American Nuclear Society

MINUTES

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

June 17, 2024
Mandalay Bay Resort, Las Vegas, Nevada

Attended	Voting Member Name	Role	Company
	Amir Afzali	Member	Aalo Atomics
x	Todd Anselmi	Member	Idaho National Laboratory
x*	Robert Budnitz	Member	Consultant
x*	Robert Burg	Member	EPM, Inc.
	Stefani Buster	Member	Duke University
x	Brandon Chisholm	Member	Southern Company
	Mihai Diaconeasa	Member	North Carolina State University
x	Donald Eggett	Member	Individual
x*	Rani Franovich	Member	Nuclear Rose Consulting
x	Dennis Henneke	Member	GE Hitachi
x	Mark Joseph	Member	Navarro Research & Engineering, Inc.
x*	Ian Jung	Member	U.S. Nuclear Regulatory Commission
x	**N. Prasad Kadambi**	**Chair**	**Individual**
	Gerry Kindred	Member	Tennessee Valley Authority
	Margaret Kotzalas	Member	U.S. Department of Energy
x	Steven Krahn	Member	Vanderbilt University
x	Svetlana Lawrence	Member	Idaho National Laboratory
	Michael Muhlheim	Member	Oak Ridge National Laboratory
x	James O'Brien	Member	U.S. Department of Energy
x*	Andrew Smetana	Member	Individual
x*	Kent Byron Welter	Member	NuScale Power
x	**Robert Youngblood**	**Vice Chair**	**Idaho National Laboratory**
16	16/22 Votes = 72.73% Participation		
x*	Jim August	Observer	Individual
x*	Norbert Carte	Guest	U.S. Nuclear Regulatory Commission
x*	David Holcomb	Observer	Idaho National Laboratory
x*	Greg Hudson	Observer	Metcalfe PLLC
x	Nikolas Krainchich	Guest	TerraPower
x*	Mark Linn	Observer	Individual
x	Jef Lucchini	Observer	Los Alamos National Laboratory
x	Don Moneghan	Observer	Electric Power Research Institute
x	Alex Renner	Observer	Oklo, Inc.
x	Andrew Sowder	Observer	Electric Power Research Institute
x	John Stamatakos	Observer	Southwest Research Institute

**participated remotely*

1. Welcome, Roll Call & Introductions

RP3C Chair Prasad Kadambi initiated the meeting. He welcomed Steven Krahn as the incoming RP3C Chair. Standards Board Chair Andrew Sowder presented Kadambi a certificate of appreciation in recognition of his leadership in and dedication to the incorporation of risk-informed, performance-based principles in American Nuclear Society standards and for his founding role in and leadership of the RP3C since 2013. Brandon Chisholm was welcomed as in-coming RP3C Vice Chair.

THEME: CLARIFYING THE ROLES OF RI AND PB TO PRODUCE OPTIMUM RIPB RESULTS

2. Approval of Meeting Agenda—Kadambi

The agenda was approved as presented.

The meeting presentation embedded here covers each topic on the agenda and was used throughout the meeting for all presenters.

2-Compilation_RP3C Meeting_06-17-20

CATEGORY I: ADDRESS STANDARDS BOARD'S OBJECTIVES

3. Institution of RP3C Charter in place of Bylaws—Youngblood

The Bylaws called for a lot of process that was not being used and not deemed beneficial which is why the Bylaws were replaced with a charter and a revision of Policy A2, "Policy on ANS Standards Committees' Membership and Responsibilities." The RP3C will follow the new procedures. Official balloting will be conducted at the request of the Standards Board. The RP3C will continue to review (not formally ballot) draft standards that use RIPB methods. Comments submitted on draft standards are sent to the working group to prepare responses. Responses are provided to the commenters via email and posted to the ballot in Collaborate. Anyone on the RP3C roster can go back through ballots to review comment responses. See slides 3 – 10 for more details.

4. RP3C Activities Under SMART Matrix

NOTE: The matrix filtered for RP3C actions is embedded here.

4_SMART_MATRIX_Update_2-20-23.xlsx

A. SMART Matrix components to be included:
   (1) Item 1A: Executive Advisory Committee – on hold
   (2) Item 1C: CCs to identify standards that WGs should coordinate during development
   (3) Item 1F1: RIPB Guidance Document and training package
   (4) Item 1F2: CC and WG Chairs provide feedback during RP3C and SB meetings
   (5) Item 1F3: Focused pilots with RARCC & LLWRCC on specific standards

The SMART Matrix is a companion document to the ANS Standards Committee Strategic Plan. The Strategic Plan sets high-level goals and objectives. The SMART Matrix is used to track specific actions to support the goals and objectives of the Strategic Plan. The Strategic Plan is being revised. The SMART Matrix is expected to be simplified but include similar actions for RP3C. See slides 11-14 for more details.

Prasad Kadambi stated that ANSI/ANS-2.26-2024 (R2021), *Categorization Of Nuclear Facility Structures, Systems, And Components For Seismic Design*, is the first ANS standard to have incorporated RIPB methods. In Kadambi's opinion, ANSI/ANS-2.26-2004 (R2021) has not been used to

its full capability. Robert Budnitz is in favor of more ANS standards using RIPB methods but recognized that RIPB methods are not appropriate for all standards. Don Eggett pointed out that Advanced Reactor Codes and Standards Collaborative (ARCSC), the industry centralized led SDO team for determining new reactor codes and standards for advanced reactor designs, was given a presentation by Kadambi in spring 2024 on the potential usefulness of the RP3C RIPB Guidance Document and its approaches. It currently is being given consideration to be used in an industry pilot project to create a RIPB generic standard for the industry to use.

5. Update on Training Activities related to the RP3C Guidance Document

A. Issues Encountered with Use of RP3C Guidance Document
James O'Brien presented slides 15-16 of the meeting presentation. The Guidance Document received a lot of comments. O'Brien recognized that not everyone is on the same page with RIPB methods. There are some standards that make sense to be RIPB and some that do not. There has been no feedback on the use of the Guidance Document.

Dennis Henneke doesn't think there's a problem with the Guidance Document. The experts understand, but non experts do not. The Guidance Document needs to be implemented more effectively; working groups need to be shown how to implement it. Some people have a better understanding of "risk informed" but not "performance based." Brandon Chisholm was asked to frame a universal understanding of "performance based."

ACTION ITEM 06/2024-01: Brandon Chisholm to refine/expand definitions and/or examples in the Guidance Document to provide better clarity on the definition of "performance based." DUE DATE: November 1, 2024

B. Update on Training Activity
A few training sessions were held, and the training sessions were updated with feedback. O'Brien thinks that the Guidance Document may need to be simplified; perhaps made into a checklist. He would suggest updating the training modules after the Guidance Document is updated but would want to make sure there is interest in these products before putting too much time into it. Andrew Sowder recognized the challenge for any new concept as it takes time for users to internalize it. He recommends that we continue the effort and focus on our own Standards Committee members. See slides 15 – 19 for more details.

Robert Youngblood presented slides 20 – 23. He stated that the RP3C is charged with promoting appropriate application of RIPB concepts in ANS consensus documents that are under development or being revised. He feels that "appropriate application" is not being completely achieved. Sowder explained that a process has been implemented that requires the subcommittee chair to review Project Initiation Notification Systems (PINS) Forms and draft standards for consistency before a draft is sent to the subcommittee. This review includes a check to make sure a draft uses RIPB methods consist with its PINS. Andrew Smetana thinks that it is difficult for the working group to decide on use of RIPB methods at the PINS stage. It would be helpful to incorporate someone from RP3C on key working groups. Dan Moneghan added that a standard needs to prove that there is a benefit for using RIPB methods.

6. Report on Community of Practice Sessions
The RP3C Community of Practice (CoP) initiative has been very successful. There have been more than 40 CoPs. A list of CoPs and links to their recordings are available on the ANS website at https://www.ans.org/standards/rp3c/cop/. See slide 24 for more details.

CATEGORY II: EXPAND RIPB METHODS

7. Performance-Based Design Presentation

Prasad Kadambi introduced Norbert Carte. He is an observer on the RP3C. While he works for the NRC in instrumentation and controls (I&C), his presentation today is not as an NRC staff member but as an individual. Carte presented slides 25 – 36. Slide 27 is his understanding of "performance based." Carte is trying to figure out how to implement performance-based approaches in the design of I&C. Once figured out, he will look to publish his findings. Carte suggested for those interested in more details to look at the following documents:

- BTP 7-19 (Rev. 9), "Guidance for Evaluation of Diversity and Defense-in-Depth in Digital Computer-Based Instrumentation and Control Systems"
- SECY-22-0076, "Expansion of Current Policy on Potential Common-Cause Failures in Digital Instrumentation and Control Systems"
- BTP 7-14 (Rev. 6), "Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems"

8. Focus on RIPB Methods in RP3C Guidance Document

Prasad Kadambi presented slides 38 – 47 on behalf of Brandon Chisholm. The presentation provided a review of sections in the Guidance Document. A key part of the Guidance Document is Table 1. The idea of using RIPB methods is to minimize the requirements.

9. Beneficial Role for ANS-2.26 in Seismic Site Selection

Alex Renner presented slides 49 – 51 with Oklo's RIPB approach to siting characterization. Prasad Kadambi feels that RP3C is able to help Oklo by looking at each of the seismic design categories and what makes sense for their process. Kadambi will bring a request to the Standards Board from Oklo to modify ANSI/ANS-2.26-2024 (R2021), *Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design*, to the Standards Board. The changes are provided below:

- Reinstate the ability for code users to characterize and design their structures, systems, and components based on the International Building Code; ASCE-7, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*; and the U.S. Geological Survey, via ANS-2.26 (or ASCE 43, *Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities*).
- Current ANS-2.26 excludes power reactors, and this statement should be updated, because ASCE 43, whether -05 or -19 points to ANS-2.26 for Seismic Design Categorization selection for power reactors.
- Further, existing U.S. Department of Energy precedent that exercises ANS-2.26 is antiquated and cannot be effectively used by the advanced reactor fleet – there is a need for a new precedent to demonstrate how these standards can be effectively utilized.

CATEGORY III INTERACTIONS WITH STANDARDS WORKING GROUPS

8. Reports from and on ANS Working Groups

A. Status of ANSI/ANS-30.3-2022, *Light-Water Reactor Risk-Informed Performance-Based Design* — K. Welter/ M. French
Kent Welter presented slides 52 – 55 which included an update on the status of endorsement of ANSI/ANS-30.2-2002. An NRC public meeting to discuss the endorsement is scheduled on July 15, 2024.

B. RP3C Input on ANS-GS-30.1, *Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs* (new standard)—M. Linn/ G. Hauck
Mark Linn provided background on the development of ANS-GS-30.1. The Standards Board directed the working group to convert the standard to a guidance standard. The Joint Committee on Nuclear Risk Management (JCNRM) sent a letter to the Standards Board with a request to terminate the project; the Standards Board responded that the process needs to be followed. The process is to first send the draft to the subcommittee and to non-developing consensus committees (NDCC) for review. Following this step, the draft needs to be issued to the Research and Advanced Reactor Consensus Committee (RARCC). The draft was revised and issued to the subcommittee and for NDCC review last year. Comment responses and the revised draft were sent back to commenters earlier this year. A few commenters were not satisfied with their resolutions and provided additional comments. The working group has been provided with all materials for a second attempt at resolution. If no resolution is found, the objections will be included with the RARCC ballot so that the committee is aware. See slide 56 for more details on ANS-GS-30.1.

ACTION ITEM 06/2024-02: Pat Schroeder to forward Mark Linn the email with objections and guidance on the next step for ANS-GS-30.1.
DUE DATE: July 1, 2024

C. ANS-19.13, *Initial Fuel Loading and Startup Tests for FOAK Advanced Reactors* (new standard)—S. Bays, A. Weitzberg/ A. Smetana
Robert Youngblood worked with the ANS-19.13 Working Group to come to an understanding on the standard being performance based. Prasad Kadambi thinks that ANS-19.13 is a good example to include in the Guidance Document. Andrew Smetana thinks that the issue may be not being familiar with terminology and difficulties with the “risk informed” part. See slide 57 for more details.

D. Status of ANS-30.2, *Categorization Classification of SSCs for New Nuclear Power Plants* (new standard)—M. Diaconeasa/ G. Hauck
James August is a member of the ANS-30.2 Working Group. He reported that the working group has progressed through about 90% of the content but still have conflicts on definitions. See slide 58 for more details.

E. Report on ANS-20.2, *Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt-Reactor Nuclear Power Plants* (new standard)—D. Holcomb/ G. Hauck
A request will be submitted to NRC to formally endorse the standard. NRC is already aware of this standard from the NRC representatives on the working group and an internal review at NRC has been started.

F. Status of ANS-60.1, *Civil Nuclear Export Control* (new standard)—M. Harding/ M. French
Prasad Kadambi is a member of the ANS-60.1 Working Group. He feels that the standard is coming along nicely. ANS-60.1 will be performance based.

G. Status of ANS-57.11, *Integrated Safety Assessments for Nonreactor Nuclear Facilities*—M. Kotzalas/ M. Joseph

Todd Anselmi is a member of the working group. He confirmed that the working group has worked though many changes.

H. Status of ANS-53.1, *Nuclear Safety Criteria for the Design of High Temperature Gas-Cooled Reactor Plants*, J. August/ G. Hauck
James August stated that work over the past year has been on the direction and focus of the revision. The working group has a good outline and has populated material which needs to be folded into the outline.

I. Status of ANS-3.13, *Nuclear Facility Reliability Assurance Program (RAP) Development* (new standard)—J. August/ M. French
August reported that the working group has resolved a lot of work and is trying to include more RIPB methods into the draft.

9. INVITE INPUT FROM STANDARDS ON RIPB SCHEDULE

The Schedule of RIPB Standards in Development is embedded here for reference.

9_Proposed Schedule for ANS RI

- RP3C interaction/input on the following PINS or standards on the RIPB Schedule (not discussed elsewhere):
  - ANS-2.3, *Estimating Tornado, Hurricane, and Extreme Straight-Line Wind Characteristics at Nuclear Facility Sites*
  - ANS-2.15, *Criteria for Modeling Atmospheric Dispersion of Radiological Releases from Nuclear Facilities*
  - ANS-2.18, *Evaluating Radionuclide Transport in Surface Water for Nuclear Reactor and Nuclear Facility Sites*
  - ANS-2.22, *Environmental Radiological Monitoring at Operating Nuclear Facilities*
  - ANS-2.26, *Categorization of Nuclear Facility SSCs for Seismic Design*
  - ANS-2.32, *Remediation of Radioactive Contamination in the Subsurface at Nuclear Power Plants*
  - ANS-2.34, *Characterization and Probabilistic Analysis of Volcanic Hazards*
  - ANS-2.36, *Accident Analysis for Aircraft Crash into Reactor and Nonreactor Nuclear Facilities Confirmed that the standard is for "accidental crashes"* (not sabotage)
  - ANS-3.5.1, *Nuclear Power Plant Simulators for Use in Simulation-Assisted Engineering and Non-Operator Training*
  - ANS-GD-3.8, *Guidance for Risk-Informing Emergency Preparedness Programs for Nuclear Facilities*
  - ANS-3.11, *Determining Meteorological Information at Nuclear Facilities*
  - ANS-3.15, *Risk-Informing Critical Digital Assets (CDAs) for Nuclear Power Plant Systems*
  - ANS-15.22, *Classification of Structures, Systems and Components for Research Reactors*
  - ANS-56.2, *Containment Isolation Provisions for Fluid Systems After a LOCA*
  - ANS-57.2, *Design Requirements for LWR Spent Fuel Storage Facilities at NPPs*
  - ANS-57.9, *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type)*

10. Report on Interaction with SDOs and Others

Donald Eggett provided a brief update on the ARCSC. He explained that the ARCSC was formed as a need identified through the NEI/EPRI North American Advanced Reactor Roadmap. Eggett proposed that the ARCSC look at the RP3C Guidance Document as a RIPB pilot. Other possibilities for a RIPB

pilot under the ARCSC are the ASME Plant System Design Standard or a new generic RIPB design concept standard.

Eggett mentioned an initiative on artificial intelligence (AI) currently an action item under the Large Light Water Reactor Consensus Committee (LLWRCC). Pat Schroeder provided additional details on the AI ad hoc committee's effort. Recognizing that this topic crosscuts all ANS consensus committees, the first step was to gather feedback from the entire Standards Committee. A survey was issue to all Standards Committee members to gather feedback on existing applications and general interest. Everyone that responded to the survey was invited to participate in discussions and a few others have been added by request. The ad hoc committee held two meetings. Their preliminary thoughts are that there is sufficient interest and need for ANS to develop AI standards and that a new consensus committee would need to be formed. A white paper will be presented to the LLWRCC for their direction. If the LLWRCC agrees with the white paper, the LLWRCC would then present a proposal to the Standards Board for their approval.

11. Review of Open Action Items

The following two action items have been completed:

ACTION 11/2023-01: Robert Youngblood (lead), Prasad Kadambi, Todd Anselmi, and Rani Franovich to work on a revision of the Bylaws to

- Completely redraft the "Scope" section in the Bylaws. Spell out our relationship to the WGs, the CCs, and the SB.
- Call out the GD as a maintained RP3C document.
- Design the voting / balloting / etc. formalities to support those functions.
- Once the job is better defined, the rest of the modification task will largely be implied, other than the need to discuss and agree on certain details of the "formality" requirements.

ACTION ITEM 11/2023-02: John Fabian to work with Prasad Kadambi to create a collection of files from RP3C on the NST Open Research Platform.

12. Other Business

No other business was discussed.

13. Next Meeting

Upcoming ANS meetings:

- 2024 ANS Winter Meeting in Orlando, FL, at the Renaissance at SeaWorld, November 17–21, 2024
- 2025 ANS Annual Meeting in Chicago, IL, at the Chicago Marriott Downtown, June 15–18, 2025
- The next RP3C meeting is anticipated to be held during the 2024 ANS Winter Meeting in Orlando, FL.

14. Adjournment

The meeting was adjourned.