written at a high-level (Attribute P2) to provide flexibility?
- Does the Rule define how to develop the risk insights, e.g., the importance of inputs or steps used in achieving the outcome? (Attribute R1)
- Does the Rule define how to use risk insights? (Attribute R2)

# Maintenance Rule



## Questions

- The outcome of the standard is clearly defined.
  - Yes
- Are the criteria that are established to achieve the outcome written at a high-level?
  - Yes. They support performance-based implementation because they establish a high level goal that enables flexibility on how to achieve it.
- Does it define how to develop the risk insights (e.g., the importance of inputs or steps used in the standard)?
  - No.
- Does it define how to use risk insights?
  - It is risk-informed because it includes a risk metric as part of the outcome (Attribute R2).

## Type of Standard

Design Basis Event Definition

## Outcome

- *This standard provides (a) criteria for selecting the seismic design category (SDC) for nuclear facility structures, systems, and components (SSCs) to achieve earthquake safety and (b) criteria and guidelines for selecting Limit States for these SSCs to govern their seismic design. The Limit States are selected to ensure the desired safety performance in an earthquake.*

## Questions

- Is the outcome of the standard is clearly defined? (Attribute P1)



## Answer

- Kind of -- In simple terms, the outcome could be stated to be:

“The outcome of the use of this standard is the identification of the Seismic Design Criteria (SDC) and Limit States for System, Structures, and Components (SSCs) to achieve earthquake safety.”

# ANS-2.26 Categorization of Seismic Design



## Directions for Meeting the Outcome

- *One of the SDCs listed in Table 1 shall be assigned to the SSCs based on the unmitigated consequences that may result from the failure of the SSC by itself or in combination with other SSCs.*
- *Following determination of the regulatory requirements applicable to the project or to the facility, a safety analysis or integrated safety analysis shall be performed. The guidelines provided in this standard and other applicable standards such as Refs. [4] and [5] should be used.*
- *To achieve the objectives of this standard, the safety analyses shall evaluate the uncertainties with determining failure and the consequences of failure. The depth and documentation of the uncertainty analyses should be sufficient to support the judgment that categorization based on Table 1 and the design requirements in ANSI/ASCE/SEI 43-05 produce a facility that is safe from earthquakes.*

## Questions

- Are the criteria that are established to achieve the outcome written at a high-level (Attribute P2) to provide flexibility in achieving it?
- Does it define how to develop the risk insights, e.g., the importance of inputs or steps used in the standard? (Attribute R1)
- Does it define how to use risk insights? (Attribute R2)

# ANS-2.26 Categorization of Seismic Design



## Answer (high-level Criteria)

- Yes and No
  - ANS-2.26 provide high level criteria that provide what needs to be done
  - It also has very detailed prescriptive criteria and also invokes other consensus standards that provide very prescriptive criteria for the design of safety SSCs.

## Answer (how to develop risk insights)

- Yes
  - *One of the SDCs listed in Table 1 shall be assigned to the SSCs **based on the unmitigated consequences** that may result from the failure of the SSC by itself or in combination with other SSCs.*

## Answer (how to use risk insights)

- Yes
  - *The scope and comprehensiveness of the safety analysis will vary with the complexity of the facility, its operations, and the contained hazard. The assignment of an SDC to an SSC determined to have a safety function is based on the objective of achieving acceptable risk to the public, the environment, and workers resulting from the consequences of failure of the SSC.*
  - .
- This criteria specifies that a higher SDC will be assigned to SSCs whose failure would have greater consequences.

# Summary/Take Aways



- ANS is promoting the use of RIPB approaches in ANS standards
- Guide is intended as a tool for Consensus Committees and Working Groups
- Early RP3C engagement is encouraged

# Potential Future Training



- Go through more examples in the guide
- Go through one or two standards the class recommends to look through
- Go through experiences gained from use of guidance and RPC3 engagement
- Focus topics (e.g., draft Part II of this Training on Licensing Modernization Project)

# Contact Information



- Prasad Kadambi, Chair RP3C
  - [kadambiecpl@gmail.com](mailto:kadambiecpl@gmail.com)
  - 301 502-1531
  
- Jim O'Brien
  - [James.Obrien@nnsa.doe.gov](mailto:James.Obrien@nnsa.doe.gov)
  - 240 702-5577
  
- Ed Wallace
  - [ed.wallace@gnbcassociates.com](mailto:ed.wallace@gnbcassociates.com)
  - 423 902-5330

# Backup Slides



- Backup slides follow

# RIPB Background



## Commission's Definitions of RIPB (SRM to SECY-98-144, RIPB White Paper)

- **Risk-Informed Approach**
  - Explicit consideration to a broader set of challenges
  - Logical prioritization of challenges
  - Consideration of broader set of resources to defend against challenges
  - Explicitly identifying and quantifying sources of uncertainty
  - Better decision making by testing for sensitivity to key assumptions
- **Performance-Based Approach**
  - Measurable (or calculable) parameters for monitoring
  - Objective criteria to assess performance
  - Flexibility to meet performance criteria for improved outcomes
  - Failure to meet criterion does not lead to immediate safety concern



# Outcome Attributes of Risk-Informed Safety



A “risk-informed” approach to safety decision-making represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus licensee and regulatory attention on design and operational issues commensurate with their importance to public health and safety.

A "risk-informed" approach enhances the deterministic approach by: (1) allowing explicit consideration of a broader set of potential challenges to safety, (2) providing a logical means for prioritizing these challenges based on risk significance, operating experience, and/or engineering judgment, (3) facilitating consideration of a broader set of resources to defend against these challenges, (4) explicitly identifying and quantifying sources of uncertainty in the analysis (although such analyses do not necessarily reflect all important sources of uncertainty), and (5) leading to better decision-making by providing a means to test the sensitivity of the results to key assumptions. Here, “prioritization” is key; while “risk-informed” means, in part, “not relying purely on the PRA,” it also means being able to say that some scenarios or systems are more important than others and understanding how sure we are about the statements we are making.

[Ref 1, SRM-SECY-98-0144]

# Outcome Attributes of Performance-Based Safety



A performance-based safety approach is one that establishes performance and results as the primary basis for safety decision-making, and incorporates the following attributes:

- (1) measurable (or calculable) parameters (i.e., direct measurement of the physical parameter of interest or of related parameters that can be used to calculate the parameter of interest) exist to monitor system, including facility and licensee performance,
- (2) objective criteria to assess performance are established based on risk insights, deterministic analyses and/or performance history,
- (3) licensees have flexibility to determine how to meet the established performance criteria in ways that will encourage and reward improved outcomes; and
- (4) a framework exists in which the failure to meet a performance criterion, while undesirable, will not in and of itself constitute or result in an immediate safety concern. A performance-based approach offers two categories of benefits:
  - (1) the focus is on actual performance rather than satisfaction of prescriptive process requirements, and
  - (2) the burden of demonstrating actual performance can be substantially less than the burden of demonstrating compliance with prescriptive process requirements.

[Ref 1, SRM-SECY-98-0144].