American Nuclear Society

MINUTES

Risk-Informed, Performance-Based Principles and Policy Committee (RP3C) Meeting

June 8, 2020

Members:
N. Prasad Kadambi (Chair), Individual
Robert B. Hayes (Vice Chair), North Carolina State University
Patricia Schroeder (Secretary), American Nuclear Society
Todd Anselmi, Idaho National Laboratory
James August, Southern Nuclear Operating Company
Robert Budnitz, Lawrence Berkeley National Laboratory
Donald R. Eggett, Eggett Consulting LLC
Jordan Hagaman, Kairos Power
Kurt Harris, Flibe Energy, Inc.
Ralph Hill, Individuals
David Holcomb, Oak Ridge National Laboratory
Gerald (Tim) Jannik, Savannah River National Laboratory
Earnestine Johnson-Turnipseed, Entergy
Marsha Kinley, Duke Energy Corporation
Mark Linn, Oak Ridge National Laboratory
Stewart Magruder, U.S. Nuclear Regulatory Commission
Stephen McDuffie, U.S. Department of Energy
Michael Muhlheim, Oak Ridge National Laboratory
Kathryn Murdoch, American Nuclear Society
James O'Brien, U.S. Department of Energy
William Reckley, U.S. Nuclear Regulatory Commission
Andrew Smetana, Savannah River National Laboratory
Edward, Wallace, GNBC Associates
Robert Youngblood, Idaho National Laboratory

Guests:
Charles Martin, Longenecker and Associates
Steven Nesbit, LMNT Consulting
Andrea Nicholas, Individual
Sam Sham, Argonne National Laboratory

1. Welcome, Roll Call & Introductions

RP3C Chair Prasad Kadambi called the meeting to order.

2. Approval of Meeting Agenda

Prasad Kadambi directed members to a presentation prepared to use as a guide throughout the meeting—See Attachment 1. The agenda was approved as presented with the flexibility to move agenda items as needed to accommodate schedules.

CATEGORY I: ADDRESS STANDARDS BOARD'S OBJECTIVES

3. Status of Interaction with Standards Board (See Slide 10 of Attachment 1)

- RP3C Actions on Standards Committee Strategic Plan Goals & Objectives SMART Matrix—Attachment 2
  Prasad Kadambi reviewed RP3C tasks as assigned on the SMART Matrix.

- RP3C Proposal for Evolving SMART Matrix for Modified Goal #1—(D) Attachment 3
  Kadambi feels that the current version of the SMART Matrix does not accurately reflect the direction and progress of the RP3C. He believes that Standards Board action items have not been effective. The SMART Matrix should reflect what is working successfully toward communicating risk-informed, performance-based (RIPB) methods. Kadambi provided examples of internal vs. external resources. Internal guidance would be developed by ANS such as the Guidance Document (GD) and associated training. He'd like to make internal resources into case studies. External guidance includes NEI 18-04, "Risk-Informed Performance-Based Technology Inclusive Guidance for Advanced Reactor Licensing," RG 1.233, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light- Water Reactors," and other guidance documents developed outside of ANS.

  Kadambi's proposal for changing the SMART Matrix includes the following:

  - focus efforts on socializing the GD
  - focus on external guidance
  - prepare and deliver training on external guidance
  - track and report progress to the Standards Board

  Ed Wallace agreed with the proposal and recommended that RP3C approve the change to the SMART Matrix as presented in Attachment 3. With no objection, the proposal is considered approved.

- Items from SB Meeting on November 19, 2019, Relative to RP3C

  Kadambi reported that the following issues were discussed:
  - RP3C has been active in continued development of GD
  - RP3C has been promoting use of NEI 18-04 in relation to Standards Committee work
  - RP3C has been evolving GD based on feedback
  - RP3C has been improving effectiveness of working group training on RIPB methods
  - An issue of continuing significance is progress on ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs"
  - RP3C reported on ASME's Plant Systems Design code and importance of coordination with ANS standards' modernization

4. RP3C Procedural Guidance Development and Implementation (See Slides 11-13 of Attachment 1)

- RP3C Guidance Document socialization and training program
  Attachment 4—Guidance Document (GD)

Attachment 5--- Frequently Asked Questions

James O'Brien stated that the GD was prepared by many individuals with him as lead. There have been two trainings so far—May 6 and May 26, 2020. Some changes were made to the GD based on received comments. Changes were not large but are important. He believes that the RP3C should review the revised document. Prasad Kadambi clarified that some of the comments had to do with a broader issue. He thought that the Q&A could bridge the gap.

- Questionnaire to be prepared and sent to each active working groups after socialization and refinement of draft GD
  Members reviewed the draft Frequently Asked Questions (Attachment 5) and thought it was a very good list. Robert Budnitz suggested one more level of detail that would likely be about 10 more questions. Kadambi asked that RP3C members submit additional Q&As that they feel need to be added.

ACTION ITEM 6/2020-01: Members with additional Q&As for Frequently Asked Questions to forward to Prasad Kadambi and James O'Brien for consideration. DUE DATE: September 1, 2020

- Process to incorporate comments and feedback to finalize the GD
  A series of questions were proposed to gain feedback from those that participated in the GD training to help in finalizing the GD. The draft questions were provided on Slide 13 of Attachment 1. Kadambi explained that the training is in two parts. O'Brien has taken the lead on Part 1; Ed Wallace has the lead on Part 2. More training sessions will be available. O'Brien stated that the training sessions were very interactive. Some of the participants provided supplemental information. A few last slides did not get covered due to the discussions. More than an hour may be needed for the training. Altogether, he thinks the first trainings went well.

5. ANS-30.1 and Related Products (See Slides 14–19 of Attachment 1)

Prasad Kadambi recognized the importance of new standard ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs." Slide 14 of Attachment 1 provides a flow chart of new reactor RIPB standards. The chart shows how ANS-30.1 plays a key role in a number of other standards; however, the working group is facing some challenges with this project. RP3C has tried to help the working group and hopes that the help aides in getting the standard to the next step. Specific suggestions (see Slide 16 of Attachment 1) provided by RP3C were identified. Robert Hayes expressed his concerned with "should" statements that may be neglected. He feels that users should document any time a "should" is not followed.

Mark Linn explained that the draft of ANS-30.1 was issued for a preliminary review to the Research and Advanced Reactors Consensus Committee (RARCC) at the request of the Standards Board. RP3C comments previously submitted are being considered as a companion to the RARCC. Approximately 150 comments were received and reflected opinions from one spectrum to the other, many not positive about pursuing the standard. The comments will be discussed at the Standards Board meeting tomorrow to help determine a path forward.

6. Launch of RIPB Community of Practice (CoP) (See Slides 20-21 of Attachment 1)

RP3C's RIPB CoP was launched in February of this year with subsequent sessions held the last Friday of the month. The first session was hosted by Kent Welter on systems engineering framework for RIPB practices. The second CoP was presented by Marsha Kinley on incorporating RIPB concepts in ANS-2.21, "Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink". The

third presentation was given by Kadambi on the NRC's reactor oversight program. The next CoP is planned for the end of June. The CoP has been well received.

CATEGORY II: EXPAND RIPB METHODS

7. Status Update on Standards Committee on Plant System Design (PSD) (consensus committee level) (See Slides 22-23 of Attachment 1)

Chair: Ralph Hill

Ralph Hill reminded members that the PSD Committee was approved as a consensus committee about a year ago and started work on a new PSD standard in July 2019. The PSD standard will be technology neutral. Hill is also working with Mark Linn on ANS-30.1. The PSD standard should provide one means for implementing some of the requirements of ANS 30.1. Prasad Kadambi's comments on the PSD standard have been incorporated. Kadambi added that the PSD standard and ANS-30.1 together meet the objectives of RIPB as described by the Commission for flexibility and incentive to improve outcomes.

Hill explained that the PSD is considered a controlled design activity because the entire process is a controlled activity; however, more time is needed to explain. Kent Welter suggested that controlled design activity could be a topic for a CoP to allow more time to talk about technical issues.

ACTION ITEM 6/2020-02: Prasad Kadambi and Kent Welter to consider "controlled design activity" as a CoP topic. DUE DATE: September 1, 2020

8 RP3C Review of ANS-30.3, "Light-Water Reactor Risk-Informed Performance-Based Design" (new standard) (See Slides 24-26 of Attachment 1)

- Summarize Review and Receive Feedback
  Chair: Kent Welter
  The draft of ANS-30.3 was issued for subcommittee ballot and in parallel to RP3C and to the JCNRM's Subcommittee on Risk Application (SCoRA). Many comments were received. The working group has addressed the majority of comments but has struggled to address conflicting comments. The working group has focused on adding more guidance on decision-based analysis, guidance on defense-in-depth, and reconciling definitions and terminology. Overall, the working group greatly appreciates many good comments received to result in a better standard. Kent Welter expects a revised draft to be ready soon.

9. RP3C Input on Security Standards (See Slides 27-31 of Attachment 1)

Robert Youngblood provided members an update on two related security standards—ANS-3.15, "Risk-Informing Critical Digital Assets for Nuclear Power Plant Systems," and the JCNRM's "Guidance Document for Risk Informing Physical Security and Cyber Security Programs at Nuclear Facilities." The Project Initiation Notification System (PINS) for ANS-3.15 was approved and submitted to the American National Standards Institute (ANSI) about a month ago. The JCNRM project is a guidance document. While a PINS was prepared to approve the project, the PINS will not be submitted to ANSI since it is not being developed as a standard. Robert Budnitz said that their guidance document will use probabilistic risk assessment (PRA) methods but will not be a PRA. The purpose is to provide guidance to practitioners. The PINS for the guidance document is currently with the Standards Board for approval. The working group has already held several meetings. Youngblood was initially a member of the group but was not listed on the PINS. Kadambi would like to see Youngblood on the working group as the RP3C representative. Budnitz added that Greg Hudson will likely be a liaison between the ANS-3.15 Working Group, the JCNRM Guidance Document Working

Group, and SCoRA. Budnitz confirmed that JCNRM will be coordinating with the Nuclear Energy Institute to limit conflicts.

ACTION ITEM 6/2020-03: Robert Budnitz to confirm Robert Youngblood's membership of the JCNRM's Risk Informed Security Guidance Document Working Group. DUE DATE: August 1, 2020

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10. NRC Work on Seismic Categorization (See Slides 32-35 of Attachment 1)

Robert Budnitz covered for Nilesh Chokshi who originally planned to report of NRC's work on seismic categorization. Budnitz explained that the work is integrating seismic into the License Modernization Project (LMP) starting with the F-C curve. You must do a PRA to see if you meet the F-C curve. Individual elements must be targets to come out of the F-C curve. The goal is to integrate with a larger RIPB framework. ASCE 43, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities," has an existing RIPB approach for seismic structural engineering. The NRC will be relying on ASCE 43. A crucial point in the new scheme is instead of insisting Limit State D, the designer can go to Limit State C. Sequences are risk informed, but the component level is performance based. The NRC will be scheduling a workshop to discuss this work around the Labor Day Holiday.

CATEGORY III SUPPORT TO WORKING GROUP APPLICATION OF RIPB METHODS

11. Review of Interaction with Other Standards Working Groups

Schedule of RIPB Standards in Development—Attachment 6

Prasad Kadambi recognized recent interaction and status of the below standards. He will be seeking consensus committee chair input at tomorrow's Standards Board meeting. Kadambi is specifically interested to find out if the chairs feel that they have what they need from the RP3C.

- ANS-2.21-202x, "Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink" (revision of ANSI/ANS-2.21-2012; R2016)
- ANS-2.26-202x, "Categorization of Nuclear Facility SSCs for Seismic Design" (revision of ANSI/ANS-2.26-2004; R2017)
- ANS-20.2-202x, "Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt-Reactor Nuclear Power Plants" (new standard)
- ANS-2.35-202x, "Guidelines for Estimating Present & Projecting Future Socioeconomic Impacts from Construction, Operations, and Decommissioning of Nuclear Facilities" (new standard)
- ANS-30.2-202x, "Categorization Classification of SSCs for New Nuclear Power Plants" (new standard)

12. Changing Environment

For members' awareness, Prasad Kadambi reported that RG 1.233 endorses NEI 18-04. William Reckley added that NRC's next activity is development of Part 53 which will be the NRC's new framework for advanced reactors, small modular reactors, and fusion. The NRC will be looking closely at new standards. Reckley said that he will be in a better place to make recommendations on new standards once the rule is approved.

ACTION ITEM 6/2020-04: William Reckley to let RP3C know what the committee can do to enable NRC's efforts related to Part 53 once approved. DUE DATE: Next RP3C Meeting

13. Review of Open Action Items

With several action items tied to the SMART Matrix, Prasad Kadambi expects that the list will need to be revised assuming the Standards Board approves the proposed changes as discussed under Agenda Item #3. He would like to make action items more efficient by grouping action items and putting them in the structure of the revised SMART Matrix. For this reason, action items were not reviewed.

ACTION: ITEM 6/2020-05: Prasad Kadambi to simplify the action item list to be more relevant. DUE DATE: October 1, 2020

14. Other Business

No other business was addressed.

15. Next Meeting

Upcoming ANS meetings:

- ANS Winter Meeting at Chicago Marriott Downtown from November 15-19, 2020
- ANS Annual Meeting at Omni / Convention Center in Providence, RI, from June 13-17, 2021

The RP3C plans to hold meetings on Monday afternoon at both the 2020 ANS winter and 2021 ANS annual meeting.

16. Adjournment

The meeting was adjourned.

ANS Standards Committee

Risk-informed Performance-based Principles and Policy Committee (RP3C) Meeting

Virtual Meeting

June 8, 2020

Agenda

- Welcome, Roll Call & Introductions
- Approval of Meeting Agenda

<u>Address Standards Board Objectives</u>

- SMART Matrix
- Proposal to Modify SMART Matrix
- Training on RP3C Guidance Document
- Relevant Items from SB Meeting of 11-19-2019
- Significance of ANS-30.1 and Related Work

<u>Expand RIPB Methods</u>

- Opportunities for Improving Balance Between RI and PB

<u>Support to WG Application of RIPB Methods</u>

- Review of Interaction with Working Groups
  - Review of work with specific standards and obtain feedback
  - Inputs from Consensus Committees
- Changing Environment
  - NRC Initiatives
  - Industry Initiatives
  - SDO Initiatives (ANS and Others)
- Open Items & Action Items
- Other Business
- Next Meeting, Adjournment
  - ANS Winter Meeting, November 15-19, 2020, Chicago, IL

SB SMART Matrix

- Standards Board (SB) SMART Matrix reflects Standards Committee (SC) Strategic Plan
- Goal#1(D)=incorporate risk-informed, performance-based (RIPB) methods in ANS standards
  - Desired outcome for Goal#1(D)(1), (2) and (4) captured by Guidance Document (GD) and draft training package
  - Desired outcome for Goal#1(D)(4) captured by SB Action Item 11/2018-14
  - Desired outcome for Goal#1(D)(6) will be based on initial implementation of training package
  - Goal#1(D)(5) completed with *Nuclear News* article
  - Outcomes for Goal#1(D)(3) part of implementation and outreach

SB SMART Matrix
Assessment of Current Version

- Current version of SB SMART Matrix does not accurately reflect RP3C direction of progress and its activities
- Goal#1(D)=incorporate RIPB methods in ANS standards
  - As GD and draft training package are being worked on, the dynamic of learning process is not reflected in current SMART Matrix
  - It is not effective to use SB Action Items to interact with Consensus Committees (CCs) and Working Groups (WGs)
  - RP3C meeting agenda listing standards using RIPB methods will be more effective to capture SB Action Item 11/2018-14
  - Goal#1(D)(5) completed with *Nuclear News* article
  - Outcomes for Goal#1(D)(3), (4) and (6) are part of implementation and outreach involving internal and external audiences and resources

Proposed Approach to Goal #1 (D)

- SMART Matrix should reflect what is working successfully toward communicating RIPB methods
- SMART Matrix should reflect progress being achieved by WGs in planning for and developing better standards
- SMART Matrix should facilitate RP3C assessing interaction between learning and implementation which occurs differently among the CCs
- SB should be able to observe and direct RP3C's outreach externally (SDOs, industry, international, etc.)
- It is better to separate internal and external training

Proposed Approach to RIPB Communication for Goal#1 (D)

- We should make distinction between internal and external needs and resources
  - Internal to SC, we should socialize the GD and focus training on specific examples
  - Internal and external resources need to be socialized appropriately
  - External outreach and training should address industry goals and objectives

Examples of Internal vs. External

- Primary internal resource is Guidance Document
  - Socialize SC process, basic concepts, high-level examples
  - Distinguish regulatory precepts from standards development
  - Treat SC training as case studies
- Primary external resource currently is Licensing Modernization Project products
  - NEI 18-04
  - RG 1.233
  - New approaches to external events
  - EPRI resources
  - Pre-application submittals from developers

Revised SMART Matrix for Goal #1 (D)

See Attachment 2

- First activity under Goal#1(D) focuses on the Guidance Document
  - Activity so far is considered to be socialization of process and concepts in the GD
  - Socialization is useful for newcomers to SC
  - Training is next phase of a new SC member's experience
  - Training would focus on specific examples
- Second activity under Goal#1(D) builds and organizes RIPB resources
  - Resources now include NEI, EPRI, MBSE, NRC, etc.
  - Clarify nexus to standards development

Revised SMART Matrix for Goal #1 (D) (cont'd)

- Third activity under Goal#1(D) is to prepare and deliver external training
  - Part 2 of GD training package will serve as pilot
- Fourth activity under Goal#1(D) is to track and report progress on standards employing RIPB methods
  - Focus will be on "Schedule of ANS Standards in Development Using RIPB Properties"
  - WG Chairs will be expected to report on progress and hurdles regarding RIPB methods
  - CC Chairs will be expected to summarize issues to SB so that cross-cutting problems can be addressed

Items Related to SB Meeting of Nov 19, 2019 Re. RP3C

- RP3C has been active in continued development of GD
- RP3C has been promoting use of NEI 18-04 in relation to SC work
- RP3C has been evolving GD based on feedback
- RP3C has been improving effectiveness of WG training on RIPB methods
- An issue of continuing significance is progress on ANS-30.1
- RP3C reported on ASME's Plant Systems Design code and importance of coordination with ANS standards' modernization

Guidance Document Development

Refer to Attachments 3 and 4

- For Trial Use Guidance Document issued on June 11, 2019
- Discussed during RIPB training sessions
- Updated based upon Feedback

RP3C Training for CC/WG

- Training package developed and reviewed by RP3C in late 2019/Early 2020
- Part I Training provided to RP3C and Consensus Committees in Spring 2020
  - Part I Training is on the RIPB Guide
  - 60 minute session
  - Total of about 50 people trained
  - Training updated based upon feedback giving during the training
- Additional Training Sessions being planned
- Expansion of training being considered
  - More discussion on examples
  - Tailored to examine in detail a given Consensus Committee Standard of Interest
  - Part II training on RIPB (Licensing Modernization Project)
- WG target audiences
    - Large group – cross functional training sessions
    - Small - CC or WG specific training
    - Other audiences?

RP3C Training Feedback Questionnaire

For each question, please indicate your satisfaction with the training and if not satisfied, why not and briefly, how it could be improved

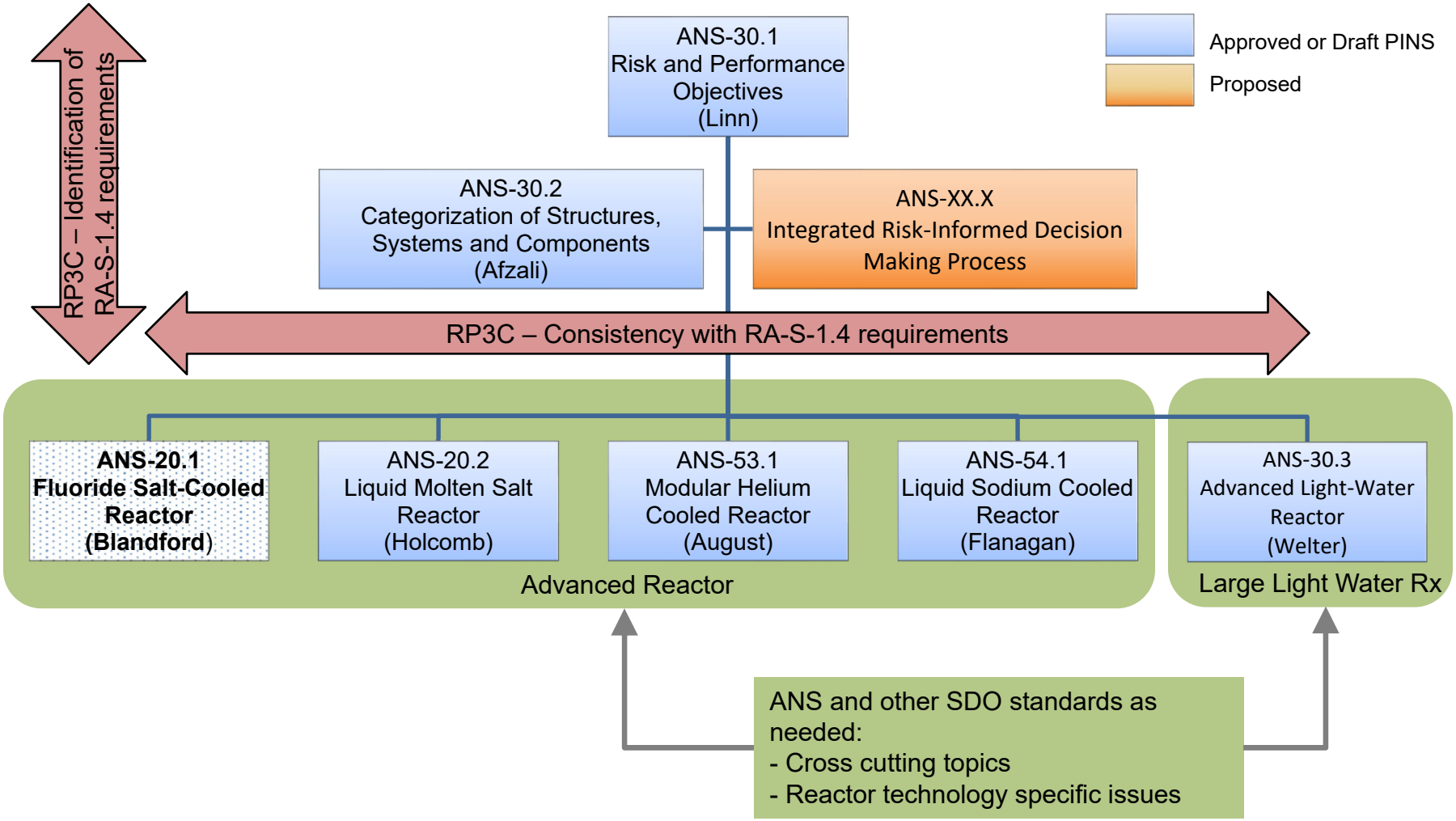
Overall Value of Training:

- Do you believe that the effort to make ANS standards more risk-informed and/or performance-based is a worthwhile effort?
- Do you think the process of engaging with RP3C as outlined in the guide can be effective?
- Are the Attributes for RIPB inclusion in standards appropriate?
- Are the examples useful?

Training Content Improvement Comments:

- Were the training objectives clearly communicated?
- Was the training material clear and complete in support of the training objectives?
- Was the total time adequate for the topics covered, including time for questions?
- Are there other recommendations to make the training even more effective?
- The target audience is standard working groups. Are there other audiences that would benefit from this training?

ANS New Reactor RIPB Standards Structure



RP3C Review of Draft Standard ANS-30.1

- Title: “Integrating Risk and Performance Objectives into New Reactor Safety Designs”
- RP3C was provided with a draft document for review in May 2019
- ANS-30.1 WG Chair, presented to the RP3C meeting on June 10, 2019, and indicated his expectations from the RP3C review
- RP3C provided comments and guidance which were discussed at November 2019 meetings
- RP3C provided further input on PB section of draft ANS-30.1 on February 21, 2020
- RP3C updated the input on the PB section within the later draft of ANS-30.1 on May 6, 2020

RP3C Review of Draft Standard ANS-30.1 (cont'd)

Overarching *structural* RP3C comment:

- Specific requirements ought to flow from higher-level (more general) requirements
- Given an objectives hierarchy, the reason for appropriate "shalls," "shoulds," and "mays" is immediately apparent
  - For example, Process X shall be applied because it is the means to accomplish Objective Y or demonstrate that Y is accomplished
- Arguably, specific requirements that cannot be rationalized in this way should not be promulgated

ANS-30.1 Proposed Standard

- On March 5, 2020, a preliminary review ballot of ANS-30.1, “Integrating Risk and Performance Objectives into New Reactor Safety Designs,” was issued to the RARCC (only) for comment
- This comment ballot was requested by the SB
- The ballot was closed April 17, 2020. The results were
  - Affirmative were 10
  - Negative were 2
  - Abstentions were 1
- R3PC comments were previously provided and were considered as companion to this ballot

ANS-30.1 Proposed Standard

- Verbal remarks were obtained from JCNRM
- Results
  - Approximately 150 comments were derived from the feedback provided
  - Ranged from approval without comment to this standard has no purpose, could be detrimental to ongoing design efforts, and should not be published

ANS-30.1 Proposed Standard

- RARCC chair directed the following
  - Parse the feedback into two categories
    - The first for comments that have a technical basis within the existing text and may be resolvable
    - The second for comments that are of a philosophical nature and likely are not resolvable within the existing text
  - The second category is to be presented to the SB for discussion and determination of a path forward

RIPB Community of Practice

- Enable communication of practices, challenges, and opportunities
- Open architecture knowledge sharing
- Experience has been gained at NRC and NuScale
- Appears useful for RP3C efforts with addressing issues related to ANS CCs
- Also useful for collaboration with SCoRA
- SB support and direction is needed for success
  - SB indicated that Community of Practice (CoP) is within RP3C purview

Initiation of CoP Presentations

- Knowledge sharing on RIPB methods and practices will be informal and unstructured
- RP3C initiated CoP presentations as webinars similar to regular meetings
  - Scheduled for last Friday of each month
  - First CoP event in February 2020
  - Three held; Missed May 2020
- Three sessions covered varied areas
  - Systems engineering framework for RIPB practices
  - Incorporating RIPB concepts into ANS-2.21
  - NRC's Reactor Oversight Program as an example of RIPB application
- Reception has been reasonably favorable
  - Recent one was recorded

Support to ASME PSD-1

- Section 1.13 of current draft Plant Systems Design (PSD) Standard describes what, why, and how risk-informed, performance-based, and risk-informed performance-based design approaches are applicable to, and used in, the PSD Standard
- Prasad has provided comments and they have been incorporated

Incorporation of RIPB in PSD-1 Based on RP3C Input

- RIPB design approaches considered as part of the "Technical Baseline" of the project
- RI definition is used to allocate priorities in "Functional Baseline" based on safety significance
- PB definition is used to structure "Functional Baseline" hierarchically consistent with NUREG/BR-0303
  - Objectives hierarchy (OH) is used to specify performance requirements and criteria
  - Margins in performance objectives is used to optimally assure avoidance of undesirable outcomes
  - OH is used to validate and monitor parameters associated with key outcomes
- RIPB design should have flexibility to incentivize improved outcomes
  - Not considered a controlled design activity

ANS-30.3 Update

- Review status
  - Draft for review June 2019
  - Extensive comments received
  - Worked closely with RP3C Chair to develop updated draft
  - Updated draft ready for review June 2020

ANS-30.3 Update

- Updates focused on:
  - Added more guidance on performance-based decision making and analysis
  - Added more guidance on defense-in-depth adequacy evaluations
  - Reconciled definitions and terminology
  - Reaffirmed the difference between state-of-the-art and state-of-practice standards
  - Reaffirmed position regarding NEI 18-04 guidance

ANS-30.3 Update

- Observations during comment resolution process
  - RP3C comments are greatly appreciated and overall addressing them will create a better standard
  - Many RP3C comments echoed NEI 18-04 guidance, which may not be practical for LWR design efforts
  - RP3C training documents are heavily influenced by regulatory guidance/language
  - Reactor design organizations with formal systems engineering programs use different terminology than RP3C training materials, but concepts are the same – translation overhead

Steps in Formulating a Performance-Based Regulatory Alternative

Clip from NUREG/BR-0303, “Guidance for Performance-Based Regulation”

Generally, a performance-based regulatory alternative needs to:

R-I

1. allocate performance across relevant functions, systems, or barriers, in order to assess whether the target safety objectives are satisfied

P-B

2. then implement that allocation of performance which entails identifying the steps to be taken by licensees and/or NRC to make the performance allocation “come true” in practice

Part of implementation is confirmation of ongoing performance

ANS-3.15 PINS, Risk-Informing Critical Digital Assets for Nuclear Power Plant Systems (1 of 2)

Need for the Project:

The current deterministic guidance for designating digital assets as critical digital assets (CDAs) yields thousands of CDAs to protect. All assets are treated the same when assessed for designation as a CDA. The risk-informed, performance-based methods described in this standard are intended to reduce the current burden plus strengthen the focus on reducing public health and safety risk from cyber threats. This is expected to be a two-stage process with the initial issue of the standard addressing the selection process.

Read: R-I

"Allocation"

ANS-3.15 PINS, Risk-Informing Critical Digital Assets for Nuclear Power Plant Systems (2 of 2)

- The PINS form commits to “RIBP”
- The first stage will be largely “risk-informed”
- In this arena, “how to risk-inform” (allocate) is arguably easier to see right now than “how to performance-base” (implement)

PINS form for "Guidance Document for Risk Informing Physical Security and Cyber Security Programs at Nuclear Facilities" (1 of 2)

Guidance Document being developed by ASME/ANS JCNRM Working Group on Risk Informing Physical/Cyber Security

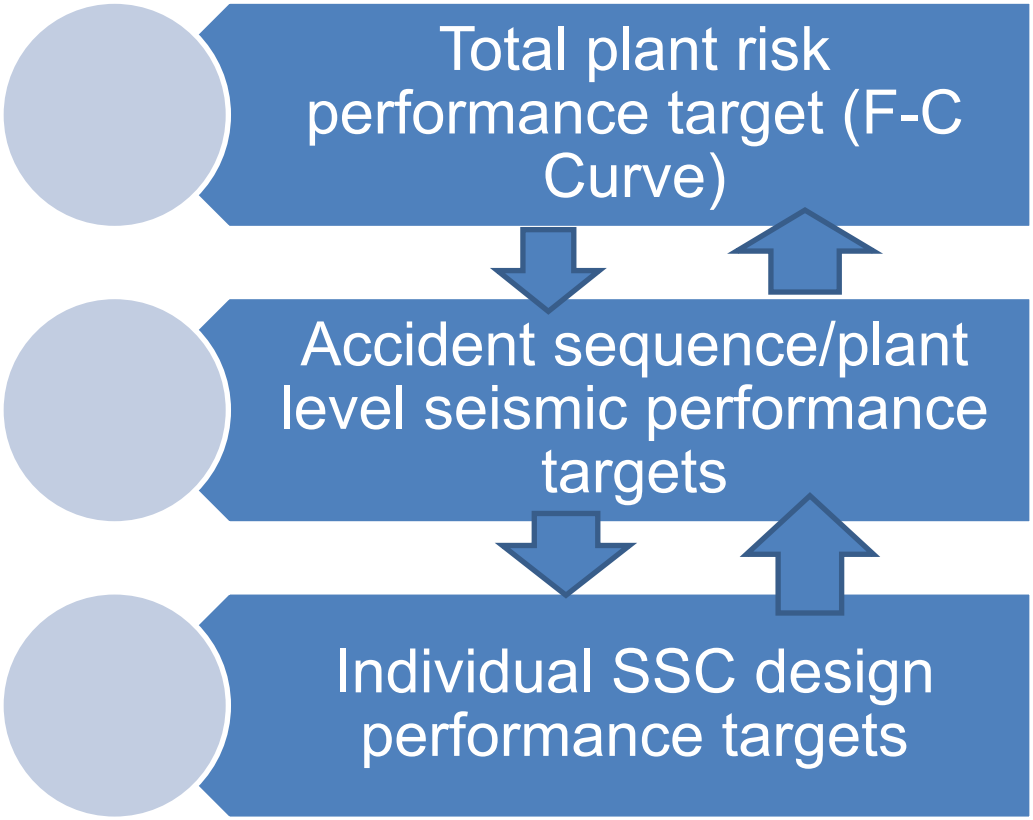
Need for the Project:

The current technical basis underlying physical-security and cyber-security programs at nuclear facilities does not take full advantage of the mature, approved analysis methods routinely used in PRA-based analysis of the safety risks at those facilities. This project's objective is to remedy this by providing guidance on how to use such analysis methods in facilitating risk informed decision making to understand security risks better and to counter them more effectively. Specifically, use of the proposed guidance document can increase the effectiveness and efficiency of the physical-security and cyber-security programs, by leveraging risk-informed methods and insights to enhance those programs, such that facility resources can be assigned consistent with public health and safety impact …

PINS form for “Guidance Document for Risk Informing Physical Security and Cyber Security Programs at Nuclear Facilities” (2 of 2)

- “Will this guidance document use RIPB requirements, and/or a graded approach: yes”
- The WG activity covers both physical and cyber
- Details of risk-informing and performance-basing can be expected to differ between physical and cyber
- For now, at least, this group is more focused on risk-informing

LMP Framework and Application to Structural Analysis and Design (Concepts)



Guiding Principles

- Integrate with the broader RIPB framework
- Build on existing RIPB approaches in structural/seismic engineering
- Utilize existing codes and standards to a maximum extent possible
- Update regulatory framework and guidance as necessary

ASCE 43, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities" (1 of 2)

- A standard for the design of a new nuclear facility using performance targets for individual structures, systems, and components (SSCs)
- The goal of the standard is to achieve the specified target levels at the component levels:
  - Less than about a 1% probability of unacceptable performance (limit state) for design basis earthquake (DBE) ground motion; and
  - Less than about a 10% probability of unacceptable performance for ground motions equal to 150% of the design basis ground motion.

ASCE 43, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities" (2 of 2)

- The acceptable performance level (the target performance goal) is achieved by selecting the return period of the DBE shaking
- Limit state (LS) defines the required performance in terms of the limiting acceptable condition of the SSC
- The limit state (or the design performance) is adjusted based on the ultimate safety function and risk significance of the component

This approach allows to control conservatisms and safety margins in accordance with the risk significance of SSCs permitting more balanced design

Interaction with CCs and WGs

- Feedback sought from CCs regarding how RP3C is doing relative to helping them with RIPB methods
- CC reports to SB now contain a section addressing modernization (i.e. RIPB methods)
- Currently, the reports only address the limited number of standards that RP3C previously identified as candidates for RIPB
- All standards in LLWRCC were awaiting training on GD
  - RP3C will work with this and other CCs to ensure that training needs are addressed
  - Needs of WGs will be addressed on a case basis
- CCs will be requested to go beyond the list of standards originally identified by RP3C
  - Each portfolio should be categorized and prioritized.

Status of Standards Tracked by Standards Manager

- ANS-2.21-202x, “Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink” (revision of ANSI/ANS-2012; R2016)
- ANS-2.26-202x, “Categorization of Nuclear Facility SSCs for Seismic Design” (revision of ANSI/ANS-2.26-2004; R2017)
- ANS-20.2-202x, “Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt-Reactor Nuclear Power Plants” (new standards)
- ANS-2.35-202x, “Guidelines for Estimating Present & Projecting Future Socioeconomic Impacts from Construction, Operations, and Decommissioning of Nuclear Facilities” (new standard)
- ANS-30.2-202x, “Categorization Classification of SSCs for New Nuclear Power Plants” (new standard)
- ANS-30.1-202x, “Integrating Risk and Performance Objectives into New Reactor Safety Designs” (new standard)

Changing Environment

- RG 1.233, Rev 0 is publicly available
  - Opportunity to comment was in DG-1353
- Work has been initiated on “Fuel Qualification” and “Inspection and Oversight for Advanced Reactors” that may offer significant RIPB opportunities
- Advanced Reactor Content of Applications (ARCAP)
- Technology-Inclusive Content of Applications (TICAP)

RP3C Report to SB

- SMART Matrix Report
  - RP3C proposal to modify
- Procedural GD and Implementation
  - Feedback sought for continuous maintenance and improvement of GD
- RIPB CoP
- CC Chairs Report on RIPB
- Expand RIPB Methods
  - ANS-30.1 and ASME PSD
  - ANS-30.3
  - Security standards
  - Seismic categorization model for all types of natural hazards
- Interactions with WG
- Other Items

Action Item Status

Action Item	Description	Responsibility	Status/Action
11/2019-01	RP3C members to provide comments on the two training presentations. NOTE: Ballots will be issued to capture member comments. DUE DATE: January 31, 2019	RP3C Members	Completed Ballots closed 1/31/20
11/2019-02	Consensus committee chairs to identify at least one working group to be included in the pilot training to incorporate RIPB methods. DUE DATE: January 31, 2019	Consensus Committee Chairs	Completed ESCC: ANS-2.26 FWDCC: ANS-57.9 RARCC: ANS-15.22 (ANS-20.2 as alternate) LLWRCC: All WGs NA: NRNFCC, JCNRM, NCSCC, SRACC
11/2019-03	Pat Schroeder to provide George Flanagan and Mark Linn the ANS Policy on Trial Use and Pilot Application Standards to consider whether ANS-30.1, “Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs,” should be issued for trial use. DUE DATE: December 1, 2019	Pat Schroeder	Completed 11/18/19
11/2019-04	Prasad Kadambi (lead), Ralph Hill, Robert Youngblood, Ed Wallace, Mark Linn, Amir Afzali, and Todd Anselmi to discuss/address differences between ASME and ANS taxonomy (terminology). NOTE: Pat Schroeder to facilitate a call when directed by Prasad Kadambi to discuss harmonization of ASME and ANS taxonomy. DUE DATE: March 1, 2020	Prasad Kadambi, Ralph Hill, Robert Youngblood, Ed Wallace, Mark Linn, Amir Afzali, and Todd Anselmi	Completed Call held 2/26/20

Action Item Status

Action Item	Description	Responsibility	Status/Action
11/2019-05	Pat Schroeder to provide Charles Martin and Ralph Hill each other's email addresses so that they can discuss risk informing ASME NQA-1. DUE DATE: December 1, 2019	Pat Schroeder	Completed 11/18/19
11/2019-06	Pat Schroeder to provide Nilesh Chokshi a copy of ANS-30.3, "Light-Water Reactor Risk-Informed Performance-Based Design," as issued to RP3C for review. DUE DATE: December 1, 2019	Pat Schroeder	Completed 11/18/19
11/2019-07	Amir Afzali to send James August the latest version of NEI 18-04, "Risk-Informed Performance-Based Technology Guidance for Non-Light Water Reactors." DUE DATE: December 1, 2019	Amir Afzali	Completed 11/19/19
11/2019-08	Prasad Kadambi to review RP3C comments on draft standard ANS-3.14-202x, "Process for Infrastructure Aging Management and Life Extension of Nonreactor Nuclear Facilities," and resubmit in the format of the RIPB Guidance Document. DUE DATE: February1, 2020	Prasad Kadambi	OPEN
6/2019-05	David Hillyer to give Mark Linn a call about adding the facility life cycle to ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs." DUE DATE: August 1, 2019	David Hillyer	OPEN

Action Item Status

Action Item	Description	Responsibility	Status/Action
6/2019-06	David Hillyer to provide name of potential working group members for ANS-3.13, "Nuclear Facility Reliability Assurance Program Development," to James August. DUE DATE: October 1, 2019	David Hillyer	OPEN
11/2018-03	Mark Linn to ask Robert Budnitz for a draft copy of the ALWR standard. DUE DATE: March 1, 2019	Mark Linn	Completed
11/2018-04	James O'Brien to send Prasad Kadambi an email with his thoughts on formation of the CoP. DUE DATE: December 31, 2018	James O'Brien	Completed
9/2018-03	Ed Wallace and Pat Schroeder to help establish routine teleconferences for working groups under the Advanced Initiatives Subcommittee. DUE DATE: October 15, 2018	Ed Wallace Pat Schroeder	NA Discussed recommendation to form CoP at SB 11/13/18 meeting.
6/2018-02	Prasad Kadambi to review the RP3C Bylaws and update the title of the operating plan or recommend updating the RP3C Bylaws accordingly. DUE DATE: February 28, 2019	Prasad Kadambi	OPEN
11/2016-11	RP3C to prepare a brief, five-slide presentation with a simple perspective explaining RIPB for use at consensus committee meetings.	Prasad Kadambi	OPEN

Closing

- **Other Business**
- **Next Meetings**
  - ANS Winter Meeting, November 15-19, 2020, Chicago, IL
  - ANS Annual Meeting, June 15-17, 2020, Providence, RI

Adjourn and Thank You!

SMART Matrix for ANS SC Strategic Plan – Updated 1/6/2020

A SMART strategic plan consists of goals that are **S**trategic, **M**easurable, **A**ttainable, **R**ealistic and **T**ime-related. This matrix takes each of the Initiatives in the ANS SB Strategic Plan and defines the specific activities that need to be done for each Goal and Objective along with its proposed schedule and responsibility. This is a living document. Updates and comments from Standards Board Members will be solicited and the plan adjusted.

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
Completed	Near Term	Overdue			
Goal #1 Align Standards Development Priories with Current and Emerging Needs					
D. Incorporate risk-informed and performance-based methods in ANS standards, where appropriate, by:					
1. RP3C Chair	Manage the resolution of comments and send resulting Draft Plan to Standards Manager for issuance for use on two pilot standards.	Jim O'Brien to lead effort	~~12/1/2017~~ 12/31/2018	6/2019	8/31/2018
	RP3C Chair	Provide draft ANS Risk Informed and Performance Based Standards Plan (which will provide the approaches and procedures to be used by ANS SC consensus committees, subcommittees and working groups to implement risk informed and performance based principles in a consistent manner) for review & comment prior to use in pilot applications	Jim O'Brien to lead effort; underway, should be complete by Dec 31, 2018. Balloted issued in April 2019. for proposed issue as draft for trial use	~~9/30/2017~~ ~~9/30/2018~~ ~~12/31/2018~~ 6/1/2019	6/1/2019
	RP3C Chair	Incorporate approaches used from the application of RP3C Guidance being applied on current standards under development into a trial use Guidance Document for SB approval.	Piloted on ANS-2.26, ANS-2.3, and ANS-2.21. The piloting is ongoing because each of these standards is currently being worked on.		6/11/2019

SMART Matrix for ANS SC Strategic Plan – Updated 1/6/2020

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
		Collect comments and recommendations from WG's using the trial use Guidance Document and send to Standards Manager for SB ballot.	Jim O'Brien to lead effort	6/1/2020	
	RP3C Chair	Manage the resolution of comments and send resulting document to Standards Manager for issuance as a policy or procedure.	Jim O'Brien to lead effort	?????	
2. Develop a Risk-Informed Performance-Based Principles training package for training of ANS Standards Committee members.	RP3C Chair	Develop Risk-Informed and Performance-Based Training Package for SC members and provide to SB for review.	Ed Wallace to lead. To be developed in parallel with procedure finalization	~~12/1/2017~~ ~~1/31/2019~~ 3/13/2020	
3. Conduct training of consensus committees and working groups.	CC Chairs	Schedule training for CC/WGs as needed, supported by RP3C training resources. CCs and RP3C to coordinate.	Ed Wallace to lead.	~~3/31/2019~~ 4/13/2020	
	RP3C Chair	Conduct Training for all applicable CCs.	??? to lead	~~6/30/2019~~ ????	
4. The RP3C will work with each consensus committee to develop a prioritized list and schedule for incorporating risk-informed and performance-based principles into its standards. Collaboratively, they will Identify and define any new standards that are related to risk-informed and performance-based principles. Some of such work may already have been assigned to other standards working groups, and so it is important to work with the SB and CCs to identify an appropriate WG lead (and CC) for the standards development with the objective of avoiding duplication.	RP3C Chair CC Chairs	Review ANS standards and narrow the list to 23 potential RP3C standards "Initial Priority List" and send to applicable. CCs review the list and provide their inputs on applicability and schedule for each of the 23 standards.	Completed. Link to spreadsheet with CC evaluations and schedules—ACCESS HERE	9/30/2017	8/20/2018
	CC Chairs	*Requested CCs review and confirmation of actions on Phase 1 list of potential RIPB standards and RP3C feedback on insights*	CC Response status: ESCC – 3/22/18 FWDCC – Input provided pending LLWRCC – partial information provided 1/22/18; full details remain pending NCSCC – responded N/A	9/30/2018	11/20/2018

SMART Matrix for ANS SC Strategic Plan – Updated 1/6/2020

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			1/30/18 as no NCSCC standards are on the short list. NRNFCC – N/A standards part of RP3C pilot program RARCC – 7/9/18 SRACC – confirmed N/A 1/30/18 as no SRACC standards are on the short list.		
	RP3C Chair	Manage joint discussions of the actions and schedule for the Initial Priority List of approaches and schedule and provide the results to the Standards Board for discussion at a Standards Board meeting. Mange any required interfaces with CCs and WGs. WGs and CC Management are to give this effort priority.	Agreed approaches and schedules with CC chairs to be incorporated into spreadsheet (ACCESS HERE).	4/30/2019	
5. Publishing a Nuclear News Article to inform other members of the Society of the benefits of this risk-informed and performance-based effort	RP3C Chair	*Nuclear News* (*NN*) article drafted, approved by SB Chair, and forwarded to *NN* editor. Via Standards Manager	The article has been completed. Postponed until next issue due to staff transition at NN.	~~11/1/2017~~ 12/31/2018 Article submitted, publication pending	5/1/2019
6. Developing presentation materials that can be used to inform other industry groups as to the benefits and use of the ANS Standards Committee risk-informed and performance based standards activities	RP3C Chair	Develop presentation package for use with other industry groups and submit to SB for approval.	To be developed in parallel with plan finalization	3/1/2019	
	RP3C Chair	Contact appropriate organizations to make presentations at NRC RIC, ANS UWC, and owners' groups.		~~7/1/2018~~ 4/30/2019	
	RP3C Chair	Make presentations at a minimum of 2 groups.		5/31/2019	
	CC Chair	Select SubC Chairs and other CC members with respect to their being well versed in toolkit contents and capable of being mentors. Provide mentor list to SB VChair.	11/2017: ESCC – Done FWDCC - Done LLWRCC - Done	5/1/17	6/12/2018

SMART Matrix for ANS SC Strategic Plan – Updated 1/6/2020

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
			NCSCC - Done NRNFCC - Done RARCC - Done SRACC - Done		
	CC Chair	In cases where additional assistance is required beyond the SubC Chair, CC should request mentor from SB VChair.	None identified yet	Chairs have been advised.	11/1/2017

SMART Matrix for ANS SC Strategic Plan – Updated 1/6/2020

A SMART strategic plan consists of goals that are **S**trategic, **M**easurable, **A**ttainable, **R**ealistic and **T**ime-related. This matrix takes each of the Initiatives in the ANS SB Strategic Plan and defines the specific activities that need to be done for each Goal and Objective along with its proposed schedule and responsibility. This is a living document. Updates and comments from Standards Board Members will be solicited and the plan adjusted.

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
Completed	Near Term	Overdue			
Goal #1 Align Standards Development Priories with Current and Emerging Needs					
D. Incorporate risk-informed and performance-based methods in ANS standards, where appropriate, by:					
1. Developing appropriate guidance 2. Socialize guidance that is developed 3. Modify and maintain-as-current guidance based on feedback from Working Groups	.RP3C Chair	Jim O'Brien to lead effort related to development and socialization	SB approved piloting draft guidance on trial basis	11/2019	06/2020
	RP3C Chair	Jim O'Brien to lead effort to socialize draft guidance document	Jim O'Brien to lead webinar presentations	06/2020	
	RP3C Chair	Jim O'Brien to receive feedback from socializing efforts and modify documented guidance as appropriate	Jim O'Brien to lead effort to assimilate feedback on specific standards covered by draft guidance to propose to RP3C modifications to documented guidance.		
	RP3C Chair	Kadambi to present to RP3C and to SB for approval modifications to draft guidance document at scheduled meeting	Kadambi to lead effort		
	RP3C Chair	Kadambi to summarize updates to RP3C RIPB Guidance Document at each SB presentation		?????	
Deliver training on RP3C developed internal guidance for RIPB methods to Consensus Committee and Working Group members	RP3C Chair	Jim O'Brien to lead effort to create and deliver training package focused on internally targeted needs of ANS Standards Committee			

SMART Matrix for ANS SC Strategic Plan – Updated 1/6/2020

Initiative	Assigned Responsibility (Functional Title)	Specific Action Items Needed to Accomplish the Initiative	Status/ Comments	Scheduled Completion Date	Actual Completion Date
Compile Body of Knowledge potentially useful to ANS Standards Committee for facilitating application of RIPB methods in ANS standards	RP3C Chair	Identify and clarify for relevance to standards Industry documents (NEI, EPRI, etc.)	NEI 18-04 EPRI Report 3002011801 EPRI Report 3002015752 Model-Based Systems Engineering literature		
		Identify and clarify for relevance to standards NRC documents	Reg Guide 1.233 ROP References		
	RP3C Chair	.			
Prepare and Pilot training material relevant to RIPB methods from external sources	RP3C Chair CC Chairs	Pilot training on NEI 18-04	Ed Wallace to lead		
	CC Chairs		.		
	RP3C Chair		).		
	RP3C Chair				
Update and follow-through on “Schedule of ANS Standards in Development using RIPB Properties”	RP3C Chair				
	RP3C Chair				
	RP3C Chair	.			
	CC Chair				
	CC Chair			.	

Incorporating Risk-Informed and Performance-Based

Approaches/Attributes in ANS Standards

~~**FOR INTERIM TRIAL USE**~~

1. PURPOSE

The purpose of this document is to identify roles and responsibilities and the process for using risk-informed and performance-based (RIPB) approaches, as appropriate, when developing or revising American Nuclear Society (ANS) Standards. For some standards, the incorporation of a RIPB approach/attributes will ~~make them more effective~~optimize their effectiveness for the user community to achieve the standard's outcome(s). This document also helps the Consensus Committees, Subcommittees and Working Groups (WG) decide if and how RIPB approaches can be incorporated into its standard

This document is intended to be used by all Consensus Committees during the development of new ANS standards and the development of revisions to ANS standards. This document may be useful and applicable to other Standards Development Organizations (SDOs).

2. BACKGROUND

In 2013, the ANS Standards Board created the Risk-Informed, Performance-Based Principles and Policy Committee (RP3C) to establish "approaches, priorities, responsibilities and schedules for implementation of risk-informed and performance-based principles in American Nuclear Society (ANS) standards." The RP3C was then tasked with developing a plan "which will provide the approaches and procedures to be used by the ANS ~~SC~~ consensus committees, subcommittees and working groups to implement risk informed and performance based principles in a consistent manner." This document is part of that plan.

Appendix A provides further background on the development of RIPB approaches and how RIPB approaches were successfully incorporated into the Maintenance Rule.

3. ROLES AND RESPONSIBILITIES

The following describes the roles and responsibilities of the ANS Standards Committee (SC) to support implementation of this guide.

3.1 ANS Standards Board

(a) Approve this guidance document and promote its use within all Consensus Committees.

(b) Encourage RP3C to seek and actively invite experience-based feedback from the users of this guide (e.g., consensus committees)

3.2 RP3C Chair

(a) Assign responsibilities to maintain this guidance document (e.g., developing a schedule for its review and update).

(b) Assign responsibilities for developing training on this guidance document.

(c) Assign responsibilities of members for review of new and revised standards.

(d) Provide guidance to WG Chairs during Project Initiation Notification System (PINS) development.

(e) Actively solicit experience-based feedback from the users of this guide.

3.3 RP3C Members

(a) Support reviews of new and revised standards as assigned by the RP3C chair.

(b) Develop training on this guidance document as assigned by the RP3C chair.

(c) Take training on this guidance document as specified by the RP3C chair.

(d) Draw lessons learned from the experiences encountered during 3.3(a)

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3.4 Consensus Committee Chairs

(a) Support awareness of and implementation of this guidance document throughout the various stages of development of new and revised standards.

(b) Take training on this guidance document.

(c) Provide experience-based feedback to improve this guide.

3.5 Working Group Chairs

(a) Take training on the guidance document.

(b) Use this guidance document throughout the development of any new or revised standards for which they are leading.

(c) Provide experience-based feedback to improve this guide.

4. PROCESS

The following describes the process that could be used to initiate or enhance the incorporation of RIPB approaches during the development or revision of standards.

4.1 Working Group (WG) Formation and Project Initiation Notification System Stage

4.1.1 WG Formation:

The WG Chair should consider recruiting a professional with some experience in RIPB approaches to be a part of the WG and consider a training session on this guidance document for all WG members.

4.1.2 PINS Development:

The PINS form includes the following question for the WG Chair:

> *Will this standard use risk-informed insights, performance-based requirements, and/or a graded approach?*

The PINS instructions state that it is strongly recommended that new and revised standards use risk-informed insights, performance-based requirements, and/or a graded approach, where applicable, and that WG Chairs contact the RP3C Chair for guidance to incorporate these methods.

Sections 5.1 and 5.2 of this document provides information on the types of standards where use of risk-informed insights/approaches or performance-based requirements/approaches may be appropriate (this document does not address when a graded approach may be appropriate). The WG chair can also consult with the RP3C Chair.

Note that should incorporating a risk-informed and/or performance-based approach(es) to the standard being developed or revised be deemed inappropriate or not effective, the remainder of this procedure is not applicable to that particular standard. The WG Chair should document and share with their replacement, this evaluation, its assumptions and overall assessment appropriately for consideration by all future Working Groups.

4.2 Standards Development Stage

For standards that have been deemed appropriate to incorporate RIPB approach(es), the WG Chair shall interface with RP3C, as follows:

4.2.1 Early Outlines/Draft

The WG Chair should use this guidance document (particularly Section 5) to support incorporation of RIPB approaches into the standard and should reach out to the RP3C Chair (via standards@ans.org) to request any necessary assistance. The RP3C Chair should offer to assign a member(s), i.e., primary point of contact, to support the WG during the early stages of the standard development.

4.2.2 Pre-Sub-Committee Draft

The WG Chair should send the draft standard to the RP3C for review by the RP3C Chair or designated members of RP3C. The WG should use his/judgment as to when the draft is mature enough to benefit from the RP3C review. Details of the standard ~~do~~ need not ~~necessarily have to have be~~en near completion~~ed~~. The RP3C should schedule and perform the review to minimize any impact to the standard development schedule. The WG Chair has the authority to adopt any of the RP3C recommendations resulting from the review.

In the final stages of ~~At this point in~~ the standard development ~~phase~~, it might be too late to implement any or all of the recommendations. This will be based upon the value added versus the difficulty in implementing the recommendations. The WG Chair should consult with the Subcommittee and Committee Chairs to factor in questions of schedule, volunteer resources (amount and appropriate skill sets), extensiveness of standard rework, etc. so as to chart most the appropriate path forward. It may be that comprehensive risk evaluation and outcome based performance were already passively incorporated into the standard in an optimized fashion. The WG Chair should document appropriately whatever decisions are made in this regard for consideration by future Working Groups.

5. RISK-INFORMED, PERFORMANCE-BASED APPROACHES

~~The following discusses RIPB approaches.~~ As an aide, Table ~~5~~ 1 provides a high-level attributes that are the key elements of the performance-based and risk-informed approaches that can be used to support the development or revision of standards. Examples are provided in Appendix B on how these approaches have been used (and where their use could be enhanced) in some current ANS standards.

5.1 Performance-Based Approaches

All standards should prescribe what (~~the~~ outcome) is to be obtained from using the standard and in an appropriate manner~~to different levels~~, how to obtain the outcome. The "how" includes criteria and methods to validate that the top-level outcome is ~~decomposed~~defined and approached correctly as well as criteria and methods to verify that the outcome is achieved. Outcomes can be continuous (temperature range), discreet (one of several defined configurations) or even binary (on or off) but needs to be clearly defined such as to allow an unambiguous interpretation.

Depending upon the outcome to be achieved, different degrees of prescription on how to achieve that outcome may be appropriate. For example, in calculating the reactor decay heat it is necessary to use scientific first principles, representative data, and applicable equations; therefore, defining the exact steps to perform may be the best means for achieving the outcome.

Alternatively, a standard outcome be a ~~type~~ quality metric or training criteria where it may be appropriate to provide some high level expectations for what needs to be done to meet the outcome and allow flexibility (be less prescriptive) in how to achieve the outcome. For example, a standard might have "not exceeding an exposure limit" as an outcome. The user of the standard can be provided the flexibility on how to meet this outcome, but certain high level

expectations (margin and reliability) might be specified. Generally, where there is more margin, there is room for more flexibility.

Note that a standard needs to provide some level of direction/prescription on what needs to be done to achieve the outcome. Verbatim compliance to a standard must guarantee a successful outcome, even if some criteria in the standard is qualitative or open ended. ~~If it did not, then the standard would have no "shall" statements and would not be a standard.~~ However, a performance-based standard would keep the direction provided at a high level and ~~would~~ allow flexibility in the specific steps that could be taken to achieve the outcome. The degree of flexibility manifests itself by permitting the standard user to determine what performance metrics are necessary (to ensure success) and what the desired values of such metrics should be to declare success, as well as how to ~~measure~~ assess those metrics and their associated uncertainties. The degrees of "hows" would be up to the standard writer; he/she would determine any constraints that would need to be placed on the standard user when determining performance-based metrics, how they will be measured, and what constitutes a success. Less prescriptive approaches are feasible; e.g.: (i) a quality attribute might be "Independent Verifiability"; (ii) criteria and methods to validate that the top-level outcome ~~is~~ is defined and approached correctly ~~decomposed~~ correctly; (iii) criteria and methods to verify that the outcome is achieved. In all cases it is necessary to provide ~~the~~auditable assurance that the outcome is achieved. This assurance should be based on authoritatively-validated principles of the relevant body of knowledge (the science) and reasoning (but could be as simple as a log book entry).

This is outlined in a step by step manner below.

5.1.1 Defining the Ultimate Outcome of the Standard

Clear understanding and ~~statement~~ declaration of the ultimate outcome of the standard is a critical step in the early stage of any standard development. Clear statement of the outcome and those attributes that characterize the outcome will also support efforts to determine whether the standard is candidate for incorporating a performance-based approach. Examples of clear outcome statements are provided in Appendix B.

5.1.2 Define the Approach (Major Steps) to Obtaining the Outcome

All standards define and require the use of an approach for achieving an outcome. This can be done at a high level or at a more detailed (prescriptive manner) depending upon the nature of the standard, the preference of the standard writers, and needs of the standard users. The goal of a standard is to define the approach such that there is a sufficiently high level of confidence that the outcome will be achieved in an efficient manner.

5.1.3 Determine Whether there are Alternative Approaches for Achieving the Outcome.

For some situations, ~~there will only be~~the standard committee might agree there is only one acceptable approach that will result in achieving the outcome (e.g., calculation of decay heat load). ~~In that case, the standard is generally not considered suitable to being written in a performance-based manner~~. Here the outcome may be simple but this does not yet address risks

associated with the approach or outcome which can include uncertainties (unless uncertainty control is part of the outcome).

In other situations, there may be various different means to establish the outcome (e.g., achieving a regulatory compliant ~~n appropriate~~ fire protection ~~program~~ or radiation protection program). In these situations, the level of specificity in the definition of the process for achieving the outcome (or sub-outcomes) should be determined.

5.2 Risk-Informed Approaches

Risk insights can be used to support decisions on the scope, focus, level of rigor or sophistication of the standard (and the program or process that is the subject of the standard). A "risk-informed" approach to decision-making represents a philosophy whereby risk insights are considered together with other factors to establish requirements that better focus attention on design and operational issues commensurate with their importance to health and safety. Risk insights can also be used to support verification that the specified requirements are satisfied. Decisions made in processes described in a standard can be risk-based or risk-informed.

Risk-based decisions are decisions made entirely on specified risk criteria, which could be qualitative or quantitative (but defined). -While it is acceptable to use risk-based steps in a process, broader decisions should be risk-informed. A known system failure or wear rate are examples of defined risks if they can affect the outcome of a standard. Alternatively, a deterministic risk that is qualitative might be a requirement that a substantive notification take place "as soon as practical".

A risk-informed process sets up an integrated decision-making structure that allows consideration of a broad range of technical and stakeholder input uncertainties, imperfections in analysis and decision criteria and knowledge constraints. Regulatory Guide 1.174, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, is an example of a risk-informed process.

5.2.1. Using Risk Insights to Define the Scope of the Standard

Risk insights can be used to define/narrow the scope of standard, e.g., program elements or structures, systems, and components (SSCs), to those which need to be addressed to meet the outcome. Facilities with risk models may be able to consider quantitative measures, such as risk importance measures as part of the scoping decision. Formal PRA addressing an SSC can also provide risk insights relevant to the standard and might be incorporated to the extent appropriate for obtaining the outcome in either a generic or specific manner.

5.2.2. Using Risk Metrics as Part of the Standards Outcome Statement

The outcome of the standard can be stated in terms of risk metrics such as "As Low As Reasonably Achievable" or "consequence at a given frequency." These may be defined in a formal engineering calculation, system design description or even a regulation but marrying risks and outcomes in a standard can be entirely appropriate on a case by case basis.

5.2.3 Using Risk Insights to Define How to Meet the Standard's Outcome

Risk insights can be used in defining the rigor, sophistication, or level of ~~effort~~ analysis to be used in meeting the standard's outcome. Examples include using risk-insights to help set requirements for testing, surveilling, or inspecting SSCs. For example, a standard that tests a number of similar components could require monthly tests for the high risk category, quarterly tests for the medium risk category, and annual tests for the low risk category. The industry has been successful in implementing risk-informed in-service testing and inspection programs that reduce the rigor and periodicity of tests/inspections, which provide both cost and exposure

savings (RG 1.175, *An Approach for Plant-Specific, Risk-Informed Decision-making: In-service Testing* and RG 1.178, *An Approach For Plant-Specific Risk-informed Decision-making In-service Inspection of Piping*.

Similar to the categorization and focus above, the increase in level of rigor or sophistication can be applied on a ~~continuous~~ graded scale based on risk insights. The treatments can be different and focused based on the specific risk contribution. For example, an SSC may have different functions during different modes of reactor operation. The categorization and the suggested treatment may differ for the different functions. Similarly, the level or rigor and sophistication of an analysis called for in a standard or the elements of a safety program can be tailored based upon risk insights. Further, the standard can specify the use of probabilistic or statistical methods for achieving the outcome. The industry has been successful in identifying safety-related SSCs that have little or no safety significance, and so reduced the regulatory treatment requirements typically placed on safety-related SSC (10 CFR 50.69, *Risk-informed Categorization and Treatment of Structures, Systems and Components*).

Finally, the standard can allow different approaches to be made to achieve outcomes, but require that the approach used be justified to provide assurance that ~~an appropriate level of confidence on the accuracy or repeatability of achieving~~ the outcome is achieved. In other words, ~~(e.g.,~~ by bounding ~~of the~~ residual uncertainty through the~~and~~ contributors to the uncertainty while ~~and allows~~accounting for the relation of~~ing~~ the contributors ~~with~~to the corresponding severity of the consequences~~)~~. An example is where the margin of safety provided (or amount of conservatism) is based on the confidence (or uncertainty) associated with the data or the process used in achieving the outcome.

Table 1. Key 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 and any uncertainties in assuptions of intermediary steps).
R2. The standard defines how to use risk insights (e.g., to specify a required actions to

achieve the outcome under identified risks).

APPENDIX A

BACKGROUND ON RISK INFORMED AND PERFORMANCE BASED APPROACHES

A1. GENERAL BACKGROUND

The Nuclear Regulatory Commission (NRC) has defined the RIPB approach as:

> *An approach in which risk insights, engineering analysis and judgment including the principle of defense-in-depth and the incorporation of safety margins, and performance history are used, to (1) focus attention on the most important activities, (2) establish objective criteria for evaluating performance, (3) develop measurable or calculable parameters for monitoring system and licensee performance, (4) provide flexibility to determine how to meet the established performance criteria in a way that will encourage and reward improved outcomes, and (5) focus on the results as the primary basis for safety decision-making.* [Ref 1, SRM-SECY-98-0144].

In ~~SRC~~ SECY-98-0144 the NRC provided characteristic attributes and expected outcomes of applying RIPB approaches in regulations. The following is largely taken from the NRC document.

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.

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.

Outcome Attributes of Risk-Informed and Performance-Based Safety:

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 in which risk insights, engineering analysis and judgment including the principle of defense-in-depth and the incorporation of safety margins, and performance history are used to (1) focus attention on the most important activities, (2) establish objective criteria for evaluating performance, (3) develop measurable or calculable parameters for monitoring system and licensee performance, (4) provide flexibility to determine how to meet the established performance criteria in a way that will encourage and reward improved outcomes, and (5) focus on the results as the primary basis for decision-making. By “results,” we mean actual safety performance, not demonstrations of adherence to mandated processes or prescriptions.

A2. EXAMPLE OF REGULATORY APPLICATION: MAINTENANCE RULE

The nuclear industry has had many successes in implementing RIPB approaches. One area ~~that~~ where the nuclear industry has been particularly successful has been in establishing maintenance programs to meet the NRC Maintenance Rule (10 CFR 50.65), which is a RIPB rule

The following provides examples of risk-informed and performance-based (RIPB) attributes in the Nuclear Regulatory Commission’s (NRC’s) Maintenance Rule. Although there are significant differences between what is put in a regulation versus a standard, the identification and discussion of some of the key attributes in the Maintenance Rule can be beneficial~~ly~~ in understanding what is meant to use a RIPB attributes/approach.

A2.1. Outcome:

The rule states in (a)(1):

> *[liciensees] 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, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions.*

Thise is, in essence, the required "outcome." It is clear (Attibute P1 from Table 1) and supports performance-based implementation because it establishes a high level goal. It is risk-informed because it includes a risk metric as part of the outcome (Attribute R2). Note that there are other ways for a rule (or standard to be risk-informed), so one should not think that a risk metric must be included in the outcome for a standard to be risk-informed.

A2.2. Method for Achieving Outcome

Several parts of the rule provide instructions for achieving the outcome. Examples include:

Example 1: *These goals shall be established commensurate with safety and, where practical, take into account industry-wide operating experience.*

This is a high level instruction for how to meet part of the Maintenance Rule's outcome and flexibility is provided on how best to perform this (Attribute P2).

Example 2: *Performance and condition monitoring activities and associated goals and preventive maintenance activities shall be evaluated at least every refueling cycle provided the interval between evaluations does not exceed 24 months*

This is another example of a high level instruction for how to meet part of the Maintenance Rule's outcome (Attribute P2).

Example 3: *[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.*

This is an example of a high level instruction for meeting an element of the Maintenance Rule as well a requirement of develop risk insights and to use risk insights in meeting the Maintenance Rule outcome (Attributes P2, R1 and R2).

APPENDIX B

EXAMPLES OF RISK-INFORMED PERFORMANCE BASED

ATTRIBUTES IN ANS STANDARDS

The following provides examples of performance-based and risk-informed attributes in American Nuclear Society (ANS) standards. The examples are organized to cross reference the attributes to those listed in Table 1 in the main body of this guidance document.

Different types of standards (i.e., standards that define a design basis event; standards that define a safety program, etc.) are used as examples because each of the types can been seen to be more (or less) easily make use of risk-informed and performance-based approaches.

B1. ANSI/ANS-2.26-2004, CATEGORIZATION OF NUCLEAR FACILITY STRUCTURES, SYSTEMS, AND COMPONENTS FOR SEISMIC DESIGN

This "design basis event" type of standard.

B1.1 Performance-Based Attributes

B1.1.1 Attribute P1: Outcome

ANS 2.26 states in the SCOPE section that:

> *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.*

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."

B1.1.2 Attribute P2: High Level Criteria

Three examples of appropriate criterion that have this attribute are provided below:

> *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. [Note that this is also an example of a risk-informed approach.]

Note that although ANS 2.26 includes many criteria that provide what needs to be done, it does include some prescriptive criteria and ANS 2.26 invokes other consensus standards that provide very prescriptive criteria for the design of safety SSCs. For example:

SDC-1 and SDC-2 in conjunction with the IBC and SDC-3, SDC-4, and SDC-5 in conjunction with ANS-2.27, ANS-2.29, and ANSI/ASCE SEI 43-05 establish the design response spectra (DRS) and SSC design and analysis Requirements

ANS 2.2.6 also includes some guidance that supports use of performance-based approach to achieving the standards outcome.

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.

B1.2 Risk-Informed Attributes

B1.2.1 Attribute R1: Development of Risk Importance

An example of a criterion that has this risk-informed attribute is:

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.

This criteria specifies that a higher SDC will be assigned to SSCs whose failure would have greater consequences.

B1.2.2 Attribute R2: Use of Risk Insights

An example of a criterion that has this attribute is;

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.

B2. ANSI/ANS-2.3-2011, ESTIMATING TORNADO, HURRICANE, AND EXTREME STRAIGHT LINE WIND CHARACTERISTICS AT NUCLEAR FACILITY SITES

This "design basis event" related standard.

B2.1 Performance Based Attributes

B2.1.1 Attribute P1: Outcome

ANS 2.3 states in the SCOPE section that:

> *This standard establishes criteria for acceptable guidelines to estimate the frequency of occurrence and the magnitude of parameters associated with rare meteorological events such as tornadoes, hurricanes, and extreme straight line winds at nuclear facility sites within the continental United States.*

The outcome from the use of this standard could be stated to be:

> An estimate of "the frequency of occurrence and the magnitude of parameters associated with rare meteorological events …"

This is a good, clear performance-based outcome statement.

B2.1.2 Attribute P2: High Level Criteria

An example of a criterion that has this attribute is

> *Tornado hazard probability models shall account for the following:*
>
> *(1) constant or gradations of velocity along and across the tornado path;*
> *(2) meteorological conditions affecting the site;*
> *(3) topographical features surrounding the site; and*
> *(4) biases in reporting occurrence and velocity of tornadoes on target structures. .*

This is performance-based because it provides broadly based statements on what needs to be considered, but does not provide details on how to account for these items.

Another example of a criterion that has this attribute is

> *Two basic approaches in the characterization of wind-generated missiles are recognized as acceptable in this standard:*
> *(1) a standard spectrum of missiles; and*

(2) a probabilistic assessment of the hazard.

This is somewhat performance-based (high level) because it provide options for achieving an outcome.

B2.2 Risk-Informed Attributes

~~None identified.~~Uncertainty in outcomes is considered in direct and indirect effects from high winds where secondary effects (power loss) should then be captured elsewhere.

The following is an example of a ~~non~~ RIPB feature that does not immediately portray RIPB methods as described in this guidance (in that it is explicitly prescriptive):

> *The height of the radial inflow layer shall be at least 0.35 R. Above this height, the radial wind is assumed to be zero or to flow outward.*

Note: this does not mean the standard or the criterion is not appropriate in this this may be an optimal means to obtain an outcome based on the science, industry history and/or risk mitigations. There are times when it is very appropriate to be prescriptive and so in this way compliant with RIPB methods. It is recommended that the underlying assumption inherent to such an approach be communicated so that if the standard is ever applied when those assumptions have changed for any reason, this can be identified by the user and addressed.

B3. ANS 2.21, CRITERIA FOR ASSESSING ATMOSPHERIC EFFECTS ON THE ULTIMATE HEAT SINK

This is a "design analysis" type standard.

B3.1 Performance Based Attributes

B3.1.1 Attribute P1: Outcome

ANS 2.21 states in the SCOPE section that:

> *This standard establishes criteria for acceptable guidelines to estimate the frequency of occurrence and the magnitude of parameters associated with rare meteorological events such as tornadoes, hurricanes, and extreme straight line winds at nuclear facility sites within the continental United States.*
>
> *Required analyses are provided for a meteorological assessment of the ultimate heat sink to ensure that design temperatures and cooling capacity requirements for the facility are met.*

The outcome could be stated to be:

> "A determination of whether adequate design temperature and cooling capacity requirements for the facility's ultimate heat sink ~~for a facility~~ are met."
> .

This is a good performance-based outcome where uncertainty in the "adequacy" criterion is captured in the risk informed aspects of the approach.

Note that the introductory statement could be better written (to be consistent with other ANS introduction statements) as:

> *This standard establishes criteria for performing an analysis to determine whether design temperature and cooling capacity requirements for the ultimate heat sink for a facility are met.*

Another example of a criterion that has this attribute is:

> *Ultimate heat sinks shall be designed to have the cooling capacity to provide sufficient cooling water at the maximum allowable inlet temperature under the most adverse meteorological conditions expected for the power plant climatic regime.*

This is a good performance-based statement.

Note that one element of performance-based approaches in industry is the verification that the outcome is met using a measurement. The design goal under the most extreme conditions likely could not be verified by measurement, but measurement of parameters at actual conditions could be compared with calculational results to provide confidence the goal is met. It would be good to consider whether adding this type of criteria would benefit the standards.

B3.2 Risk-Informed Attributes

As a general rule of practice, uncertainties in measurements, observations and assumptions should be considered if they can credibly effect and change the likelihood of an acceptable outcome. Because risks can take many forms, appropriate consideration should be applied accordingly.

B3.2.1 Attribute R1: Development of Risk Importance

An example of a criterion that has this attribute is;

> *The results of the 10-year–or–longer simulation with several extreme events shall be used to perform extreme value statistical analyses that project the most extreme weather conditions for the expected license period of the power plant, which could be 60 years or more.*
>
> *The U.S. Nuclear Regulatory Commission provides guidance in regard to the critical time period. In the case of a cooling lake, the lake temperature may reach a maximum in five days following a shutdown. Therefore, three critical time periods to be included in the assessment are five days, one day, and 30 days to ensure the availability of a 30-day cooling supply. The three periods need not occur contiguously but may be combined to produce a synthetic 36-day period that may be used as the design basis for the lake. In the case of a wet cooling tower, the meteorological conditions resulting in maximum*

evaporation and drift losses shall be the worst 30-day combination of the controlling parameters such as wet-bulb temperature and wind speed.

This does incorporate some risk-informed elements.

RIPB Frequently Asked Questions Regarding Guidance Document (GD)

- Q: How is the GD to be used by standard writers and reviewers with no familiarity about RIPB concepts?

  A: The GD provides information that will help standard writers and reviewers understand RIPB concepts and provides references that can be used to get additional information. Most importantly the GD identifies ANS resources (e.g., RP3C) that can the standard writers and reviewers can go for support.

- Q: What is the relevance of the GD to a specific technology or design being developed by a potential vendor?

  A: The GD is relevant to every standards that supports the development of nuclear facility technologies and designs. However, as discussed in the GD, some standards will utilize RIPB to different degrees and in different manners.

- Q: How does the GD apply to ANS standards currently in use for operating LWRs?

  A: Yes. The Committees and Working Groups responsible for maintenance of the standards should evaluate how the might become more effective if RIPB approaches were adopted.

- Q: How to make use of the GD to decide on “level of detail” issues?

  A: The “level of detail” in a standard relates to standards providing “what” is needed to meet the outcome of the standard rather than “how” to meet the outcome. This also related to the level of prescription that is considered necessary to have confidence in achieving the outcome and the degree of flexibility which is considered appropriate. The GD discusses this and also includes examples where the “level of detail” is discussed for specific Standards.

- Q: How is the GD to be used to incorporate RIPB concepts and methods in standards developed by other Standards Developing Organizations (SDOs) or international ISO standards?

  A: The GD is available as a reference for other SDOs or international ISOs. The concepts in the GD are also applicable to how Standards from these organizations can be made more RIPB.

Schedule of ANS Standards in Development using RIPB Properties (June 2020)

Standards Project	Draft App'd by WG	+4 months SubC or Preliminary Review/Comment Resolutions	+6 months 1st CC Ballot/Comment Resolutions (concurrent PR)	+4 months 2nd CC Ballot/Comment Resolutions (concurrent PR)	+2 weeks ANS Standards Board Certification	+2 Weeks ANSI Approval	~4 months Publication
ANS-2.22 (T. Jannik)/*ESSC (C. Mazzola) Environmental Radiological Monitoring at Operating Nuclear Facilities JCNRM Rep:	Sept 2020	Oct-Jan 2021	Feb-Jul 2021	Aug-Nov 2021	Dec 2021	Dec 2021	Apr 2022
ANS-2.21 (M. Kinley)/*ESCC (C. Mazzola) Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink JCNRM Rep:	Dec 2020	Jan - Apr 2021	May - Oct 2021	Nov - Feb 2022	Mar 2022	Mar 2022	Jul 2022
ANS-2.26 (D.Clark) /*ESCC (C. Mazzola) Categorization of Nuclear Facility SSCs for Seismic Design JCNRM Rep:	PINS submitted to ANSI 10/1/19. Schedule TBD.						
ANS-2.34 (S. McDuffie)/*ESCC (C. Mazzola) Characterization and Probabilistic Analysis of Volcanic Hazards RP3C Rep: N. Chokshi / JCNRM Rep:	Dec 2020	Jan - Apr 2021	May - Oct 2021	Nov - Feb 2022	Mar 2022	Mar 2022	Jul 2022
ANS-2.35 (D. Anderson)/*ESCC (C. Mazzola) for Estimating Present & Projecting Future Socioeconomic Impacts from Construction, Operations, and Decommissioning JCNRM Rep:	PINS submitted to ANSI 5/20/19. Schedule TBD.						
ANS-3.13 (OPEN) / *LLWRCC (M. French) Nuclear Facility Reliability Assurance Program (RAP) Development JCNRM Rep:	Project in need of new chair to proceed.						
ANS-3.14 (T. Anselmi)/*NRNFCC (J. O'Brien) Process for Aging Management and Life Extension of NRNF JCNRM Rep: J. O'Brien	Jul 2019 - ? Draft issued to SCoRA & RP3C 7/19/19 in parallel to NRNFCC ballot. Comments taking longer than anticipated to address. Schedule TBD.						
ANS-15.22 (D. Cronin/*RARCC (G. Flanagan) Classification of Structures, Systems and Components for Research Reactors JCNRM Rep:	Dec 2021	Jan - Apr 2022	May - Oct 2022	Nov - Feb 2023	Mar 2023	Mar 2023	Jul 2023
ANS-20.2 (D. Holcomb / *RARCC (G. Flanagan) Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt-Reactor Nuclear Power Plants JCNRM Rep:	Mar 2021	Apr - Jul 2021	Aug - Jan 2022	Feb - May 2022	Jun 2022	Jun 2022	Oct 2022
ANS-30.1 (M. Linn) / *RARCC (G. Flanagan) Risk-Informed & Performance-Based NPP Design Process JCNRM Rep: D. Johnson/K. Fleming/A. Maioli	Mar 2020	Mar 2020-? RARCC preliminary review ballot closed 4/17/20. Schedule to be determined once comments addressed. Draft not sent to RP3C or SCoRA at request of RARCC Chair.					
ANS-30.2 (A. Afzali) / *RARCC (G. Flanagan) Categorization Classification of SSCs for New Nuclear Power Plants JCNRM Rep: R. Grantom	Project on hold awaiting determination of path forward with evaluation on the Licensing Modernization Project.						

Schedule of ANS Standards in Development using RIPB Properties (June 2020)

Standards Project	Draft App'd by WG	+4 months SubC or Preliminary Review/Comment Resolutions	+6 months 1st CC Ballot/Comment Resolutions (concurrent PR)	+4 months 2nd CC Ballot/Comment Resolutions (concurrent PR)	+2 weeks ANS Standards Board Certification	+2 Weeks ANSI Approval	~4 months Publication
ANS-30.3 (K. Welter)/*LLWRCC (M. French) Advanced LWR RIPB Design Criteria and Methods JCNRM Rep:		Aug 2019 -? Draft issued to SCoRA, RP3C, RARCC 8/15/19. Comments taking longer than anticipated to address. Schedule TBD.					
ANS-56.2 (E. Johnson)/*LLWRCC (M. French) Containment Isolation Provisions for Fluid Systems After a LOCA JCNRM Rep:	Nov 2021	Dec-Mar 2022	Apr-Sept 2022	Oct-Jan 2023	Feb 2023	Feb 2023	Jun 2023
ANS-57.2 (R. Browder) / *FWDCC (D. Hillyer) Design Requirements for LWR Spent Fuel Storage Facilities at NPPs JCNRM Rep:	Mar 2021	Apr - Jul 2021	Aug - Jan 2022	Feb - May 2022	Jun 2022	Jun 2022	Oct 2022
ANS-57.8 (J. Scaglione)/*FWDCC (D. Hillyer) Fuel Assembly Identification JCNRM Rep:			May-Oct 2020 Draft provied to SCoRA & RP3C on 11/3/19. Draft issued for FWDCC ballot 5/2/20.	Nov-Feb 2021	Mar-21	Mar-21	Jul 2021
ANS-57.9 (M. Sanders)/*FWDCC (D. Hillyer) Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type) JCNRM Rep:		PINS submitted to ANSI 2/2020. Project needs new chair to be initiated.					
ANS-57.11 (B. Eble) / *NRNFCC (J. O'Brien) ISAs for Nonreactor Nuclear Facilities JCNRM Rep:		Closed 6/2/19 with significant comments; resolutions require additional time. Schedule TBD. Draft provided to RP3C, SCoRA, and NCSCC on 4/3/19.					
ANS-59.3 (OPEN / *LLWRCC (M. French) Nuclear Safety Criteria for Control Air Systems JCNRM Rep:		PINS submitted to ANSI 1/10/19. Project not currently active. Schedule TBD. The working group questions whether RIPB methods can be incorporate but will consider as the standard is developed.					

*= ANS responsible consensus committee

ANS Contacts: Prasad Kadambi, RP3C Chair: Phone: 301-236-4162 -- Email: praskadambi@verizon.net

ESCC = Environmental & Siting Consensus Committee

FWDCC = Fuel, Waste, & Decommissioning Consensus Committee

LLWRCC = Large Light Water Reactor Consensus Committee

NRNFCC = Nonreactor Nuclear Facilities Consensus Committee

RARCC = Research and Advanced Reactors Consensus Committee

RP3C Action Item Status Report for June 8, 2020, Meeting

Action Item	Description	Responsibility	Status/Action
11/2019-01	RP3C members to provide comments on the two training presentations. NOTE: Ballots will be issued to capture member comments. DUE DATE: January 31, 2019	RP3C Members	Completed Ballots closed 1/31/20
11/2019-02	Consensus committee chairs to identify at least one working group to be included in the pilot training to incorporate RIPB methods. DUE DATE: January 31, 2019	Consensus Committee Chairs	Completed ESCC: ANS-2.26 FWDCC: ANS-57.9 RARCC: ANS-15.22 (ANS-20.2 as alternate) LLWRCC: All WGs NA: NRNFCC, JCNRM, NCSCC, SRACC
11/2019-03	Pat Schroeder to provide George Flanagan and Mark Linn the ANS Policy on Trial Use and Pilot Application Standards to consider whether ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs," should be issued for trial use. DUE DATE: December 1, 2019	Pat Schroeder	Completed 11/18/19
11/2019-04	Prasad Kadambi (lead), Ralph Hill, Robert Youngblood, Ed Wallace, Mark Linn, Amir Afzali, and Todd Anselmi to discuss/address differences between ASME and ANS taxonomy (terminology). NOTE: Pat Schroeder to facilitate a call when directed by Prasad Kadambi to discuss harmonization of ASME and ANS taxonomy. DUE DATE: March 1, 2020	Prasad Kadambi, Ralph Hill, Robert Youngblood, Ed Wallace, Mark Linn, Amir Afzali, and Todd Anselmi	Completed Call held 2/26/20
11/2019-05	Pat Schroeder to provide Charles Martin and Ralph Hill each other's email addresses so that they can discuss risk informing ASME NQA-1. DUE DATE: December 1, 2019	Pat Schroeder	Completed 11/18/19
11/2019-06	Pat Schroeder to provide Nilesh Chokshi a copy of ANS-30.3, "Light-Water Reactor Risk-Informed Performance-Based Design," as issued to RP3C for review. DUE DATE: December 1, 2019	Pat Schroeder	Completed 11/18/19
11/2019-07	Amir Afzali to send James August the latest version of NEI 18-04, "Risk-Informed Performance-Based Technology Guidance for Non-Light Water Reactors." DUE DATE: December 1, 2019	Amir Afzali	Completed 11/19/19
11/2019-08	Prasad Kadambi to review RP3C comments on draft standard ANS-3.14-202x, "Process for Infrastructure Aging Management and Life Extension of Nonreactor Nuclear Facilities," and resubmit in the format of the RIPB Guidance Document. DUE DATE: February1, 2020	Prasad Kadambi	OPEN
6/2019-05	David Hillyer to give Mark Linn a call about adding the facility life cycle to ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs." DUE DATE: August 1, 2019	David Hillyer	OPEN
6/2019-06	David Hillyer to provide name of potential working group members for ANS-3.13, "Nuclear Facility Reliability Assurance Program Development," to James August.	David Hillyer	OPEN

Action Item	Description	Responsibility	Status/Action
	DUE DATE: October 1, 2019		
11/2018-03	Mark Linn to ask Robert Budnitz for a draft copy of the ALWR standard. DUE DATE: March 1, 2019	Mark Linn	Completed
11/2018-04	James O'Brien to send Prasad Kadambi an email with his thoughts on formation of the CoP. DUE DATE: December 31, 2018	James O'Brien	Completed
9/2018-03	Ed Wallace and Pat Schroeder to help establish routine teleconferences for working groups under the Advanced Initiatives Subcommittee. DUE DATE: October 15, 2018	Ed Wallace Pat Schroeder	NA Discussed recommendation to form CoP at SB 11/13/18 meeting.
6/2018-02	Prasad Kadambi to review the RP3C Bylaws and update the title of the operating plan or recommend updating the RP3C Bylaws accordingly. DUE DATE: February 28, 2019	Prasad Kadambi	OPEN
11/2016-11	RP3C to prepare a brief, five-slide presentation with a simple perspective explaining RIPB for use at consensus committee meetings.	Prasad Kadambi	OPEN