American Nuclear Society

MINUTES

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

June 7, 2021

Members Present:
N. Prasad Kadambi (Chair), Kadambi Engineering Consultants
Robert W. Youngblood III (Vice Chair), Idaho National Laboratory
Patricia Schroeder (Secretary), American Nuclear Society
Kathryn Murdoch, (Secretary pro tem), American Nuclear Society
Amir Afzali, Southern Nuclear Operating Company
Todd Anselmi, Idaho National Laboratory
James August, Individual
Thomas Bellinger, Consolidated Nuclear Solutions, LLC
Robert Budnitz, Lawrence Berkeley National Laboratory-retired
Robert Burg, Engineering Planning and Management, Inc.
Donald R. Eggett, Eggett Consulting LLC
George F. Flanagan, Individual
Michelle L. French, WECTEC
Jordan Hagaman, Kairos Power
Margaret Harding, 4 Factor Consulting, LLC
Kurt Harris, Flibe Energy, Inc.
Robert Hayes, North Carolina State University
Dennis Henneke, GE Hitachi
David Holcomb, Oak Ridge National Laboratory
Gerald (Tim) Jannik, Savannah River National Laboratory
Christian Johnson, Pacific Northwest National Laboratory
Marsha C. Kinley, Duke Energy Corporation
Margaret Kotzalas, U.S. Department of Energy
Vincent Lackowski, Thorium Energy Alliance
Mark A. Linn, Individual
Jean-Francois (Jef) Lucchini, Los Alamos National Laboratory
Charles (Chip) Martin, Longenecker and Associates
James O'Brien, U.S. Department of Energy
Leah Parks, U.S. Nuclear Regulatory Commission (for Carl Mazzola)
Hanh Phan, U.S. Nuclear Regulatory Commission
William Reckley, U.S. Nuclear Regulatory Commission
Steven L. Stamm, Individual
Ed Wallace, GNBC Associates
Kent Welter, NuScale Power

Guests Present:
Edward M. Buchak, Environmental Resources Management
Richard Codell, Individual
Steven Nesbit, LMNT Consulting

1. Welcome, Roll Call & Introductions

RP3C Chair Prasad Kadambi welcomed all. He explained that the meeting was rescheduled a week earlier due to his surgery tomorrow. Kadambi recognized Standards Board (SB) Chair Don Eggett.

Eggett stressed that the RP3C and all its initiatives are important. He is looking for the completion of RP3C's Risk-Informed, Performance-Based Guidance Document (GD) and sharing the document with others as deemed beneficial. Kadambi recognized Robert Youngblood as the new RP3C Vice Chair. He took over for Robert Hayes who had to step down due to other engagements.

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 slide was reviewed and approved as presented.

CATEGORY I: ADDRESS STANDARDS BOARD'S OBJECTIVES

3. Standards Committee Strategic Plan and New SMART Matrix for RP3C

A. Updated Standards Committee Strategic Plan
Members were informed that the Standards Board recently issued the 2021-2026 Standards Committee Strategic Plan.

B. RP3C Actions on Standards Committee Strategic Plan Goals & Objectives SMART Matrix
Along with a new Standards Committee Strategic Plan, the SMART Matrix was updated. Kadambi reviewed the following goals requiring RP3C action:

- Goal #1: Align Standards Development Priorities with Current and Emergent Industry Needs
- Goal#1(E): (RP3C/JCNRM) Develop interface matrix outlining the scope, responsibilities, and interface
- Goal#1(F): Incorporate risk-informed and performance-based (RIPB) methods in ANS standards, where the working group (WG) responsible has found such methods to be appropriate

Specific actions to address these goals can be found on slides 3-5 of Attachment 1.

4. RP3C Procedural Guidance Development and Implementation

A. Status of RP3C Guidance Document (GD)
Prasad Kadambi provided the status of the GD. Additional comments were recently received on the GD from members of the Joint Committee on Nuclear Risk Management (JCNRM) and are currently being addressed. The ad hoc group of Kadambi, James O'Brien, and Ed Wallace needs to discuss the comments and determine how to modify the GD in a way that all will be satisfied. Wallace feels that the comments are beneficial, but he thinks some comments are outside of RP3C's charter and will need further discussion. As directed by the SB, the revised GD will be issued to RP3C for a formal ballot. Depending on comments received, the GD may need to be modified again before sending to the SB for approval. Robert Budnitz clarified that he and Dennis Henneke were the JCNRM commenters. He added that the comments are individual comments, not approved by the JCNRM. While he believes the JCNRM would agree, there was no formal JCNRM review and approval. Budnitz stated that the most recent version is headed in the right direction. Initially, the GD received strong objections from Budnitz and Henneke.

Kadambi will look to the SB to direct socialization of the GD outside of the ANS Standards Committee.

Kadambi will check with James O'Brien for an estimate of when the revision of the GD will be ready.

ACTION ITEM 6/2021-01: Prasad Kadambi to check with James O'Brien on a date for completing the modified GD. DUE DATE: July 15, 2021

B. Commenting Process and Resolution of Comments (File addressing comments—Attachment 2)
Kadambi stated that the bottom line is that input is needed to make the product a better document.

ACTION ITEM 6/2021-02: Ed Wallace to work with Pat Schroeder to make the appropriate version of the GD available to members for input. DUE DATE: July 1, 2021

ACTION ITEM 6/2021-03: RP3C members, especially working group chairs, to provide assistance/feedback on the GD to make it more useful. DUE DATE: August 15, 2021

The question of whether the GD should be issued for trial use will be taken up with the SB.

C. Next Steps Toward Delivery of Training
Training on the GD is addressed within the SMART Matrix.

5. RP3C Member Survey

Prasad Kadambi introduced Robert Burg explaining that he created and managed the RP3C member survey. Burg continued that the survey's intent was to improve the effectiveness of the committee. The survey received nine responses. See slides 10-17 of Attachment 1 for the survey questions and feedback. The survey reflects many positives but recognizes that there remains much that is uncompleted. Kadambi reiterated that RP3C needs everyone's help for the committee to be successful.

6. Report on Community of Practice (CoP) Sessions

Launched in February 2020, RP3C's CoP initiative continued in 2021. Presentations covered varied subjects with speakers sharing knowledge and experience on RIPB matters. CoP presentations range in the area of 40-60 participants per session. Don Eggett added that he thought the CoP presentations have been excellent and thanked Prasad Kadambi for his efforts.

CATEGORY II: EXPAND RIPB METHODS

7. ANS Input to Rulemaking Under 10 CFR Part 53, "Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors"

- ANS Letter to NRC dated March 3, 2021
- ANS Presentation to Advisory Committee on Reactor Safeguards (ACRS) on March 17, 2021

- Opportunities for ANS Standards

  Prasad Kadambi explained that ANS leadership decided to get involved in the Part 53 rulemaking, and ANS Vice President Steven Nesbit assigned the Operations and Power Division (OPD) to lead this effort. ANS sent a letter to the U.S. Nuclear Regulatory Commission (NRC) on March 3, 2021, with eight substantive points. Kadambi addressed the ACRS with these points and feels the input was well received. Nesbit stated that one of his goals is for ANS to have a stronger presence in advanced reactors and thinks we are off to a good start with the support of OPD. Nesbit would like to develop a group within ANS as a clearing house on advanced reactors to encompass the gamut of ANS activities to support these technologies. Another area ANS weighed in on is As Low As Reasonably Achievable—ALARA. Kadambi sees opportunities for ANS standards to support this effort. When questioned, Nesbit agreed that there is more to the game than just NRC, and if we can figure out how to engage with others (i.e., Nuclear Energy Institute, Institute of Nuclear Power Operations), we should.

  A copy of the ANS letter sent to NRC is available as Attachment 3.

8. Cost-Benefit Analyses for RIPB Methods

- Potential benefits for reactor design process by incorporating cost-benefit analysis (CBA)

  Prasad Kadabmi feels that an initiative by the ANS Standards Committee on CBA would be helpful. He invited RP3C members to consider the following:
  - "how safe is safe enough"
  - "when is enough, enough"
  - "how to avoid unnecessary requirements."

CATEGORY III SUPPORT TO WORKING GROUP APPLICATION OF RIPB METHODS

9. SUBSTANTIVE DISCUSSION OF SPECIFIC STANDARDS

A. ANS-30.1, "Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs" (new standard)—M. Linn
Mark Linn refreshed everyone's memory with a little history on the development of draft standard ANS-30.1. The draft was issued to the Research and Advanced Reactor Consensus Committee (RARCC) for preliminary review on March 5, 2020. The SB has provided direction to proceed. Responses to preliminary review comments have been prepared, and the draft has been revised to include more explicit language that ANS-30.1 is intended to provide requirements for the preparation of lower-tier, technology-specific design requirement standards. The standard is not intended to provide requirements for specific use and application by reactor designers and manufacturers. Because of extensive comments, including from the working group, a subgroup was formed to address comments to avoid working group members resolving their own comments. The draft will go back and follow the normal approval process starting with the subcommittee review in parallel with reviews from RP3C, the Subcommittee on Risk Application (SCoRA), and other ANS consensus committees. Comment responses from the preliminary review will be included for reference with the subcommittee review.

See slides 24 – 29 of Attachment 1 for more details on ANS-30.1.

B. ANS-30.3, “Light-Water Reactor Risk-Informed Performance-Based Design” (new standard)—K. Welter
Kent Welter provided an update on the ballot of draft standard ANS-30,3 currently out for approval with the Large Light Water Reactor Consensus Committee (LLWRCC). He acknowledged the challenge of addressing and tracking comments from multiple groups, especially conflicting comments. The standard was scrubbed of the use of “should” and “shall” before the LLWRCC ballot; but additional comments on “should” and “shall” have been received and will require a second scrub. Welter believes that other commenters lack understanding of the technology. See slides 30-32 of Attachment 1 for more details.

C. ANS-30.2, “Categorization Classification of SSCs for New Nuclear Power Plants” (new standard)—K. Welter
Welter reported that ANS-30.2 is off to a good start. They have a large active group meeting weekly but need more volunteers to write. They are using an online, model-based systems engineering tool called Innoslate for flowcharts. Welter believes that ASME’s system design standard currently in development will address a gap of guidance on application of system engineering best practices.

D. RP3C Input on ANS-2.21, “Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink” (revision of ANSI/ANS-2.21-2012 (R2016))—M. Kinley
Marsha Kinley reported on ANS-2.21. The work started at the end of 2018. The group began to incorporate RIPB concepts after talking to Prasad Kadambi in 2019. The draft was approved by the working group and issued to RP3C and SCoRA for review in parallel to the subcommittee review. Resolutions have been prepared for RP3C. Responses to SCoRA’s comments are being completed. Challenges addressing comments were discussed. More detail and example of comments can be found on slides 33-36 of Attachment 1.

E. ANS-2.26, “Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design” (revision of ANSI/ANS-2.26-2004 (R2017))—H. Phan
Hahn Phan recently accepted the role of ANS-2.26 Co-Chair. Work has just started so steps for a revision have yet to be defined. He recognized that the revision may be referenced in Part 53 rulemaking. Robert Budnitz, who is working on the seismic section of Part 53, added that the rulemaking will rely on ASCE/SEI 43, “Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities,” which in turn relies heavily on ANS-2.26.

F. ANS-20.2, “Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt-Reactor Nuclear Power Plants” (new standard)—D. Holcomb
David Holcomb provided a brief status report on ANS-20.2. The working group has tried not to be prescriptive. The draft has been circulated within the working group and developers. They have received some NRC comments and are awaiting further comments from them. They would like to resolve all NRC comments before releasing the draft to begin the approval process.

G. ANS-60.1, “Civil Nuclear Export Control” (new standard)—M. Harding
Margaret Harding reported that ANS-60.1 is just getting started. The Project Initiation Notification System (PINS) form has been approved by the LLWRCC and is with the Standards Board for approval. Most of the working group members are not nuclear engineers; a couple are attorneys. The working group is currently developing an outline.

H. ANS-57.11, "Integrated Safety Assessments for Nonreactor Nuclear Facilities" (new standard)—M. Kotzalas
Margaret Kotzalas reported that the ballot of ANS-57.11 closed with several negatives and roughly 120 comments. She recently took over as the working group chair and has reinitiated work to address comments. Comment responses should be completed by this September.

10. Invite Input from Standards on RIPB Schedule

See the Schedule of RIPB Standards in Development provided as Attachment 4.

Several other standards are currently in development using RIPB methods. Those not discussed elsewhere are listed below:

- ANS-2.22, "Environmental Radiological Monitoring at Operating Nuclear Facilities"
- ANS-2.34, "Characterization and Probabilistic Analysis of Volcanic Hazards"
- ANS-3.11, "Determining Meteorological Information at Nuclear Facilities"
- ANS-3.13, "Nuclear Facility Reliability Assurance Program (RAP) Development"
- ANS-3.15, "Risk-Informing Critical Digital Assets (CDAs) for Nuclear Power Plant Systems"
- ANS-3.14, "Process for Aging Management and Life Extension of NRNF"
- ANS-15.22, "Classification of Structures, Systems and Components for Research Reactors"
- ANS-57.2, "Design Requirements for LWR Spent Fuel Storage Facilities at NPPs"
- ANS-56.2, "Containment Isolation Provisions for Fluid Systems After a LOCA"
- ANS-57.9, "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type)"

11. Changing Environment

- NRC Initiatives
- Industry Initiatives

Prasad Kadambi stated that he'd like to provide an opportunity for members to share initiatives they are aware of that may be of interest to RP3C. In the interest of time, no further discussion was had.

12. Review of Open Action Items

Action items assigned at previous meetings were reviewed. A status report of action items can be found following these minutes.

13. Other Business

No other business was discussed.

14. Next Meeting

Upcoming ANS meetings:

- ANS Winter Meeting in Washington D.C. at the **Washington Hilton** from **November 30 – December 4, 2021**
  (Note: This meeting was rescheduled and is now being held from Tuesday through Saturday)
- ANS Annual Meeting in Anaheim, CA, at the Anaheim Hilton from June 12-16, 2022

An in-person meeting of RP3C is expected to be held during the 2021 ANS Winter Meeting in Washington D.C.

15. Adjournment

The meeting was adjourned.

RP3C Action Item Status Report from 6/7/21 Meeting

Action	Description	Responsibility	Status/Action
6/2021-01	Prasad Kadambi to check with James O'Brien on a date for completing the modified Guidance Document. DUE DATE: July 15, 2021	Prasad Kadambi, James O'Brien	OPEN
6/2021-02	Ed Wallace to work with Pat Schroeder to make the appropriate version of the Guidance Document available to members for input. DUE DATE: July 1, 2021	Ed Wallace, Pat Schroeder	OPEN
6/2021-03	RP3C members, especially working group chairs, to provide assistance/feedback on the Guidance Document to make it more useful. DUE DATE: August 15, 2021	RP3C members	OPEN
11/2020-01	Michael Muhlheim and Kent Welter to develop a presentation on converting the EPRI TAM process for new reactor builds. DUE DATE: June 2021	Michael Muhlheim, Kent Welter, and Steven Stamm	CLOSED The date of 6/29/21 has been set for K. Welter to make a presentation to ANS-3.15.
6/2020-02	Prasad Kadambi and Kent Welter to consider "controlled design activity" as a CoP topic. DUE DATE: September 1, 2020	Prasad Kadambi, Kent Welter	CLOSED K. Welter made the presentation to the CoP.
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	Robert Budnitz	CLOSED Membership confirmed.

ATTACHMENT 1

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

Virtual Meeting
June 7, 2021

Agenda Highlights

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

Address Standards Board Objectives

- Standards Committee Strategic Plan and SMART Matrix
- RP3C Guidance Document and Comment Resolution
- RP3C Member Poll
- Report of Community of Practice Sessions (Outreach)

Expand RIPB Methods

- ANS Initiative and Role in 10 CFR Part 53 Rulemaking
- Focus on Cost-Benefit Analysis

Interactions with Standards Working Groups

- Reports From and on ANS Working Groups
- Report on Interaction with ASME standards

Other Business

- Action Items
- Next Meeting, Adjournment

Standards Committee Strategic Plan

- Goal #1: Align Standards Development Priorities with Current and Emergent Industry Needs
  - Objective: Establish an approach and supporting systems to collect industry priority input and integrate it into the standards priorities and delivery targets.
    - E: Develop interface matrix outlining the scope, responsibilities, and interface management between the ANS/ASME JCNRM and RP3C.
    - F: Incorporate RIPB methods into ANS standards, where appropriate.
    - G: Socialize accomplishments of RP3C and the positive impact it can have on external organizations.

SMART Matrix RP3C Components

- Goal#1(E): (RP3C/JCNRM) Develop interface matrix outlining the scope, responsibilities, and interface management between the ANS/ASME JCNRM and RP3C.
  - 1(E)1: Develop draft for ANS Standards Board (SB)-ASME Review.
  - 1(E)2: Finalize and submit for ballot to ANS SB and ASME; resolve comments and issue. Adjust responsibilities in SMART Matrix based on this agreement.

SMART Matrix RP3C Components (Cont'd)

- Goal#1(F): Incorporate risk-informed and performance-based (RIPB) methods in ANS standards, where the working group (WG) responsible has found such methods to be appropriate.
  - 1(F)1(RP3C):Issue questionnaire to be sent to active WG Chairs to provide feedback on the approach and status of incorporation of RIPB methods into active standards development and the use of the RIPB Guidance Document.
  - 1(F)2(WG Chairs): WG Chairs provide feedback on the approach and status of incorporation of RIPB methods in active standards development and the use of the RIPB Guidance Document. If the timing permits, the feedback should be offered at a RP3C meeting.
  - 1(F)3(CC Chairs): Consensus Committee (CC) Chairs review the WG feedback and coordinate needed assistance. CC Chairs should examine commonality in the feedback among other WGs in the CC. CC Chairs to summarize RIPB progress at SB meetings and offer actionable proposals to RP3C.
  - 1(F)4(Policy TG/RP3C Chair): RP3C collect comments from trial-use of the RP3C RIPB Guidance Document. Policy Task Group and RP3C address comments and prepare a policy to be added to the Standards Committee Policy Manual. Send to Standards Board for ballot.
  - 1(F)5(RP3C): Develop a RIPB Guidance Document training package to train current WG members on its application to standards.
  - 1(F)6(RP3C): Provide RP3C Guidance Document training to new WGs formed to develop, reaffirm, or revise standards.

Implications of Implementing Goal#1(F)

- Current process continues with RP3C working with WGs.
- RP3C recommendations are communicated to WG Chair.
- WG has full freedom to accept or reject recommendations.
- WG Chair is requested to report response to RP3C at a regular meeting.
- WG rejections of recommendations to be considered by the subcommittee or CC Chair.
- CC considers implications for other standards in their portfolio.
- CC Chair provides report to SB as part of normal reporting.
- SB discussion with RP3C participation should clarify implications for incorporating RIPB concepts as part of ANS standards' modernization.
- RP3C considers implications for RP3C RIPB Guidance Document (GD).
- RP3C modifies the GD, as necessary.

SMART Matrix RP3C Components (Cont'd)

- 1(G): Socialize accomplishments of RP3C and the positive impact it can have on external organizations.
  - 1(G)1 (RP3C): Develop a *Nuclear News* article that summarizes the ANS standards that have attempted to utilize RIPB approaches and associated advantages by applying RIPB principles and submit to SB for review.
  - 1(G)2 (RP3C). Develop a PowerPoint presentation to present accomplishments to other industry organizations, including through industry forums, to publicize the progress that ANS has made.

Status Report on RP3C Guidance Document

- The GD has been available for trial use on the ANS website since the SB approved this in June 2019.
- After a training presentation to CC Chairs based on the GD and other feedback, it was presented to SB for approval
- Further comments were received.
- GD was modified and discussed by SB. A response to comments document was developed.
- After discussion with SB leadership, a further review by JCNRM commenters was performed.
- Insufficient time at this point to respond to most recent comments received on May 20, 2021.
- Next steps will be reported to SB on June 15, 2021.

Proposed Next Steps for RP3C Guidance Document

- RP3C sub-group will discuss inputs provided with JCNRM commenters.
- Modified version of GD will be balloted within RP3C and review comments will be addressed.
- Next version will be presented to SB for approval and further direction.
- SB direction will be implemented ASAP.

RP3C Poll

- Purpose: *Help in improving the effectiveness of the efforts undertaken by RP3C*
- Published in December 2020
- Nine (9) responses

RP3C Poll (Cont'd)

Question	Score
Has the RP3C achieved the initiatives as described?	2.5/5.0

- Even though the objectives are not yet complete, the RP3C has made significant progress against a challenging set of goals and should continue.
- To advocate performance-based thinking is to push on one end of a rope, while trying to convince people at the other end of the rope to pull. It's easy to offer theoretical arguments for the benefits; killer examples of "success" would help.
- Improve usability of the GD.
- Improve coordination with JCNRM SCoRA.

RP3C Poll (Cont'd)

Question	Score
Thinking about your personal reason(s) for joining the RP3C, have your goals been met?	2.8/5.0

- Objective was to enhance coordination between ANS and ASME, and this is happening.
- My goal, was to have a large number of standards converted to RIPB. It has not yet been achieved.
- We need to reassess what we're doing, re-evaluate what the framework says and NRC has done, and move forward on that basis.
- Develop a better way of explaining RIPB principles as it pertains to specific standards projects. In its review of a standard, RP3C should issue a brief report on what it recommends, and the basis for the recommendation.

RP3C Poll (Cont'd)

Question	Score
To date, have you gotten any personal value from being a member of the RP3C?	Yes – 8 No – 1

- It's a worthwhile group of people struggling together in a good cause.
- I have learned a great deal since joining and plan to continue to learn as I move forward with this committee.
- The RP3C monthly forums have been very informative as well as the opportunity to give a presentation on ASME Plant Systems standard to ANS members.
- I am finally learning something about the details of RIPB.
- Better understanding of RIPB principles but would like to have a better grasp on them as it pertains to specific standards and standards projects.
- Well, I never kidded myself as to the difficulty of changing a mindset. It's a process. I think we have to develop more support materials and precedents.

RP3C Poll (Cont'd)

Question	Score
As written, does the guidance document meet its stated purpose?	2.5/5.0

- I think the document provides a solid overview of RIPB principles and provides some good examples.
- I think this document could well provide more concrete guidance (in the form of one or more standards) to achieve the end. The more specific criteria we provide, the more we actionalize (make actionable) the process.
- My WG Chairs are still having difficulty using the current draft. Needs to be more of a cookbook to better enable WG Chairs who may know very little about RIPB.
- Being new to RP3C, I am not intimately knowledgeable of the purpose of this guidance. However, reading it, I do not find that it offers much in the way of practicable guidance on how to implement in a standard.

RP3C Poll (Cont'd)

Question	Score
Should the guidance document "Incorporating Risk-Informed and Performance-Based Approaches/Attributes in ANS Standards" become an ANS document proposed for use by other Standards Developing Organizations (SDOs)?	Yes – 4 No – 5

- The document has clear benefits for ANS and the nuclear industry at large.
- I think continued collaboration with other SDOs is important for the nuclear industry and this document is a good instrument to facilitate discussions.
- I see no reason not to present it as guidance for use by others.
- The current version is a brave attempt, but to make a really good version of it would be a really large amount of work. However, I would suggest improving it before trying to make it an ANS document, and the improvements I'd suggest include modernizing the concepts of RI and PB.
- Not as an ANS document. The purpose, scope, and objectives (PSO) would need to be redefined and target SDOs would have to be on board and collectively agree to PSO as well as decide on how it should be developed and maintained.

RP3C Poll (Cont'd)

Question	Score
What should be the future of the RP3C? Are there new directions, activities, initiatives, etc., that should be pursued?	N/A

- RP3C should work more closely with the External Communications Task Group of the SB to seek harmonization of ANS standards with those of IEEE, ACI, ASME, ISA, and many other SDOs.
- RP3C should be better integrated within the Standards Committee with clear lines of responsibilities and operations. To do this, it needs to develop procedures that are congruent with the existing Standards Committee operating procedures.
- RP3C membership is large with very little clear identification of what each member's responsibilities are. This needs to be fleshed out in a procedure.
- The scope of RP3C needs to be better disseminated, and JCNRM should not be overstepping it.
- Try to make all guidance more concrete and actionable. Remove ambiguity.
- **I think the next step is to revisit where we've been, and then review and redecide where we want to go.**

RP3C Poll (Cont'd)

Results and Recommendations

- Good start.
- RP3C goals and approach and Guidance Document should be reviewed based on lessons learned, feedback, etc.
- RP3C would benefit from better external integration and possibly procedure backed approach.
- Guidance Document should be:
  - More basic in concept and explanation; do not assume RIPB knowledge.
  - More practical; add examples.
  - Not a standard at this time.

RIPB Community of Practice

- RP3C's Community of Practice (CoP) initiative has continued in 2021.
- Presentations covered varied subjects with speakers sharing knowledge and experience on RIPB matters.
  - "ANS-20.2"; "Necessity of Systems Engineering"; "ALARA"; "NRC Review of Advanced Reactor Applications"; "Safety Margin in RIPB Methods"
- Audiences in the range of 30-50 participants have been quite supportive.

ANS Input to 10 CFR Part 53 Advanced Reactor Rulemaking

- ANS leadership assigned Operations & Power Division (OPD) to coordinate input to Part 53 rulemaking.
- OPD assembled a diverse group to participate in ANS input.
- Letter (ADAMS: ML21063A107) issued on March 3, 2021, with eight bullet points.
- ANS presentation to ACRS sub-committee addressed each of the bullet points.
- ANS input was welcomed and well received.

Items of RP3C Interest in ANS Letter to NRC of March 3, 2021

- Endorsement of ANS Standards with RIPB Methods
  - ANS has pursued a systematic approach to applying RIPB concepts whereas NRC has been ad hoc.
  - Unnecessarily prescriptive aspects of Part 53 as proposed could adversely impact ANS siting standards.
- ANS supports integrated decision-making; our standards are incorporating it in specific standards.
  - Implications for ANS-30.1, 30.2, 30.3, and 3.13.
  - ANS supports concept of cost-justified safety enhancements in the rule but took issue with using ALARA as the basis.
- NUREG/BR-0303, “Guidance for Performance-Based Regulation”
  - This guidance offers one successful structure to reach findings for reasonable assurance of adequate protection.
  - Accomplishment of discrete performance objectives can incentivize improved outcomes while offering flexibility for innovation.
  - Interdependence of flexibility and margins needs to be deliberately incorporated into integrated decision-making process..

Cost-Benefit Analysis in RIPB Methods

- Cost-benefit analysis (CBA) has always been integral to NRC regulation. Generally, ANS standards have not included it.
- RIPB methods offer many more tools to enhance CBA in ways that improve efficiency and effectiveness of design, construction, and operation.
- If an ANS standard includes CBA (QA, some NRNFCC standards) generic guidance may be helpful.
- It is up to ANS (RP3C?) to present specific documents for review that implement CBA concepts.
- There is abundant information about good practices in CBA from various fields to develop simplified guidance.
- A systems engineering (SE) framework appears well suited for the kind of holistic perspectives where CBA has relevance.

Example High-Level Issues for CBA

- "How safe is safe enough?"
  - This basic question drove the Commission's consideration of the Safety Goal Policy Statement.
  - Although included in Part 53, does not elicit enough stakeholder input.
- "When is enough, enough?"
  - Licensing Modernization Project (LMP) addressed this question with respect to defense-in-depth.
  - LMP did not include CBA, which may offer opportunities for ANS.
- "How to avoid unnecessary requirements?"
  - Requirements management is part of current SE practices but is unclear regarding avoidance of unnecessary requirements.
  - Effectiveness of programs such as quality assurance could benefit from CAB and RIPB by providing specific parameters and metrics in integrated decision-making.
  - Acceptance criteria for programmatic requirements could be rationalized to be more objective.

Example Outcome Objectives for Advanced Reactor Design

- Design decisions for advanced reactors are based on optimizing performance to support safety, economic, and societal objectives.
  - If regulatory precedents need to be considered, the costs of doing so will be balanced against the compromises needed relative to the main objectives.
- The assessment of effectiveness relative to accomplishing the above objectives will be part of the designer's decision-making framework.
  - Assessment methods are commensurate with the importance of the design decisions relative to the functional objectives.
- Implementation decisions will focus on maximizing the benefits related to the technology in question.
- The level of risk associated with unknown factors would be subject to the designer's articulation of "how safe is safe enough (HSISE)."

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 Research and Advanced Reactor Consensus Committee (only) for comment.
- This comment ballot was requested by the SB.
- The ballot was closed April 17, 2020.
- Approximately 136 comments were derived from the feedback provided.
- This included comments from Ian Jung as the assigned representative of the NRC to the ANS-30.1 WG.
- Responses to all feedback have been prepared.

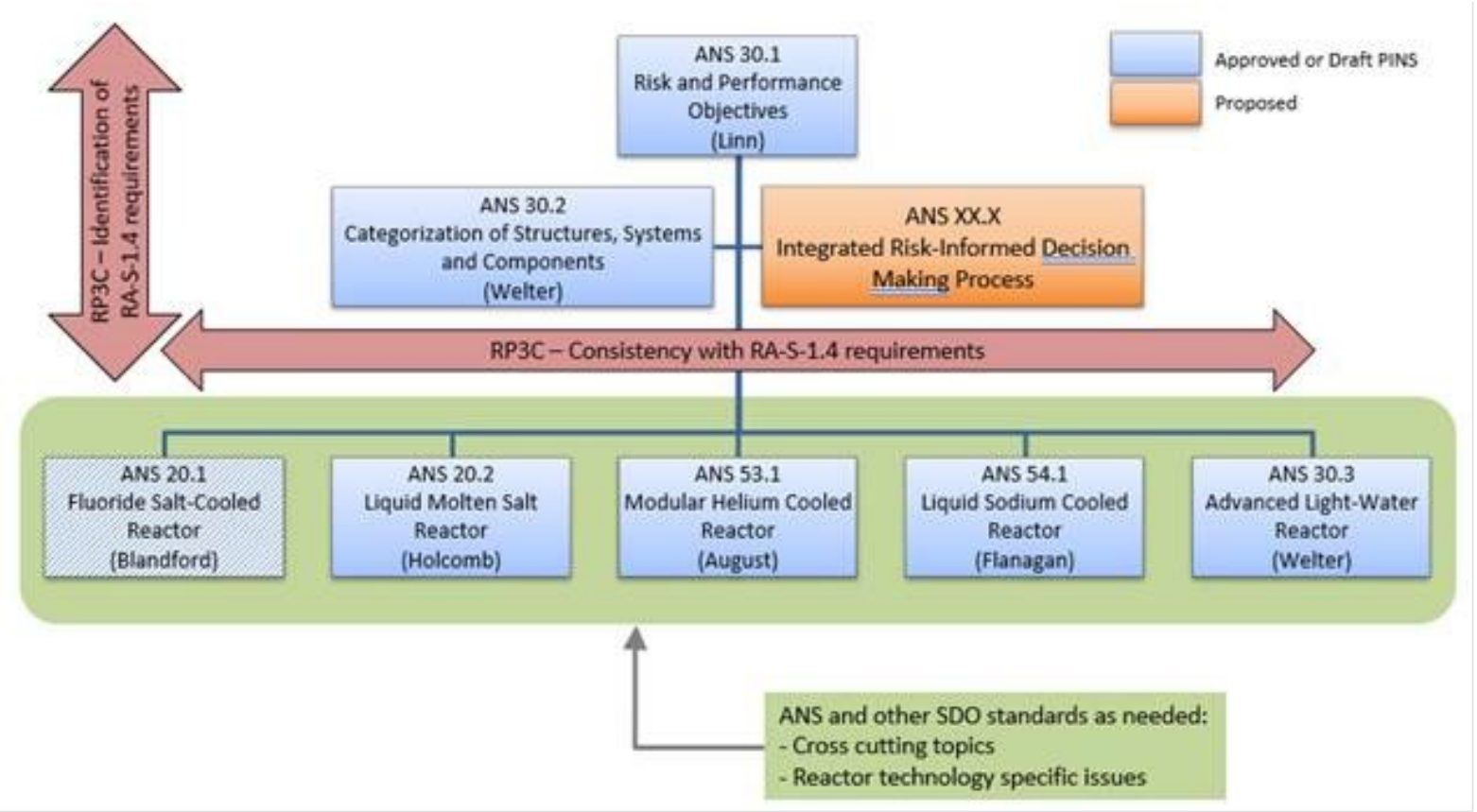
ANS-30.1 Proposed Standard

- The SB discussed the results of the 2020 review, including path forward options during the June 9, 2020, board meeting.
- The SB decision was to resolve the comments to the extent possible and to continue with preparation of the standard.
- The status of the draft standard was revisited and discussed again during the November 17, 2020, SB meeting.
- The SB directed the standard preparation continue.

ANS-30.1 Proposed Standard

- In January 2021, the WG remained concerned at the continued opposition to the standard and issued a request to those preparing lower-tier and technology-specific design standards to assess whether ANS-30.1 fulfills its function under the tiered advanced-reactor design standards framework.
- From the feedback received, it became clear to the WG members that the current ANS-30.1 draft had not been sufficiently explicit in the role of ANS-30.1.

ANS-30.1 Proposed Standard



ANS-30.1 Proposed Standard

- The current draft in preparation has been revised to provide more explicit language that ANS-30.1 is intended to provide requirements for the preparation of lower-tier, technology-specific design requirement standards.
- It is not intended to provide requirements for specific use and application by reactor designers and manufacturers.
- The current draft is to be ready for formal RARCC ballot by June 1, 2021.

ANS-30.1 Proposed Standard

- Because extensive comments had be received from within the WG, a sub-group was formed to respond to all comments and provide a revised draft.
- This was to avoid WG members from having to resolve their own comments.
- The June ballot will serve to bring the entire WG back together to move the standard forward toward approval.

Report on ANS-30.3 and ANS-30.2

- A major revision of the ANS-30.3 draft was submitted for ballot to the LLWRCC on March 24, 2021, addressing 200+ comments.
- As of June 3, 2021, the LLWRCC ballot include 8 affirmative and 3 negative votes.
- Ballot extended to June 6, 2021, to gather required number of votes.
- ANS-30.3 has been challenging and time consuming to address such a large number of comments that often conflict with each other.

Technical Comments Received to Date

- Continued disagreement on the use of should, shall and may.
- Continued disagreement regarding accepted LWR definitions vs new (relatively) RIPB definitions .
- Some reviewer comments seem to lack understanding of (or experience) with modern approaches to advanced LWR design and licensing (e.g., ESBWR, AP1000, NuScale, etc.).

Comments on Associated Standards

- ANS-30.1
  - Good high-level guidance that invokes RIPB and SE concepts
- ANS-30.2
  - Large, diverse, engaged, and active WG with four subgroups.
  - Significant RIPB experience and representation.
  - Purpose, scope, and application drafted.
  - Key terms and definitions being drafted/collected/reviewed.
  - Process flowchart drafted using online model-based systems engineering tool (Innoslate).
  - Working on detailed outline and assignment of sections.
  - Lots of excellent input but need more volunteers willing to WRITE!
- ASME System Design
  - Addresses significant gap in nuclear industry regarding guidance on application of SE best practices.
  - The standard by which all other standards should be developed.

Interactions with Standards Working Groups

ANS-2.21 Working Group (Timeline: WG & RP3C)

- ANS-2.21: Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink
  - **Feb. 7, 2021**: WG ballot closed and approved Draft7b (rev. 28Jan2021).
  - **March 28, 2021**: RP3C ballot for comments on draft ANS-2.21 closed.
  - **March 30, 2021:** WG received preliminary Excel list of RP3C comments and suggested text to consider in Appendix A.3.
  - **April 20, 2021:** WG discussed preliminary RP3C comments.
  - **April 21, 2021:** WG received final Excel list of RP3C comments.
  - **May 11, 2021:** WG prepared responses to RP3C comments.
  - ANS plans to release WG responses to RP3C and SCoRA simultaneously, in case the WG makes additional edits to draft or in responses to comments (e.g., mid June ?).

Interactions with Standards Working Groups

ANS-2.21 Working Group (Prelim Responses)

- In writing the draft, the WG considered how the RIPB concepts could be applied to the scope of meteorological data analyses needed to provide inputs to Ultimate Heat Sink (UHS) performance analyses. However, as stated in section 1, RIPB does not apply to the data itself, but only to the analyses used. So, RIPB applicability is limited in the scope of this document but incorporated where possible.

- Eliminated the use of the word "must" either by rewording the sentence or replacing it with the word: shall, should, or may. Changed to "shall" in Section 7.3 on pg. 18 (1st full paragraph).

Interactions with Standards Working Groups

ANS-2.21 Working Group (Prelim Responses)

- Agree that monitoring is outside the scope of this standard, and potential approaches to UHS analyses were placed in the appendices of the proposed draft as examples, for information only. Changed phrase in Appendix A.3 to "risk-informed" instead of "risk-based."

- Engineering solutions is beyond the scope of this standard. Added the following new text at the end of A.3 instead: "*This example has considered the statistical characterization of the peak temperature in the UHS as a proxy for incorporating risk considerations into meeting heat removal requirements during the postulated LBE. Additional engineering analyses would be needed to evaluate performance of plant systems but are beyond the scope of this standard (see Section 1).*"

Interactions with Standards Working Groups

ANS-2.21 Working Group (SCoRA Excerpts)

Comments, Recommendations
Use of the term risk informed performance based may be misleading. The change that falls under this appears to be moving from condiseration of a worst possible case to multiple cases along various data axes. The probability of occurance ofan event ex. peak return water temps. is not of itself risk informed or performance based. If as noted, the focus of the standard is the selection and use of meteorological and hydrologic data and not UHS performance the RIPB terminology sould be eliminated and conventional statistical terms used.

Comments, Recommendations
General comment. The discussion on risk-informed performance based approaches should be removed throughout the document as nothing in the document is related to the approach. There is a discussion on a Probablistic approach, which is different. With improvements in dynamic PRA modeling that have been made, a more comprehensive approach approach based on the consequences or the plant could be taken, but that would be better left to a seperate effort.

Other Standards

- ANS-2.26, “Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design”
- ANS-20.2, “Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt-Reactor Nuclear Power Plants”
- ANS-60.1, “Civil Nuclear Export Control”
- ANS-57.11, “Integrated Safety Assessments for Nonreactor Nuclear Facilities”

Changing Environment

- Invite input on NRC initiatives of interest
- Invite input on industry initiatives of interest

Action Items

- Michael Muhlheim and Kent Welter to develop a presentation on converting the EPRI TAM process for new reactor builds.
- Prasad Kadambi and Kent Welter to consider “controlled design activity” as a CoP topic.
- Robert Budnitz to confirm Robert Youngblood’s membership of the JCNRM’s Risk Informed Security Guidance Document Working Group.

RP3C Report to SB

- SMART Matrix report
  - Minor modifications proposed by RP3C.
- Next steps on GD and implementation
- CC Chairs report on RIPB
- Expand RIPB methods
  - Any RP3C input on Part 53?
  - Any RP3C input on CBA?
- Interactions with WGs
- Other items

Closing

- **Other business**
- **Next meetings**
  - ANS Winter Meeting, November 30-December 4, 2021, Washington, DC
  - ANS Annual Meeting, June 12-16, 2022, Anaheim, CA

Adjourn and Thank You!

ATTACHMENT 2

Comments Received from Budnitz and Henneke on the Review of the RP3C Guidance Document (GD) 2020

NAME	REPRESENTING	COMMENT	RP3C RESOLUTION
1. Bob Budnitz	JCNRM Co-Chair	Source #1: Prepared presentation for RP3C 11/16/20 mtg  RJ Budnitz slides, RP3C meeting, 16 No Source #2: Emails 11/12 and 10/19 from Budnitz to Eggett/Mazzola discussing issues with GD "Also, Robert J. Budnitz comments (below) for the ANS Standards Board on the draft RP3C document entitled "Incorporating Risk-Informed and Performance-Based Approaches/Attributes in ANS Standards" NOTES: 1) I sent in a negative ballot on this RP3C document as written. My reasons follow. 2) These comments are mine (Robert J. Budnitz), and do not represent the position of the full JCNRM (of which I am the ANS co-chair). 3) The JCNRM has a standing subcommittee, the Subcommittee on Risk Applications (SCoRA), that normally would be in-the-loop to provide comments for the JCNRM on this document, if there were enough time. SCoRA was given an opportunity to review earlier drafts and provided comments on those. This document has changed and is different enough that those earlier SCoRA comments are no longer applicable.	Does not require a response. Noted. Does not require a response. SCoRA was sent a copy of the latest RP3C RIPB Guidance Document (GD) prior to the RP3C meeting on 11-16-2020. SCORA has been a longstanding member of RP3C and receives all the distribution to regular members.

		"COMMENTARY Three major shortcomings of the draft RP3C document are (a) that the "guidance" document has almost no guidance on how an analyst should go about "analyzing" or "measuring" the performance being sought by the standard, or the "risk" that is at issue in the standard under development; (b) that it does not explicitly call out probabilistic risk assessment (PRA) or PRA methods when discussing how an analyst performs a "risk-informed" analysis to support RIPB decision-making; and (c) that it never mentions the JCNRM. In sum, it lacks any genuine "guidance" to help the standards-writing team on those subjects. "That is, if a standard is to be "risk informed," one needs four attributes -- or a comparable and parallel set of attributes for a "performance-based" standard: 1. The author of the new standard needs to identify the risk end point at issue. 2. Then, the author of the standard needs to identify the metric used for measuring that risk end point. 3. Then, the author of the standard needs to determine a threshold or criterion separating an "acceptable" from an "unacceptable" outcome, using the metric identified in (2). 4. Finally, the author of the standard needs to identify how	Response to (a): This "shortcoming" is addressed in detail within references provided in the GD. To summarize, the Working Group (WG) is asked to analyze performance by first directing the user of the standard to a well-defined performance objective. Referral to contact JCNRM is now generally encouraged for standards considering PRA content or insight application. Additionally, the LMP document is provided as a further reference offering guidance details, including addressing RIPB information (see GD Section 6.1.2). Response to (b):The WG is directed by the GD to look for risk insights when developing the PINS. Such insights may be derived from formal PRAs or from other risk evaluation methods. Response to (c): This has been corrected in the most recent version. Clarifications and examples of portions of these items are in the body, Appendix C and D (1) A typical ANS standards addresses a risk end point in success space within a performance objective. More detail has been provided in the GD FAQ section. (2) A well-defined performance objective needs identification

		to measure (or analyze) the performance or risk to determine if it is above or below the threshold.	of appropriate performance parameters. See FAQs. (3) Acceptance criteria are associated with margin management. The WG is directed to contextualization of performance objectives. (4) Optimal measurement of performance occurs with a structured set of performance objectives. This is what the GD calls an ultimate outcome. See FAQs.
		"So far so good, except that nothing like the above formulation is present in this "guidance" document, leaving the standards-development team without "guidance" on how to proceed. To continue, where the document is seriously deficient is that for many of the performance outcomes or risks involved in a performance-based or risk-informed situation, *the way one "analyzes" performance is using PRA methods* – either a full facility PRA (for reactor core-damage frequency) or perhaps only a probabilistic-based method (such as to estimate the reliability of an equipment item or the likelihood that a procedure is done incorrectly.) However, this document <u>provides no guidance</u> on that set of issues. It hardly even mentions that there is an analysis methodology called PRA, a methodology that is mature, and that <u>can</u> and <u>should</u> be used where its use is the *appropriate way to analyze* the "*risk*" (for "risk-informed" applications) or the "*performance*" (for "performance-based" applications).	<u>Serious deficiencies:</u> How to use PRA methods is outside the scope of the GD which directs that the WG should seek guidance from JCNRM for developing PRA and risk insights. This has been clarified in GD Section 6.2 and elsewhere. Additional references provide guidance on how to develop and apply RI products. Risk insights are the basic means to prioritize performance objectives. Although JCNRM input to the GD at an earlier point may not have mentioned this, RP3C input to WGs will emphasize this concept.
		"The ANS has a consensus committee, the JCNRM, with the charter to develop standards for such PRAs or PRA methods. These standards, if used, provide high assurance of an acceptable analysis outcome. *However, as previously noted, the subject RP3C draft guidance document never even mentions the existence of the JCNRM or its PRA standards.* It is	This has been remedied wrt JCNRM. Reference to the various standards and products from JCNRM are unnecessary in this guidance.

		as if the JCNRM and its PRA standards do not exist.“ Source #3: Budnitz email 10/19 (9-2020 draft issued to SB for review)  Robert J. Budnitz comments on the drat	Addressed in GD FAQs.
2. Dennis Heineke	GE consultant, JCNRM Co-Vice Chair	Source #1: HENNEKE EMAIL TO BUDNITZ WITH RP3C GUIDANCE DOCUMENT COMMENTS -------- Forwarded Message -------- Subject: RE: Review and critique of RP3C draft Guidance Document" Date: Mon, 5 Oct 2020 22:34:25 +0000 From: Henneke, Dennis (GE Power Portfolio) <dennis.henneke@ge.com> To: Robert J. Budnitz <budnitz@pacbell.net>, Grantom, Rick <crgrantom@hotmail.com>, Pamela Nelson <pnelson_007@yahoo.com>, Kindred, Gerry Wane <gwkindred@tva.gov>, Stanley Levinson <stanley.levinson56@gmail.com> Bob: I submitted the following on the document through ANS Collaborate. I never finished my review, but I think I made my point. One last comment, I did not submit…. ARGHHHHH. 1. The document never mentions the JCNRM or the supporting standards. You cannot meet the RGs listed without meeting the PRA standards, and the JCNRM develops and maintains all of the nuclear PRA standards for ANS and ASME. This document should never be developed without significant discussion on the JCNRM PRA standards, and interface with the JCNRM.	Does not need response. JCNRM has been mentioned as requested in multiple places.

		2. The process detailed in the document appears to be to a) Send the standard to RP3C for their review, and b) respond to comments through a documented process. The process that is envisioned in the front matter (to provide information to the WGs so that they can incorporated RIPB approaches in their own standards) is not described or supported by the document. The overall document needs to be re-worked to allow WGs to perform their own assessments, and then call on the PRA experts from JCNRM or RP3C, when needed. See more detailed comments below in comments 10 and 11.	The process details have been reviewed and enhanced where needed. The text in the GD is premised on experience over the past few years which indicates that WGs will benefit from early interaction with RP3C. See Sec 4.1. The intention is to foster consultation and discussion with the RP3C being the starting point. If risk-informed information is envisioned, the guidance will likely result in the WG being directed to JCNRM, if not already consulted.
		3. Need to add History of RISC and the JCNRM to the background in section 2.	Disagree with this suggestion.
		4. Appendix A, mentioned in Section 3, should also list the roles and responsibilities of JCNRM and SCORA.	Multiple statements, including Appendix A.5, now direct WG Chairs to JCNRM. SCoRA is a sub-committee of JCNRM. It is up to JCNRM where to direct the request.
		5. 4.1.1 mentions the WG chair should recruit a professional with RIPB approaches. However, what they need is someone with PRA experience. The training mentioned should be on the guidance document and PRA.	Not all ANS standards employ PRAs. JCNRM should be the source of any PRA guidance and training needed by the WGs. Other RIPB practices, training or discussions of RIPB applications may involve other than PRA professionals depending on the needs of the WG.
		6. It is unclear why the document continues to refer to the RP3C chair, such as in 4.1.2. The interface should be with RP3C and SCORA – not with the Chair alone. In most cases in the document, RP3C Chair can be replaced with RP3C and JCNRM SCORA.	The revised draft has been reviewed for the appropriate use of “RP3C Chair”. As mentioned previously, SCoRA is a sub-committee of JCNRM. Both RP3C and JCNRM report directly to the SB. Hence, it is

			more appropriate for SCoRA to be accessed through JCNRM so that any referral to JCNRM is appropriately handled there.
		7. Last Paragraph in 4.1.2 – please remove the word "inappropriate". The standard may not need RIPB but use of RIPB approaches would never be inappropriate.	While we agree with the thrust of this comment, some WGs have felt that RIPB methods would not be appropriate for them. Examples in the body provide insight into where RIPB may not be appropriate.
		8. RIBP is used in 4 locations. Should be RIPB.	The typos have been corrected.
		9. 4.2.2; the review mentioned for RP3C review of a standard duplicates the current review performed by the JCNRM SCORA. Currently SCORA reviews standards from all organizations including ANS and ASME; and provides feedback as requested. The RP3C review will duplicate this effort. Recommend this review be kept with SCORA, which contains about 20 PRA experts who can better review is significant number of standards.	We have worked with ScoRA for a number of years and do not find duplication in the work that has been accomplished. No change in guidance is required.
		10. Section 4.2.2 is a problem. In general, the process is described in previous sections as providing guidance on the incorporation of RIPB processing in a specific ANS standard. In the end, Section 4.2.2 basically says to provide the standard to RP3C and have them determine what should be done. This is clearly not helpful, and if this is what we are doing; then we do not really need the whole document – just require all standards to get JCNRM or RP3C review – and we can figure the need since that is what we do for a living (e.g., PRA and RIPB applications). There needs to be a process where the individual standard SC can make the call based on specific principals, and	Section 4.1 addresses initial RIPB inclusion. We feel that the text in Section 4.2.2 is being misinterpreted in this comment. This section of the GD merely keeps the WG in full control of the production schedule and extent to which it intends to incorporate RIPB concepts. No change in the guidance is required.

		then contact the JCNRM if they are not sure how to proceed.	
		11. The approach discussed above is repeated in Appendix A as indicated in the WG chair responsibilities (provide feedback to RP3C, etc.) and the RP3C responsibilities (support reviews of the standards). This is the wrong way to update standards. The review and determination should be performed by the WG members, with support from JCNRM or RP3C.	Again, we feel that the text is being misinterpreted. The WG should have complete responsibility, authority, and accountability for the ANS standard that results from the process described in the GD. No change in guidance is required.
		12. Chapter 5 is really not useful. A standard does not have an "outcome" as specified in the chapter, but a purpose and scope. The review of the standard for incorporation of RIPB approaches does not change the purpose.	We disagree with this comment. No change in guidance is required.
		13. Table 1, as referred to in Section 6.0 and 6.1 is clearly not useful. These "RIPB Attributes" are not useful in developing a RIPB standard. For example, "P1: The outcome of the standard is clearly defined" can occur in either a performance based or nonperformance based standard. It is not true that something clearly defined is always performance based. Similarly, R1 defining risk insights, does not make the standard risk- informed. Risk-informed is much more complicated than that, which includes using risk insights in combination with deterministic requirements to provide a more effective outcome (this is a simplistic statement). The attributes do not mention balancing determinate and probabilistic outcomes.	We disagree with this comment. No change in the guidance is required. True, however this is only one of two criteria for PB. True. The examples and references to external guidance document and standards is integral to this guidance. The guidance also discusses risk-informed decision making and refers to both NRC RGs and NEI 18-04 for additional information. The open question is whether ANS and/or JCNRM should take on the challenge of developing a specific industry standard for integrated decision making.

		14. Appendix B needs to be totally re-written. This is not a background on RIPB approaches, but an abbreviated history. In truth, Appendix B could be removed without affecting the document. If retained, then the purpose of Appendix B needs to be established, and an accurate document needs to be developed. Currently, for example, the maintenance rule example is not really helpful to a standard developer.	We disagree with this comment. Appendix B is important because it establishes the validity of what has come to be known as RIPB concepts and methods. It also provides additional examples and expectations for RIPB from the inception of regulatory consideration of RIPB inclusion in design, safety and regulatory actions. No change in guidance is required at this time. RP3C is open to further inputs for specific changes from JCNRM or SCORA at any point.
		15. Appendix D needs to be re-worked. The questions and answers are not useful.	We disagree with is comment. Specific comments welcome. No general change in guidance is required.
		16. Appendix D, question 6, is inaccurate. This needs to be reviewed by PRA experts such as by JCNRM. For example, Risk-based is not defined by the use of risk-metrics. We use risk metrics all the time and are not risk-based. Overall, the resulting answer is confusing and not useful.	Question 6 has been modified. We would appreciate input from JCNRM regarding how to fix any remaining deficiencies in the response to the question.
		17. Overall, I stopped reviewing the document due to the long overall time to review this document. It is generally a mess, inaccurate, and has the wrong aim, as shown in the comments above.	Review of the modified version would be welcome.

ATTACHMENT 3

American Nuclear Society
555 N. Kensington Ave.
La Grange Park, IL 60526

708-352-6611
askanything@ans.org
ans.org

March 3, 2021

Mr. John Tappert
Director, Division of Rulemaking, Environmental, and Financial Support
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: American Nuclear Society (ANS) Comments on the Nuclear Regulatory Commission (NRC) Rulemaking for a Risk-Informed, Performance-Based, and Technology-Inclusive Regulatory Framework for Advanced Reactors (10 CFR Part 53)

Dear Mr. Tappert,

In response to the November 6, 2020, *Federal Register* Notice on a Risk-Informed, Technology-Inclusive Framework for Advanced Reactors, I write on behalf of the 10,000 members of ANS and over 100,000 workers in the nuclear industry to provide comments on the proposed framework. The attributes of these advanced reactors extend beyond clean, zero-carbon-emission electricity production, as discussed in ANS Position Statement 35, "Advanced Reactors."[1] ANS recognizes the importance of this 10 CFR Part 53 rulemaking initiative, and we believe it is a step in the right direction to ensure successful and timely deployment of advanced reactor technologies. The timely completion of the rulemaking will support deployment of needed advanced reactor technologies as soon as feasible.

The following comments are provided for your consideration.

- ANS supports incorporating into the Part 53 rulemaking decades of experience with risk-informed and performance-based (RIPB) regulation and philosophy. ANS expects that this will facilitate achieving the NRC's stated objective of meeting the Nuclear Energy Innovation and Modernization Act (NEIMA) requirement by developing an optional technology inclusive Part 53 Rule. ANS has gathered significant experience modernizing our safety standards by incorporating the concepts resulting from the NRC's initiatives, which culminated in the White Paper on Risk-Informed and Performance-Based Regulation in March 1999 (SRM-SECY-98-0144). The key attribute of Part 53 should be to use RIPB platforms to provide flexibility to determine

[1] ANS Position Statement 35, "Advanced Reactors," June 2018; https://cdn.ans.org/policy/statements/docs/ps35.pdf.

American Nuclear Society
555 N. Kensington Ave.
La Grange Park, IL 60526
708-352-6611
askanything@ans.org
ans.org

how to meet established performance criteria in ways that will enable and incentivize improved outcomes. ANS encourages the Staff, to the extent possible and consistent with Commission's direction in the RIPB White Paper, to introduce RIPB principles in all Subparts. For example, the Staff should explore the possibility of enabling a RIPB approach for consideration of distance from the population centers in Subpart D (which was recently provided) instead of retaining the current prescriptive language.

- Part 53 regulatory language should be formulated such that the determination of reasonable assurance of adequate protection is based on an integrated, transparent, and coherent decision-making method that only requires performance objectives of regulation to be achieved with appropriate level of defense-in-depth. This will enable innovation and flexibility in the features used by developers to meet the regulation. This will result in consistent treatment of different designs, deployment of safety features based on the needs of a specific technology/design, clarity of the regulatory expectations, operational flexibility, and avoidance of unnecessary burden. For example, designs that deploy highly reliable inherent and passive features with significant margin to meet performance objectives of regulation should not be required to add design features (e.g., redundancy or diversity) or regulatory elements (e.g., a 10-mile emergency planning zone). The current language in Subpart B provides a good foundation for achieving this objective.

- Anticipated attributes of advanced reactors are their improved safety and economics, along with more flexible operations. The flexible operations should be able to take advantage of design margins appropriately and not be burdened with additional requirements as long as defense-in-depth and safe operation are demonstrated.

- Lessons learned from 10 CFR Parts 50 and 52 should be utilized in the Part 53 rulemaking to ensure that the opportunity to meet the Commission's expectation and industry desire to transition to RIPB regulation is not missed. Specifically, many lessons learned from implementation of Part 52 in an overly prescriptive way should guide what to avoid relative to Part 53 rulemaking. Also, the Reactor Oversight Process has improved regulation of the operating fleet, and those benefits should be preserved in the new regulation.

- Regulatory Guide 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," offers a good foundation for use of a RIPB

American Nuclear Society
555 N. Kensington Ave.
La Grange Park, IL 60526
708-352-6611
askanything@ans.org
ans.org

approach to formulating the safety case for an advanced reactor over its life cycle.

- The existing guidance on the performance-based approach is NUREG/BR-0303, "Guidance for Performance-Based Regulation," which incorporates a decision-making construct of performance objectives (called objectives hierarchy) that is substantially technology-inclusive and risk-informed. However, enabling such a construct to be used for the variety of technologies and designs under consideration requires additional guidance that supports licensing decision-making, which predictably and reliably leads to findings of reasonable assurance of adequate protection of public health and safety and the environment. For example, the safety cornerstones of limiting initiating events and assuring reliability of mitigating systems would look quite different in detail when applied to molten-salt or gas-cooled reactors but could employ standardized performance objectives at higher levels in the hierarchy for safety, radiation protection, and security. Many of these are likely to be unchanged over the life cycle of a plant. NUREG/BR-0303 also offers good foundations for use of a RIPB approach to formulating the safety case for an advanced reactor over its life cycle.

- ANS supports the structure and expected processes that would be part of the proposed Subparts B, C, and F of Part 53 rulemaking because, as presented so far, the provisions would support accomplishment of many of the most significant objectives articulated in ANS Position Statement 46, "Risk-Informed and Performance-Based Regulations for Nuclear Power Plants."[2] This position statement was prepared with risk-informed and performance-based concepts and methods in mind.

- ANS supports the "as low as reasonably achievable" (ALARA) principle as a fundamental tenet of radiation protection. As noted in ANS Position Statement 41, "Health Effects of Low-Level Radiation"[3]:

> ALARA is intended to be an optimization process in which the costs associated with any potential dose reduction are balanced against the benefits in a risk-informed decision-making process considering all appropriate factors. Unfortunately, current implementation of ALARA often results in a practice of dose minimization rather than a risk-informed optimization, which can lead to more harm than benefit.

[2] ANS Position Statement 46, "Risk-Informed and Performance-Based Regulations for Nuclear Power Plants," February 2017; https://cdn.ans.org/policy/statements/docs/ps46.pdf.
[3] ANS Position Statement 41, "Health Effects of Low-Level Radiation," November 2020; https://cdn.ans.org/policy/statements/docs/ps41.pdf.

American Nuclear Society
555 N. Kensington Ave.
La Grange Park, IL 60526

708-352-6611
askanything@ans.org
ans.org

With respect to radiation protection, ANS believes adequate protection should be based on technology-independent limits derived from consensus national and international standards, not ALARA.

ANS would like to better understand the basis for the proposed quantitative ALARA guidelines [e.g., 53.810(a)]. Also, ANS would like to understand if all of the already existing radiation protection requirements in 10 CFR Part 20 (including those pertaining to ALARA) would apply to reactors licensed under 10 CFR Part 53.

ANS appreciates the opportunity to provide comments during this early stage of the Part 53 licensing initiative, and we look forward to working with the NRC on the rulemaking as it continues. If you have any questions about these comments or desire additional information, please contact John Starkey jstarkey@ans.org.

Sincerely,

Craig H. Piercy
Executive Director/CEO
American Nuclear Society

Dr. Mary Lou Dunzik-Gougar
President
American Nuclear Society

cc: John Starkey

ATTACHMENT 4

Schedule of ANS Standards in Development using RIPB Properties (June 2021)

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 RP3C Rep: P. Kadambi / JCNRM Rep:	Sept 2021	Oct - Jan 2022	Feb - Jul 2022	Aug - Nov 2022	Dec 2022	Dec 2022	Apr 2023
ANS-2.21 (M. Kinley)/*ESCC (C. Mazzola) Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink RP3C Rep: P. Kadambi / JCNRM Rep:	Jan 2021	Feb - Aug 2021	Sept - Feb 2022	Mar - Jun 2022	Jul2022	Jul 2022	Nov 2022
	The draft was issued to the subcommittee, RP3C, and SCoRA 2/2021. On schedule.						
ANS-2.26 (D.Clark & H. Phan) /*ESCC (C. Mazzola) Categorization of Nuclear Facility SSCs for Seismic Design RP3C Rep: N. Chokshi / JCNRM Rep:	Feb 2023	Mar - Jun 2023	Jul - Dec 2023	Jan - Apr 2024	May 2024	May 2024	Sep 2024
ANS-2.32 (C. Johnson)*/ESCC (C. Mazzola) Remediation of Radioactive Contamination in the Subsurface at Nuclear Power Plants RP3C Rep: P. Kadambi / JCNRM Rep:	TBD						
	PINS submitted 1/2021 under new WGC. Schedule TBD.						
ANS-2.34 (S. McDuffie)/*ESCC (C. Mazzola) Characterization and Probabilistic Analysis of Volcanic Hazards RP3C Rep: P. Kadambi / JCNRM Rep:	Jul 2021	Aug - Nov 2021	Dec - May 2022	Jun - Sep 2022	Oct 2022	Oct2022	Feb 2023
ANS-3.5.1 (K. Singh)/*LLWRCC (M. French) NPP Simulators for Use in Simulation-Assisted Engineering and Non-Operator Training RP3C Rep: P. Kadambi / JCNRM Rep:	Dec 2022	Jan - Apr 2023	May - Oct 2023	Nov - Feb 2024	Mar 2024	Mar 2024	Jul 2024
ANS-3.11 (T. Bellinger/D. Bruggeman)/*ESCC (C. Mazzola) Determining Meteorological Information at Nuclear Facilities RP3C Rep: N. Chokshi / JCNRM Rep:	TBD						
	PINS submitted 12/2020. Schedule TBD.						
ANS-3.13 (J. August) / *LLWRCC (M. French) Nuclear Facility Reliability Assurance Program (RAP) Development RP3C Rep: P. Kadambi / JCNRM Rep:	TBD						
	Committee being reconstituted. Schedule TBD.						
ANS-3.14 (T. Anselmi/C. McMullin)/*NRNFCC (C. Martin) Process for Aging Management and Life Extension of NRNF RP3C Rep: J. O'Brien / JCNRM Rep:				Jun - Sep 2021	Oct 2021	Oct 2021	Feb 2022
	Draft issued to SCoRA & RP3C 7/19/19 in parallel to NRNFCC ballot. Comment responses were provided. The draft has been issued for a recirculation ballot to approve a few substantive changes. Ballot closes 6/10/21. PR closes 7/12/21.						
ANS-3.15 (M. Muhlheim/*LLWRCC (M. French)	Feb 2023/Part 1	Mar - Jun 2023	Jul -Dec 2023	Jan - Apr 2024	May 2024	May 2024	Sep 2024
Risk-Informing Critical Digital Assets (CDAs) for Nuclear Power Plant Systems	Feb 2024/Part 2	Mar - Jun 2024	Jul - Dec 2024	Jan - Apr 2025	May 2025	May 2025	Sep 2025
RP3C Rep: R. Youngblood / JCNRM Rep: R. Budnitz & G. Hudson							
ANS-15.22 (B. Meffert)/*RARCC (G. Flanagan) Classification of Structures, Systems and Components for Research Reactors RP3C Rep: P. Kadambi / JCNRM Rep:	Mar 2022	Apr - Jul 2022	Aug - Jan 2023	Feb - May 2023	Apr 2023	Apr 2023	Aug 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 RP3C Rep: P. Kadambi / JCNRM Rep:	Jul 2021	Aug - Nov 2021	Dec - May 2022	Jun - Sep 2022	Oct 2022	Oct 2022	Feb 2023

Schedule of ANS Standards in Development using RIPB Properties (June 2021)

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-30.1 (M. Linn) / *RARCC (G. Flanagan)	Jun 2021	Jul - Oct 2021	Nov - Apr 2022	May - Aug 2022	Sep 2022	Sep 2022	Jan 2023
Risk-Informed & Performance-Based NPP Design Process			RARCC preliminary review ballot closed 4/17/20.				
RP3C Rep: P. Kadambi / JCNRM Rep: D. Johnson/K. Fleming/A. Maioli			Draft not sent to RP3C or SCoRA at request of RARCC Chair.				
ANS-30.2 (K. Welter) / *RARCC (G. Flanagan)	Apr 2022	May - Aug 2022	Sept - Feb 2023	Mar - Jun 2023	Jul 2023	Jul 2023	Nov 2023
Categorization Classification of SSCs for New Nuclear Power Plants							
RP3C Rep: P. Kadambi / JCNRM Rep: R. Grantom							
ANS-30.3 (K. Welter)/*LLWRCC (M. French)			Apr - Sept 2021	Oct - Jan 2022	Feb 2022	Feb 2022	Jun 2022
Advanced LWR RIPB Design Criteria and Methods		Draft issued to SCoRA, RP3C, RARCC 8/15/19. RP3C, SCoRA, RARCC comment respones issued January 2021.					
RP3C Rep: P. Kadambi / JCNRM Rep:		Draft issued to LLWRCC with a close date of 5/23/21, but a two-week extension was issued through 6/6/21.					
ANS-56.2 (E. Johnson)/*LLWRCC (M. French)	Nov 2021	Dec - Mar 2022	Apr - Sept 2022	Oct - Jan 2023	Feb 2023	Feb 2023	Jun 2023
Containment Isolation Provisions for Fluid Systems After a LOCA							
RP3C Rep: P. Kadambi / JCNRM Rep:							
ANS-57.2 (R. Browder) / *FWDCC (J. Lucchini)	TBD						
Design Requirements for LWR Spent Fuel Storage Facilities at NPPs			Group needs new WGC to be reactivited.				
RP3C Rep: P. Kadambi / JCNRM Rep:							
ANS-57.9 (M. Sanders)/*FWDCC (J. Lucchini)	Nov 2023	Dec - Mar 2024	Apr - Sep 2024	Oct - Jan 2025	Feb 2025	Feb 2025	Jun 2025
Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type)							
RP3C Rep: P. Kadambi / JCNRM Rep:							
ANS-57.11 (M. Kotzalas) / *NRNFCC (C. Martin)				Jan - Apr 2022	May 2022	May 2022	Sep 2022
ISAs for Nonreactor Nuclear Facilities		Closed 6/2/19 with significant comments; resolutions require additional time. WG has goal to complete resolutions & a revised draft by October 2021. Resolutions & draft will then be issued to commenters. Negative voters will have an opportunity to upgrade their vote.					
RP3C Rep: P. Kadambi / JCNRM Rep:		Draft provided to RP3C, SCoRA, and NCSCC on 4/3/19.					

*= 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